Reducing Downstreaming Incidents
Report of the Quality Action Team

Executive Summary

In fleeting operations, a towboat operator will frequently perform a maneuver known as "downstreaming" which involves positioning the boat above the fleet, then moving downstream with the current in order to land on a barge and remove it from the fleet. The same maneuver may be used to land on a dock, terminal or barges in a tow. Downstreaming is a common procedure and one that is done without incident under most conditions. However, under swift current conditions are present, the maneuver has resulted in a number of vessel sinkings and crew fatalities.

The Southern Region Quality Steering Committee (SRQSC) felt that downstreaming - a maneuver which is performed routinely and without incident, but has resulted in vessel sinkings and deaths under extreme adverse conditions – was an appropriate candidate for attention under the Coast Guard/AWO safety partnership. In July 1997, the SRQSC formed a Quality Action Team (QAT) to study the problem and make recommendations for reducing incidents stemming from downstreaming. The QAT included Coast Guard and industry representatives who were familiar with the practice of downstreaming.

The QAT surveyed the towing industry and reviewed the available casualty information from the Coast Guard database. This analysis showed that downstreaming maneuvers were a factor in roughly 1.6 towboat sinkings a year between 1992 and 1996. It is difficult to obtain complete incident information prior to 1992 through the Coast Guard database, but the QAT was able to identify a total of 16 towboat sinkings from 1982 to 1997. Significantly, six of those sinkings resulted in a total of 12 fatalities.

Based on its study, the QAT believes that under normal conditions downstreaming may be a practical and sometimes necessary operation. However, when casualties do occur, the risk to the vessel crew is very high and the options for escape are limited. Efforts to reduce downstreaming incidents should focus on smaller towboats (1350 horsepower or less) operating under high current conditions, primarily on the Lower Mississippi River.

The QAT feels strongly that addressing the human factor causes of these incidents is the most effective prevention approach. This involves raising awareness of proper downstreaming techniques and the risks involved in downstreaming under adverse conditions. The towing company must make awareness of downstreaming risks a part of its overall high current/high water operating procedures. Ultimately, the decision whether to downstream must rest with the vessel operator and the company must create an environment in which it is understood that ensuring crew safety is more important than saving time or gaining financial advantage.

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1.0 Background

Downstreaming is a common practice in the fleeting and shifting of barges. Under most conditions it may be considered a safe practice. In a typical downstreaming maneuver a towboat will move downstream with the current to land on a fleet in order to remove a barge. Towboats may also use this maneuver to land on a dock, terminal or barges in a tow. However, under swift current conditions, usually associated with high river events, downstreaming has resulted in vessel sinkings and several crew fatalities.

In July 1997, the Coast Guard/American Waterways Operators (AWO) Southern Region Quality Steering Committee formed a Quality Action Team (QAT) to study downstreaming incidents and recommend ways of preventing these incidents. The Quality Steering Committee was formed under the auspices of the Coast Guard/AWO Safety Partnership. This partnership's goal is to foster a process by which the Coast Guard and the towing industry can address safety issues in a cooperative, constructive manner. The downstreaming issue was seen as a natural candidate for that process. (QAT Charter enclosed as attachment A.)

The QAT membership was drawn from Coast Guard and industry representatives with a combined expertise in vessel operations, fleet management and incident investigations. Assistance in the writing of the report was provided by Ken Wells, AWO. The QAT met three times beginning with a first meeting on July 22, 1997. In the course of its work, the QAT surveyed the towing industry on downstreaming policies, reviewed the Coast Guard casualty database and studied specific downstreaming incidents.

2.0 Downstreaming Definitions and Practices

While downstreaming is a familiar practice in the towing industry, it is not a commonly understood term outside the industry or in most books on maritime operations. The QAT defines downstreaming as a procedure in which a towboat moves downstream with the current in order to approach and land on another object, such as a fleet, dock or another tow.

Downstreaming is used in barge fleets to remove barges from the upstream end of a tier of barges. In a successful downstream maneuver, a towboat will proceed upstream above the fleet before turning downstream, also known as topping around. The vessel will then

move downstream toward the fleet, preferably with the engines in reverse, also known as backing down. This allows the boat to move toward the barges at a slower speed than the current, idling in place if necessary. Preferably, flanking rudders are used to hold the boat in position as it approaches the fleet. The towboat will face up to the barge squarely, deckhands will tie off to the barge and the boat will back out the barge to remove it from the fleet. It should be noted that depending on the fleet location or river stage, this maneuver may be done with little or no current.

However, in a downstreaming casualty, the towboat may have difficulty approaching the barge and facing off to it squarely. If the towboat meets the barge at an angle and if there is a strong enough current, the boat may become pinned sideways against the barge. In these cases, water may rise up onto the deck and enter the vessel itself through doors or windows. The vessel may capsize and sink, or if it is pinned under the rakes of the barges, be pulled down under the fleet itself. Survivors or witnesses have described incidents as happening with surprising speed, with the vessel sinking in less than one minute. Crewmembers who are not able to climb onto the fleet or rescue vessels are at extreme risk.

