Port of Honolulu, Hawaii, After Action Report

Introduction.

A Port Risk Assessment was conducted for the port of Honolulu, Hawaii 13 – 14 December 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.

Participants.

The following is a list of stakeholders/experts that participated in the process:

LT(jg) Adler, USCG XO, USCGC ASSATEAGUE e-mail: sadler@d14.uscg.mil Tel: 808.263.6627	Mr. Frank Alexich Dream Cruises e-mail: dcruises@lava.net Tel: 808.592.5211	LT Jim Breen, USN Port Operations Officer Naval Station Pearl Harbor e-mail: N31@pearlharbor.navy.mil Tel: 808.473.1139
Mr. Michael A. Chung Honolulu Fire Department Tel: 808.581.9559	Mr. Tom Collins Hawaii Responder e-mail: resphnwi@dyncorp.com Tel: 808.531.8220 Fax:808.531.8277	CAPT Rich Davison Paradise Cruise LTD. e-mail: hardlydavison@hotmail.com Tel: 808.221.0507
CAPT Ed Enos Hawaii Pilots Assn. e-mail: Edgin/6@hawaii.nn.com Tel: 808.263.9373	CAPT Matthew Peake Chevron Shipping Company e-mail: Peake805@aol.com Tel: 808.263.2611	Howard Gehring, RADM, USCG(Ret) State of Hawaii, DLNR e-mail: 4boating@gte.net Fax: 808.587.1977
Mr. David Hamaishi Honolulu Fire Department Tel: 808.527.6889 Fax:808.524.9032	Mr. Dale Hazlehurst Matson Navigation e-mail: dhazlehurst@matson.com Tel: 808.848.1258	Mr. Charlie Pires P & R Water Taxi Tel: 808.526.9811 Fax:808.581.2939
LCDR John Prince, USCG CO, USCGC WALNUT e-mail: lcdr_prince/d14@uscg.internet.mil Tel: 808.541.2431	Mr. Brad Rimell Sause Brothers, Inc. Tel: 808.521.5082 Fax:808.533.4107	LT(jg) Matt Salas, USCG OPSO, USCGC WALNUT e-mail: ltjg_m_salas/d14.uscg.internet.mil tel: 808.541.2431
QMC Schaefer, USCG Commanding Officer USCG Group Honolulu e-mail: vschaefer@d14.uscg.mil Tel: 808.541.2483	Mr. Dan Shimomura TESORO Hawaii Corp. e-mail: dshimomura@tesoropetroleum.com Tel: 808.547.3484	LT(jg) Dan Stulack, USCG CCGD14 (oan) e-mail: dstulack@d14.uscg.mil Tel: 808.541.2319
Mr. Ronald Souza USCG Auxiliary e-mail: Rsouza@hei.com Tel: 808.543.4295 Fax:808.543.4366	Mr. Arthur Takushi Hawaiian Tug and Barge Tel: 808.543.9325 Fax:808.543.9477	Mr. Clint Taylor CSX Lines e-mail: clint_taylor@sealand.com Tel: 808.842.5383
Mr. Pat Torres State Harbors Division Tel: 808.587.2080 Fax:808.587.2075		

Numerical Results.

Book 1 - Factors *(Generic Weights sum to 100))*

Fleet Composition	Traffic Conditions	Navigational Conditions	Waterway Configuration	Short-term Consequences	Long-term Consequences
23.5	17.2	17.2	10.6	16.9	14.6

Analysis:
The participants contributed the above scores to the National Model. They determined that the Fleet Composition, Traffic Conditions, and Navigational Conditions are the largest drivers of risk.

Book 2 - Risk Subfactors *(Generic Weights)*

Fleet Composition 23.5	Traffic Conditions 17.2	Navigational Conditions 17.2	Waterway Configuration 10.6	Short-term Consequences 16.9	Long-term Consequences 14.6
% High Risk Deep Draft 19.0	Volume Deep Draft 8.1	Wind Conditions 2.0	Visibility Obstructions 2.8	Volume of Passengers 3.1	Economic Impacts 4.6
% High Risk Shallow Draft 4.5	Volume Shallow Draft 3.1	Visibility Conditions 9.2	Passing Arrangements 2.9	Volume of Petroleum 5.6	Environmental Impacts 6.3
	Vol. Fishing & Pleasure Craft 2.5	Currents, Tides, Rivers 3.8	Channel and Bottom 2.0	Volume of Chemicals 8.1	Health & Safety Impacts 3.7
	Traffic Density 3.6	Ice Conditions 2.2	Waterway Complexity 3.0		

