Final Report of the Coast Guard-AWO Working Group on ATB Operations and Manning

March 6, 2017

1. Executive Summary

Articulated tug-barge units, or ATBs¹, have become a vessel design option of choice for the safe and efficient transportation of both liquid and dry cargoes in the coastwise and ocean trade. Although they have proliferated and increased in size and sophistication over the past 30 years, the Coast Guard's primary guidance on ATB design, operation and manning is provided by a Navigation and Vessel Inspection Circular (NVIC 2-81, Change 1) that is over thirty years old.

The Coast Guard initiated a review of its regulations and guidance regarding ATBs as a result of concerns about the currency of its policies and their adequacy to address crewmember safety. The Coast Guard-AWO Working Group on ATB Operations and Manning was formed to support the agency's review of its ATB policy with the mutual goal of ensuring that ATBs can continue to operate safely and efficiently, with utmost care for the protection of life, property, and the environment. The Working Group was charged with assessing the risks of ATB operations and analyzing the gaps between existing Coast Guard regulations and policy and current ATB operations. The Working Group was then directed to make recommendations to ensure that the gaps and risks it identified are addressed through revisions to policy or regulation, as appropriate, and through the utilization and effective implementation of safety management systems.

A focus of the Working Group was the widespread industry practice of placing ATB crewmembers on board the barge for limited periods of time. Due to the design of ATBs, Masters are able to authorize crewmembers to transfer between the tugboat and the accompanying barge while the ATB is underway in order to inspect and monitor equipment and cargo, conduct maintenance and perform rounds. However, these activities are discrete and discretionary, and can be delayed or deferred without risk to the equipment or the cargo if it is unsafe for a crewmember to transfer between the vessels. Furthermore, it is never necessary for there to be a continuous watchstander on board the ATB barge when it is operating outside the boundary line.

Because ATB barges are typically certificated as unmanned, the Working Group assisted in the development of a new Coast Guard policy letter, CG-CVC Policy Letter 16-04, to provide OCMIs and ATB operators with guidance on the circumstances under which personnel may conditionally occupy an unmanned ATB barge operating beyond the boundary line to perform discretionary, non-navigational tasks. The policy letter directs OCMIs, if the outlined criteria are met, to endorse the barge's COI with a Conditionally Occupied Barge Endorsement specifying the number and required qualifications of crewmembers who are permitted to conditionally occupy the barge.

The Working Group further recommends the following changes to existing Coast Guard regulations and policy, which are discussed in greater detail in Section 5:

• The Working Group recommends that the term "Dual Mode ITB" be replaced with the term "ATB" in all existing and future Coast Guard policy and guidance.

¹ For the purposes of this report, the term "ATB" is synonymous with the term "Dual Mode ITB" as defined in NVIC 2-81, Change 1.

- The Working Group recommends that review, certification and inspection procedures and design guidance for ATB tugboats should be removed from NVIC 2-81, Change 1, and incorporated into Subchapter M implementation guidance.
 - If this change cannot be effected expeditiously, the Working Group recommends that a Change 2 to NVIC 2-81 be promulgated to clearly distinguish and delineate guidance for ATBs from guidance for Pushing Mode ITBs and to ensure that ATB guidance is aligned with 46 CFR Subchapter M.
- The Working Group recommends that the Load Line Policy Notes be amended to include, from CG-CVC Policy Letter 16-04, a definition of conditionally occupied unmanned barges and the conditions under which they may qualify for a 25 percent freeboard reduction.
- The Working Group recommends that the Marine Safety Manual, Vol. II, be amended to add guidance for OCMIs issuing conditional occupancy endorsements to barges, and that the sample Conditionally Occupied Barge Endorsements found in Section 9, Endorsements, of CG-CVC Policy Letter 16-04 be added to the MSM, Vol. III, Annex. The Working Group also recommends that MSM, Vol. III's manning guidance for ATB tugs be clarified.
- The Working Group recommends that the review and approval of ATB vessel plans by the Coast Guard Marine Safety Center, registered professional engineer or authorized classification society should include consideration of whether the barge may be conditionally occupied and the means of egress between the tug and the barge, in coordination with the cognizant OCMI, the vessel operator and the third-party organization, if applicable.
- The Working Group recommends that a description of the systems to be installed on an unmanned ATB barge should be a required element of its application for inspection, to assist OCMIs in understanding the basis for a Conditionally Occupied Barge Endorsement on the barge's COI; for the allowance of "other required crew," as necessary, on the accompanying tug's COI as specified by the tug's safety management system, if applicable, and in accordance with the service the tug is engaged in; and for identifying the necessary qualifications of those crew.

<u>2.</u> Process

At the request of the Coast Guard, AWO hosted a discussion on ATB operations and policy on November 20, 2014, to review existing agency policy and guidance regarding ATB operations and to establish a framework for further consideration of concerns regarding ATB operations. The Coast Guard-AWO Working Group on ATB Operations and Manning was then established by the Coast Guard-AWO Safety Partnership on May 18, 2015. The Working Group conducted its preliminary risk assessment and gap analysis at its first meeting on June 9, 2015.

