Port of Lake Charles, LA
Workshop Report

Introduction

A Port Risk Assessment Workshop was conducted for the Port of Lake Charles 25-26 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 Analytic 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 judgments 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 experts/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 effectiveness 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 experts/stakeholders that participated in the process:

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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
12.0	13.2	19.1	14.2	21.3	20.2

Analysis:

Book 1 begins the process of weighting the national port risk model. The participant teams contribute their knowledge, using the AHP, to provide weights to the six major risk factors. The contribution to the national model by the Port of Lake Charles participants is as listed above. These participants determined that Short-term Consequences was the largest driver of risk.

Book 2 - Risk Subfactors *(Generic Weights)*

Fleet Composition 12.0	Traffic Conditions 13.2	Navigational Aids 19.1	Waterway Configuration 14.2	Short-term Consequences 21.3	Long-term Consequences 20.2
% High Risk Deep Draft 6.2	Volume Deep Draft 2.3	Wind Conditions 3.3	Visibility Obstructions 3.6	Volume of Passengers 8.5	Economic Impacts 3.9
%High Risk Shallow Draft 5.8	Volume Shallow Draft 2.5	Visibility Conditions 10.2	Passing Arrangements 3.3	Volume of Petroleum 3.8	Environmental Impacts 3.3
	Vol. Fishing & Pleasure Craft 3.3	Currents, Tides, Rivers 2.3	Channel and Bottom 2.0	Volume of Chemicals 9.0	Health & Safety Impacts 12.9
	Traffic Density 5.1	Ice Conditions 3.3	Waterway Complexity 5.3		

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 that the subfactors which contributed the most to overall risk under each of the six major factors were:

1. Fleet Composition factor: High-Risk Deep Draft Vessels contribute a slightly higher number than Shallow Draft Vessels.

2. Traffic Conditions: Traffic Density contributes the greatest amount of risk to the waterway; followed by Volume of Fishing & Pleasure Craft and Volume of Shallow Draft Vessels.

3. Navigational Conditions: Visibility Conditions contribute the most risk.

4. Waterway Configuration: Waterway Complexity contributes the most risk followed by Visibility Obstructions.

5. Short Term Consequences: The Volume of Chemicals and Passengers contribute the highest risk factor.

6. Long Term Consequences: Health & Safety Impacts contribute the most risk by a significant number.

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	2.8
c. Severe winds are frequent & anticipated	4.8
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	5.2
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	2.0
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	1.8
c. Icebreakers keep channel open	5.0
d. Vessels need icebreaker escorts	9.0
Visibility Obstructions	
a. No blind turns or intersections	1.0
b. Good geographic visibility-intersections	2.0
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	2.5
c. Meetings & overtakings in specific areas	7.1
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	1.6
c. Mud, sand, and rock outside channel	4.7
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	4.7
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	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	2.2
c. Petroleum for transshipment inland	4.8
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	5.6
d. High volume of hazardous chemicals	9.0

Economic Impacts

a. Vulnerable population is small	1.0
b. Vulnerable population is large	3.8
c. Vulnerable, dependent & small	5.0
d. Vulnerable, dependent & Large	9.0

Environmental Impacts

a. Minimal environmental sensitivity	1.0
b. Sensitive, wetlands, VULNERABLE	3.2
c. Sensitive, wetlands, ENDANGERED	6.1
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	5.9
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 1.0 and 9.0 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 less than 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 of Lake Charles)*

Fleet Composition	Traffic Conditions	Navigational Aids	Waterway Configuration	Short-term Consequences	Long-term Consequences
% High Risk Deep Draft 4.9	Volume Deep Draft 4.9	Wind Conditions 2.7	Visibility Obstructions 4.8	Volume of Passengers 5.0	Economic Impacts 7.3
%High Risk Shallow Draft 4.8	Volume Shallow Draft 5.7	Visibility Conditions 3.8	Passing Arrangements 6.2	Volume of Petroleum 9.0	Environmental Impacts 8.8
	Vol. Fishing & Pleasure Craft 6.4	Currents, Tides, Rivers 3.7	Channel and Bottom 2.4	Volume of Chemicals 6.8	Health & Safety Impacts 4.0
	Traffic Density 6.8	Ice Conditions 1.0	Waterway Complexity 8.6		

Analysis:

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

1. Volume of Petroleum
2. Environmental Impacts
3. Waterway Complexity
4. Economic Impacts
5. Volume of Chemicals (tie)
6. Traffic Density (tie)

Book 5 - VTM Tools (Port of Lake Charles)