Analysis:
The participants contributed the above results to the national model. Subfactors contributing the most to overall risk under each of the six major factors were:

- For the Fleet Composition factor, High-Risk Deep Draft Vessels contribute four times as much risk as Shallow Draft.
- For Traffic Conditions, Volume of Deep Draft contributes the greatest amount of risk to the waterway.
- For Navigational Conditions, Visibility Conditions contribute the most.
- For Waterway Configuration, Waterway Complexity contributes the most followed by Passing Arrangements.
- For Short Term Consequences, The Volume of Chemicals contributes the most.
- For Long Term Consequences, Environmental Impact contributes the most.

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	2.0
c. Severe winds are frequent & anticipated	4.6
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	2.4
c. Poor visibility is frequent & anticipated	5.2
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	2.1
c. Transits are timed closely with tide	4.7
d. Currents cross channel/turns difficult	9.0
Ice Conditions	
a. Ice never forms	1.0
b. Some ice forms-icebreaking is rare	2.0
c. Icebreakers keep channel open	5.2
d. Vessels need icebreaker escorts	9.0
Visibility Obstructions	
a. No blind turns or intersections	1.0
b. Good geographic visibility-intersections	1.6
c. Visibility obscured, good communications	4.2
d. Distances & communications limited	9.0
Passing Arrangements	
a. Meetings & overtakings are easy	1.0
b. Passing arrangements needed-ample room	1.7
c. Meetings & overtakings in specific areas	5.6
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	2.0
c. Mud, sand and rock outside channel	4.4
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	4.9
d. Converging WITH crossing traffic	9.0

Passenger Volume

a. Industrial, little recreational boating	1.0
b. Recreational boating and fishing	2.9
c. Cruise & excursion vessels-ferries	5.8
d. Extensive network of ferries, excursions	9.0

Petroleum Volume

a. Little or no petroleum cargoes	1.0
b. Petroleum for local heating & use	2.7
c. Petroleum for transshipment inland	5.3
d. High volume petroleum & LNG/LPG	9.0

Chemical Volume

a. Little or no hazardous chemicals	1.0
b. Some hazardous chemical cargo	2.4
c. Hazardous chemicals arrive daily	5.2
d. High volume of hazardous chemicals	9.0

Economic Impacts

a. Vulnerable population is small	1.0
b. Vulnerable population is large	3.6
c. Vulnerable, dependent & small	5.4
d. Vulnerable, dependent & Large	9.0

Environmental Impacts

a. Minimal environmental sensitivity	1.0
b. Sensitive, wetlands, VULNERABLE	3.3
c. Sensitive, wetlands, ENDANGERED	6.3
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	5.4
d. Large DEPENDENT population	9.0

Analysis:

The participants contributed the above calibrations to the Subfactor scales for the national model. For each Subfactor above there is a low (Port Heaven) and a high (Port Hell) severity limit, which are assigned values of 1 and 9 respectively. The participants determined numerical values for two intermediate qualitative descriptions between those two extreme limits. In general, participants from this port evaluated the difference in risk between the lower limit (Port Heaven) and the first intermediate scale point as being equal to the difference in risk associated with the first and second intermediate scale points. The difference in risk between the second intermediate scale point and the upper risk limit (Port Hell) was generally 2.5 times as great.

Book 4 Risk Subfactor Ratings (Honolulu)

Fleet Composition	Traffic Conditions	Navigational Conditions	Waterway Configuration	Short-term Consequences	Long-term Consequences
% High Risk Deep Draft 4.5	Volume Deep Draft 3.8	Wind Conditions 2.9[2]	Visibility Obstructions 3.1	Volume of Passengers 5.5	Economic Impacts 7.2
% High Risk Shallow Draft 5.7	Volume Shallow Draft 5.3	Visibility Conditions 2.3	Passing Arrangements 7.9	Volume of Petroleum 7.1	Environmental Impacts 7.6
	Vol. Fishing & Pleasure Craft 5.7	Currents, Tides, Rivers 5.8[3]	Channel and Bottom 8.6	Volume of Chemicals 5.1	Health & Safety Impacts 8.4
	Traffic Density 5.8	Ice Conditions 1.0	Waterway Complexity 8.5[4]		

Analysis:

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

1. Channel and Bottom
2. Waterway Complexity
3. Health and Safety Impacts
4. Passing Arrangements
5. Environmental Impacts
6. Economic Impacts

[2] This number may be a little low.
[3] The answer choices allowed for some ambiguity.
[4] Only the top answer allowed for crossing traffic.