The Coast Guard subsequently drafted a new policy letter describing the circumstances under which personnel may conditionally occupy an unmanned ATB barge to provide interim guidance to OCMIs and ATB operators while further changes to policy and regulation are contemplated. At its second meeting on December 8-9, 2015, the Working Group reviewed and provided its input on the draft policy letter. CG-CVC Policy Letter 16-04 was published on July 26, 2016, and became effective on August 26, 2016. The Working Group met for a final time on November 15-16, 2016, to make recommendations for revisions to other policy and regulations on ATB design, operations and manning, including revisions to NVIC 2-81, Change 1, the Marine Safety Manual, Vol. III, and the Load Line Policy Notes.

3. Current ATB Fleet and Operational Picture

ATBs are comprised of a barge and a tug positioned in a notch in the stern of the barge, enabling the tug to propel and maneuver the barge. They incorporate a tug-barge connection system that allows the two vessels to move relative to each other while underway in the vessel motion known as pitch, while not allowing the vessels to move relative to each other in other vessel motions such as heave and roll. The connection system also allows the draft of the tug and the barge to change relative to each other.

ATBs have become the preferred vessel combination for both operators and customers in many operating environments, not only for the carriage of hydrocarbons, but for all cargoes that are carried in coastwise trade. ATBs represent a significant advancement in industry efficiency, combining the economics of high-capacity, low-cost barge transportation with the speed, seakeeping and weather-reliability of a ship. ATBs also represent a significant advancement in industry safety, with a long history of safe operations.

The U.S.-flag ATB fleet currently numbers 165², with approximately 85 percent of associated barges classified as tank barges and the remaining 15 percent classified as bulk cargo or ro-ro barges. While most U.S.-flag ATBs operate domestically, many also engage in international trade. ATBs operate on the Atlantic, Pacific and Gulf coasts and the Great Lakes, transporting a wide variety of liquid cargoes including crude oil, refined petroleum products (including fuel and asphalt) and chemicals, as well as dry cargoes including cement, coal, limestone, taconite, salt and sand. This proven design has also led to the recent construction of ATB hopper dredges and the class functional approval and Coast Guard design basis approval of ATB LNG bunker barges.

As the ATB as a design option has increased in popularity and prevalence, the vessels have grown larger, the tug-barge connection systems that they utilize have become more sophisticated, and the number and complexity of other equipment and systems installed on board the barges has increased as a result of regulatory and customer requirements.³

Depending on cargoes carried, applicable regulations, and customer stipulations, ATB tank barges may be equipped with thermal fluid heater systems, crude oil washing (COW) systems,

² See Appendix 1 for a list of existing ATBs as of February 24, 2017.

³ See Appendix 2 for photographic examples of ATBs, ATB coupling systems, and ATB barge equipment and systems.

and/or inert gas systems (IGS). Other types of ATB barges may be configured with selfunloading and hopper systems. Furthermore, many ATBs will soon be outfitted with ballast water management systems (BWMS). Many of these systems, including BWMS and COW systems, are operated primarily in port, during ballasting and de-ballasting or cargo loading and unloading activities, and do not need to be operated when the ATB is underway.

While ATB crewmembers routinely transition from the tug to the barge while the ATB is underway to ensure equipment and systems are properly maintained, to monitor cargo and ballast levels, and to perform periodic rounds on the deck of the barge, these activities are all discrete and discretionary. The safe operation of the equipment and systems, as well as the safety of the ATB and its cargo, is not affected by a delay in the performance of these tasks in the event that it is unsafe for crewmembers to go aboard the barge.

It is at all times within the authority of the Master to determine whether it is safe for crewmembers to transition from the tug to the barge. Any regulations that require activities to be conducted onboard the ATB barge while the ATB is underway, whether inside or outside the boundary line, include exemptions allowing the Master to defer the activity if he or she deems it to be unsafe. There is no situation in which a continuous watchstander is needed on an ATB barge while it is underway outside the boundary line.

4. Risk Assessment and Identification of Control Measures

As required by its charter, the Working Group conducted a risk assessment of ATB operations to identify issues for further consideration by the Working Group. In its wide-ranging discussion, which was not limited to the issue of crewmembers transiting to and working on board ATB barges, the Working Group identified the following potential hazards to personnel, vessels and cargo. It is important to note two things: first, that many of the hazards it identified are not unique to ATB operations; and second, that many of these risks are actively mitigated by existing Coast Guard policies and/or by control measures put in place by ATB operators, as discussed in more detail below.

