Cincinnati
Workshop Report

Introduction

A one-day Port Risk Assessment Workshop was conducted for Cincinnati, Ohio on January 18, 2001. 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) [1];
- Summary of risks and mitigations discussion; and
- Cincinnati Port Attributes Summaries.

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 merits of specific types of Vessel Traffic Management (VTM) improvements for reducing risk in the port. Based on the Analytic Hierarchy Process (AHP), the port risk assessment process uses a select group of waterway users/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 experts 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 translated into computer algorithms by the Volpe National Transportation Systems Center. In that model, risk is defined as the sum 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 normally devoted to obtaining expert opinion about how to weight the relative contribution of each variable to overall port risk. This step in the process is eliminated when the workshop is compressed into one day, as was done for Cincinnati. The experts then are asked to establish scales to measure each variable. Once the parameters have been established for each risk-inducing factor, port specific 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 waterway users and stakeholders who participated in the process:
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Participant	Organization	Phone	Email
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Facilitation Team	Organization	Phone	Email
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Numerical Results

Book 1 – Risk Categories *(Generic Weights Sum to 100)*

Fleet Composition	Traffic Conditions	Navigational Conditions	Waterway Configuration	Immediate Consequences	Subsequent Consequences

Analysis:

Book 1 begins the process of weighting the national port risk model. Cincinnati PAWSA participants were not asked to develop information for the national model, and therefore, Books one and two were not completed. Had they been, the participant teams use their knowledge and the AHP process to provide weights for the six major risk categories.

Book 2 - Risk Factors *(Generic Weights)*

Fleet Composition	Traffic Conditions	Navigational Conditions	Waterway Configuration	Immediate Consequences	Subsequent Consequences

% High Risk Deep Draft	Volume Deep Draft	Wind Conditions	Visibility Obstructions	Number of People on Waterway	Economic Impacts
% High Risk Shallow Draft	Volume Shallow Draft	Visibility Conditions	Channel Width	Volume of Petroleum	Environmental Impacts
	Vol. Fishing & Pleasure Craft	Tide & River Currents	Bottom Type	Volume of Chemicals	Health & Safety Impacts
	Traffic Density	Ice Conditions	Waterway Complexity		

Analysis:

Book 2 further refines the weighting for the national port risk model. Participants examine the importance of the 20 risk factors to port safety, and provide results to the national model, determining the factors that contribute the most to overall risk under each of the six major categories.

Book 3 Factor 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	5.1
d. Severe winds occur without warning	9.0
Visibility Conditions	
a. Poor visibility < 2 days/month	1.0
b. Poor visibility occurs in brief periods	2.4
c. Poor visibility is frequent & anticipated	4.7
d. Poor visibility occurs without warning	9.0
Tide and River Currents	
a. Tides & currents are negligible	1.0
b. Currents run parallel to the channel	3.1
c. Transits are timed closely with tide	5.6
d. Currents cross channel/turns difficult	9.0
Ice Conditions	
a. Ice never forms	1.0
b. Some ice forms-icebreaking is rare	2.3
c. Icebreakers keep channel open	2.9
d. Vessels need icebreaker escorts	9.0
Visibility Obstructions	
a. No blind turns or intersections	1.0
b. Good geographic visibility-intersections	0.9
c. Visibility obscured, good communications	4.5
d. Distances & communications limited	9.0
Channel Width	
a. Meetings & overtakings are easy	1.0
b. Passing arrangements needed-ample room	2.4
c. Meetings & overtakings in specific areas	6.2
d. Movements restricted to one-way traffic	9.0
Bottom Type	
a. Deep water or no channel necessary	1.0
b. Soft bottom, no obstructions	1.8
c. Mud, sand and rock outside channel	4.6
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	2.7
c. Converging - NO crossing traffic	4.6
d. Converging WITH crossing traffic	9.0

Number of People on Waterway

a. Industrial, little recreational boating	1.0
b. Recreational boating and fishing	3.9
c. Cruise & excursion vessels-ferries	6.4
d. Extensive network of ferries, excursions	9.0

Petroleum Volume

a. Little or no petroleum cargoes	1.0
b. Petroleum for local heating & use	2.9
c. Petroleum for transshipment inland	5.5
d. High volume petroleum & LNG/LPG	9.0

Chemical Volume

a. Little or no hazardous chemicals	1.0
b. Some hazardous chemical cargo	2.5
c. Hazardous chemicals arrive daily	5.2
d. High volume of hazardous chemicals	9.0

