Port Fourchon, LA
Workshop Report

Introduction.

A Port Risk Assessment Workshop was conducted for Port Fourchon 4-5 April, 2000. This workshop report provides 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.

Strategies for reducing unmitigated risks will be the subject of a separate report.

Assessment Process.

The risk assessment process is a structured 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 uses a select group of expert/stakeholders in each port 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. Thus the process is a joint effort involving waterway user experts, stakeholders, and the agencies/entities responsible for implementing selected risk mitigation measures.

This methodology employs a generic model of port risk that was conceptually developed by a National Dialog Group on Port Risk and then developed into computer algorithms by the Volpe National Transportation Systems Center. In that model, risk is defined as the product of the probability of a casualty and its consequences. Consequently, the model includes variables associated with both the causes and the effects of vessel casualties. Because the risk factors in the model do NOT contribute equally to overall port risk, the first session of each workshop is devoted to obtaining expert opinion about how to weight the relative contribution of each variable to overall port risk. The experts then are asked to establish scales to measure each variable. Once the parameters have been established for each risk-inducing factor, each port's risk is estimated by putting into the computer risk model specific values for that port for each variable. The computer model allows comparison of relative risk and the potential efficacy of various VTM improvements between different ports.

[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:

Participant		Organization	Phone	Email
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Facilitation Team Members		Email/Phone
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Numerical Results.

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

Fleet Composition	Traffic Conditions	Navigational Conditions	Waterway Configuration	Short-term Consequences	Long-term Consequences
12.1	12.7	16.5	28.0	20.9	9.8

Analysis:
Book 1 begins the process of weighting the national port risk model. The participant teams contribute their knowledge, using the AHP process, to provide weights to the six major risk factors. The contribution to the national model by the Morgan City participants is as listed above. These participants felt that Waterway Configuration was the largest driver of risk.

Book 2 - Risk Subfactors *(Generic Weights)*

Fleet Composition 12.1	Traffic Conditions 12.7	Navigational Conditions 16.5	Waterway Configuration 28.0	Short-term Consequences 20.9	Long-term Consequences 9.8
% High Risk Deep Draft 7.9	Volume Deep Draft 3.4	Wind Conditions 2.3	Visibility Obstructions 12.3	Volume of Passengers 1.0	Economic Impacts 1.6
% High Risk Shallow Draft 4.2	Volume Shallow Draft 3.8	Visibility Conditions 7.2	Passing Arrangements 3.8	Volume of Petroleum 10.0	Environmental Impacts 4.3
	Vol. Fishing & Pleasure Craft 2.3	Currents, Tides, Rivers 5.0	Channel and Bottom 6.4	Volume of Chemicals 9.9	Health & Safety Impacts 4.0
	Traffic Density 3.2	Ice Conditions 2.1	Waterway Complexity 5.5		

Analysis:
Book 2 further refines the weighting for the national port risk model. The participants examined the importance to port safety for each of the 20 risk subfactors and provided the above results to the national model. They determined the following subfactors contributed the most to overall risk under each of the six major factors were:

- For the Fleet Composition factor, High-Risk Deep Draft Vessels contribute a very high number.
- For Traffic Conditions, Volume of Shallow Draft contributes the greatest amount of risk to the waterway; followed very closely by Volume of Deep Draft and Traffic Density.
- For Navigational Conditions, Visibility Conditions contribute the most.
- For Waterway Configuration, Visibility Obstructions contribute the most.
- For Short Term Consequences, The Volume of Petroleum and Chemicals contribute the highest risk factor.
- For Long Term Consequences, Environmental Impacts contribute the most followed closely by Health and Safety 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	5.4
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	2.7
c. Poor visibility is frequent & anticipated	5.4
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	4.9
d. Currents cross channel/turns difficult	9.0
Ice Conditions	
a. Ice never forms	1.0
b. Some ice forms-icebreaking is rare	2.1
c. Icebreakers keep channel open	5.3
d. Vessels need icebreaker escorts	9.0
Visibility Obstructions	
a. No blind turns or intersections	1.0
b. Good geographic visibility-intersections	2.5
c. Visibility obscured, good communications	5.2
d. Distances & communications limited	9.0
Passing Arrangements	
a. Meetings & overtakings are easy	1.0
b. Passing arrangements needed-ample room	2.6
c. Meetings & overtakings in specific areas	5.9
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	1.8
c. Mud, sand and rock outside channel	5.0
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	2.4
c. Converging - NO crossing traffic	4.7
d. Converging WITH crossing traffic	9.0