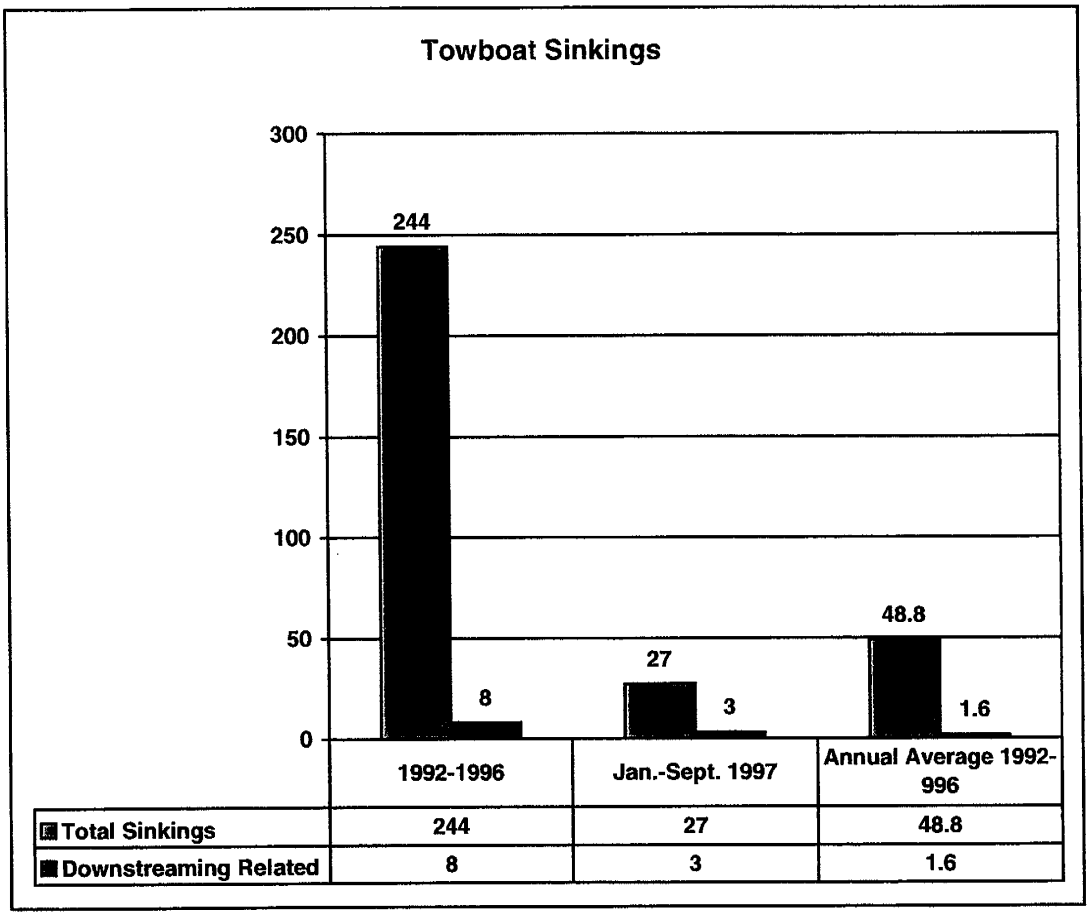
3.0 Casualty Data

The QAT reviewed casualty data in formulating its report. An earlier study performed by Lt. Dennis Branson formed a foundation for the review. Additional background formed for the QAT involved a thorough search of the Coast Guard marine casualty database as well as a survey of fleeting and towing companies. Assistance in locating and analyzing the specific incident reports was provided by Marilyn Clark, AWO, and Harold Krevait, U.S. Coast Guard.*

The QAT identified 16 sinkings that were related to downstreaming operations or were caused by similar factors between 1982 and 1997 (see attachment B). In a number of these incidents, the operator was not attempting to downstream, but had simply ventured too close to the head of a fleet and became pinned. Because these incidents were caused by similar factors and because they provided similar opportunities for a "lessons learned" approach, the QAT included them in the study group. It is very likely that there were additional incidents between 1982 and 1992, but little information is available from this period. Changes in the Coast Guard database did make information accessible by computer search after 1992, allowing for a more complete analysis from that date forward.

* It should be noted that the Coast Guard marine casualty database is not setup to easily identify downstreaming incidents. The process of identifying and analyzing these incidents involved reviewing each towboat sinking for the 5+ year period (1992-1997) for which reports are available. In many cases important details were not available through the computerized records check.

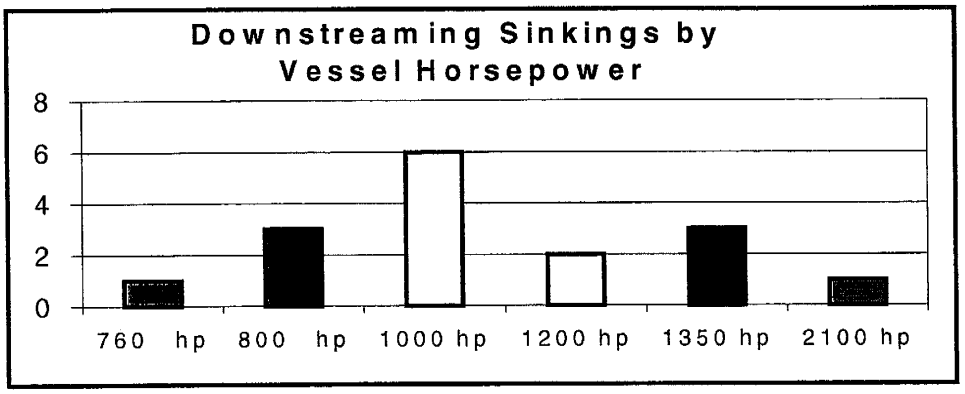
The analysis shows that between 1992 and 1996, 244 towboat sinkings occurred on navigable inland waterways in the United States and eight of these were related to downstreaming. Another 27 sinkings occurred in the first three quarters of 1997 and three of these were related to downstreaming. Put another way, between 1992-1996, the towing industry averaged 48.8 towboat sinkings a year and an average of 1.6 per year could be blamed on downstreaming.



While the number of downstreaming incidents is small, the potential danger to crewmembers involved in a downstreaming sinking is immense. The analysis shows that dating back to 1982, six sinkings resulted in 12 deaths. In two of these cases, all crewmembers were lost, making it difficult to determine causal factors.