Economic Impacts

a. Vulnerable population is small	1.0
b. Vulnerable population is large	3.0
c. Vulnerable, dependent & small	5.6
d. Vulnerable, dependent & large	9.0

Environmental Impacts

a. Minimal environmental sensitivity	1.0
b. Sensitive, wetlands, VULNERABLE	2.8
c. Sensitive, wetlands, ENDANGERED	6.0
d. ENDANGERED species, fisheries	9.0

Health and Safety Impacts

a. Small population around port	1.0
b. Medium - large population around port	2.4
c. Large population, bridges	5.3
d. Large DEPENDENT population	9.0

Analysis:

The purpose of Book 3 is for the participants to calibrate a risk assessment scale for each risk factor. For each risk factor 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. On average, 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 1.5; the difference in risk between the first and second intermediate scale points was equal to 2.8; and the difference in risk between the second intermediate scale point and the upper risk limit (Port Hell) was 3.7.

Book 4 - Risk Factor Ratings *(Cincinnati)*

Fleet Composition	Traffic Conditions	Navigational Conditions	Waterway Configuration	Immediate Consequences	Subsequent Consequences
6.4	21.2	11.2	24.1	18.2	17.5

% High Risk Deep Draft	Volume Deep Draft	Wind Conditions	Visibility Obstructions	Number of People on Waterway	Economic Impacts
1.0	1.0	3.0	7.2	6.5	5.5
% High Risk Shallow Draft	Volume Shallow Draft	Visibility Conditions	Channel Width	Volume of Petroleum	Environmental Impacts
5.4	6.3	2.9	4.2	6.0	4.1
	Vol. Fishing & Pleasure Craft	Tide & River Currents	Bottom Type	Volume of Chemicals	Health & Safety Impacts
	7.1	3.0	4.3	5.7	7.9
	Traffic Density	Ice Conditions	Waterway Complexity		
	6.8	2.3	8.4		

Analysis:

This is the point in the workshop when the process begins to address local port risks. The participants use the scales developed in Book 3 to assess the absolute level of risk in their port for each of the 20 risk factors. The values shown in the preceding table do NOT add up to 100. Based on the input from the participants, the following are the top risks to port safety in Cincinnati (in declining order of importance):

1. Waterway Complexity (8.4)
2. Health & Safety Impacts (7.9)
3. Visibility Obstructions (7.2)
4. Volume of Fishing & Pleasure Craft (7.1)
5. Traffic Density (6.8)
6. Volume of Passengers (6.5)
7. Volume of Shallow Draft Vessels (6.3)
8. Volume of Petroleum (6.0)

Book 5 - VTM Tools (Cincinnati)

Fleet Composition	Traffic Conditions	Navigation Conditions	Waterway Configuration	Immediate Consequences	Subsequent Consequences

% High Risk Deep Draft		Volume Deep Draft		Wind Conditions		Visibility Obstructions		Number of People on Waterway		Economic Impacts	
17	0.0	**17**	0.0	**13**	0.1	**1**	1.8	**11**	0.2	**10**	0.4
RA		RA		RA		CM		RA		RA	
% High Risk Shallow Draft		**Volume Shallow Draft**		**Visibility Conditions**		**Channel Width**		**Volume of Petroleum**		**Environmental Impacts**	
9	0.5	**6**	1.0	**16**	0.0	**1**	1.8	**8**	0.6	**15**	0.1
RA	ALERT	RA	ALERT	RA		RA		RA		RA	
		Vol. Fishing & Pleasure Craft		**Tide & River Currents**		**Bottom Type**		**Volume of Chemicals**		**Health & Safety Impacts**	
		5	1.5	**20**	-0.2	**12**	0.2	**14**	0.1	**4**	1.5
		RR		RA		RA		RA		RA	ALERT
		Traffic Density		**Ice Conditions**		**Waterway Complexity**					
		6	1.0	**19**	-0.1	**3**	1.7				
		RR	ALERT	RA		RA	ALERT				

KEY	
Risk Factor	
Rank	Risk Gap
Tool	ALERT

RA	Risk Acceptable	DI	Improve Dynamic Navigation Info
AN	Improve Aids to Navigation	VTIS	Vessel Traffic Information System
CM	Improve Communications	VTS	Vessel Traffic System
RR	Improve Rules & Regulations	OTH	Other – not a VTM solution
SI	Improve Static Navigation Info		