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**
11 1.7	**13** 1.6	**18** 0.3	**12** 1.6	**16** 0.6	**7** 2.7
RA ALERT	VTS ALERT	RA	EAIS ALERT	RA	IER ALERT
% High Risk Shallow Draft	**Volume Shallow Draft**	**Visibility Conditions**	**Passing Arrangements**	**Volume of Petroleum**	**Environmental Impacts**
9 2.1	**10** 2.0	**15** 0.7	**6** 2.9	**3** 4.3	**2** 4.3
VTS	VTS	RA ALERT	VTS	VTS	IER ALERT
	Vol. Fishing & Pleasure Craft	**Currents, Tides, Rivers**	**Channel & Bottom**	**Volume of Chemicals**	**Health & Safety Impacts**
	4 2.9	**17** 0.5	**20** -0.3	**8** 2.6	**14** 1.0
	IER	RA	RA	VTS	RA ALERT
	Traffic Density	**Ice Conditions**	**Waterway Complexity**		
	5 2.9	**19** 0.0	**1** 4.6		
	VTS	RA	VTS		

Legend:

See the **KEY** below. Rank is the position of the subfactor relative to the others as determined by the size of the risk gaps. Risk Gap is the variance between the existing numerical risk factor determined in Book 4 and the average acceptable risk level as determined by the participants. 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 of Lake Charles. The mitigations discussed to reduce the first and third highest risks in Book 4 (above) seemed to be best addressed by adding a **VTS**. The second highest risk seemed to be best addressed by **IER**. For the following risk areas, the participants could not agree mathematically on the tool:

- % High Risk Deep Draft
- Volume Deep Draft
- Visibility Conditions
- Visibility Obstructions
- Economic Impacts
- Environmental Impacts
- Health & Safety Impacts

Further facilitated discussion would be needed to reach consensus within the group on the appropriate tool to reduce risk in these seven areas.

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	In the Port of Lake Charles area, along the Greater Calcasieu River from CC Buoy to the Central Crude Docks immediately below the Salt Water Barrier and across the Calcasieu River Waterway on the ICW at the Choupique Cutoff between MM 244 and 239, more specifically between the Black Bayou Bridge and the Ellender Bridge. Deep draft cannot go north of the Saltwater Barrier and East Lake Oil #1 and #2.
Additional Risk Areas	None Reported

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. Note - Port of Lake Charles is a "deepwater" port - preponderance of ships are large. 2. 20-30% falls into this category for crew and material condition. 3. Physical size is overall risk 4. Draft follows physical size; double bottoms reduce level of risk. 5. Trend: increasing number of high risk deep draft vessels 6. Tanker fleet stable in population-facilities are fully utilized. 7. LNG is increasing (well maintained but require special operating conditions). 8. Large older deep draft vessels are poorly maintained. 9. Port State Control: Cat I (most risk) - 0 Cat II - 10% 10. 80% have high value cargo. Comes on well-maintained ships with trained crews. 11. Other 20% are the ones that go in the high-risk category for maintenance and crew deficiencies.	1. Mitigations for this risk factor were not discussed.
%High Risk Shallow Draft Cargo & Passenger Vessels	1. 10 % of tugs and barges in category-very low for a Gulf port when compared to other Gulf ports. 2. Commercial fisheries. Seasonal. Very high risk. No regulations for shrimp boats. 50-50 local. Cameron and jetties are principal areas of shrimp fishery. Cameron is also a mooring area where the shrimpers interfere. 3. Fisheries. Hackberry is another transit area where shrimpers interfere. 4. Shrimpers set nets elsewhere in river. Four corners (ICW) also popular area to fish and interferes with both Calcasieu Waterway and ICW traffic. 5. Recreational boaters. Seasonal-summer. 30-40% are high risk. Upper river is very risky. Entire river is a problem. The frequent boaters are conscientious; the seasonal boaters lack knowledge of waterways. Interstate I-210 bridge waterway area is dangerous: drinking related problem area with recreational boaters. Water skiers also a problem. Recreational boaters speed out of backwaters into channel without looking. 6. OSV fleet-works out of Cameron and off shore from 30 buoy to St John's Island. OSV fleet starting to have problems finding quality captains. 7. Trend is increasing number of accidents. Tugs and tows in the port area have collisions and allisions. Allisions are typically with ICW bridges (pontoon bridge) not Calcasieu River. OSVs collide offshore.	1. "Mom and Pop" operations bought out. 2. Double hull and other standards enforce quality.