Passenger Volume	
a. Industrial, little recreational boating	1.0
b. Recreational boating and fishing	3.0
c. Cruise & excursion vessels-ferries	5.9
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	5.7
d. High volume petroleum & LNG/LPG	9.0
Chemical Volume	
a. Little or no hazardous chemicals	1.0
b. Some hazardous chemical cargo	2.7
c. Hazardous chemicals arrive daily	5.7
d. High volume of hazardous chemicals	9.0
Economic Impacts	
a. Vulnerable population is small	1.0
b. Vulnerable population is large	2.9
c. Vulnerable, dependent & small	5.6
d. Vulnerable, dependent & Large	9.0
Environmental Impacts	
a. Minimal environmental sensitivity	1.0
b. Sensitive, wetlands, VULNERABLE	3.0
c. Sensitive, wetlands, ENDANGERED	5.9
d. ENDANGERED species, fisheries	9.0
Safety and Health Impacts	
a. Small population around port	1.0
b. Medium - large population around port	2.7
c. Large population, bridges	5.5
d. Large DEPENDENT population	9.0

Analysis:

This is the point in the workshop when the process begins to **address local port risks**. The participants developed the above subfactor calibration scales for their local port. 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 (Port Fourchon)

Fleet Composition	Traffic Conditions	Navigational Conditions	Waterway Configuration	Short-term Consequences	Long-term Consequences
% High Risk Deep Draft 3.5	Volume Deep Draft 3.6	Wind Conditions 2.9	Visibility Obstructions 4.1	Volume of Passengers 2.8	Economic Impacts 6.7
% High Risk Shallow Draft 4.7	Volume Shallow Draft 4.0	Visibility Conditions 2.8	Passing Arrangements 5.1	Volume of Petroleum 3.8	Environmental Impacts 8.5
	Vol. Fishing & Pleasure Craft 4.8	Currents, Tides, Rivers 2.3	Channel and Bottom 4.2	Volume of Chemicals 4.5	Health & Safety Impacts 1.5
	Traffic Density 7.4	Ice Conditions 1.0	Waterway Complexity 3.3		

Analysis:

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

1. Environmental Impacts
2. Traffic Density
3. Economic Impacts
4. Passing Arrangements
5. Volume of Pleasure and Fishing Craft

Book 5 VTM Tools (Port Fourchon)

Fleet Composition	Traffic Conditions	Navigation Conditions	Waterway Configuration	Short-term Consequences	Long-term Consequences
% High Risk Deep Draft **11** 0.7 RA	**Volume Deep Draft** **14** 0.3 RA	**Wind Conditions** **12** 0.4 RA	**Visibility Obstructions** **9** 0.8 IAN ALERT	**Volume of Passengers** **13** 0.3 RA	**Economic Impacts** **3** 2.4 VTS
% High Risk Shallow Draft **5** 1.4 RA ALERT	**Volume Shallow Draft** **8** 0.9 RA ALERT	**Visibility Conditions** **18** 0.3 RA	**Passing Arrangements** **6** 1.4 VTS	**Volume of Petroleum** **10** 0.7 RA ALERT	**Environmental Impacts** **1** 4.3 VTS
	Vol. Fishing & Pleasure Craft **4** 1.4 RA ALERT	**Currents, Tides, Rivers** **19** 0.1 RA	**Channel & Bottom** **17** 0.3 RA ALERT	**Volume of Chemicals** **7** 1.3 RA ALERT	**Health & Safety Impacts** **15** 0.3 RA ALERT
	Traffic Density **2** 3.0 VTS	**Ice Conditions** **20** 0.0 RA	**Waterway Complexity** **16** 0.3 RA		

<u>Legend:</u>

See the KEY below. Rank is the position of the subfactor relative to the others as determined by the participants. Risk Gap is the variance between the existing numerical risk factor determined in Book Four and the average acceptable risk level as determined by each participant team. The teams were instructed: *If the acceptable risk level is <u>higher or equal</u> to the existing risk level for a particular subfactor, circle RA (Risk Acceptable) at the end of that line. Otherwise, circle the VTM tool that you feel would MOST APPROPRIATELY reduce the unmitigated risk to an acceptable level*.

