Port Lavaca/Point Comfort, Texas, After Action Report

Introduction.

A Port Risk Assessment was conducted for the Port Lavaca/Point Comfort, Texas 30 August and 2 September 1999. This 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 the 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:

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Numerical Results.

Book 1 - Factors *(Generic Weights)*

Fleet Composition	Traffic Conditions	Navigational Conditions	Waterway Configuration	Short-term Consequences	Long-term Consequences
12.6	**15.1**	**15.9**	**14.4**	**20.5**	**21.6**

Analysis:
The participants contributed the above scores to the National Model. They determined that that Short term consequences and Long term consequences are the largest drivers of risk.

Book 2 - *Risk Subfactors (Generic Weights)*

Fleet Composition	Traffic Conditions	Navigational Conditions	Waterway Configuration	Short-term Consequences	Long-term Consequences
12.6	**15.1**	**15.9**	**14.4**	**20.5**	**21..6**
% High Risk Deep Draft	**Volume Deep Draft**	**Wind Conditions**	**Visibility Obstructions**	**Volume of Passengers**	**Economic Impacts**
6.3	**2.5**	**6.1**	**2.1**	**8.9**	**6.0**
% High Risk Shallow Draft	**Volume Shallow Draft**	**Visibility Conditions**	**Passing Arrangements**	**Volume of Petroleum**	**Environmental Impacts**
6.3	**5.8**	**4.2**	**3.8**	**2.0**	**5.1**
	Vol. Fishing & Pleasure Craft	**Currents, Tides, Rivers**	**Channel and Bottom**	**Volume of Chemicals**	**Health & Safety Impacts**
	3.8	**5.0**	**4.8**	**9.6**	**10.5**
	Traffic Density	**Ice Conditions**	**Waterway Complexity**		
	3.0	**0.7**	**3.7**		

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 and high risk shallow draft vessels contribute about the same amount.
For traffic conditions, the volume of fishing and pleasure craft contributes the most to risk.
For navigational conditions, wind conditions contribute the most.
For waterway configuration, channel and bottom characteristics contribute the most.
For short-term consequences, the volume of passengers contributes the most.
For long term consequences, Health and Safety 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	3.1
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	5.2
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	2.6
c. Transits are timed closely with tide	5.2
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	5.8
d. Vessels need icebreaker escorts	9.0
Visibility Obstructions	
a. No blind turns or intersections	1.0
b. Good geographic visibility-intersections	2.7
c. Visibility obscured, good communications	5.6
d. Distances & communications limited	9.0
Passing Arrangements	
a. Meetings & overtakings are easy	1.0
b. Passing arrangements needed-ample room	2.0
c. Meetings & overtakings in specific areas	5.2
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	5.2
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	5.0
d. Converging WITH crossing traffic	9.0

Passenger Volume

a. Industrial, little recreational boating	1.0
b. Recreational boating and fishing	4.0
c. Cruise & excursion vessels-ferries	6.0
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	5.2
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	3.2
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	5.8
d. ENDANGERED species, fisheries	9.0

Safety and Health Impacts

a. Small population around port	1.0
b. Medium - large population around port	2.7
c. Large population, bridges	5.7
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 twice as great.

Book 4 *Risk Subfactor Ratings (Port Lavaca/Point Comfort)*

Fleet Composition	**Traffic Conditions**	**Navigational Conditions**	**Waterway Configuration**	**Short-term Consequences**	**Long-term Consequences**
% High Risk Deep Draft 4.8	Volume Deep Draft 4.0	Wind Conditions 3.7	Visibility Obstructions 2.3	Volume of Passengers 3.7	Economic Impacts 5.3
% High Risk Shallow Draft 6.5	Volume Shallow Draft 6.4	Visibility Conditions 2.6	Passing Arrangements 5.1	Volume of Petroleum 8.1	Environmental Impacts 7.2
	Vol. Fishing & Pleasure Craft 6.9	Currents, Tides, Rivers 7.3	Channel and Bottom 4.5	Volume of Chemicals 8.0	Health & Safety Impacts 3.4
	Traffic Density 6.1	Ice Conditions 1.1	Waterway Complexity 9.0		

Analysis:

The participants believe that the following subfactors contribute the most risk to Port Lavaca/Point Comfort:

- The complexity of the waterway, with the ACOE buoys hugging the channel and some of the intersecting waterways.
- The volume of petroleum, which is a lot!
- The volume of chemicals, again, a lot!
- The current at the pass moves at nine knots.
- Fishing and pleasure craft sometimes loiter in the channel, obstructing traffic; these same craft also seem to operate erratic, sometimes.