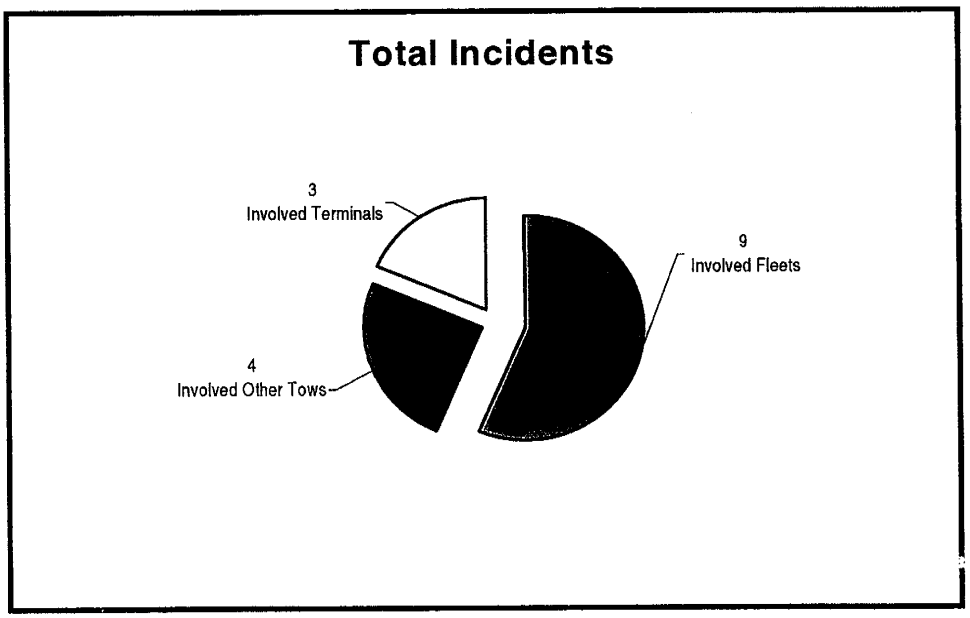
Incidents took place in a number of different areas, but most were clustered in St. Louis Harbor and the area between Baton Rouge and New Orleans. Where information was available, These incidents were cross-referenced with U.S. Army Corps of Engineers statistics to determine river stages on the day of the sinking. Almost universally they occurred during periods of high current/high river stage. The historic floods of 1993 and 1997 coincided with increases in the number of downstreaming sinkings. The most striking example was in 1997 when three sinkings occurred in the month of March.

With one exception, all of the incidents involved towboats with 1350 horsepower or less. This is in keeping with the common use of these smaller boats in fleeting of shifting operations.



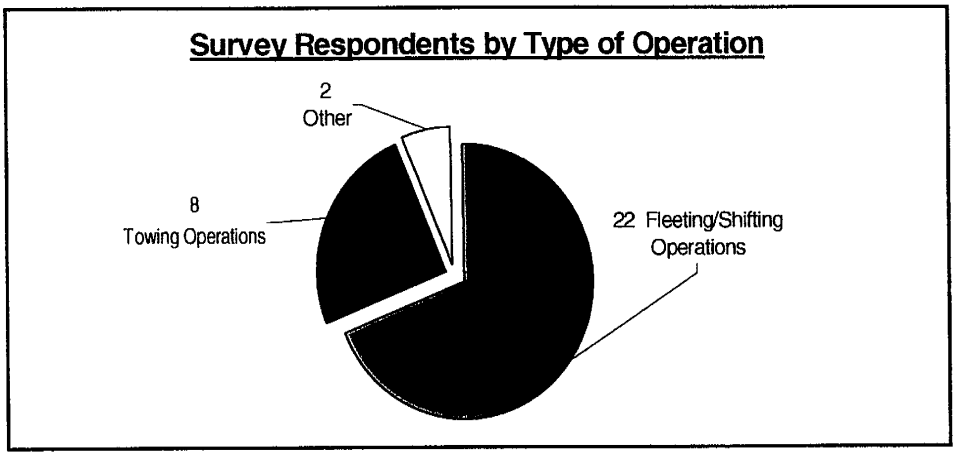
In a number of incidents investigating officers noted that doors on the first deck were open and that vessels had inadequate freeboard for the conditions in which they were operating. In at least three of the cases, some degree of mechanical or electrical failure was claimed as a factor, although the degree is very difficult to gauge.

Nine of the incidents occurred in fleets, four of the incidents occurred as a towboat was attempting to remove barges from a tow in the control of another towboat and three of the incidents occurred at terminal facilities.



4.0 Survey Results

In an effort to determine industry practice and to identify downstreaming incidents, the QAT surveyed the inland towing industry. More that 100 surveys were sent out and 32 responses were received. Of those responses, 22 were from companies primarily engaged in fleeting or shifting operations. Eight responses were from companies primarily engaged in dry or liquid towing operations. The remaining two responses were from companies engaged in other towing operations, specifically dredging, construction and salvage operations.



The survey asked respondents to describe their company policy on downstreaming. Answers ranged from outright bans on the practice to companies which do not have policies regarding downstreaming. A number of respondents indicated that they had some form of written or verbal ban on downstreaming under adverse conditions or that their ban on downstreaming was tied to a specific river stage. Sample comments from these respondents:

- "Our pilots are instructed to disregard all requests from line boat pilots for downstreaming."
- "Downstreaming is basically left to the discretion of individual pilots except in river stage 25' & above where it is not allowed under any circumstances."
- "The vessels that run on the river are informed not to make downstream landings on rivers that are running hard."

Several respondents stressed that they relied on the judgment of the vessel operator to determine when it was safe to downstream and or that they did not have a downstreaming policy, although many of those companies might have said they also rely on the judgment of the vessel operator if the survey had explicitly asked that question. Sample responses from these respondents:

- "Left up to pilot who is trained to judge current & conditions to ensure safe operations."
- "We leave it to the discretion of the pilot on duty. If they feel it is unsafe to downstream a tow, we agree with their opinion."
- "Company relies on experience and judgment of the master to determine what is safe."

Two of the respondents provided written company policies on downstreaming. A number of respondents gave detailed directions for downstreaming safely. (An example is included as attachment C.)

The QAT reviewed the survey responses in developing its conclusions and recommendations.

5.0 Conclusions

5.1 Downstreaming casualties are infrequent, but highly dangerous when they do occur.

Under most operating conditions it may be a practical and sometimes necessary operation when a towboat operator is removing barges or landing at a facility. However, when casualties do occur the risk for the vessel crew is very high. If the towboat becomes pinned against barges or other fixed objects under the wrong conditions, the operator's ability to save the vessel is limited and the question may become whether there is enough time for the crew to reach safety, usually by climbing onto the fleeted barges.