Legend:

Rank is the position of the Risk Gap for a particular factor relative to the Risk Gap for the other factors as determined by the participants. Risk Gap is the variance between the existing level of risk for each factor determined in Book 4 and the

average acceptable risk level as determined by each participant team. Negative numbers imply that the risk level could INCREASE and still be acceptable. The teams were instructed as follows: *If the acceptable risk level is equal to or higher than to the existing risk level for a particular factor, circle RA (Risk Acceptable). If the mitigation needed does not fall under one of the VTM tools, circle OTH (Other) at the end of the 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. An ALERT is given if no mathematical consensus is reached for the tool suggested.

Analysis:

The results shown are consistent with the discussion that occurred about risks in Cincinnati. For 13 of the 15 of the risk factors for which there was good consensus, the participants judged the risk to be at an acceptable level already due to existing mitigation strategies. The participants suggested VTM tools were appropriate for:

- Volume of Fishing and Pleasure Craft – RA (2), RR (10), OTH (2)
- Visibility Obstructions – RA (2), CM (12)

No consensus alerts occurred because votes were split between several VTM tools, as indicated:

- % High Risk Shallow Draft Vessels – RA (7), CM (3), RR (2), SI (1), OTH (1)
- Volume of Shallow Draft Vessels – RA (6), CM (4), RR (2), SI (2)
- Traffic Density – RA (5), CM (1), RR (6), VTIS (1), OTH (1)
- Waterway Complexity – RA (5), CM (3), RR (5), VTIS (1)
- Health & Safety Impacts – RA (7), CM (2), RR (2), VTIS (1), OTH (2)

Summary of Risks

Scope of the port area under consideration: The participants defined the geographic bounds of the port area to be discussed as:

- The Ohio River between mile markers 436 (Zimmer power plant) to mile 500.
- Including the Licking River to mile 7, the Great Miami River (for two miles), and Tanners Creek.

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Fleet Composition		
Percent High Risk Deep Draft Cargo & Passenger Vessels	**Today:** • No ships of this category on the river. **Trends:** • None discussed	**Existing Mitigations:** • None discussed **New ideas:** • None discussed

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Fleet Composition (continued)		

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Percent High Risk Shallow Draft Cargo & Passenger Vessels	**Today:** • The quality of tugs and tows is much improved. Operators belong to the responsible carrier program, and, training has improved tremendously. – Some tow boat operators may be from away, but are still "posted," and are not unfamiliar with the area. – Fleeting tug operators many not be of uniform quality. Lighting and location of the fleeting areas are the most frequent problem. There were 6 barge breakaways in the last couple months. USACOE permits the activity subject to public comment. • Bridge allisions seldom occur, but are the most frequent problem. Many collisions are not reported. • Passenger vessels: • Recreational vessels. Statistics will probably not include recreational boater accidents, and definitely will not include near misses. – Good shape, recent vintage, and are properly equipped. Many more are larger yachts causing wake damage. Those trailered in are often not well maintained, and are susceptible to breakdown; some are not suited to the river environment, especially at special events drawing large fleets. – Bass tournements draw many outside boats, but the event organizers have standards, and inspect participants. – Recreational crew qualifications are better for local boaters than for those who trailer to the river infrequently. Few seem to understand of rules of the road. • Drunkeness is a major problem, as it results in poor exercise of judgment. • PWCs operators are often dangerous to boaters and tug/tow operators. **Trends:** • Study of 6 year data set showed 27 allisions and 4 collisions.	**Existing Mitigations:** • None discussed **New ideas:** • None discussed

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Traffic Conditions		
Volume of Deep Draft Vessels	**Today:** • No vessels of this type in the port. **Trends:** • Not discussed	**Existing Mitigations:** • None discussed **New ideas:** • None discussed
Traffic Conditions (continued)		
Volume of Shallow Draft Vessels	**Today:** • Tug/tows: about 5,500 line haulers' thru-transits annually. • Fleeting movements are localized and are about 50 daily • Dinner cruise traffic / excursion boats move up to 35 times per day. • Use of Markland and Meldahl locks are at about 55% of capacity, therefore the system has excess throughput capacity. But downtown area development is limiting this now between the route75 and I-471 bridges for fleeting. – Shore infrastructure can not absorb much more, and is situational by seasons. Fleet areas hold barges for unloading, and are being moved farther away. **Trends:** • Depends on river conditions and closings. Long-term trend is likely to be at 2% increase of river traffic.	**Existing Mitigations:** • None discussed **New ideas:** • None discussed

