Port of Morgan City, LA
Workshop Report

Introduction.

A Port Risk Assessment Workshop was conducted for the port of Morgan City, LA, 2-3 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:

Participants	Organization	E-mail address/phone number
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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
11.0	15.1	16.4	27.2	13.3	17.0

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	Traffic Conditions	Navigational Conditions	Waterway Configuration	Short-term Consequences	Long-term Consequences
11.0	15.1	16.4	27.2	13.3	17.0
% High Risk Deep Draft	Volume Deep Draft	Wind Conditions	Visibility Obstructions	Volume of Passengers	Economic Impacts
2.9	1.2	3.2	8.6	4.9	3.7
% High Risk Shallow Draft	Volume Shallow Draft	Visibility Conditions	Passing Arrangements	Volume of Petroleum	Environmental Impacts
8.1	3.4	6.7	4.4	3.6	1.9
	Vol. Fishing & Pleasure Craft	Currents, Tides, Rivers	Channel and Bottom	Volume of Chemicals	Health & Safety Impacts
	3.5	5.5	3.9	4.8	11.4
	Traffic Density	Ice Conditions	Waterway Complexity		
	7.0	1.0	10.3		

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 Shallow Draft Vessels contribute a very high number.
- For Traffic Conditions: Traffic Density contributes the greatest amount of risk.
- For Navigational Conditions: Visibility Conditions contribute the most.
- For Waterway Configuration: Waterway Complexity contributes the most followed closely by Visibility Obstructions.
- For Short Term Consequences: The Volume of Passengers contributes the highest risk factor.
- For Long Term Consequences: Health and Safety Impacts contribute the most; this subfactor also contributes more than any other in the generic model.

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	2.5
c. Severe winds are frequent & anticipated	5.3
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	2.6
c. Poor visibility is frequent & anticipated	5.3
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	2.7
c. Transits are timed closely with tide	5.1
d. Currents cross channel/turns difficult	9.0
Ice Conditions	
a. Ice never forms	1.0
b. Some ice forms-icebreaking is rare	1.8
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	2.1
c. Visibility obscured, good communications	4.8
d. Distances & communications limited	9.0
Passing Arrangements	
a. Meetings & overtakings are easy	1.0
b. Passing arrangements needed-ample room	2.2
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	2.2
c. Mud, sand and rock outside channel	5.6
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	2.5
c. Converging - NO crossing traffic	5.1
d. Converging WITH crossing traffic	9.0

Passenger Volume

a. Industrial, little recreational boating	1.0
b. Recreational boating and fishing	3.3
c. Cruise & excursion vessels-ferries	6.3
d. Extensive network of ferries, excursions	9.0

Petroleum Volume

a. Little or no petroleum cargoes	1.0
b. Petroleum for local heating & use	3.2
c. Petroleum for transshipment inland	5.6
d. High volume petroleum & LNG/LPG	9.0

Chemical Volume

a. Little or no hazardous chemicals	1.0
b. Some hazardous chemical cargo	2.3
c. Hazardous chemicals arrive daily	5.3
d. High volume of hazardous chemicals	9.0

Economic Impacts

a. Vulnerable population is small	1.0
b. Vulnerable population is large	3.0
c. Vulnerable, dependent & small	5.7
d. Vulnerable, dependent & Large	9.0

Environmental Impacts

a. Minimal environmental sensitivity	1.0
b. Sensitive, wetlands, VULNERABLE	3.2
c. Sensitive, wetlands, ENDANGERED	6.2
d. ENDANGERED species, fisheries	9.0

Safety and Health Impacts

a. Small population around port	1.0
b. Medium - large population around port	2.4
c. Large population, bridges	5.6
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 (Morgan City)

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
1.7	1.3	4.6	5.4	2.7	7.6
% High Risk Shallow Draft	Volume Shallow Draft	Visibility Conditions	Passing Arrangements	Volume of Petroleum	Environmental Impacts
6.1	7.0	6.0	7.5	9.0	9.0
	Vol. Fishing & Pleasure Craft	Currents, Tides, Rivers	Channel and Bottom	Volume of Chemicals	Health & Safety Impacts
	6.6	9.0	4.6	7.0	6.4
	Traffic Density	Ice Conditions	Waterway Complexity		
	7.1	1.0	8.1		

Analysis:

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

1. Environmental Impacts
2. Volume of Petroleum
3. Currents, Tides, Rivers
4. Waterway Complexity
5. Economic Impacts
6. Passing Arrangements

Book 5 VTM Tools (Morgan City)