5.2 Smaller towboats operating in swift current conditions are most at risk.

The accident history shows that smaller boats with 1350 horsepower or less are the most likely to become involved in a downstreaming incident. This may be attributed to three factors:

- Larger boats are generally powerful enough to avoid becoming pinned against fleets or other fixed facilities.
- Larger boats are also more stable, allowing them to survive a pinning incident.
- Most of the work in fleets and at terminals is done by smaller boats, meaning that those boats are likely to downstream more often than larger boats.

Based on these factors, the QAT believes that the recommendations in this report should focus on smaller towboats, specifically those of 1350 hp or less.

River current appears to be a critical factor in downstreaming incidents. If human error is the direct cause, a swift current may take away the vessel operator's ability to recover from an error and raises the likelihood that a mistake will result in a serious incident. Unfortunately, current speed on a river is a somewhat difficult factor to predict or measure. *

Additionally, individual fleet locations react differently to high water/high flow events. Some fleets are located in areas which are protected from current. As the water rises, different hydrodynamic features also come into play. In some cases, eddies produced by rising waters may actually result in a current that moves upstream through the fleet. In any event, safe approaches to downstreaming must be considered on a case by case basis, rather than a blanket approach pegged to a river stage.

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* Swift river currents usually accompany high river stages, but the relationship between the two is not precise. A quick rise in river stage can produce a strong current, even though the river itself has not reached a high water level. Conversely, in an extended high water event the current speed may moderate somewhat. The U.S. Army Corps of Engineers measured current speeds on the Mississippi River in the 1970s and 1980s and recorded mean and maximum speeds as they relate to river stages. Those measurements show that at moderately high river levels, the mean and maximum current speeds vary by 25-30%. A copy of the Corps' river velocities chart is included as attachment D.

Further complicating the issue is the fact that vessel operators do not normally think in terms of current speed. Operators do recognize the effect that differing current speeds have on the handling of their vessels and they do factor that into their decisionmaking, but the actual current speed is not reliably measured or understood. River stages are generally used in determining operational safety measures, such as increased horsepower guidelines or fleet restrictions. While this is a clumsy gauge of risk, it is the most universally accepted gauge. There may be value in also factoring in the rate of rise as a measure of downstreaming risk, since this may serve as an early predictor for current speed.

5.3 Human factors, especially complacency and lack of awareness on the part of vessel operators, appear to be the most significant causes of downstreaming incidents and represent the best opportunity to prevent these incidents.

Downstreaming incidents occur through a combination of very complex factors and engineering principles, including river speed, vessel dimensions, vessel horsepower and handling capability. Mechanical problems have also been a factor in some downstreaming incidents.

The one constant is the human factor. The QAT believes very strongly that the root causes of most downstreaming incidents have been complacency and a lack of awareness of the risks involved in downstreaming under high current conditions. In some of the case studies reviewed by the QAT, operators had limited experience with downstreaming maneuvers or they had limited experience with their vessel or the area in question. In other cases, the vessel operators had extensive experience, but they failed to use adequate caution and attempted to perform a downstreaming maneuver under unsafe conditions. The common thread in these cases was that at a critical moment the operator was not sufficiently aware of the risk facing his vessel and crew.

5.4 The most effective way to reduce these casualties is to raise awareness of the risks of downstreaming during high current river conditions.

High water and swift current create a number of operational challenges, including increased risk associated with downstreaming. Prudent companies stress the need for safety and caution in all areas of operation during these periods. This message is communicated consistently and continually. Raising awareness of the risks of downstreaming should be a part of that communication.

However, control of the towboat ultimately rests with the vessel operator and the safety of that vessel rests with the operator's skill and judgment. The decision to downstream should not be a yes or no decision. Rather it should be a process of continual evaluation, in which the factors which may cause an incident are weighed. The prudent operator will leave himself a way out of the maneuver and be prepared to abort if necessary. Above all, he should recognize that his safety and the safety of the crew are paramount.

The QAT prepared a decision tree, outlining the factors which should be considered in any downstreaming maneuver in which current is present. Those factors include river and weather conditions, vessel characteristics and the operator's own skill level. (The decision tree is found in attachment E.)

If an operator determines that any of those factors make downstreaming unacceptably risky, the company's role must be to support that decision. Companies should not allow operators to be pressured by company personnel, such as dispatchers or other vessel operators.

5.6 Some operational measures affect the likelihood and survivability of downstreaming casualties. Where applicable, this includes the use of weather-tight doors and windows and placement of empty barges with box ends upstream.

A towboat which becomes pinned under the rake end of an empty barge is at high risk of capsizing and being pulled under the fleet, significantly raising the potential for fatal incident. For this reason, fleeted barges that are empty should be placed with the box ends facing upstream whenever it is safe and practical to do so. It should be recognized that under high water conditions, it may be necessary to face the rakes of barges upstream to deflect debris which could threaten the fleet. Also, when a full entire tow is brought into an anchor fleet, it is often safer to leave the barges as they arrived, with the rake ends facing upstream. However, under these conditions, it is necessary to use additional care in moving through the fleet and to avoid downstreaming whenever possible.

The accident history shows a number of incidents in which downstreaming on line haul tows has resulted in fatalities. If the tow moves at a critical moment, the downstreaming boat may be swept under the rake end of a barge very quickly. As a rule this practice should be avoided, however it must be recognized that large upbound tows cannot be turned in the river. If it is necessary to downstream on a tow, the line tow should move out of the current before downstreaming is attempted and be prepared to back down if necessary. An important consideration is that the vessel operator who is taking barges from the line tow should not be pressured to perform an operation with which he is not comfortable.

A vessel with its decks awash in the current is at risk under any circumstance. If this occurs while a towboat is attempting a downstreaming maneuver, the escape options available to that vessel are limited. Ensuring that the towboat has adequate freeboard and that doors and windows on the deck level are closed and secured are important safety measures for all operations in high current conditions.