The Tool listed is the one determined by the majority of participant teams as the best to narrow the Risk Gap. Below are the matching tool acronyms.

An Alert is given if no mathematical consensus is reached for the tool suggested.

KEY			
Risk Subfactor	RA Risk Acceptable		
	IER Improve Existing Rules	AIS	Automatic Identification System
	INI Improve Navigation Information	EAIS	Enhanced AIS
Rank Risk Gap	IAN Improve Aids to Navigation	VTIS	Vessel Traffic Information System
Tool Alert	IEA Improve Electronic ATON	VTS	Vessel Traffic System

Analysis:

This is very consistent with the discussion that occurred about risks in the Port Fourchon area. The mitigations discussed to reduce the top three risks in Book 4 (above) seem to be best addressed by adding a Vessel Traffic Service.

Summary of Risks

Scope of the port area under consideration: (The participants addressed the geographic bounds of the port area to be discussed**)**	
Port Area – *Danger area*	In the Port Fourchon area, from ICWW 3 miles out into the Gulf of Mexico, including main port area, Flotation Canal, north to the Chevron up in Leeville Deepdraft cannot go north of the main port area
Other Additional Risk Areas	Many oil rig generated casualties affect the port

Risk Factors	Risks	Mitigations
Fleet Composition		
% High Risk Deep Draft Cargo & Passenger Vessels Defined in terms of poor maintenance, high accidents, quality of crew	1. Biggest barge is Vahalla 2. No real risks identified	1. Tugs will not bring barge Hercules into port 2. Port has no derelict vessels 3. Large vessels move very slowly in the port

Risk Factors	Risks	Mitigations
%High Risk Shallow Draft Cargo & Passenger Vessels	1. **Tugs** drafting 17-18 feet can come into Port Fourchon 2. **Recreation boats** – • Unsafe operations – young men drinking • Spring and summertime • On weekend • Launch at 3 spots in flotation • Must use the entire waterway to exit 3. **Uninspected** vessels • Poor material conditions • Include smaller crew boats • CG finding many violations – safety gear • Inexperienced crew 4. **Fishing** • Language barrier – 50% English is not primary language – French is primary • Do not monitor Chl 13 • 50%(?) of fishing fleet is Asian • Operations are sometimes suspect -- very wide with outriggers out (flopper-stoppers) • Fishing operations (shrimping) conflict with transiting crew boats in Belle Pass • Don't always follow rules of the road • 100-150 ft. shrimp boats • Big Vietnamese fishing fleet o 50-60 Vietnamese boats in close together and run aground/tie together in Belle Pass o Fishing fleet moor up east end of Flotation Canal o Moor up at end of Pass Fourchon 5. When **moving rigs**, must physically direct small boat traffic 6. Quality of crews • Crew boat captains **lack responsibility** and dependability • **Owners not happy** with quality of captains they hire. Quality is **going down fast**. • **Licensing** process may not ID the best operators	1. Crew boats and supply boats are inspected and mariners are licensed