Risk Factors	Risks	Mitigations
Traffic Conditions		
Volume of Deep Draft Vessels	1. Background: 85 ships per month now. Volume trend is increasing. There is room for growth in the port with existing facilities; however there is an upper limit with the existing infrastructure and technology. 2. There are infrastructure growth plans. 3. Ships with 400x20 max limits on two way traffic (pilot rule) 4. CC Sea Buoy to CONOCO Westlake, full route capable of 36' draft traffic but one-way traffic when in transit. Three ships per day. 60-mile transit. One way traffic most of the day with maxi ships. Speed 10 kts or less. 5. Limited anchorages. A-4 anchorage (off CITGO)-not really an anchorage, more used as a turning basin. Can hold 3 ships. 6. Limited anchorages. Clooney anchorage can handle 4 maxi's. 7. Limited anchorages. There are no designated federal anchorages on the Calcasieu River. 8. No safe place to put ships other than at their berth. 9. No written rules or regulations specifying the maximum size of ships. Keeps changing. 10. Anticipated increase in traffic. New traffic in oil rigs which will come into the industrial canal turning basin. 11. East fork of Cameron is planning similar storage space for oilrigs. Dredging basin	1. 36' or greater draft mandates one-way traffic (pilot rule). 2. Can easily increase 85 per month by ship caravans 3. Formalize regs for maximum size.
Volume of Shallow Draft Vessels	1. Today volume is 13,000 tows crossing Calcasieu Intersection. 2. CONOCO tug and barges as well as tank ships 3. Very heavy traffic 4. OSV fleet averages 30 per day. 40-50 OSVs working out of Cameron. 5. Very heavy shallow draft traffic, especially in lower river and around Cameron. 6. Ferries. Monkey Island and Cameron 7. Casino boats in Lake Charles. Limited cruising and do not interfere with commercial traffic. Not a problem because they avoid traffic. Impact of volume of shallow draft traffic is north of Calcasieu/ICW intersection, with the bends and turns, difficult to set up where to pass or meet—especially first timers and ICW tows rather than the local operators who all possess local knowledge. 8. Limited fleeting areas for tugs and barges 9. North side of Calcasieu. No place to tie up when you trip a tow. 10. Tows generally are two wide-one deep, pushing ahead.	1. Casino boats avoid meeting situations with tugs and barges-call the companies and schedule/route their traffic accordingly.

Risk Factors	Risks	Mitigations
Volume of Fishing & Pleasure Craft	1. Fishing. North of Calcasieu Intersection/ICW very little. Below it is seasonal. May be as many as 30 at a time. 2. Menhaden boats seasonal. Offshore. Run in to Cameron to offload. 3. High incidents of drunken operators, especially during two weeks of Contraband Days. 4. Summertime density, especially weekends, thousands of boats and jet skiers in upper river turning basin off CITGO up to Lake Charles. 5. Commercial traffic operates 7 days per week in this port so recreational boats do impact transits on weekends. 6. Prien Lake is largest concentration for launching recreational boats. 7. Lower river not a problem. They are there but more responsible (fishing rather than drinking and water skiing).	
Traffic Density	1. Freighters anchoring offshore awaiting berth space in Port Of Lake Charles 2. Congestion-barge traffic-at Calcasieu Lock 3. Congestion when seasonal storms, hurricanes draw vessels into river for safety 4. Ships anchored in vicinity of sea buoy waiting for berths 5. East of 30 buoy (near seaward entrance to Calcasieu Channel) waiting for the pilot 6. Calcasieu intersection, ICW four corners 7. Upper river north of A4 8. Mix of traffic causes particular problem at north side of jetties at entrance to Omega Protein and Pilot's Station. Called "The Firing Line" and can effectively close down the river with hundreds of butterfly net fishing boats.	1. Educate recreational boat operators. 2. Regulate speed. 3. Regulate times when selected traffic can move. 4. Require use of checkpoints at entrance, Cameron, four corners. 5. Schedule traffic to reduce congestion. 6. Schedule windows for activities-shrimp boats at jetties when deep draft ships in transit. 7. Enforce waterway regulations. 8. System similar to ATC 9. Build wings on channel for barges to lay on. 10. Build and/or designate more lay, berth, anchorage areas. 11. Reliable channel 100% of the time-dredged at full width 12. Review and amend environmental laws to provide more waterway user flexibility. 13. Address multiple competing waterway related interests. 14. Licensing system for recreational watercraft 15. State safety course to operate a recreational boat 16. Funding for additional local level enforcement 17. More enforcement patrols by Wildlife and Fisheries Enforcement personnel during high risk times, especially for drunks