- Risk of fall over water during crewmember transfers between the tug and the barge
- Risk of slips, trips and falls on or from the deck of the barge (not unique to ATB operations)
- Risk of fire on the barge when crewmembers are working on board the barge
- Risk of failure of equipment used by crewmembers to communicate between the barge and the tug
- Risk of inability to transfer between the tug and the barge in the event of an emergency on either vessel, including injury to a crewmember on board the barge
- Risk of inability to utilize lifesaving equipment to evacuate the barge in the event of an emergency

- Failure of tug-barge connection system
- Risk of cargo loss (not unique to ATB operations)

The Working Group also discussed the potential for failure of equipment on board the barge and failure of systems used to remotely monitor equipment on board the barge, but agreed that because delays or interruptions in the operation of equipment installed on board the barge do not affect the safety of the ATB, its cargo or its personnel, such failure does not present material risk.

Control Measures

ATB operators have put in place a variety of measures to address these risks, including policies and procedures included in and implemented as part of a vessel safety management system; crewmember training; and a variety of engineering controls based on the individual design characteristics of the ATB. These include, but are not limited to, gangways between the tug and the barge, elevated catwalks over piping and other equipment on the deck of the barge, barge handrails, and installed equipment including lifesaving and firefighting equipment. Many of these safety management system policies and procedures, and engineering controls have been implemented based on best practices and are not required by regulation.

The Working Group believes that the optimal mechanism to address many of the risks it has identified is a safety management system. Through the utilization and implementation of a safety management system, ATB operators can assess and identify measures to mitigate the specific hazards presented by the vessel combination, its cargo, its route and its other unique operating characteristics. Below are policies and procedures identified by the Working Group that it recommends to be included in ATB operators' safety management systems to address the identified risks.

- Affirmation of the authority of the Master/Person in Charge (PIC) to ensure crew and vessel safety
- Validation of the stop-work responsibility of each vessel crewmember
- Enumeration of the types of equipment installed on board the barge; how it is maintained and monitored; when, where and how it is operated; who may operate it and what their qualifications are
- Vessel-specific guidelines for the circumstances under which the Master can authorize crewmembers to board the barge These circumstances should include environmental factors, including the sea state and weather forecast; the necessity of the operation; the duration of the evolution; and the use of safety equipment. The Working Group also agreed that ATB operators should implement a risk assessment or job safety analysis to identify and implement control measures for crewmember transfers between the tug and the barge.

- Enumeration of the safety equipment, including lifesaving and firefighting equipment, required to be carried on board the barge. The determination of required safety equipment and qualifications of crewmembers designated to operate it should be vessel-specific and made in consideration of the vessel's design, manning, route, cargo, etc.
- Emergency response and evacuation procedures, including crewmember training
- Procedures for maintaining, monitoring and disconnecting the tug-barge coupling system and for emergency towing
- Identification of means of egress between the tug and the barge and vessel-specific procedures for crewmember access and safety equipment

The Working Group considered the means of egress between the tug and the barge, and various access arrangements that are utilized by ATB operators or in other segments of the international maritime industry. The Working Group found that, for existing ATBs, the diverse structural characteristics of each vessel combination makes retrofitting the vessels to modify the access arrangement extremely impracticable. The Working Group agreed that the best way to address hazards to crewmembers transiting between the tug and the barge is not for the Coast Guard to prescribe a specific access arrangement, but for operators to assess the risks of each ATB's unique access arrangement and to identify and implement risk mitigation measures.⁴

5. Gap Analysis and Policy Recommendations

As required by its charter, the Working Group conducted a gap analysis to identify disconnects between existing Coast Guard regulations and policies and current ATB design and operations.

CG-CVC Policy Letter 16-04 was based in large part on the preliminary risk assessment and gap analysis of the Working Group, as captured in its April 8, 2016 interim report. Its characterization of current ATB operations and establishment of criteria for unmanned ATB barges to be conditionally occupied has closed many gaps and provided a firm foundation from which OCMIs and ATB operators can work together to ensure the continued safety of ATB crewmembers. The Working Group agrees that if an ATB does not meet the criteria outlined in Section 7, Policy, of CG-CVC Policy Letter 16-04, and personnel are placed on board the barge, it should be considered as manned.

The Working Group reviewed and recommended further changes to Coast Guard guidance as described below in order to ensure a comprehensive and consistent update to the agency's ATB policy.

⁴ See Appendix 3 for photographic examples of ATB access arrangements and personnel protection measures.

NVIC 2-81, Change 1

The Working Group is in strong agreement that the term Dual Mode ITB as defined in NVIC 2-81, Change 1, is outdated and can be misleading. The Working Group recommends that the term Dual Mode ITB be replaced with the term ATB in all existing and future Coast Guard regulations, policy and guidance.

On June 20, 2016, the Coast Guard published a final rule to establish a towing vessel inspection regime at 46 CFR Subchapter M. As the Working Group reviewed NVIC 2-81, Change 1, it was observed that with towing vessels now subject to inspection, many of the review, certification and inspection procedures it prescribes will become redundant.