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Traffic Conditions (continued)		
Volume of Fishing & Pleasure Craft	**Today:** • High (600+) recreational boat volume, particularly drawn to major events at sports stadiums, Riverbend and other music events, Riverfest, fireworks and Tall Stacks special events. – Riverbend at mile 458, boats are in the channel, a real problem. In Downtown area, rec boaters watching football games. Fast boats travel three abreast & at high speed. Create the most trouble. Between the bridges, larger traffic causing wakes that hazard shore facilities, tugs with tows, and construction barges in operation. • The river has capacity for multiple use as long as the boaters stay out of the way of commercial traffic. • No commercial fishing of significance. • Speed downtown is a problem. • Fishermen hinder the channel at Tanners Creek (mile 458). **Trends:** • Volume increasing as riverfront development progresses and becomes a venue. • Registrations are constant in number, but the size and design of the boats are changing toward larger and faster boats. Plus, their usage may be increasing.	**Existing Mitigations:** • None discussed **New ideas:** • Pamphlet on proper anchoring techniques • Dockmasters/marina owners provide with info signs or publications educating boaters about NDS, safe boating practices

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Traffic Conditions (continued)		

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Traffic Density	**Today:** • Memorial to Labor Day higher traffic volumes with pleasure boating, fishing. Estimates of up to 25,000 boats at fireworks events. • Areas of high density at Rivertown or Four Seasons marina entrances to these off-river marinas, boats queued to get in or out hammer down. • Density of traffic at Meldahl locks, problems with fishermen, waiting to get in. • Tall Stacks event and Riverfest are so well controlled, and, the industry knows about them. Therefore they aren't a problem. It's the day to day situations! • Non-marine permit events are becoming greater problem; Sawyer Point, Serpentine Wall music events, football games, etc. After-event mayhem (usually at night) is very dangerous and damages shore facilities. – Many events are associated with heavy drinking and poor judgment – Traffic at Aurora Park, at I 275 (499) is problem area because of jet skis. – Riverside ramp backups make congestion and block the channel. – Licking R. rec boaters and rowers are not cooperative with tug and tows. • Lack of good communication (transmission/receiving) is poor because of geography and bends in river. • Greater maritime law enforcement presence is the solution. • Fishing-tournament-fleets' mass movements at Tanner Cr. And Hogan Cr for bass fishermen. **Trends:** • Expected to increase with downtown development and additional entertainment events creating a destination for boaters.	**Existing Mitigations:** • River closed for certain events. **New ideas:** • None discussed

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Navigation Conditions		
Wind Conditions	**Today:** • Wind's effect depends on the freeboard of the tow. It comes from any direction because of the double S curve of the river. At 10 miles an hour, the wind greatly affects ability to navigate the bridges. Rec boaters also encounter danger at that wind speed. Worst in March & April, plus thunderstorms during summer. • Lucky to get a couple days straight without wind concerns for tow boat operators. Rec boaters don't go out. **Trends:** • None discussed	**Existing Mitigations:** • Rec boater doesn't go out, avoidance. **New ideas:** •
Navigation Conditions (continued)		
Visibility Conditions	**Today:** • Rec boaters don't recognize the presence of a barge because of its size and color at night. • Fog hasn't been a problem at the downtown bridges. • Fog season is spring and fall for about a month each. • Fleeting services have to move barges during fog. • Smog in summertime reduces visibility to a mile or less. **Trends:** • None discussed	**Existing Mitigations:** • Predictability. Expected and prepared for fog. • Pilots don't run if visibility is reduced too far. **New ideas:** • None discussed

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Navigation Conditions (continued)		
Tide & River Currents	**Today:** • About a knot generally, 5-6 knots during high water seasons. • Rec boaters stay in at high water, those that do go out at very high risk…causing fatalities. • Debris a real factor causing damage. • Commercial vessels unaffected by pool water currents. As flows get higher they must make navigation decisions earlier in their transit through downtown area. • Winds cause more trouble getting into Licking River. • Cincinnati bridges at high water are most dreaded navigation event by tow operators because of drift and trash in the river. • High water occurs about 3 times a year with variable duration, maximum of two weeks. **Trends:** • None discussed	**Existing Mitigations:** • Restrictions of tow sizes during high flows and a prohibitions against running at night for down bound traffic. **New ideas:** • None discussed.
Navigation Conditions (continued)		
Ice Conditions	**Today:** • Almost a generation of boaters and commercial operators who have not seen significant ice conditions. • Licking River above navigation head will freeze. The ice subsequently floats free, and dislodge barges which then go adrift in the river. **Trends:** • None discussed	**Existing Mitigations:** • None discussed **New ideas:** • None.