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Book 5 *(Port Lavaca/Point Comfort)*

	Risk Factors						
	Fleet Composition	**Traffic Conditions**	**Navigational Conditions**	**Waterway Configuration**	**Short-term Consequences**	**Long-term Consequences**	**Relative Merit Index**
VTS	12.9	25.7	17.7	19.6	20.0	27.4	**21.1**
VTIS	25.0	15.9	23.2	18.9	27.9	19.2	**21.8**
EAIS	19.7	30.8	25.8	18.6	18.2	21.4	**22.2**
AIS	21.6	15.7	16.3	26.2	16.4	17.3	**18.5**
Improve Current System	20.9	12.0	17.0	16.7	17.5	14.6	**16.3**

Analysis:

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

PARTICIPANT IDENTIFIED RISKS AND MITIGATIONS

FACTOR/ SUB-FACTOR	IDENTIFIED RISKS	SUGGESTED MITIGATIONS
Geo Scope	Includes: • Shallow Draft Canal • Matagorda Bay • Lavaca Bay • Victoria Bay Area • ICW…Milepost 457 to milepost 492	Not required for this line item
Fleet Composition		
% High Risk Deep Draft Vessels (“High Risk” determined by condition of vessels, including manning, and type of cargo)	Defined by the group as ships that must use the channel 1. 85% of the deep draft ships fall into this category. There are an average of 2-3 transits/day 2. Problem areas: • Difficulty created by strong current at the pass • Potential conflicts with tows at the Intersection of the main ship channel and the ICW	1. Pilotage is required for deep draft vessels. 2. Following VTM tools exist: • Aids to Navigation Communications (Bridge to bridge) • RADAR • Rules of the Road • Port State Control Boarding • Company “vetting” process incident to chartering (ISO 9000-type inspection program • Appropriate use of restrictions upon port entry

FACTOR/ SUB-FACTOR	IDENTIFIED RISKS	SUGGESTED MITIGATIONS
% High Risk Shallow Draft Vessels ("High Risk" determined by condition of vessels, including manning, and type of cargo)	Defined as ships that are not kept up well as could be, low training, do NOT have to use the channel 1. 70% of all traffic is shallow draft., includes OSV, barge, 2. 15-20% risk is lack of knowledge of the area 3. Uninspected vessels increase risk 4. The category includes vessels hauling bulk chemical cargo 5. Many chemical carriers use the Victoria Barge Canal: • High risk movements stem from the cargo carried; chemical and petroleum 6. Numbers of vessels are increasing	1. Following VTM activities exist: • Overpackaged containers. Special equipment • Double hulled requirements • Internal inspection program, incident to chartering, etc. • Operator licensing. 2. Following VTM measures are proposed: • Putting qualified person aboard when vessel has not operated in that area, or has no current experience with the waterway. • Use specialized crews with more training when hazardous material is carried; with greater familiarity with cargo, equipment, and route. • Employ decal system State requires contingency plans onboard petrochemical and hazmat carriers.
Traffic Conditions		

FACTOR/ SUB-FACTOR	IDENTIFIED RISKS	SUGGESTED MITIGATIONS
Volume of Deep Draft Vessels (Takes into consideration size of vessel in relation to the channel as well as density)	1. Ship size and numbers of deep-draft transits are not big risk drivers 2. 3. Three hour transit for deep draft 4. Future increase in trade • Delays, causing economic impact • May require night time traffic 5. Navigable mud defines the bottom 6. Volume project to increase	1. Pilots impose one way ship traffic, now. 2. Transits are currently limited to daylight hours, but will move to 24 hour operation in the future 3. Draft restrictions are now in place 4. Collision avoidance equipment 5. Continue requirement for use of pilots 6. Future, with increasing traffic, add more aids to navigation
Volume of Shallow Draft Vessels	1. Volume of traffic is expanding and will continue to do so 2. Volume of traffic currently causes congestion at ICW locks 3. Problem areas identified were the crossing at Towers, and the junction of the ICW and Matagorda ship Channel • Strong currents in isolated areas. • There is a limitation on tug horsepower while barges are increasing in size 4. The Port O'Connor area constitutes a bottle neck due to the presence of: • Offshore supply vessels	1. Internal programs are currently put in place by "Blue Chip" chemical companies 2. Traffic thins out on main ship channel 3. Consider giving greater attention to alignment of tug horsepower with size of tow and use of second tug when required 4. CG issues restrictions on tow width 5. Consider improving Oversize Tow Permitting program • Formulas are convoluted • Process is currently "automatic"; with those who request permit issued one with little questioning.