Risk Factors	Risks	Mitigations
Traffic Conditions		
Volume of Deep Draft Vessels Port is major avenue for all industry	1. One to two rig movements a week. **Trend** to increase in number 2. Tanker comes in twice a week – 300 ft long 3. 200 – 240 vessels are coming in. **Trend** is increasing number of transits 4. **Trend** is for the ships to get bigger 5. Gary S Class – 276 feet; tonnage is >3000 ITC tonnage; G.T. is unknown 6. Derrick barges come in – hard to get in and out 7. **Trend** - Gorilla class drilling rig – interested in port usage 300-400 ft wide 8. 13.5 percent annual growth rate – estimated 9. Currently dredging to 27 feet 10. Size of vessels is outgrowing size of port	1. Dredge the sides of the channel to allow bigger to come through
Volume of Shallow Draft Vessels Many companies are moving from satellite sites to Port Fourchon	1. In one week – **600 –750 vessels in 24 hours** moving in the port – in the summer – does not include dock shifts within the port 2. 56% is in crew/supply boat work 3. **Trend** is to increase as other ports are shutting down – for shallow draft vessels 4. One stop shopping will eliminate transiting intra port 5. Chouest – Trend -- volume will increase with larger vessels and shallow draft vessels 6. Tidewater – pulling out from storage to work – utilization is up – increasing 3 boats per week	1. Provide education • For fishermen • For recreation boaters 2. Safety enforcement 3. Public awareness 4. Require licensing
Volume of Fishing & Pleasure Craft	1. Recreation boats---many on weekend and trend is increasing 2. Charter fishing not increasing 3. Commercial Fishing – not increasing	1.

Risk Factors	Risks	Mitigations
Traffic Density	**1. Dense at** • Jetties – recreation and commercial F/V – to seaward (east and west side) and between the jetties • Belle Pass is serious area year round due to current and wave action – vessels need rudder (steerage) power. • Bayou La Fourche and seaport intersection – number of facilities in area • Bayou La Fourche and Belle Pass intersection • East slip 2. **Mooring buoys** outside channel along canal • South end of port toward jetties • North side of seaport – in Bayou itself **3. Traffic mixing** • Fishing in the channel – Bayou La Fourche up to Flotation Canal • End of East Lip • End of stone dock --- OSV, supply boats tied up together – 20 – 25 boats – move away from dock – Fourchon shuffle • Dredge in channel middle just inside jetty and just outside jetty 4. **Trends** • Two years, building two new slips to the north off Flotation canal • Anchoring offshore awaiting berth space in Port Fourchon	1. Ordnance passed – • Bayou Lafourche up to Flotation canal – cannot shrimp • No wake zone same place as above 2. Traffic control – • Transponders • Communications? • Monitoring camera • Mandatory? – For everyone including pleasure boats • Run by state or local authorities? • Partnership with federal government • Put in radar to monitor traffic – an active monitor • AIS – need everyone to have the system – 25% would NOT be carrying AIS (advertised requirements) 3. Port Authority provides informal VTIS functions 4. RNA- where? 5. Extend the safety fairway 6. **Design the port waterway** to separate the categories of vessels 7. Consider one way traffic in narrow areas
Navigational Conditions		
Wind Conditions	1. 25% of time – trouble staying in channel with winds 2. SE in summer time…go cross channel 3. N in winter…across Flotation canal	1. Wx information is made available
Visibility Conditions	1. Fog not bad in last couple of years – 5% figure may be accurate 2. Squalls – Low occurrence and short duration	
Currents, Tides and Rivers	1. All of Fourchon has a strong current – 2 knots 2. In winter time, wind pushes the water out 3. High spring, water coming back in 4. Intersection Bell Pass and Fourchon – clocked at 5 kts. 5. Jetties are affected by the swell, particularly with SE wind – swells are worse in Belle Pass than anywhere in Gulf	1.