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Waterway Configuration		
Visibility Obstructions	**Today:** • The topography exasperates the communication problem. Blind spots rounding the many bends in the river for visual, radar, and VHF communications. – All structures add to the limitation in visibility. • FCC tested from mile 463-474, finding 7 pager freqs interference problems. The 'wide front door of the marine radio band' does not filter out the interference from the NOAA weather broadcasts. Installing par notch filters was suggested and followed by most operators to solve that. – Vessels starting into the bridges cannot be heard by those in the bridges. 4/19/99 date of report. Miami River to Anderson Ferry. Many dead communications sections and interference • Background lighting in downtown is trouble for commercial operators, but, helpful to rec boaters to know where they are. • Paul Brown stadium lights blank out the suspension bridge from sight. • Pleasure boaters come out of marinas (a blind spot for tow boats) and aren't looking/can't see beyond the land…very dangerous intersections. • CG signal survey shows they can talk well everywhere from their high level site except between miles 484-512, where it is weak but readable. No plan for a new high level site. **Trends:** • None discussed	**Existing Mitigations:** • CG keeps vegetation around shore aids well trimmed. • New dock lighting requirements are for lower intensity lights that aren't so bad. • Tugs relaying messages **New ideas:** • Cell phone party line concept offered.

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Waterway Configuration (continued)		
Channel Width	**Today:** • Passing arrangements made between tows all the time using narrow channel rules • 600-800 feet wide at downtown, restricted by bridge piers. • May take separate span passages. • Fleet sizes are seasonal and encroach upon the channel. Larger tows being used now also. **Trends:** • None discussed	**Existing Mitigations:** • Tugs don't pass in downtown area, a rule of thumb that depends upon the situation, and sizes of the tow. **New ideas:** • None discussed
Waterway Configuration (continued)		
Bottom Type	**Today:** • Both sand, mud and some rock bottoms. – Rock shore/bottom at 438-445 miles • Some submerged obstructions, most well marked. Dependent upon stage of the river. – Man-made obstructions along the banks, ice piers, wall, restaurants. • Shoaling between miles 450-456 at New Richmond. The Dayton Bar seems stable. **Trends:** • None discussed	**Existing Mitigations:** • Obstructions are generally marked, and the professional river men know the waterway. **New ideas:** • None.

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Waterway Configuration (continued)		
Waterway Complexity	**Today:** • Chop develops and doesn't dissipate in the downtown area especially on weekends • Intersections of marina entrances and the river are dangerous because of high land on each side. Licking and Miami Rivers, Tanners, Hogans, and Laughery Creek are dangerous intersections. • Anderson Ferry makes many crossings daily, year-round. • Many bends in the river especially downtown. • Fleeting services move barges across the river for unloading/onloading. • Dinner cruise shuttles for the ball games crossing will increase. • Little Miami River has a major bend that's a problem; as the channel narrows, boaters have trouble passing. • There are no mile markers on the river. Boaters don't know where they are! Lack of local knowledge. • Waterway can handle the traffic anticipated, but shoreside development in restricting safe holding areas. **Trends:** • Probably see commuter water taxi/shuttle service increase.	**Existing Mitigations:** • Professional mariners operating on the river. Exercising one-way traffic discipline when the size of the tows require it. Voluntary system. • Ohio mandatory education forthose born after Jan 1, 1982. Kids under 16 required to have boater education training courses. KY mandates classes in school system. 7-8 boating classes are available now from CG Auxiliary, yet they are under attended. • 13,000 people in Ohio took the classes. Ohio has home study test sites and other educational venues available. • USACOE permitting processes have been careful concerning the use of the river in regulatory processes. • City control of traffic during marine events is good. • On-the-water boater education by CG & Auxiliary. • Fishing tournament information coordinated to avoid major congestion on the waterway. • Anderson Ferry crossing is well known and vessels use bridge-to-bridge radio communications to avoid problems **New ideas:** • Enforcement of speed limitations on the river where posted, as well as general law enforcement increase. • Need funding for enforcement activities; federal money is given to the states for boating safety initiatives. • Clarification and harmonization of the state laws affecting boating safety. Both states have jurisdiction bank-to-bank except when laws are diametrically opposed.