Fleet Composition		Traffic Conditions		Navigation 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	
20	-0.5	**19**	-0.2	**17**	0.1	**9**	1.7	**16**	0.2	**5**	2.9
RA		RA		RA		IAN		RA		RA	ALERT
% High Risk Shallow Draft		Volume Shallow Draft		Visibility Conditions		Passing Arrangements		Volume of Petroleum		Environmental Impacts	
15	0.8	**10**	1.7	**13**	1.0	**8**	1.8	**2**	3.3	**1**	4.8
RA		RA		RA	ALERT	IER	ALERT	INI		EAIS	
		Vol. Fishing & Pleasure Craft		Currents, Tides, Rivers		Channel & Bottom		Volume of Chemicals		Health & Safety Impacts	
		11	1.6	**2**	3.3	**14**	0.9	**7**	2.7	**6**	2.9
		RA		RA	ALERT	RA		AIS		VTS	
		Traffic Density		Ice Conditions		Waterway Complexity					
		11	1.6	**18**	0.0	**4**	3.1				
		VTS		RA		RA	ALERT				

Legend:

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 higher or equal 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
Rank Risk Gap
Tool Alert

RA Risk Acceptable
IER Improve Existing Rules
INI Improve Navigation Information
IAN Improve Aids to Navigation
IEA Improve Electronic ATON

AIS Automatic Identification System
EAIS Enhanced AIS
VTIS Vessel Traffic Information System
VTS Vessel Traffic System

Analysis:

This is very consistent with the discussion that occurred about risks in the port area along the Atchafalaya River. The mitigations discussed to reduce the risks in Book 4 (above) seem to be best addressed by adding **enhanced AIS**, **improvement to the current system and adjustments to the short range aids to navigation system.**

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	The area surrounding Morgan City, in particular • From MM 85 to MM 110 on the GICW, • The Morgan City – Port Allen Route north to MM 35 • South along the Atchafalaya River beyond Horse Shoe Bend beyond Horse Shoe through Eugene Island to the Gulf of Mexico
Other Additional Risk Areas	Consider the flotsam and debris in the water, primarily logs and other large floating objects • Water lilies obscure the logs in the water

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. Includes: • 180 foot coastal freighter drawing 16 feet • 225 foot supply boats • Delta Queen carrying 250 passengers and 70-80 crew • Barges of RVs (passenger vessel) 2. Maintenance of deep draft is minimal risk to COTP in this zone 3. Honduran Flag vessels are NOT well maintained – present ship making monthly visits is okay – crews are competent	1. No mitigations due to very low and acceptable risk

Risk Factors	Risks	Mitigations
%High Risk Shallow Draft Cargo & Passenger Vessels	1. **Crew fatigue**: Many small independent companies push crews beyond 12 hour limit on time – will run 24 hours with one operator and one deckhand 2. **Maintenance**: • Don't have bilge slops tanks • Don't have operating sewage treatment systems • Small vessels do NOT have deep pockets • OSVs – sometimes let the maintenance slide 3. This pertains to 40 –50 percent of the fleet…arguably 20 percent; mostly uninspected towing vessels 4. Low **horse power to weight** ratio – tugs handling rock barges 5. **Air draft of vessel** not always known by operator when transiting light under bridges. 6. Derrick barges are **limited in ability to maneuver** – particularly in cross winds	1. Have added horse power to weight restrictions 2. No in-depth discussions conducted for this factor
Traffic Conditions		
Volume of Deep Draft Vessels	1. A non problem 2. Very few deep draft ships use this port	
Volume of Shallow Draft Vessels	1. Risk factor is high 2. Includes many tugs and barges	1. No in depth discussions were held for this risk factor
Volume of Fishing & Pleasure Craft	1. Recreation boats • Run at high speed in low visibility in the vicinity of Rousseau's boat landing. • High number on weekends and holidays • Are scattered all over • Tend to concentrate at main launching points ○ Hunting season – Wax Lake delta launching is packed • Fresh water fishermen go into the marshes • Use the channel as a transit lane • Are very maneuverable – problem is when they lose power. • Are susceptible to wake damage – big boats give big wake to little boats	1. No in depth discussions were held for this risk factor

Risk Factors	Risks	Mitigations
Traffic Density	Locations of Traffic Density 1. Atchafalaya and Bayou Boeuf 2. Intercoastal west and river intersection – small boats crossing bow 3. Fishing tournaments during mass start 4. Duck season – opening day 5. Horse Shoe area – Crew Boat Cut and Horse Shoe channel cause confusion 6. Mile 99 and Atchafalaya – collision (supply and crew boat) and grounding about 6 years ago 7. Bayou Boeuf Forebay – trying to get thru the locks 8. Amelia and Sugar House Bend – congestion 9. Bayou Boeuf and Intercoastal -- congestion	1. Buoy Crew Boat Cut 2. Cut new GICW channel at Mile 104 - cut thru land and come out into Sweet Bay Lake, down the Atchafalaya River and cut across Bayton Island
Navigational Conditions		
Wind Conditions	1. **15-20 Kt range** – becomes a problem for navigation – considered a high to moderate strength 2. **High winds** occur in winter (1 Dec thru middle of April) time caused by cold fronts 3. **Duration** – usually lost a day 4. **Prediction** – Well predicted – visually can see the cloud coming … summer squalls are sometime unpredicted --- 50 + knots. 5. **Percent** of time winds impact navigation – **10 percent** or 30 days is a good estimate 6. **Windy areas** – • Wax lake spillway – trees do not protect the area • MM 99 GIWW • At the three Berwick Bay Bridges • Flat Lake • 20 Grand • Bayou Boeuf – Sugar House intersection • Bayou Chene where it empties into the Atchafalaya, above the horse shoe.	