Enclosure 1, at 4.c., states, "Dual mode [ATB] units will be reviewed as separate vessels. The tug will be inspected only if it requires inspection under applicable statutes. [...] Similarly, the barge will be inspected only if it requires inspection under applicable statutes. Review of an inspected barge, however, will encompass the specially designed connection system, <u>including those system components on the tug</u>" (emphasis in the original). Until the publication of Subchapter M, the barge in an ATB combination was much more likely to require inspection than the tug.⁵ Now that the tug will, in all cases, be inspected, it is no longer necessary or practical for the connection system components on the tug to be encompassed in the review of the barge – principally because all of the critical components of the connection system are located on the tug.

As a result, the Working Group recommends that review, certification and inspection procedures and design guidance for ATB (again, a term synonymous with Dual Mode ITB) tugboats should be removed from NVIC 2-81, Change 1, and incorporated into Subchapter M implementation guidance. Once this change is effected, NVIC 2-81 will apply only to Pushing Mode ITBs. If this change cannot be effected expeditiously, the Working Group recommends that a Change 2 to NVIC 2-81 be promulgated to clearly distinguish and delineate guidance for ATBs from guidance for Pushing Mode ITBs and to ensure that ATB guidance is aligned with Subchapter M.

Load Line Policy Notes

The Working Group agrees that issuing Conditionally Occupied Barge Endorsements to unmanned ATB barges allows those barges to continue to qualify for a 25 percent freeboard reduction under Section 11.f.13(a) of the Load Line Policy Notes. **However, the Working Group recommends that the Load Line Policy Notes be amended to include a definition of conditionally occupied unmanned barges and the circumstances under which they may qualify for the reduced freeboard so that this is widely understood and consistently applied.** This definition can be found in Section 2, Application, of CG-CVC Policy Letter 16-04, and the criteria that must be met can be found in Section 7, Policy.

⁵ The Working Group recognizes that, for some ATBs, the tugboat is subject to inspection under Subchapter M but the accompanying barge is uninspected. The Working Group agrees that, if the criteria outlined in CG-CVC Policy Letter 16-04 are met, crewmembers of such ATBs should be permitted to conditionally occupy the barge.

Marine Safety Manual, Volumes II and III

The Working Group recommends that MSM, Vol. II, Section A, Chapter 3.H.2.i. be amended to add guidance for OCMIs issuing conditional occupancy endorsements to barges in addition to (but distinct from) existing guidance on permissive crewing. The Working Group also recommends that the sample Conditionally Occupied Barge Endorsements found in Section 9, Endorsements, of CG-CVC Policy Letter 16-04 be added to the section of the MSM, Vol. III, Annex that includes common COI/SMD sample endorsements.

The Working Group agrees that manning guidance for ATB tugs are more appropriately located in MSM, Vol. III, as opposed to Enclosure (1) to NVIC 2-81, Change 1. The July 2016 draft revisions to the MSM, Vol. III, should be further clarified to distinguish Pushing Mode ITBs from ATBs in Paragraph B2.G and to clarify that under Subchapter M, Paragraph B2.W is applicable to ATB tugs (unless it is a seagoing motor vessel >300 GRT).

Plan Review

The consensus of the Working Group is that the review and approval of ATB vessel plans by the Coast Guard Marine Safety Center, registered professional engineer, or authorized classification society should include consideration of whether the barge may be conditionally occupied and the means of egress between the tug and the barge, in coordination with the cognizant OCMI, the vessel operator and the third-party organization, if applicable.

Application for Inspection

The Working Group recommends that a description of the systems to be installed on an unmanned ATB barge should be a required element of its application for inspection, to assist OCMIs in understanding the basis for a Conditionally Occupied Barge Endorsement on the barge's COI; for the allowance of "other required crew," as necessary, on the accompanying tug's COI as specified by the tug's safety management system, if applicable, and in accordance with the service the tug is engaged in; and for identifying the necessary qualifications of those crew.

Other Regulatory and Policy Considerations

The Working Group agreed that the recommended revisions to Coast Guard policy should be executed in such a way as to minimize gaps or conflicts, particularly in instances where one policy document refers to another (i.e.: CG-CVC Policy Letter 16-04 and NVIC 2-81, Change 1).

The Working Group also identified 46 CFR Subchapter W, Lifesaving Appliances and Arrangements, and NVIC 03-05, which provides guidance on the implementation of the IBC Code, as Coast Guard policies that merit review and may require revision to eliminate potential inconsistencies in the treatment of manned and unmanned barges. The Working Group also

discussed the need to ascertain the impact of any changes to Coast Guard regulations and policy on classification society requirements.