If a towboat becomes pinned, crewmembers may have a very short window of time in which to escape from the boat. Crewmembers who are in their quarters or the galley are at especially high risk. Under high current conditions, vessel operators should alert crewmembers whenever they attempt a downstreaming maneuver and position them so that they are able to climb to safety in the event of an incident.

Terminals and docks may present their own downstreaming risks. Some have policies and operational needs which require downstreaming. The necessity for these policies when a high current is present should be reviewed along with the horsepower needs for vessels performing these maneuvers.

Assist boats do not directly prevent downstreaming incidents. However, they may be helpful in limiting the severity of the incident and helping to rescue the crew. For this reason many vessel operators use assist boats when performing a downstreaming maneuver under swift current conditions.

6.0 Recommendations

6.1 For Wheelhouse Personnel:

- Small towboat operators should recognize the risks involved in downstreaming under high current conditions and weigh those risks before attempting to downstream. Downstreaming should not be approached as a yes or no decisions, but rather as a process of continual evaluation and the vessel operator should be prepared to abort the attempt if necessary.

- Prior to downstreaming with small towboats under high current conditions, operators should:

  - ensure that doors and windows on the first deck are closed and secured;
  - ensure that the boat has adequate freeboard aft;
  - notify crewmembers of his intentions; and
  - position crewmembers to climb to safety in the event of a downstreaming casualty.

- During periods of high current, vessel operators should manage fleets so as to minimize the need to downstream. This involves managing factors such as the width of the fleet and placement of empty barges so that the box ends face upstream when practical.

6.2 For Companies:

- Companies should support the judgment of the vessel operators and not encourage them to perform any maneuver they are not comfortable with, including downstreaming. Through policy and action, the company should convey the message that crew safety is more important than saving time or gaining financial advantage.

- For fleeting companies, a senior captain or other licensed, knowledgeable supervisory employee should evaluate newly hired towboat operators to ensure that they recognize downstreaming risk factors and understand proper downstreaming procedures for their specific area of operation. If outside towing companies are used within the fleet, the operators of those vessels should undergo a similar evaluation before they are allowed to downstream.

- Companies should stress the need for safe operations during periods of high water/high current. Raising awareness as to the risks of downstreaming must be a part of that effort. This involves communicating frequently with vessel personnel in advance and during the high water period.

- Daily crew meetings and communications at watch changes should be used as a means to identify and discuss any downstreaming "close calls" and to determine if additional safety measures are needed.

- In advance of high current conditions, companies should work with vessel operators to determine whether downstreaming should be prohibited at specific river stages. This process should draw on the expertise of operators with the best judgment and working knowledge of the area of operation.

- High water procedures should address the need to close and secure doors and windows on the first deck and the need to ensure that towboats have adequate freeboard aft.

- Companies should consider conducting periodic drills to ensure that crewmembers understand assigned positions and the proper response to alarms.

6.3 For the Coast Guard:

- The Eighth Coast Guard District should institute a district-wide policy instructing field investigation units to properly identify downstreaming incidents in reports, as well as inform units of the proper querying methods for searching for previous downstreaming incidents in the Coast Guard Marine Safety Information System database.

- Through District policy letter, the Coast Guard should instruct field units to recognize downstreaming incidents and provide adequate information on investigation reports to allow for a lessons learned approach to these incidents.

- Taking the incidents studied by the QAT, the Coast Guard should insert the necessary information into the database so that these incidents can be easily identified in the future.

6.4 For The Coast Guard and Towing Industry:

- The Coast Guard and industry should work to raise awareness of the risks of downstreaming with small towboats during high current events. This should include:

  - producing a videotape explaining the potential risks of downstreaming and operational measures for reducing the likelihood and severity of downstreaming casualties, and
  - sharing the findings of this report at industry forums.

Experienced wheelhouse personnel should be involved in developing the downstreaming guidelines which are used in the video.

- The Southern Regional Quality Steering Committee should pursue follow-up measures, including:

  - Tracking downstreaming incidents on an annual basis to determine whether there has been improvement,
  - Ensuring that a video has been produced, and
  - Reforming the QAT in two years to re-survey the industry to determine whether recommendations have been instituted, whether the video is being used and whether additional measures are necessary.

Attachment

QUALITY ACTION TEAM CHARTER: BARGE FLEET DOWNSTREAMING

PURPOSE: This charter from the Southern Region Quality Steering Committee commissions a Quality Action Team to make a study of vessel casualties and fatalities associated with the barge fleeting practice of downstreaming and to identify appropriate process improvements.

BACKGROUND: Downstreaming is a barge fleeting procedure in which a towboat will make its approach from above a fleet, moving downstream as it attempts to remove or shift barges. Under normal river conditions, downstreaming is a fairly common and accepted practice among fleet operators. However, under high water conditions or when the current is swift, downstreaming has resulted in a number of vessel incidents and fatalities.

STRUCTURE: The Barge Fleet Downstreaming QAT shall consist of the following individuals. Other necessary team roles and responsibilities will be determined by the QAT members during the course of their activities.

Team Leader: Robert Ory – Triangle Fleet Corporation

Coast Guard Members: Lt. Dennis Branson – MSO St. Louis
Lt. Rick Hawkins – MSO New Orleans
Monty Ledet – Eighth District

Industry Members: Bill Grantham – Capital Fleet
George Foster – Jefferson Barracks Marine Service

Guidance Team: Southern Region Quality Steering Committee

OBJECTIVES: The study should include the following steps at a minimum:

- Define the scope of the problem utilizing statistical data, incident reports, case studies etc.;
- Analyze information to identify root causes and associated factors;
- Review and consider the effectiveness of existing regulations, industry practice and company policies concerning downstreaming;
- Based on analysis, identify improvements which will diminish the potential for downstreaming incidents and related fatalities; and
- Develop a plan to implement recommended improvements.