Book 5 (Honolulu)

	Risk Factors						
	Fleet Composition	**Traffic Conditions**	**Navigational Conditions**	**Waterway Configuration**	**Short-term Consequences**	**Long-term Consequences**	**Relative Merit Index**
VTS	14.9	26.0	20.4	21.1	16.6	19.0	**19.3**
VTIS	19.9	17.5	19.2	12.4	26.0	17.0	**19.2**
EAIS	14.2	15.3	15.6	21.1	16.3	15.8	**16.0**
AIS	8.7	9.9	16.9	16.1	10.0	8.9	**11.4**
Improve Current System	42.3	31.2	27.9	29.2	31.2	39.3	**34.2**

Analysis:

This is very consistent with the discussion that occurred about risks in the port area of Barbers Point to Diam0nd Head. The mitigations discussed to reduce the risks in Book 4 (above) seem to be best addressed by a simple **improvement to the current system.**

- While channel width and bottom depth is rated high in risk, the only mitigation is either blasting coral or controlling (one way) deep draft, wide traffic in Honolulu Harbor.
- The gathering of myriad vessels off Honolulu Harbor main channel is easily controlled by regulation (a precautionary zone). This new regulation will require consistent enforcement, however.
- Updated and tested contingency plays will serve to address how to mitigate consequences of a harbor closure.

Scope of the port area under consideration: (The participants addressed the geographic bounds of the waterway **)**	
Port area	From Barbers Point to Diamond Head. Includes Pearl Harbor

Risk Factors	Risks	Mitigations
Fleet Composition		

% High Risk Deep Draft Cargo & Passenger Vessels
Defined in terms of poor maintenance, high accidents, type of crew
	1. Ships sailing from South America to Far East **break down** and come into port due to casualty
	• 25-30 percent are high risk – includes shallow draft
	• Anchored off Molokai (outside of area)
	• Anchored off Barbers Point
	2. **U.S. Navy** makes direct transit from outside of bay into Pearl
	3. Every 7-8 weeks – **coal ship** (deep draft, overdraft vessel) to Barbers Point Deep draft harbor – maxes out the harbor
	4. Barbers Pt Harbor 6-8 per month (740 feet long) – dredged to 38 feet
	• **Tank Ships** use off shore moorings
	5. Honolulu Harbor –
	• **Passenger vessels** – 40 calls a year
	• **Matson** coming in 3 times a week
	• 1/3 Matson ships are deepdraft
	  • Well maintained
	• 100 – 125 oversees voyages
	  • Double for inter island
	• Aviation gas tankers
		1. USN manage their own
		2. Foreign tankers seem to have very competent crews

Risk Factors	Risks	Mitigations
%High Risk Shallow Draft Cargo & Passenger Vessels	1. Tremendous amount of **Tug and Barge** activity • Few foreign flag tugs – mostly local companies • Inter island barge traffic 2. High **recreation vessel** volume • Recreation boats use sea buoy as turn buoy for races off Honolulu Harbor • MSO inspectors seem to have the best perception of vessel condition • Para sailors • Don't realize how much water they control • Divers • Sail boats • Lack of VHF radios • Accidents caused by operator area, not by density. 3. **Commercial fishing vessels**: • Foreign Longline vessels – meet pilot at shore line, not pilot station; occasional bunker oil spills • Language problems in commercial fishing fleet (Vietnamese language) • **Foreign Flag commercial fishing vessels** – over 1000 movements of these type of vessels and decreasing • High risk, but low incident • Commercial fishing fleet – **domestic** • Some recent casualties – fire, dock damage, grounding	1. Mitigation for Foreign Flag commercial fishing vessels: 2. Recreation vessels • **training** is necessary • anticipate that rec boater does not know how much water area is needed 3. Need more VHF radios…communications 4. Consider licensing
Traffic Conditions	Look also into the future	
Volume of Deep Draft Vessels	1. **Off Barbers Point** – all deep draft – average 15 per month – for Tesoro and Chevron 2. **Barbers Point Harbor** – 8 – 10 per month; increasing 3. **Honolulu Harbor** – 100 – 125 oversees movements per month – 50 deepdraft per month • **Matson** – 3 calls per week (draft 30-39 feet) • 5-7 movements per week total • **Matson** and Sealand use the entire harbor – not much room • Volume very small 4. Trend – • **Matson** – 860 foot container vessel may begin to call	1. **Honolulu Harbor** – movements limited to one vessel at a time • State traffic controllers control small boats in vicinity • Build the tunnel to Sand Island