FACTOR/ SUB-FACTOR	IDENTIFIED RISKS	SUGGESTED MITIGATIONS
	• Fishing vessels 5. Barges are getting bigger and carrying more diverse cargoes • Transient vessels from Houston and Brownsville have low level of local knowledge. Tank barge sizes range from 10K to 25K bbl barge • Barges are shifting product (watch risk transfer) • Wide tow configurations meeting ships in the channel create significant problems, particularly when bulk carriers "triple up" tows (Creating beams of 105 feet) • Dry bulk, sand, and gravel carriers are lax in observing tow-rigging regulations 6. Fishing vessels predicted to increase in numbers by 15 per cent over next few years.	• Vessels operating under permit are burdened at all times 6. Plan is being developed for realignment of channel where ICW and ship channel intersects. 7. Reroute ship channel in north section of bay, at Markers 13, 14 just below the turn 8. Mark the short cut across Bay to Port Comfort, relieving congestion at ICW-Ship Channel intersection (CG is being asked to mark this channel.)
Volume of Fishing and Pleasure Craft	1. ;Pleasure craft increasing in numbers and size. 2. Majority of pleasure craft operators unfamiliar with geographical area and Rules of the Road. 3. Concentration of recreational boats in Port Connor area • Real problem inside the jetty, where the recreational boats anchor up and fish the rock • At night…fluorescent lights string under the boat…can't tell green navigation lights from	1. Shrimpers will yield right of way 90%.of the time 2. Shrimpers listen to radio 3. Limited entry of fisheries in bay…limiting participants. 4. State is requiring motor boat education course for 16 and less 5. Future: Consider requiring a license. 6. Require education for boaters

FACTOR/ SUB-FACTOR	IDENTIFIED RISKS	SUGGESTED MITIGATIONS
	fishing lights. 4. Shrimpers • are in the channel • Work from the flats to the east • Normally, by 0900, most are done 5. Shrimpers and barges….F/V try to get around tow to make time…many are foreign to area. • Seems to happen more on ICW than main ship channel. 6. Organized boating activities at Port O'Connor cause traffic problems. Consider issuing special event permits. (Port O'Connor) 7. Limited English speaking ability…Vietnamese and Spanish 8. Looking to add more dock space…1500 feet…for fishing vessels in Gulf Shrimping 9. Personal watercraft increasing…no restrictions on age.	7. Insure F/V are seaworthy and not fire hazards 8. Rewrite state laws to match CFR. (outside VTM system) 9. More use of special event permits • Vessel controls by COTP • Must consider economic balance
Traffic Density	Mix of ships trying to use the waterway 1. Port O'Connor, Sea Drift…home of many recreational boats, that cause congestion. Have F/V, recreational, deep draft. 2. At the pass, recreational boats are anchoring to fish and not moving. 3. Number of tugs and tows are increasing. 4. Oversized tows take up most of the channel.	1. Some downbound tows check in with the harbormaster; this is just a recommendation 2. Notices of ship departures and arrivals are posted so that towboats can adjust departures. 3. For Port O'Connor: • reroute the channel…take the load off the intersection. • Establish another channel to divert the

FACTOR/ SUB-FACTOR	IDENTIFIED RISKS	SUGGESTED MITIGATIONS
		traffic. • Establish a barge shelf on west side of the ship channel. 4. Make mandatory notification as part of the oversized permitting process. • Require additional assist for tows as part of the process. • A steer master requirement already exists.
Navigational Conditions		
Wind Conditions	1. **Moderate** winds: 15-17 kts 2. **Strong**: 30-35 kts. 3. Blue norther (cross channel direction is most risky). Brings strong gusty winds for short period of time; up to 35-55 kts; 20 percent of the time. Northers are not well predicted. When they prevail, **cannot cross the bay** 4. **SE** is prevaling wind direction. 5. Intersection of ICW and turn stakes very shallow. It is hard to make turn for shallow draft tug and barge 6. Recreation Boats: Strong easterly winds will prevent crossing the ship channel	1. Putting weather transmitter in Port O'Connor next couple of years…a private concern. 2. Victoria has a weather transmitter and continues to broadcast 3. Forecast is good except for blue northers