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Immediate Consequences		
Number of People on Waterway	**Today:** • 15 dinner cruise ships operating several times a day during the season. Operating from Coney Is. to Anderson Ferry (458-480 mm.) About 1,000 people on board in the worst case, 300 on average. • Two overnight steamboats carry 400 passengers each sometimes visit. • Permanently moored passenger vessels could be a problem if they break away or are hit. **Trends:** • Passenger vessels expected to be constant. Saturated market.	**Existing Mitigations:** • Active waterway provides ample good Samaritan possibilities, self-help & reliance are watchwords among the river men. • Local fire departments have small boats. • Voluntary boating safety education, with active CG Auxiliary **New ideas:** • None discussed
Immediate Consequences (continued)		
Volume of Petroleum Cargoes	**Today:** • USACOE statistics show about 65 million tons carried annually in total: 80 % coal, 15-18 % petroleum/chemical cargoes. • Tows carry about 22,500 tons = less than 200,00 bbls. in an average tow. Largest single unit in one barge is 30,000 bbls. • Plus fuel on the tugs of about 32,000 to 85,000 gallons • BP petroleum at mile 474, Licking River facility, and the Chevron petroleum transfer facility down river. **Trends:** • Constant level expected	**Existing Mitigations:** • Tow of multiple barges protect integrity of the total cargo; tanks within the barges add more protection. Barges are generally double-hulled. **New ideas:** • None discussed.

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Immediate Consequences (continued)		
Volume of Hazardous Chemical Cargoes	**Today:** • Tolulene, Styrene, chlorine, and many other chemicals are traveling in bulk through the port. **Trends:** • Constant level expected.	**Existing Mitigations:** • None discussed **New ideas:** • None discussed
Subsequent Consequences		
Economic Impacts	**Today:** • Closing this port affects up and downstream transportation of goods. • Effects felt quickly; CG&E electric generation plant uses coal. • A major shift in business inventory practices call for just in time arrival of products. This results in limited stockpiles of goods and materials. • A one-week shutdown will have major affect on the economic viability of the region. Local impacts on the maritime workforce are more immediate. • Stockpiles of petroleum are very low, perhaps days. **Trends:** • Low-inventory business model being used extensively will continue.	**Existing Mitigations:** • None discussed **New ideas:** • None discussed

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Subsequent Consequences (continued)		
Environmental Impacts	**Today:** • Some environmental awareness and sensitivity. • Endangered species: several mussels, salamanders, and minnows. • Oxbow Reserve located at Great Miami R. is several hundred acres large. **Trends:** • None discussed	**Existing Mitigations:** • None discussed. **New ideas:** • None discussed.
Subsequent Consequences (continued)		
Health & Safety Impacts	**Today:** • Drinking water drawn from the Ohio River or Licking Rivers. Industries are also drawing for cooling water. • Downtown river bank is lined by public gathering places and restaurants. • About 1.3 million people live along the river in Cincinnati who will be greatly affected by a hazardous chemical plume. St Luke's Hospital and several schools are is within a mile of the river. **Trends:** • Responders have much more capability now, but the coordination between the groups needs to grow.	**Existing Mitigations:** • Emergency action plans are ready for use, and have been exercised in the past • Industry has improved its equipment with double hulls and vapor recovery procedures. Annual certification programs are required. • Evacuation plans were developed and exercised, but not lately. • Responsible carrier program, pilothouse management training, posting on-the-job familiarization for all new crew. • Facilities handling hazardous cargoes do exercises and large casino vessels do major casualty drills annually. • Good Samaritan opportunities are high. • A PMV risk assessment survey was conducted. **New ideas:** • Exercise and maintain safety plans. • Additional coordination between responding agencies to solidify capability gains.

Additional Risk Items:

Not discussed within this framework of risk are submarine crossings of the river of natural gas, electricity and petroleum lines.

Flooding of the river can cause increased debris floating, such as railroad tankers, silos in the water as a hazard, resulting in barge breakaways and vessel hazarding.