Risk Factors	Risks	Mitigations
Traffic Density (cont'd)		18. Establish minimum ages for operating a pleasure boat (14 for personal watercraft and boats). 19. Escorts for certain vessels to clear traffic out of the way 20. Ease restrictions on sensitive cargoes (LNG)
Navigational Conditions		
Wind Conditions	1. Pilots say test is whether the pilot can get to the ship. 2. Once in the channel you are committed because there are no places to heave to or to moor, tie up. 3. 10-20% of time warrants considerations for wind effects.	1. LNG carriers are the only ships with wind restrictions. 2. NOAA provides good weather reporting and emergency alerts.
Visibility Conditions	1. Fog not bad in last couple of years – less than 10% of time less than .5 mile. Seasonal. 2. Fog. Principally winter. Lasts as long as 4 days entire length of river. 3. Fog. As summer approaches, offshore fog is a problem. Lasts days at a time 4. Squalls – Low occurrence and short duration. Not a problem in this port	1. Not addressed during mitigations discussion.
Currents, Tides and Rivers	1. River is tidal-2 foot range all the way to north end of river at Saltwater Barrier. 2. Varies seasonally 3. All of Lake Charles Port area has a strong current – 2 knots. 4. Current crosses channel at pass between West Cove and Lake Calcasieu. Dangerous place for deep draft vessel. 5. Not much current out of Prien Lake. 6. Strong rip current across jetties. 7. In wintertime, wind pushes the water out. 8. High during spring, water coming back in. 9. Spring flow over Saltwater Barrier clocked at 4 knots, gets as high as 7 knots. 10. Oceangoing ships suck up fluff, trash, and flood debris. Stop DIW and lose control. Lay upon the bank to do the repair work.	1. COE tide gauge at Cameron allow mariner to compare predicted to actual.
Ice	1. Have had some skim ice in Cameron area.	1. Risk acceptable

Risk Factors	Risks	Mitigations
Waterway Configuration		
Visibility Obstructions	1. North bound and southbound at Calcasieu intersection. Cannot see over the bluff. 2. City docks due to obstructions on bank 3. Clifton Ridge, cannot see due to overgrowth at bend. 4. Overgrowth at point on West side of Lake Charles 5. Halter shipyard lights mask lights, especially southbound. 6. Range lights, inbound masked by background lights 7. The bridge lights above the I-10 bridge going north are dimmer than the surrounding lights. 8. LNG ships are going into the Industrial Canal. 9. Entire north end of river is loaded with blind bends that you cannot see over.	1. Some ranges are now strobe lights. 2. Menhaden plant has rear range on its property. Background lighting a problem. Some lights are being raised. 3. Comms tell of vessels moving in obstructed areas
Passing Arrangements	1. Everything above I-210 is too narrow to easily pass. 2. Tightness of channel and volume of traffic is becoming an issue.	1. Not discussed
Channel and Bottom	1. Bottom is benign - sand and silts. 2. Cross currents coupled with swells can make approach dangerous. 3. Hard spots: • Stone jetties 4. Washout area in Lake Calcasieu reduces channel width to less than 400 feet. 5. Docks at Halter Marine, and other bends have deep water. You can run ship into something (docks or bridge) because deep water runs right to them; no mud to stop you. 6. Pipelines: As noted on the chart.	1. Spoil areas at approach are deep and marking on charts should be removed. 2. Pilots monitor COE soundings to detect washouts and shoals.

Risk Factors	Risks	Mitigations
Waterway Complexity	1. One significant intersection at Cameron 2. Cross at ICW 3. Converging waterway at Calcasieu refinery channel 4. Small boat traffic in channel from Prien Lake 5. Reach approaching PPG terminal 6. Contraband Bayou 7. Offshore - blend of traffic coming together at jetties 8. Significant number blind bends above Prien Lake 9. Outer Bar (CITGO) sees high risk area as requirement for pilot is reduced from 12 to 9 to 3 miles for mandatory pilotage. CC buoy to 3 miles off the jetty. Now voluntary pilotage from 3 miles out. Buoy channel runs 28 nm off shore.	1. Bends: Make them straight, cut bypasses. Costs lots of money. 2. At Black Bayou Bridge and Ellender Bridge-compulsory check in at ICW for all tows to Lake Charles pilot or other office to announce ETA at intersection. 3. Using 1950s technology to bring ships in. Upgrade to electronic skills, charts, depth and weather information, radar and cameras to monitor channels. 4. AIS provides situational information, especially at blind corners. Only as good as ships in system-if all do not have it, will not work. 5. At Four Corners, VTIS or VTS was of interest to some - could need authority to make one vessel stop while another one crosses. 6. Test is compelling federal interest. 7. IMO will eventually mandate AIS; US needs to lay groundwork if AIS is going to be foundation for future VTS. 8. Compulsory vs. voluntary pilotage 9. Pilots have mandatory check in at CC buoy, buoy 36, ICW intersection, bridges
Short Term Consequences		
Number of People on Waterway	1. Ferry operations. 50 cars, 100 people 2. OSVs 100-150 people at a time 3. Casino boats 200-1500 per trip	