FACTOR/ SUB-FACTOR	IDENTIFIED RISKS	SUGGESTED MITIGATIONS
Visibility Conditions	1. Fog • Very dense fog when it occurs. • Deep draft caught in fog will continue to operate if in transit. • There is pressure to operate when fog is anticipated. • Shallow draft will hold up, not transit in the fog; boaters, also, unless caught in middle of somewhere • Somewhere is out in the middle of the bay • Run up on bank and hold it to await increased visibility • Radar reflectors not maintained due to not being reported. 2. Who is responsible for what ATON…most is federal 3. Backlighting at Port O'Connor and Port Lavaca…hard to pick out the Aids to Nav. 4. OSV loading area at Port O'Connor particularly bad.	1. There is an informal network of calling in ATON outages. 2. Have talked to CG about possible ATON changes. 3. Deep draft will stop if fog occurs. 4. Deep draft has equipment and procedures inplace to operate.
Currents, Tides and Rivers	1. **Currents at the pass**; Shoaling and cutting currents are moving the buoys and other ATON. Speed is 9 knots (from vessel with GPS info) and getting worse. • Predicted have a jetty failure due to erosion • No flow meters currently exist. • Took buoys 13 and 14 right out of the way.	1. Will hold up if prediction is high current. Judgement based on tide and current tables. **2. Future…locate, put in some current meters…**working to install current meters throughout all the bays and info will be available through the internet.

FACTOR/ SUB-FACTOR	IDENTIFIED RISKS	SUGGESTED MITIGATIONS
	• Have numerous groundings north of jetty, vicinity of ICW intersection. 2. Congestion at locks at Matagorda; not within scope of area and not considered. 3. Needed tug help on Colorado River during flooding. 4. River currents at ICW turn off section. High rainfall caused shoaling 5. Primarily problem is tidal current trying to get through restricted passes.	
Ice Conditions	Had ice twice in remembered time	
Waterway Configuration		
Visibility Obstructions	Background lighting already discussed 1. Alcoa's fleeting areas for barges obscuring the front light of range. 2. Victoria Barge canal where I35 crosses; southbound must call ahead to avoid conflict with northbound traffic; bridge span is only 70 feet; need to align for it. 3. Turn stakes; eastbound tow and southbound tow could be obscured by the island; the spoil area. 4. Port Lavaca light is obscured. 5. At intersection of ICW and ship channel, vessels lose sight of each other; cannot see over dredge spoil area	1. Victoria Barge canal…dredging should widen and deepen the channel:.125 feet to highway I35. 2. Need to see ATON that is lost in background lighting. 3. Raise range up where being obscured by barges. 4. Change the color of light in Port Lavaca. 5. When go to night ops, better light the main ship channel. 6. Harbormaster needs to improve advisory service 7. Southbound deepdrraft ships in ship channel needs to make call to check crossing traffic.

FACTOR/ SUB-FACTOR	IDENTIFIED RISKS	SUGGESTED MITIGATIONS
Passing Arrangements	1. One way traffic in ship canal 2. Shallow draft collisions: • Two double wide barges can get by each other • No one likes to meet in area vicinity of government moorings…ACOE moorings • Port O'Connor…tow v. commercial F/V collisions…occurs on weekends…vicinity of boat ramps **due to inoperable boats and lack of knowledge and tight quarters** • concerned that deep draft vessel may ground on jetty to miss a pleasure craft • Collisions have occurred in between Port O'Conner and Seadrift (light barges in S to SE wind). When crabbing in cross wind meetings can be starboard to starboard and misjudgments result in collision	1. Make security calls to oncoming traffic. 2. Have deeper water outside the channel. 3. Have one way system. 4. Improve the oversize barge permitting system. 5. Communicate passing arrangements on FM and to control tower. 6. Companies require communications. 7. Relocate the mooring buoys at Port O'Connor.
Channel and Bottom	1. High current cutting through spoil island, scouring the bottom and increasing in speed. 2. Rocks on the jetties. 3. Cinderblocks located on Welder Flats. 4. There are bottom obstructions at head of Lavaca Bay (Shrimp boat pulls up a pipe occasionally)	1. No real major issues here
Waterway Complexity	1. Merging waterways; crossing waterway;	1. Currently, people avoid meeting at the