Summary of Cincinnati Waterway Navigational Attributes

- ***Ship Channel Complexity:*** The channel in the downtown area of the port is very complex due to a number of bends, and is made more difficult with the addition of 6 bridges that have to be navigated.

- ***Converging or Crossing Traffic:*** Up and down bound traffic meet in a very narrow channel. Passenger vessels transit the port primarily up and down river and reverse direction at the end of their routes. Anderson Ferry and some passenger vessels directly cross the river to land automobiles and pedestrians on opposite banks. Also, in the middle of the port is another navigable tributary that receives commercial vessel traffic.

- ***Ship Channel Configuration:*** The depth and width of the navigable channel is predicated upon the river water level due to rains and lock and dam controls. However, the channel is primarily considered as narrow.

- ***Ship Channel Traffic:*** 5,110 commercial towing vessels (line haulers) transit through the port each year. The average tow size is 15 barges in a 3 wide by 5 long configuration. There are also several fleet assist tow boats and construction tows that work in and around the port. In addition, there are 15 dinner cruise vessels that routinely transit the port, and numerous recreational vessels.

- ***Recreational and Local Fishing Activity:*** Larger numbers of recreational boats are present daily from May through October. Significant increases are common due to marine events and other area attractions, i.e., Cincinnati's Riverfest had 2000 boats in attendance, and the Jimmy Buffet River Bend concert had 600 recreational boats in attendance.

- ***Bottom:*** A mix of sand, rock, and mud.

- ***Currents:*** River currents can vary from day to day based on rainfall and lock and dam activities.

- ***Wind:*** Winds generally blow from Southwest, however, winter fronts and local summer thunderstorms can bring very severe strong winds from any direction.

- ***Visibility:*** Generally good, except when driving rain reduces visibility. Zero visibility conditions occur due to fog primarily in the spring and fall. Visibility in the downtown portion of the port is limited due to the bends in the river. Communication is poor in this area, further complicating safe navigation.

Cincinnati
Vessel Traffic Management Profile
(Presently in Place)

- ***Aids to Navigation (USCG and Private)***

  - Lighted & Unlighted – Fixed & Floating: USCG combination of all.
  - Regulated Navigation Areas (RNA) – USCG: during high water periods when the river water level is 40 feet or greater, down bound tows are restricted in their size.

- **Vessel Traffic Systems (VTIS/VTS):** None

- **Situation Awareness (Each Ship)**

  - Own Ship's & Other Ship's Position: Situational awareness derived by communication between vessels, visual & radar observation by the vessel pilots.
  - Other Ship's Intentions: Pilot radio communication with other vessel's pilot.
  - Waterway configuration: The Cincinnati port has a rather unique configuration with many bridges and bends that commercial pilots must navigate. Many areas allow very little room for maneuvering, especially when down bound.
  - Environmental conditions: River current can fluctuate greatly between pools, thus making navigation in the close confines of the riverbanks more hazardous.

Cincinnati
Planned and Anticipated Changes

- ***Planned Infrastructure Developments:*** Improve radio communication in the downtown portion of the port.

- ***Changes in levels and/or nature of waterway activities:*** Recreational boating traffic will increase in the future due to planned developments in the downtown area, including the recent opening of the football stadium and the future opening of the baseball park that will allow game viewing from the river. The future waterfront park will be located between the football and baseball stadiums. As the waterfront continues to offer more entertainment attractions and events, boating is becoming much more popular.

- ***Forecast Traffic Levels:*** Commercial traffic has been approximately 14 line tows per day and should not increase appreciably. During summer months, there are approximately 15 dinner cruise vessels transitting the port. The Cincinnati Port has one of the largest recreational boating contingents in the entire Western River system. With the new stadiums and many other area attractions it is expected that during the spring, summer and fall months recreational traffic could easily surpass 1,000 boats per weekend day.

- ***USCG Regulations to be implemented:*** The Coast Guard is currently revising the application process for area marine events. The number of marine events in the port has more than doubled during the past year. This trend is expected to continue. Changes have are also being made in mariner licensing processes.

- ***Changes under consideration, but not committed:*** We are currently developing a plan to effectively mark the navigable channel adjacent to River Bend Amphitheater and Paul Brown Stadium to guide recreational traffic during local music concerts and sporting events. This past year, both of these areas have become a major concern with several channel bolockages and vessel near-casualties between recreational boaters and commercial tows.