The following is a list of Coast Guard regulations, policy and guidance, some of which are addressed above, that may also warrant further review and clarification:

- CG-5P message, R202300Z JAN 15, ARTICULATED TUG-BARGE (ATB) OPERATIONS
- 46 USC §8101 Complement of Inspected Vessels
- 46 USC §8703 Tankermen on Tank Vessels
- Preamble, Final Rule on Sea Going Barges, 78 FR 53285, September 30, 2013
- 46 CFR Chapter I, Subchapter D Tanks Vessels
- 46 CFR §10.107 Definitions in Subchapter B.
- 46 CFR §11.211 Creditable service and equivalents for national and STCW officer endorsements.
- 46 CFR §13.121 Courses for tankerman endorsements.
- 46 CFR §13.127(c) Service: General.
- 46 CFR §15.501 Certificate of inspection.
- 46 CFR §31.15-1 Officers and crews TB/ALL.
- 46 CFR §31.15-5 Tank barges B/ALL.
- 46 CFR §32.02-10 Rails TB/ALL.
- 46 CFR §32.53-5 Operation T/ALL. (as applicable to tank vessels with IGS)
- 46 CFR §35.01-15 Carriage of persons other than crew TB/ALL.
- 46 CFR Chapter I, Subchapter W Lifesaving Appliances and Arrangements
- Maritime Labour Convention, 2006 (as applicable to any requirements for manning on a barge that may call upon a signatory country)

Tug Name	Barge	Operated By	Coupling System	Type of Barge
Ken Boothe Sr.	SeaJon Enterprise	American Steamship Company		bulk cargo
Karen Andrie	Endeavour	Andrie Inc.	JAK	tank barge
Samuel de Champlain	Innovation	Andrie Inc.	Bludworth	bulk cargo
GL Ostrander	Integrity	Andrie Inc.	Bludworth	bulk cargo
Spartan	Spartan II	Andrie Inc.	Bludworth	tank barge
Danielle M. Bouchard	No. 245	Bouchard Transportation Co., Inc.	Intercon	tank barge
Brendan J. Bouchard	B-215	Bouchard Transportation Co., Inc.	Intercon	tank barge
Buster Bouchard	B-155	Bouchard Transportation Co., Inc.	Intercon	tank barge
Marion C. Bouchard	B-165	Bouchard Transportation Co., Inc.	Intercon	tank barge
Capt. Fred Bouchard	B-275	Bouchard Transportation Co., Inc.	Intercon	tank barge
Jane A. Bouchard	B-225	Bouchard Transportation Co., Inc.	Intercon	tank barge
Morton S. Bouchard IV	B-242	Bouchard Transportation Co., Inc.	Intercon	tank barge
Linda Lee Bouchard	B-205	Bouchard Transportation Co., Inc.	Intercon	tank barge
Bouchard Girls	B-195	Bouchard Transportation Co., Inc.	Intercon	tank barge
Rhea I. Bouchard	B-280	Bouchard Transportation Co., Inc.	Intercon	tank barge
Robert J. Bouchard	B-185	Bouchard Transportation Co., Inc.	Intercon	tank barge
J. George Betz	B-235	Bouchard Transportation Co., Inc.	Intercon	tank barge
Ellen S. Bouchard	B-282	Bouchard Transportation Co., Inc.	Intercon	tank barge
Barbara E. Bouchard	B-240	Bouchard Transportation Co., Inc.	Intercon	tank barge
Ralph E. Bouchard	B-230	Bouchard Transportation Co., Inc.	Intercon	tank barge
Evening Star	B-250	Bouchard Transportation Co., Inc.	Intercon	tank barge
Denise A. Bouchard		Bouchard Transportation Co., Inc.	Intercon	tank barge
Kim M. Bouchard	B-270	Bouchard Transportation Co., Inc.	Intercon	tank barge
Donna J. Bouchard	B-272	Bouchard Transportation Co., Inc.	Intercon	tank barge
Morton S. Bouchard, Jr.		Bouchard Transportation Co., Inc.	Intercon	tank barge
Frederick E. Bouchard		Bouchard Transportation Co., Inc.	Intercon	tank barge
Sam B		Brice, Inc.	Anticouple	deck barge
Sea Reliance	550-1	Crowley Maritime Corporation	Intercon	tank barge
Ocean Reliance	550-2	Crowley Maritime Corporation	Intercon	tank barge
Sound Reliance	550-3	Crowley Maritime Corporation	Intercon	tank barge