FACTOR/ SUB-FACTOR	IDENTIFIED RISKS	SUGGESTED MITIGATIONS
	crossing traffic 2. Victoria Barge canal and Sea Drift channel, additional recreational boats in the area. 3. Towers intersection has current and traffic together 4. People talk to harbormaster when going into port area, but not when going into Port Lavaca.	Towers intersection. 2. Move the ICW channel to short cut to Port O'Connor. Remove the dog-leg. 3. Move the mooring buoys in Port O'Connor. • Controlled by ACOE • Industry originally asked to put in. ACOE is keeping to charted position. Need to move away from channel • Buoys located now in high traffic area 4. Keep encroaching structures out of the canal in Port O'Connor (tell Clark's to pull back).
Short-Term Consequences		
Number of People on Waterway	Large concentration of persons that one accident could affect a large number of persons 1. Crew boats going offshore 2. One small ferry operation…from Port O'Connor to down the ICW 3. Lot of people at the pass….	1. Does not seem to be a problem
Volume of Petroleum Cargoes	1. 1 million short tons of petroleum products moved at Port Comfort. 2. Naphtha: 85K deadweight tons moving at one time 3. Significant amounts of HAZMAT in transit increases risk in high population areas.	1. Review vessel response plans. 2. Review area contingency plan. 3. Design a plan to control traffic after spill. 4. Consider the need for non VTM measures 5. Company owned response equipment

FACTOR/ SUB-FACTOR	IDENTIFIED RISKS	SUGGESTED MITIGATIONS
	4. Have transient cargo moving within the port. 5. Spill could be about 45K tons. 6. Spill will spread quickly. 7. Wind will sent spill toward populated area. 8. 210 spills in Calhoun and Matagorda counties in 1999. • 1997-around a government cleaned up 30. • Spill clean up expertise being lost. • CG losing clean up expertise.	and people. 6. Revive CG Strike team expertise.
Volume of Hazardous Chemical Cargoes	1. Transients cross Port O'Connor between Houston and Corpus Christi. 2. Ships bring cargo other than that being loaded/unloaded; Port O'Connor is an intermediate stop. 3. Ships offload chemicals. 4. Lot of chemicals move through high congestion area. 5. Most loading facilities around the Victoria Barge canal 6. Population areas located: • Sea Drift • Port O'Connor 7. There is gaseous HAZMAT being transported	1. See Petro above. 2. Focus on prevention. Once the chemical is in the water, will not come out easily.
Long-Term Consequences		
Economic Impacts	Barge traffic…dependent on barge	

FACTOR/ SUB-FACTOR	IDENTIFIED RISKS	SUGGESTED MITIGATIONS
	canal…cannot bring overland… 1. Channel Blockage: • Shut down barge canal for 2 days and land manager was in a panic. • Feed managers do not want to keep large feed stocks. • **After 2-3** days, people begin to feel the loss of the waterway; **after a week**, must completely shut down a plant. • From deep draft, 3 days seems to be maximum anyone can stand. 2. Certain products must be moved by barge. 3. Most industries have 'just in time' inventory control.	1. Have salvage equipment available for grounded vessel. 2. Insure ships have 1-2 tugs and 2000 HP. 3. Major groundings require outside resources.within two days. 4. Provide lightering operations to lighten grounded vessel.
Environmental Impacts	1. Significant number of environmentally sensitive areas. 2. No specific endangered species. 3. Whooping Cranes 4. Port Comfort marshes with currents 5. Bird Island at the turn stakes	1. Have contingency plan in place that addresses the impacts. 2. Shallow draft vessel can care for the port's needs in interim to move cargo.

FACTOR/ SUB-FACTOR	IDENTIFIED RISKS	SUGGESTED MITIGATIONS
	6. Fisheries 7. Marine firefighting, at sea, capability **does not exist** at this port.	
Health and Safety Impacts	Wind direction is toward the centers of populations	For noxious gas release…have run a simulation drill and Results show that real life would work.