Risk Factors	Risks	Mitigations
	6. Cross jetty current – easterly set 7. South wind sets up a swell system – only closed during hurricane – Crew boats sometimes turn around during high swell 8. Not fed by a river system	
Ice	1. Have had some skim ice in the area	
Waterway Configuration		
Visibility Obstructions *Cannot see ATON or other ships – can be man made or natural* *Can also be background lighting*	1. Rigs obstruct 2. Buildings obstruct for smaller vessels – bigger vessels OK – in Fourchon 3. Background lighting in Seaport block out the range light for inbound vessels 4. Range light is blocked from southbound vessel…by stacked barges – in vicinity of corner and at south end at beacon. 5. Deck lights obstruct vessels and ATON 6. Haliburton Slip – south corner – can't see around it 7. Running lights left on by moored vessels	1. Consider buildings in vicinity of WW intersection when designing new port 2. Comms tell of vessels moving in obstructed areas
Passing Arrangements	1. 300 foot channel coming up Belle Pass 2. Trend – widen to 500 feet 3. Lower end of Bell Pass, shrimpers with riggers down take up a lot of room 4. Too much talking on the radio 5. Lack of passing arrangements 6. Old channel is 200 feet wide **7. Barges tied up along the mooring buoys cuts down on the channel width** 8. Turning basins are not wide enough **9. Vessels moored at mooring buoys restricting the channel**	1. More comms would be good 2. Looking to get specific channels from the FCC 3. Large ship movements are escorted 4. Consider one way traffic in vicinity of the mooring buoys **5. Eliminate the mooring buoys** **6. Turn the offending barge around**

Risk Factors	Risks	Mitigations
Channel and Bottom	1. Muddy bottom 2. Hard spots: • Stone jetties • Loose rocks on east side of east jetty • Big mud flat that sticks out across from East Slip (across from Martins) 3. Pipelines: 3. As noted on the chart 4. Around the beacon/range light 5. Usually have gas 6. Chevron -- 36' below the mud line 7. Tenn Gas is 75 ' below the mud line	
Waterway Complexity	1. Three significant intersections 2. No apparent crossing traffic	1. Short, condensed waterway results in a quick transit
Short Term Consequences		
Number of People on Waterway	1. Crew boats carry up to 60 people – usually carry around 16 2. Jack boats can carry over 100 people 3. Not less than 20% of vessels operating are crew boats --- however, they are not always completely loaded. 4. Estimate that 7,000 people per month transit through Port Fourchon	
Volume of Petroleum Cargoes	1. *Buccaneer*, tanker, comes in and out 2. 18 million plus gallons of diesel per month barged or shipped in	
Volume of Hazardous Chemical Cargoes	1. 95% (?) of all cargo is moving through the port 2. Materials must be mixed together 3. No HAZ mat facilities are listed by CG 4. Most are packaged material 5. Most stay in the mud tanks	1. Much of the cargo is packaged
Long-Term Consequences		

Risk Factors	Risks	Mitigations
Economic Impacts	1. Lose 50 million dollars per day – does not include the fishermen 2. Feel the impact within 4 hours 3. At least 4days closed, no one sent home 4. Estimate a week of closure before really economically felt 5. Rigs in Gulf would feel the shut down -- would be serviced by other ports 6. Jetty is critical risk area • Shallow draft could hit th rocks 7. Deep draft must go through 300 feet of mud before hitting the rocks	1. Have response equipment for simple grounding 2. Sunk vessel takes a long time to raise up • No salvage equipment readily available 3. Angle the jetties to avoid straight approach by swell 4. Replace the unlit buoys off the jetty with lighted buoys
Environmental Impacts Increase in the number of spills reported may be due to sensitivity and better reporting	1. Oyster leases – wherever there is open water and in the surrounding marshes and along the right side of the road 2. Fastest eroding area in world – 25 sq miles per year – more exposed to hurricane damage 3. **Tanks are being overfilled** – transfer of oil – refueling vessel at a dock most often	1. Oil boom everywhere • Easier to contain a spill in a slip area 2. Private clean up companies are on call 3. Dock owners have equipment 4. Response drills are being conducted (checking response times) 5. Improve vessel design to internally contain overfills 6. Evaluate transfer **procedures** – watch pressing up the tanks • Improve topping off procedures • Conduct pre transfer meeting • Improve shore side attention to refueling • Improve level of employee motivation 7. Last spill – 50K gallons spilled – within 30 minutes, 30K already back up 8. Focus on the transfer operation • Could be due to fatigue 9. When **storm** predicted – required to remove haz mat from the port • Can't move the oil • One problem with Hurricane Andrew and Chevron
Health and Safety Impacts	1. Population – 1200 – 1500 working people 2. Drinking water comes from way up the river 3. Weekend camp people	