Risk Factors	Risks	Mitigations
Volume of Petroleum Cargoes	1. 52 billion tons annually moving in the channel 2. 40% of traffic is petroleum vessels. 3. 80% of tonnage is petroleum cargo. 4. Risk is high; there is a lot of petroleum moving. 5. Given lay of land, virtually no time to react when something happens on a ship.	1. Mandatory double hulls 2. Dredging of the channel on time when needed (reduce groundings) 3. Single point moor to off load tankers off shore to reduce volume of oil coming into the port 4. Emergency Response Program 5. MSRC has clean up capability. 6. Response equipment at facilities is exercised on regular basis. 7. In situ burning of a spill (COTP plus other people) 8. Installed, ready to use booms, containment systems 9. Entities across from the bayous and other sensitive areas have in place the equipment to respond to their own spills. 10. Currently in reactive mode, not proactive mode.
Volume of Hazardous Chemical Cargoes	1. Much of the cargo is bulk. 2. LNG. Trend increasing. Estimate is from current 30 transits to estimated 50 transits per year. 3. LNG facility just east of Four Corners. PPG facility takes tank ships and barges. 60 ships per year in and out of PPG in 1998. 4. Coastwise traffic volume, too (transit, not stopping) 5. Containerized cargo. 1900 TEUs. Very small amount, less than 1% big container ships will not come to this port due to the air draft restriction (135').	1. Mandatory double hull 2. Reduce speed 3. Information on cargo carried available to response organization 4. Emergency evacuation plans in place and tested

Risk Factors	Risks	Mitigations
Long-Term Consequences		
Economic Impacts	1. At least 2 days closed, no one sent home. 2. Tug sank in channel. Took two days to find and two more to remove. Movement in channel very restricted during the period. 3. Rigs in Gulf would feel the shut down - would be serviced by other ports. 4. Jetty is critical risk area: • Shallow draft could hit the rocks. • Deep draft must go through 300 feet of mud before hitting the rocks. • There are no alternative entry points. Tugs are not deep sea certified so they cannot go out and around to Sabine. 5. If Four Corners is blocked there is no alternative route for ICW traffic.	1. Emergency response to get the channel reopened 2. Global Industries has barge lift capabilities in the port-2,000 ton lift. 3. Emergency response vessels in place to vacuum oil off water. 4. Tugs in place capable of moving grounded ships. 5. Barges are available to lighter liquid cargoes. 6. Weak firefighting capability on the water and not available 24 hours a day. Have fire fighting a vessel but no assigned crew. 7. Need low small boat (25-28') that can get at fires under the docks with 750 gph water and foam capabilities. 8. Tug Carl (harbor tug) has two fire-fighting monitors powered by v12 diesel but no foam capability. 9. Global has several 10 inch fire-fighting pumps (Red Adare) available and could be marked as a resource. 10. Need to pinpoint location of available equipment. 11. Appropriate VTM tools: several existing tools already in area; AIS can provide information of event and location.
Environmental Impacts	1. Wildlife refuges on west side of Calcasieu Lake 2. Oyster beds at lower end of Calcasieu Lake 3. Tanks are being overfilled – transfer of oil – refueling vessel at a dock most often. 4. Endangered species: brown pelicans 5. Floating tops on petroleum storage tanks: no vapors allowed.	1. Long term monitor and coordination of cleanup and traffic rerouting around the area 2. VTIS/VTS has only small applicability here. Stop traffic on waterway until oil cleaned up. 3. VTS could be used to plot the float/drift trajectory of the spill.
Health and Safety Impacts	1. Lake Charles Port area has 80,000 people. 2. LNG area has low population but people are moving that way. 3. Cameron has 11,000 people. 4. Weekend camp and waterway recreation people.	1. Drinking water: Ground water aquifer will not be affected. Do not use surface water. Can also get water from Sabine.