Risk Factors	Risks	Mitigations
Volume of Shallow Draft Vessels *Includes foreign fishing vessels*	1. Calls of vessels may not increase in volume 2. Pier 38-39 fishing village may cause number of fishing vessels to increase 3. 200 – 225 vessels call per month 4. Number of longliners have decreased • If provide additional lay over berthing for vessels…may increase • Honolulu used to ferry crews back and forth – based on airline availability and cost 5. Barbers Point (barge) Harbor – number of slips for large vessels increasing.	1.
Volume of Fishing & Pleasure Craft *Domestic F/V and PC*	1. Stable due to **lack of facilities** 2. Future – growth of sales of boats coming on line 3. Many trailerable boats 4. Cannot accommodate world cruising yacht industry except, temporary, in Honolulu 5. Development of marina in Barbers Point will increase traffic 6. Facilities are underdeveloped • Some PC are constrained by regulation to a specific geo area – only five para sailor groups allowed off Waikiki beach 7. Cruise ship – bring small ferry boats from ships to beach 8. Dinner cruise, whale watching boats appear to be increasing 9. Kewala Basin – no resolution; a commercial harbor for intermediate draft vessels	1.
Traffic Density	1. **At sea buoy, Honolulu Harbor** – outbound and crossing traffic • Mix of commercial vessels, tugs, recreation vessels – canoes; wind surfers • Some vessels are converging • Some crossing through • Large ships awaiting another ship to clear • Long shoreman shifts • Divers in main ship channel • Emergency vessels **2. Kewala Basin –** a mix of • Dinner cruises, • Board surfers • Body surfers 3. **Pearl Harbor** – not much volume • Large ships turning across entrance to Pearl Harbor – subs surfacing	1.
Navigational Conditions		

Risk Factors	Risks	Mitigations
Wind Conditions *Over 20 knots, problems for recreation boats; Over 25-30 knots causes problems for deep draft vessels*	1. Wind over 20 kts 10-15 days a month 2. Over 25 = 4 – 5 days a month • 15 – 20 percent over the year 3. Routine = 18 – 20 kts trade winds from NE. 4. High winds = recreation boats do not sail 5. Kona winds – • Barbers Point • Entrance to Honolulu harbor • Large, high, from south or westerly • Major change in direction • Percent of time – 10 – 15 percent; max, 20%; strong maybe 5%	1. Tractor tugs have been brought in 2. For recreation boats – self regulations
Visibility Conditions	1. **Barbers Point** – rain squalls – infrequent 2. Very low risk	1. Not required
Currents, Tides and Rivers	1. **Barbers Pt.** – 95% of risk assessment based on ocean current – 2-3 kts; puts spar buoys underwater 2. **Barbers Pt** Harbor – current is unpredictable • Offshore current – at entrance, opposite current 3. **Honolulu** – predictable and in same direction	1. .Consider use of local knowledge for unpredictable currents – particularly to tourist traffic 2. Provide PORTS to Honolulu Harbor and Barbers Point Harbor
Ice		
Waterway Configuration		
Visibility Obstructions	1. **Barbers Pt Harbor** – Limited lighting; is a dark hole • Range is not very sensitive – lights are too close together; go off at daylight • Before you know it, you are in the harbor 2. **Honolulu Harbor** – from sea, cannot see into the harbor; from harbor, cannot see to sea • ship at pier one will obscure range • Matson pier = green light on red • Pilot's view obscured by containers on ship – cannot see immediately in front of the vessel 3. **Pearl** – Cannot see around Hospital Pt. 4. Can confuse harbor entrances – Pearl, Honolulu, etc.	1. **Barbers Pt Harbor** – limited to daylight operations only 2. **Pearl Harbor** is controlled 3. **Honolulu**: Pilots need to see over contains onboard ships – maybe channel ranges in inner harbor • **Aloha Tower** has person who advises what is moving in the harbor