Tug Name	Barge	Operated By	Coupling System	Type of Barge
Coastal Reliance	550-4	Crowley Maritime Corporation	Intercon	tank barge
Pacific Reliance	650-1	Crowley Maritime Corporation	Intercon	tank barge
Gulf Reliance	650-2	Crowley Maritime Corporation	Intercon	tank barge
Resolve	650-3	Crowley Maritime Corporation	Intercon	tank barge
Commitment	650-4	Crowley Maritime Corporation	Intercon	tank barge
Courage	650-5	Crowley Maritime Corporation	Intercon	tank barge
Integrity	650-6	Crowley Maritime Corporation	Intercon	tank barge
Pride	650-7	Crowley Maritime Corporation	Intercon	tank barge
Achievement	650-8	Crowley Maritime Corporation	Intercon	tank barge
Innovation	650-9	Crowley Maritime Corporation	Intercon	tank barge
Vision	650-10	Crowley Maritime Corporation	Intercon	tank barge
Legacy	750-1	Crowley Maritime Corporation	Intercon	tank barge
Legend	750-2	Crowley Maritime Corporation	Intercon	tank barge
Liberty	750-3	Crowley Maritime Corporation	Intercon	tank barge
Baltimore	EMI 1850	Express Marine, Inc.	JAK	bulk cargo
Freedom	EMI 2400	Express Marine, Inc.	JAK	bulk cargo
Strong	American	Foss Maritime Company	Artubar	ro-ro barge
Thunder	Lightning	Foss Maritime Company	Bludworth	ro-ro barge
Douglas B. Mackie	Ellis Island	Great Lakes Dredge & Dock Co., LLC	Articouple	dredge barge*
Dale R. Lindsay	Petro Mariner	Harley Marine	Articouple	tank barge
Emery Zidell	Dr. Robert Beall	Harley Marine	Articouple	tank barge
Jake Shearer	Fight Fanconi Anemia	Harley Marine	Articouple	tank barge
Barry Silverton	Fight ALS	Harley Marine	Articouple	tank barge
Gulf Venture	Gulf Carrier	Harley Marine	Intercon	tank barge
Bill Gobel	OneDream	Harley Marine	Articouple	tank barge*
Min Zidell	Zidell 277	Harley Marine	Articouple	tank barge*
Dorothy Ann	Pathfinder	Interlake Steamship Company	Bark River	bulk cargo
Island Monarch	Island Trader	Island Tug & Barge Ltd.	Intercon	tank barge
Adriatic Sea	DBL 77	Kirby Offshore Marine	JAK	tank barge
Beaufort Sea	DBL 76	Kirby Offshore Marine	JAK	tank barge

Tug Name	Barge	Operated By	Coupling System	Type of Barge
Java Sea	DBL 78	Kirby Offshore Marine	JAK	tank barge
Greenland Sea	DBL 82	Kirby Offshore Marine	JAK	tank barge
Tasman Sea	DBL 103	Kirby Offshore Marine	JAK	tank barge
Pacific Wolf	DBL 55	Kirby Offshore Marine	JAK	tank barge
Rebel	DBL 102	Kirby Offshore Marine	JAK	tank barge
	DBL 105	Kirby Offshore Marine	JAK	tank barge
McKinley Sea	DBL 101	Kirby Offshore Marine	JAK	tank barge
Norwegian Sea	DBL 81	Kirby Offshore Marine	JAK	tank barge
Lincoln Sea	DBL 140	Kirby Offshore Marine	Intercon	tank barge
Bering Sea	DBL 22, DBL 24,	Kirby Offshore Marine	JAK	tank barge
	DBL 26, DBL 29			
Davis Sea	DBL 27	Kirby Inland Marine	JAK	tank barge
Labrador Sea	DBL 22, DBL 24,	Kirby Offshore Marine	JAK	tank barge
	DBL 26, DBL 29			
Tarpon	DBL 104	Kirby Offshore Marine	JAK	tank barge
Viking	DBL 134	Kirby Offshore Marine	JAK	tank barge
Bismarck Sea	DBL 106	Kirby Offshore Marine	JAK	tank barge
	DBL 54	Kirby Offshore Marine	JAK	tank barge
Dublin Sea	DBL 185	Kirby Offshore Marine	Intercon	tank barge
Sea Eagle	TMI 17	Kirby Offshore Marine	Bludworth	tank barge
Sea Raven	ATC 23	Kirby Offshore Marine	Bludworth	tank barge
Sea Hawk	ATC 21	Kirby Offshore Marine	Bludworth	tank barge
Osprey	ATC 25	Kirby Offshore Marine	Intercon	tank barge
Amberjack	Biscayne	Kirby Offshore Marine	Bludworth	tank barge
Eliza	Atlantic	Kirby Offshore Marine	Intercon	tank barge
Lucia	Caribbean	Kirby Offshore Marine	Intercon	tank barge
Teresa	Acadia	Kirby Offshore Marine	Intercon	tank barge
Julie	Yucatan	Kirby Offshore Marine	Intercon	tank barge
Valiant	Everglades	Kirby Offshore Marine	Bludworth	tank barge
Capt. Hagen	Key West	Kirby Offshore Marine	Intercon	tank barge