Delivery Schedule:

Special Instructions: Coast Guard District Eight Marine Safety Division will provide travel and per diem funding for Coast Guard members to the QAT. Industry representatives will be responsible for their costs associated with the QAT.

The team leader will provide meeting notices, minutes and the final report to the Co-Chairs of the SRQSC.

Ken Wells
Vice President – Southern Region
Co-Chair, SRQSC

J.W. Calhoun
Captain, U.S. Coast Guard
Co-Chair, SRQSC

DOWNSTREAMING INCIDENTS

VESSEL	ACCIDENT AREA	DATE	RIVER STAGES	FATALITIES
➢ **M/V Beaver Island** Vessel Size 760 hp	Mile 202.9 UMR Lock & Dam 26	6/22/82	25.8 St. Louis	1
Downstreaming on a tow controlled by M/V HK Thatcher. M/V Beaver Island was assisting tow to lock through Lock and Dam 26. Beaver Island struck head of tow, capsizing vessel and trapping vessel operator in the wheelhouse. Doors on the main deck were open and the vessel sank in 5-8 minutes. Swift crosscurrent was cited as a cause.				
➢ **M/V Mary Burke** Vessel Size 1350 hp	Mile 173.6 UMR St. Louis	6/30/90	29.6 St. Louis	2
Downstreaming on a fleet. Operators appeared to be violating company policy banning downstreaming in river stages 17 feet and above.				
➢ **M/V Betsy Diane** Vessel Size 800 hp	Mile 849 LMR Caruthersville, MO	12/9/91	30.0 St. Louis	0
Downstreaming on a tow controlled by M/V Gail C. Electrical failure cited as cause.				
➢ **M/V Kelly Holston** Vessel Size 1000 hp	Mile 175 LMR Donaldsonville, LA	5/17/91	37.35 Baton Rouge 15.25 New Orleans	0
Downstreaming on a tow. Limited information available.				
➢ **M/V Jackie Cenac** Vessel Size 2100 hp	Mobile River Koch Dock – formerly Douglas Oil	3/20/90		1
Downstreaming at a terminal facility. One deckhand was in his cabin and unable to escape. Extremely high current was cited as the cause.				
➢ **M/V St. Jude** Vessel Size 800 hp	Mile 151 LMR Paulina Barge Fleet	3/14/92	23.65 Baton Rouge 8.01 New Orleans	4
Downstreaming on a fleet. Vessel operator claimed electrical failure, but investigators were unable to accurately verify this. Vessel allided with the box end of a fleeted barge. Main deck doors were open and vessel had limited freeboard. Eyewitnesses said the sinking took place within one minute. Operator had only been on vessel for one week prior to incident and lack of familiarity was identified by investigators as a cause.				
➢ **M/V Miss Brandi** Vessel Size 600 hp	Mile 132.5 LMR	1/17/93	31.26 Baton Rouge 12.51 New Orleans	0
Downstreaming allision at a fleet. This does not fit the usual pattern in that the vessel was pushing two barges when an engine failed, sweeping the vessel into the rake ends of a fleet. The operating company was cited for allowing the vessel to operate in a damaged condition.				
➢ **M/V Pat Salvaggio** Vessel Size 1200 hp	Mile 105.0 LMR	4/24/93	36.00 Baton Rouge 14.64 New Orleans	0
Downstreaming on a fleet. Engine failure cited as a cause.				
➢ **M/V John F. Walker** Vessel Size 1350 hp	Mile 174.8 UMR St. Louis Harbor	10/21/93		0
Downstreaming on a fleet. Vessel allided with rake end of fleeted barge.				
➢ **M/V Point Clear** Vessel Size 1200 hp	Mile 176 LMR	5/20/93	36.56 Baton Rouge 14.97 New Orleans	0
Downstreaming on a fleet. Vessel became pinned against fleet. Sinking took place over several minutes as operator attempted to free the vessel. Low freeboard was cited as a cause.				
➢ **M/V Julia T.** Vessel Size 1000 hp	Mile 930.5 LMR	12/3/94	16.00 Baton Rouge 5.25 New Orleans	0
Downstreaming on a fleet.				
➢ **M/V Louisiana** Vessel Size 1000 hp	Mile 118.5 LMR St. Rose	6/9/95	38.13 Baton Rouge 15.70 New Orleans	0
Downstreaming at a terminal facility.				

➢ **M/V Valley Sunshine** Vessel Size 1000 hp	Mile 177 UMR St. Louis	5/16/96		3
Downstreaming on a fleet. Vessel assumed to be downstreaming on fleet, but there were no survivors or witnesses.				
➢ **M/V Perry Lobrano** Vessel Size 1000 hp	Mile 117.6 LMR ADM Growmark Fleet	12/18/96	31.35 Baton Rouge 12.63 New Orleans	0
Downstreaming on a fleet. Vessel apparently had faced up to fleeted barge when it somehow got out of position resulting in sinking.				
➢ **M/V Mary Burke** Vessel Size 1350 hp	Mile 176 UMR Near Eagle Fleet St. Louis	3/1/97		1
Downstreaming on a fleet. Operator with 40 years of experience. Extreme high current conditions were a cause.				
➢ **M/V Russell L. Sanborn** Vessel Size 800 hp	Mile 140 LMR Reserve	3/18/97	41.1 Baton Rouge 16.77 New Orleans	0
Downstreaming on a terminal facility.				
M/V Bayou Black Vessel Size 1000 hp	Mile 120 LMR	3/31/97	43.16 Baton Rouge 16.60 New Orleans	0
Downstreaming on a tow controlled by M/V Larry Tilly				

Industry Survey on Downstreaming Practices

Sample comments and recommendations for avoiding incidents

"#1. Always give yourself ample room for the approach – that is, more room than you think you need.
#2. If you must round to ahead of the fleet, turn towards the bank first and round out with the head pointing out in the river.
#3. Do not drive down onto the head of the fleet. Float, make course corrections using short bursts of the throttle & rudder. This tactic does not greatly increase headway.
#4. Keep boat straight with current AT ALL TIMES ON APPROACH.
#5. If facing down on a tow have the other pilot float or back down river to neutralize effect of current.
#6. Don't back hard nor with full rudder.
#7. Know when conditions are TOO unfavorable for your skill level.
#8. Good Luck."