Risk Factors	Risks	Mitigations
Passing Arrangements	1. **Barbers Pt**. The longer in the berth, the greater the risk. Length of exposure 2. **Honolulu Harbor**, pier 51-52, 31-33 with vessel berthed, waterway is constrained. • Crabbing with wind further decreases width. • Vessels also get sucked off the dock • Turning 900 foot vessel in 1100 foot turning basin • Not all berths have deep water alongside	1. **Honolulu Harbor,** now doing • State controls the times of movement by time slots 2. **Honolulu Harbor**, consider doing • Spread out the transit times of the large ships using the waterway • Additional ranges for accurate navigation • Find a place to put idle barges • **AIS** provides a precise navigation system • **VTIS** provides a coordination function • **VTS** provides a coordination and enforcement function
Channel and Bottom	1. Not all is Sand bottom 2. **Barbers Pt Harbor** is hard coral • Bottom is too hard for anchor to fetch up • Offshore mooring have silty sand over coral 3. **Honolulu Harbor** • Cable and pipeline crossing vicinity of pier 1 • Entrance channel is cut through the reef • Watch for sewer outfall • Change of depth is very abrupt at channel entrance 4. **Hilton Lagoon** – waves breaking; surfers in the channel 5. **Kewala basin** – watch surfer in entrance – proximity of shallow reefs is concern	1. Widen the channel 2. Standby tugs 3. Speed limit
Waterway Complexity This was determined to be the greatest risk factor	1. Converging at **Honolulu Entrance** • Use tugs to help turn into the harbor • Myriad types of vessels meeting – commercial and recreational 2. **Diamond Head and Barbers Point** are turning points for vessels sailing around the island 3. **Pearl Harbor** – a blind bend at Hospital Point • Left of Ford Island…buoys switch • Gotta make some relatively immediate turns	1. Some ships **go north** of the island to avoid the traffic to the south 2. **Honolulu Harbor**: • Create a precautionary area around the sea buoy. • Give Aloha Tower authority to say no to recreational, commercial boaters requesting permission to enter the harbor • Meet with reps of groups who meet at the sea buoy • **Give regatta permits** • Educate the recreation boaters • **Develop a harbor safety committee** (HOST is a purely voluntary effort)
Short Term Consequences		

Risk Factors	Risks	Mitigations
Number of People on Waterway	1. **Honolulu Harbor**, • Cruise ships moving in harbor • Dinner cruises are hovering, awaiting dock space • Heavily populated surrounding the harbor 2. Ferry operations – intra island demo project – experimental – high speed – commuter ferry • More is planned	1.
Volume of Petroleum Cargoes	1. 149,999 ton ships call at **Barbers Point anchorage** 2. More product increases exposure time due to longer loading, unloading 3. Refined products being shipped out 4. Hawaii is a **bunkering port** – in the middle of the ocean	1.
Volume of Hazardous Chemical Cargoes	1. Containerized material is being moved and sits at **Matson** Container yard. 2. Cannot transport hazmat cargo through tunnels 3. Not much coming in bulk – caustic soda	1. Cargo is containerized, adding to its protection from spilling
Long-Term Consequences		
Economic Impacts	1. **Honolulu Harbor** is the hub of commerce • Instant reaction to harbor closure • 80% of the state's imports come through Honolulu Harbor • Spincter muscle contraction reaction	1. Honolulu Harbor - Moor volatile ships away from Sand Island Bridge
Environmental Impacts	1. Tourism Industry affected – off Waikiki Beach 2. Fish and bird sanctuary from Pearl to Diamond Head 3. Pipeline leak in Barge Harbor ended up in Kawaii 4. Keep the beaches clean – to sustain tourism	1. Pre-position response equipment 2. Continue Contingency Planning 3. VTS can help to coordinate and speed up response to casualties
Health and Safety Impacts	1. **Honolulu** – major metro population around the harbor • Harbor sustains the food for the population	1. Consider evacuation plans 2. Install alarms to warn people of coming disaster