Tug Name	Barge	Operated By	Coupling System	Type of Barge
Skipjack	Penn 91	Kirby Offshore Marine	JAK	tank barge
Coho	Penn 92	Kirby Offshore Marine	JAK	tank barge
Yellowfin	Penn 110	Kirby Offshore Marine	JAK	tank barge
Bluefin	Penn 80	Kirby Offshore Marine	JAK	tank barge
Mako	Penn 81	Kirby Offshore Marine	JAK	tank barge
Nancy Peterkin	KIRBY 185-01	Kirby Offshore Marine	Intercon	tank barge
Tina Pyne	KIRBY 185-02	Kirby Offshore Marine	Intercon	tank barge
Heath Wood	KIRBY 155-01	Kirby Offshore Marine	Intercon	tank barge
Paul McLernan	KIRBY 155-02	Kirby Offshore Marine	Intercon	tank barge
Jason E. Duttinger	Winna Wilson	Kirby Ocean Transport	Intercon	bulk cargo
Capt. Donald Lowe Sr.	Margo Dale	Kirby Ocean Transport	Intercon	bulk cargo
Orion	Poseidon	Martin Midstream Partners	Bludworth	tank barge
Martin Explorer	Margaret Sue	Martin Midstream Partners	Bludworth	tank barge
Texan	Ponciana	Martin Midstream Partners	Bludworth	tank barge
LaForce	M6000	Martin Midstream Partners	Bludworth	tank barge
Paul T. Moran	Massachusetts	Moran Towing Corporation	Bludworth	tank barge
Barney Turecamo	Georgia	Moran Towing Corporation	Intercon	tank barge
Scott Turecamo	New Hampshire	Moran Towing Corporation	Intercon	tank barge
Pati R. Moran	Charleston	Moran Towing Corporation	Intercon	tank barge
Linda Moran	Houston	Moran Towing Corporation	Intercon	tank barge
Lois Ann L. Moran	Philadelphia	Moran Towing Corporation	Intercon	tank barge
Mary Ann Moran	Virginia	Moran Towing Corporation	Intercon	bulk cargo
Mariya Moran	Texas	Moran Towing Corporation	Intercon	tank barge
Leigh Ann Moran		Moran Towing Corporation	Intercon	tank barge
Barbara Carol Ann		Moran Towing Corporation	Intercon	tank barge
Moran				
OSG Columbia	OSG 242	OSG Ship Management, Inc.	Bludworth	tank barge
OSG Courageous	OSG 244	OSG Ship Management, Inc.	Intercon	tank barge
OSG Endurance	OSG 192	OSG Ship Management, Inc.	Intercon	tank barge
OSG Enterprise	OSG 214	OSG Ship Management, Inc.	Bludworth	tank barge

Tug Name	Barge	Operated By	Coupling System	Type of Barge
OSG Honour	OSG 209	OSG Ship Management, Inc.	Bludworth	tank barge
OSG Horizon	OSG 351	OSG Ship Management, Inc.	Intercon	tank barge
OSG Independence	OSG 243	OSG Ship Management, Inc.	Bludworth	tank barge
OSG Intrepid	OSG 254	OSG Ship Management, Inc.	Intercon	tank barge
OSG Navigator	OSG 252	OSG Ship Management, Inc.	Intercon	tank barge
OSG Vision	OSG 350	OSG Ship Management, Inc.	Intercon	tank barge
Pere Marquette	Pere Marquette #41	Port City Marine Services	Custom	bulk cargo
Bradshaw McKee	St. Mary's Challenger	Port City Marine Services	Bludworth	bulk cargo
Prentiss Brown	St. Mary's Conquest	Port City Tug, Inc.	Bludworth	bulk cargo
Defiance	Ashtabula	Rand Logistics/Grand River Navigation	Bludworth	bulk cargo
Invincible		Rand Logistics/Grand River Navigation	Bludworth	bulk cargo
Victory	James L. Kuber	Rand Logistics/Grand River Navigation	Hydraconn	bulk cargo
Olive L. Moore	Lewis J. Kuber	Rand Logistics/Grand River Navigation	Hydraconn	bulk cargo
Dace Reinauer		Reinauer Transportation	JAK	tank barge
Joanne Reinauer		Reinauer Transportation	JAK	tank barge
Lucy Reinauer		Reinauer Transportation	JAK	tank barge
Timothy Reinauer	RTC 104	Reinauer Transportation	Intercon	tank barge
Craig Eric Reinauer	RTC 502	Reinauer Transportation	Intercon	tank barge
Morgan Reinauer	RTC 101	Reinauer Transportation	Intercon	tank barge
Austin Reinauer	RTC 100	Reinauer Transportation	Intercon	tank barge
Stephen Reinauer		Reinauer Transportation	JAK	tank barge
Nicole Leigh Reinauer	RTC 135	Reinauer Transportation	Intercon	tank barge
Christian Reinauer	RTC 145	Reinauer Transportation	Intercon	tank barge
Meredith Reinauer	RTC 150	Reinauer Transportation	Intercon	tank barge
Ruth M. Reinauer	RTC 102	Reinauer Transportation	Intercon	tank barge
Laurie Ann Reinauer	RTC 103	Reinauer Transportation	Intercon	tank barge
Reinauer Twins	RTC 105	Reinauer Transportation	Intercon	tank barge
B Franklin Reinauer		Reinauer Transportation	JAK	tank barge
Curtis Reinauer		Reinauer Transportation	JAK	tank barge
Dean Reinauer	RTC 106	Reinauer Transportation	Intercon	tank barge