"Downstreaming is an integral and sometimes desirable maneuver for a towboat. Obviously many conditions need to be considered when making any maneuver with a towboat. Wind, weather, current, river segment, traffic, condition of vessel, handling of vessel, and ability of operator, to name a few, all come into play... At certain high river stages, portions of the Evansville harbor become as slack as 'pool' river stages – with current crossing adjacent fields. During some stages, we also encounter various river segments with eddies that have the current running upriver. We feel a competent operator is the only person that can effectively evaluate his given position and situation."

"Don't come down (on fleet) unless you can completely control your vessel while backing."

"Keep Equipment in good mechanical shape"

"Our pilots know we will stand behind them when they say no to the line boat pilots. Line boat pilots generally want work done quickly without a lot of regard for the safety of our boats."

"It would be a good idea that when we are in a high river situation on each shift the elevator remind the vessel and crew that the river is high and they should be extra careful."

"Eliminate downstreaming unless there is no alternative. It should be the exception rather than the rule."

"Prior to downstreaming discuss the situation with your crew, i.e. what you are doing, how you are doing it and where the crew should be."

"If it takes more than ½ your horsepower to back upstream get an assist boat."

"We can honestly say that no person that has operated a vessel in strong river currents had not had a near miss at one time of another while making this maneuver."

JAN 1991

RIVER VELOCITIES AT NEW ORLEANS, LA. (MILE 102.8) RELATED TO THE CARROLLTON GAGE

BASED ON OBSERVARTIONS OF 1973-1989 AT THE NEW ORLEANS AND BELLE CHASSE, LA. DISCHARGE RANGES.

V E L O C I T Y

GAGE HEIGHT IN FEET NGVD (86 ADJ)	MEAN AT 60% DEPTH		MEAN SURFACE		MAXIMUM AT 60% DEPTH		MAXIMUM SURFACE	
	FT/SEC	MI/HR	FT/SEC	MI/HR	FT/SEC	MI/HR	FT/SEC	MI/HR
1	0.8	0.5	0.9	0.6	1.0	0.7	1.1	0.8
2	1.5	1.0	1.7	1.2	1.8	1.2	2.0	1.4
3	2.0	1.4	2.3	1.5	2.6	1.8	2.9	2.0
4	2.4	1.6	2.7	1.8	3.1	2.1	3.5	2.4
5	2.8	1.9	3.2	2.2	3.7	2.5	4.2	2.8
6	3.1	2.1	3.5	2.4	4.2	2.9	4.8	3.2
7	3.4	2.3	3.8	2.6	4.7	3.2	5.3	3.6
8	3.7	2.5	4.2	2.8	5.1	3.5	5.8	3.9
9	4.0	2.7	4.5	3.1	5.5	3.7	6.2	4.2
10	4.3	2.9	4.9	3.3	5.9	4.0	6.7	4.5
11	4.7	3.2	5.3	3.6	6.3	4.3	7.1	4.8
12	5.1	3.5	5.8	3.9	6.7	4.6	7.6	5.2
13	5.4	3.7	6.1	4.2	7.1	4.8	8.0	5.5
14	5.8	4.0	6.6	4.5	7.5	5.1	8.5	5.8
15	6.2	4.2	7.0	4.8	8.1	5.5	9.2	6.2
16	6.7	4.6	7.6	5.2	8.7	5.9	9.8	6.7
17	7.3	5.0	8.2	5.6	9.5	6.5	10.7	7.3
18	7.8	5.3	8.8	6.0	10.3	7.0	11.6	7.9

MILES PER HOUR = 0.682 X FT/SEC
KNOTS = 0.592 X FT/SEC

MILES PER HOUR = 1.152 X KNOTS
KNOTS = 0.868 X MI/HR

100KRWD*V. TABLE

JAN 1991

RIVER VELOCITIES AT TARBERT DISCHARGE RANGE RELATED TO THE RED RIVER LANDING GAGE

BASED ON OBSERVARTIONS OF 1973-1989 AT THE TARBERT LANDING DISCHARGE RANGE.

V E L O C I T Y

GAGE HEIGHT IN FEET NGVD (76 ADJ)	MEAN AT 60% DEPTH		MEAN SURFACE		MAXIMUM AT 60% DEPTH		MAXIMUM SURFACE	
	FT/SEC	MI/HR	FT/SEC	MI/HR	FT/SEC	MI/HR	FT/SEC	MI/HR
5	2.3	1.6	2.6	1.8	2.8	1.9	3.1	2.1
10	2.6	1.7	2.9	2.0	3.0	2.0	3.4	2.3
15	2.8	1.9	3.2	2.2	3.2	2.2	3.7	2.5
20	3.2	2.1	3.6	2.4	3.6	2.4	4.1	2.8
25	3.4	2.4	3.9	2.6	4.0	2.7	4.5	3.1
30	3.8	2.6	4.2	2.9	4.5	3.1	5.1	3.5
35	4.0	2.7	4.5	3.1	5.2	3.5	5.9	4.0
40	4.4	3.0	5.0	3.4	6.0	4.1	6.8	4.6
45	4.8	3.2	5.4	3.7	6.9	4.7	7.8	5.3
50	5.3	3.6	6.0	4.1	8.0	5.4	9.0	6.2
55	5.9	4.0	6.7	4.5	9.2	6.2	10.3	7.0
60	6.8	4.6	7.6	5.2	10.5	7.2	11.9	8.1

MILES PER HOUR = 0.682 X FT/SEC
KNOTS = 0.592 X FT/SEC

MILES PER HOUR = 1.152 X KNOTS
KNOTS = 0.868 X MI/HR

100KRWD#V; TABLE

JAN 1991

RIVER VELOCITIES AT BATON ROUGE, LA. (MILE 228.4) RELATED TO THE BATON ROUGE GAGE

BASED ON OBSERVARTIONS OF 1975-1983 AT THE BATON ROUGE, LA. DISCHARGE RANGE.