Risk Factors	Risks	Mitigations
Visibility Conditions	1. Persistent problem – at nite with fog 2. Fog occurs at least 15 % of the time, following major areas • Atchafalaya Bay with light south wind conditions • Bayou Chene where it empties into the Atchafalaya, above the horse shoe 3. Summer squalls cause short term visibility problems – duration is no longer than 30 minute 4. Aluminum boats show up well on radar; FRP and wood boats do NOT 5. Watch the small boats blending into the background	
Currents, Tides and Rivers	1. Not much tidal current 2. River current – seasonal – spring and fall 3. Current speed – 5-6 kts – depends on flood year 4. High current areas: • Mile 99 Atchafalaya and GIWW – difficult turn at high water due to current • By the bridges • Wax Lake cut • Bayou Chene comes in to the Atchafalaya, just above the Horse Shoe 5. ACOE must maintain a 30% split of water diversion – mandated by law – a flood control measure on Atchafalaya and Mississippi	1. Reroute the channel to reduce the current 2. Control a diversion of water to reduce the current **3. Wax Lake –** • **GIWW crossing – install light** reflector **signs to gauge speed and distance. Planned for the RR bridge** • For tows, provide tugs when crossing the river • Create a new lock and dam project • Conduct more dredging 4. VTS to provide current speeds to the mariner – USGS has current meters accessible through the internet 5. Provide current meter at high current locations. 6. Mile 99 Atchafalaya and GIWW – difficult turn at high water due to current – provide a bumper system 7. The bridges – re align and/or raise the bridge 8. RNA imposed HP requirements when transiting the triple bridges at high water
Ice	Not a risk factor	No mitigations required

Risk Factors	Risks	Mitigations
Waterway Configuration		
Visibility Obstructions *Cannot see ATON or other ships – can be man made or natural*	1. ICWW canal from Bayou Boeuf Locks to Sugar House bend have lights that are directed toward the bay and totally blind the operator 2. Lighting in Sweet Bay lake – Oil rigs have a red beacon similar to red ATON 3. Intercoastal into the WAX, blind corners all around, especially down stream and west bound (sharp intersection and high trees). East bound is rounded off and OK 4. Bayou Boeuf and Sugar House bend has blind turn. 5. 20 Grand point is obstructed 6. At the bridges – Too many white lights sometimes take away nite vision. 7. Around 88, point obscures visibility – Bayou Chene and Bayou Boeuf	1. This risk factor not discussed
Passing Arrangements	1. Tight areas: • Bridges • Horse Shoe • 20 Grand • Wiggles – MM100 and Wax Lake • Wax Lake 2. Double wides meeting on Intercoastal is tight…from MM 110 to MM 85 3. For supply boats and research boats – Horse shoe is real tight 4. Two supply boats meeting under a bridge is not a problem	1. Keep bridges one way traffic is best. 2. Make channels wider 3. Single up tows in tight spots 4. Over wide tow permit – identify conflicts and gain information – coordination effort
Channel and Bottom	1. Underwater pipes – bulkhead and rip rap • West of Atchafalaya 101 cross to Wax Lake 2. Sunken barges – Atchafalaya across from Spirit. • On Wax lake – sunken barges protrude into the channel – sunk in 7-8 feet of water 3. Rip Rap – Union Island CG Station –Oyster beds 4. Sand bars are solid, not real forgiving 5. Chene empties into Atchafalaya – hard rip rap 6. Horse Shoe – rip rap 7. Bayou Boeuf Locks – rip rap	

Risk Factors	Risks	Mitigations
Waterway Complexity	1. Waterway has many bends and curves 2. Changing bottom and channel limits due to erosion and water movement 3. By the lighthouse – Eugene light – seems to be a steady setting current to the west. • Keep the generator set for use as a NAV AID 4. Crossing traffic –Avoca Island – cable operated ferry 5. Some Operators have little to no knowledge of waterway and its complexities. 6. Not all names for local marks are charted. • *20* grand notation is not on the chart; adjacent to it, MM 95 notation is on the chart 7. Where river intersects the delta – ATON may be too far apart for low visibility – Shell island pass to Big Island	1. Improve the navigation aids…remove red conflicts … • Too many red lights marking well heads 2. Big Island and River … long stretch with no lighted ATON. Conduct a WAMS of the area • Consider adding more dayboards = Bayou Shaffer at the Y at Sweet Bay 3. VTS to help – already in place for part of the port area 4. Provide channel info – current, wx information. 5. Update the published charts
Short Term Consequences		
Number of People on Waterway	1. Inland rigs being towed in the river carrying RTVs and people 2. Crew boats – 25-30 people • Location: West of Port of Iberia and return and go north of Atchafalaya • Based out of all over • Highest concentration is at 20 grand – Shell and Mobile 3. When evacuating all the rigs due to hurricane – 2-3 times a year – about 5,000 to 6,000 people 4. Petroleum festival – 400 people	
Volume of Petroleum Cargoes	1. A lot of petroleum moving thru the area 2. CG data charts are not complete – traffic data is from the ACOE – based on Bayou Boeuf Lock • Transits in 99 is VTS DATA • A lot of petroleum products go up the river that is not tracked at the locks • Need info from Port Allen locks 3. Trend is upward for petroleum carried 4. Seems to be 10-15 percent of vessels moving 5. One tow carries 2.5 million gallons 6. 17 percent of the country's refineries are in this risk area	1. Closest response vessel at Lake Charles and one at Venice 2. Pre-staged equipment – need at Morgan City – ask for an oil spill response vessel 3. Have small oil spills continuously 4. A dam could help to contain an oil discharge 5. Replacement lock at Bayou Sorrell to be 56 feet wide (east of Atchafalaya levy…MM 36.5) has been approved 6. Change in operating procedures 7. VTS to control the waterway until response is over 8. VTIS can oversee the response efforts

Risk Factors	Risks	Mitigations
Volume of Hazardous Chemical Cargoes	1. Carry Propane, Benzene, Naphtha, Drilling Waste (not hazardous materials in LA) 2. Salt water disposal wells are located in the risk area 3. Legal definitions of salt water in LA differ from federal definitions 4. Understated risk 5. HAZMAT incinerator at Amelia – closed down and going through court battle to reopen 6. Bateman Island – oil field waste dumping facility – LA state law and US Congress have said are not hazardous materials	
Long-Term Consequences		
Economic Impacts	1. If Atchafalaya blocked: • Supply boats, support people, and fabrication yards would be shut down • Must go 30 miles east and 60 miles west to detour around any constriction – not completely isolated – will be draft constrained 2. If block the Intercoastal – • Will take 40 percent of the jobs…this is an inter state waterway. Alternate is down the Atchafalaya and up the Chene to get around • Can block the entire ICWW 3. If blockage is worse case -- Economic impact is felt in 1 week…due to ways to get around a blockage. 4. At Amelia – a major fabrication – need 20 feet water depth to move a rig – a billion dollar impact when they move the rig 5. Take out bridges – railroads stop -- $7M a week when bridge was last down	1. Build a new Intercoastal…east of 99. This alternate waterway will bypass problem areas 2. Put in other infrastructure to take the transportation requirements • Morgan City has rail but no loading facilities 3. VTIS/VTS may provide information to organize the maritime traffic • Look at different traffic schemes
Environmental Impacts	1. Many environmentally sensitive areas • Black bear • Sturgeon • Commercial fishing • Breeding grounds for brown shrimp • Birds – pelicans • A million or more water fowl • Primary areas for ducks on East Coast • Delta Islands • Eugene Island 2. Dead zone in Gulf growing every year. 3. Risk Area is Wildlife management area	1. Install pump out stations 2. Install solid waste holding facilities 3. Install bilge slop pump out stations 4. Install and approve Type II MSD 5. Responsible Carrier Program for uninspected towing vessels 6. Improve response capabilities 7. Designate an anchorage area in the Atchafalaya 8. Accurately plot the pipelines on the chart

Risk Factors	Risks	Mitigations
	4. Commercial fishermen operate from Morgan City – menhaden and shrimp • Smaller boats in the bay • Larger boats offshore 5. Sewage systems on boats fail to work all the time.	9. Physically mark the pipeline crossings along the bank. Check these crossings - due to erosion may be exposed 10. VTS to give operators places to nose into the bank…stop and wait 11. Will be putting mooring buoys on Bayou Boeuf Locks
Health and Safety Impacts	1. Water intake on ICWW near Rousseau Landing 2. Morgan City – population 8 thousand people • 20 thousand people within a few miles • Both sides of river 3. Protection levy around entire areas with pumping system to pull rain water out. 4. Prevailing wind is from SE	1. Identify Hazardous Materials spill contaminant 2. Provide a viable means to alert emergency response people 3. Has the evacuation plan been tested?