V E L O C I T Y

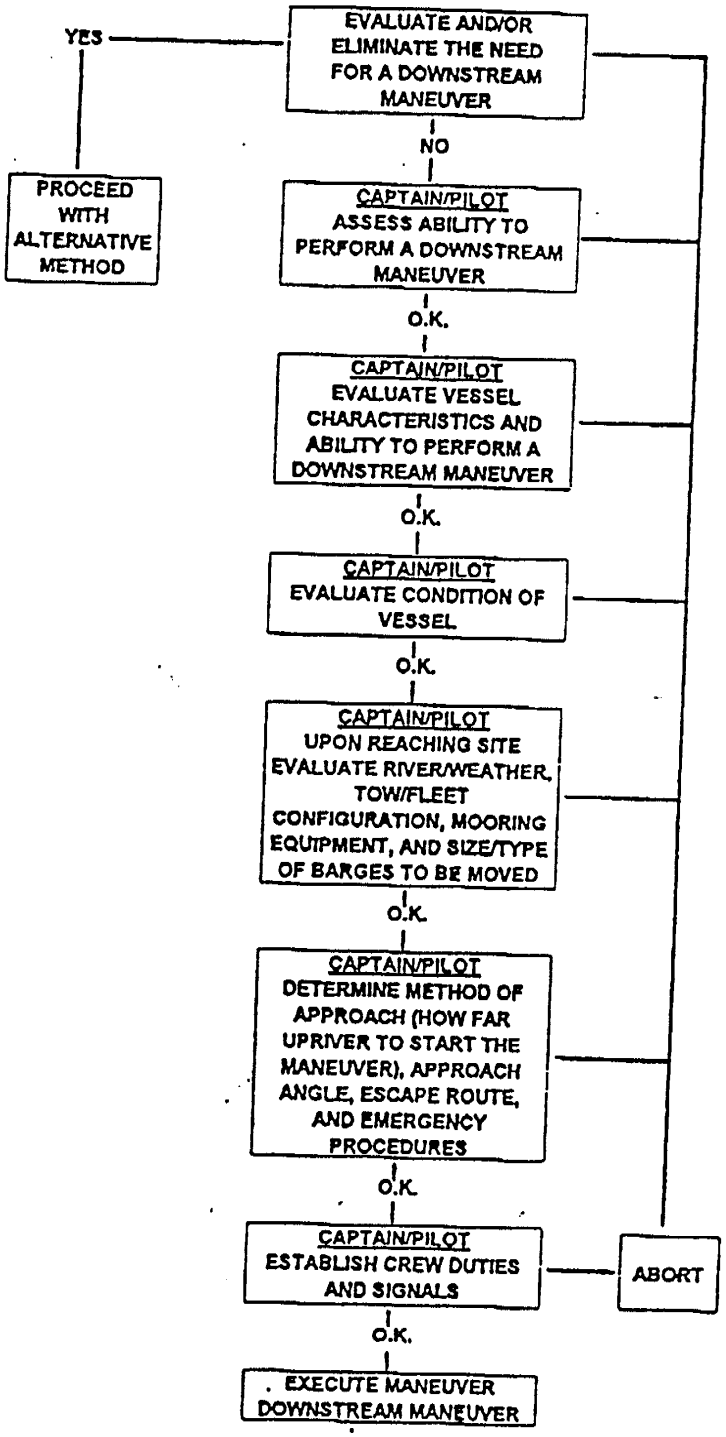
GAGE HEIGHT IN FEET NGVD (83 ADJ)	MEAN AT 60% DEPTH		MEAN SURFACE		MAXIMUM AT 60% DEPTH		MAXIMUM SURFACE	
	FT/SEC	MI/HR	FT/SEC	MI/HR	FT/SEC	MI/HR	FT/SEC	MI/HR
2	1.6	1.1	1.8	1.2	2.0	1.4	2.3	1.5
4	2.1	1.4	2.4	1.6	2.8	1.9	3.2	2.2
6	2.5	1.7	2.8	1.9	3.3	2.4	3.7	2.5
8	2.8	1.9	3.2	2.2	3.8	2.6	4.3	2.9
10	3.0	2.0	3.4	2.3	4.2	2.9	4.8	3.2
12	3.2	2.2	3.6	2.5	4.4	3.0	5.0	3.4
14	3.4	2.3	3.8	2.6	4.7	3.2	5.3	3.6
16	3.6	2.4	4.1	2.8	5.1	3.5	5.8	3.9
18	3.8	2.6	4.3	2.9	5.3	3.6	6.0	4.1
20	4.0	2.7	4.5	3.1	5.6	3.8	6.3	4.3
22	4.2	2.9	4.8	3.2	5.8	4.0	6.6	4.5
24	4.4	3.0	5.0	3.4	6.2	4.2	7.0	4.8
26	4.7	3.2	5.3	3.6	6.5	4.4	7.3	5.0
28	4.9	3.3	5.5	3.8	6.8	4.6	7.7	5.2
30	5.2	3.5	5.9	4.0	7.2	4.9	8.1	5.5
32	5.5	3.7	6.2	4.2	7.6	5.2	8.6	5.8
34	5.8	4.0	6.6	4.5	8.2	5.6	9.3	6.3
36	6.2	4.2	7.0	4.8	8.7	5.9	9.8	6.7
38	6.6	4.5	7.5	5.1	9.4	6.4	10.6	7.2
40	7.2	4.9	8.1	5.5	10.2	7.0	11.5	7.9

MILES PER HOUR = 0.682 X FT/SEC
KNOTS = 0.592 X FT/SEC

MILES PER HOUR = 1.152 X KNOTS
KNOTS = 0.868 X MI/HR

100KRWD*V. TABLE

PROCEDURES FOR EXECUTING A DOWNSTREAM MANEUVER



NOTE: Use an assist boat as needed during any step in this process.