Tug Name	Barge	Operated By	Coupling System	Type of Barge
Haggerty Girls		Reinauer Transportation	JAK	tank barge
Dylan Cooper		Reinauer Transportation	Intercon	tank barge
Dillon		Reinauer Transportation	Intercon	tank barge
Gracie M.		Reinauer Transportation	Intercon	tank barge
Sea Power	Sea Chem I	Seabulk Tankers		tank barge
USS Freeport	Chemical Transporter	U.S. Shipping Corp.	Intercon	tank barge
Galveston	Petrochem Producer	U.S. Shipping Corp.	Intercon	tank barge
Brownsville	Petrochem Trader	U.S. Shipping Corp.	Intercon	tank barge
Corpus Christi		U.S. Shipping Corp.	Intercon	tank barge
Naida Ramil	Peggy Palmer	United Maritime Group	Bludworth	bulk cargo
Sharon DeHart	Doris Guenther	United Maritime Group	Bludworth	bulk cargo
Janis Guzzle	Marie Flood	United Maritime Group	Artubar	bulk cargo
Betty Wood	Pat Cantrell	United Maritime Group	Artubar	bulk cargo
Joseph H. Thompson Jr.	Joseph H. Thompson	Upper Lakes Towing		bulk cargo
Joyce L. Van Enkevort	Great Lakes Trader	Van Enkevort Tug & Barge	Hydroconn	bulk cargo
Houma		Vane Brothers Company	JAK	tank barge
Brandywine	Double Skin 141	Vane Brothers Company	Intercon	tank barge
Christiana	Double Skin 143	Vane Brothers Company	Intercon	tank barge
Trafalgar	Iguanna I	Waller Marine	Intercon	tank barge
Victory	Iguanna II	Waller Marine	Intercon	tank barge

ATBs



Crowley Maritime Corporation: Legend/750-2



Kirby Offshore Marine: Dublin Sea/DBL-185



Port City Marine Services: Bradshaw McKee/St. Mary's Challenger



Express Marine Inc.: Freedom/EMI-2400



Foss Maritime Company: Thunder/Lightning

Specifications and Arrangements



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Crowley Maritime Corporation: 650 Class General Arrangement



Crowley Maritime Corporation: 650 Class Tank Layout



Kirby Offshore Marine: 185,000 Bbl Deck Layout



Port City Marine Services: Bradshaw McKee

ATB Coupling Systems

Intercon Coupler



Crowley Maritime Corporation





An intercom coupler consists of a pair of port and starboard rams, which are installed in a structural support module on the tug. Each ram has a toothed "helmet" at the outboard end that engages a continuous track of teeth on the barge notch wall, thus establishing a transverse, fixed horizontal axis about which the tug can pitch independently of the barge. Onboard the barge, each side of the notch wall has a series of toothed castings vertically arrayed over a span representing the range of possible connection points between the tug and the barge. The tooth pattern on the notch matched the tooth pattern on the tug, allowing for unlimited choices of draft on either vessel.

JAK



Express Marine, Inc.: EMI-2400 JAK Pin Receptacles



Express Marine, Inc.: EMI-1850 JAK Pin Receptacles



Express Marine, Inc.: JAK Pin on Port Side



Express Marine, Inc.: JAK Pin on Starboard Side

<u>Bludworth</u>



Port City Marine Services: St. Mary's Challenger Notch

ATB Barge Equipment



Kirby Offshore Marine: DBL-140 Inert Gas System



Crowley Maritime Corporation: 650 Class Starboard Manifold Area



Kirby Offshore Marine: Dublin Sea/DBL-185 access platforms



Reinauer Transportation Company: Gangway



Grand River Navigation Company: Gangway and safety net





OSG Ship Management, Inc.: OSG Vision/OSG-350



OSG Ship Management, Inc.: OSG Navigator/OSG-252 showing starboard side of the notch in ballast condition, no cargo. This is the embarkation area from the tug to the barge. Visible are the pigeon holes used in the ballast condition. The upper walkway is used to step from tug to barge when loaded.



OSG Ship Management, Inc.: OSG Intrepid/OSG-254 access (trunk deck barge)



OSG Ship Management, Inc.: OSG Endurance/OSG-192 access (ballast condition)



Great Lakes Dredge & Dock Co., LLC: Fall arrest gear installed under barge coamings on pigeon hole ladders



Great Lakes Dredge & Dock Co., LLC: Fall arrest gear installed on scow pigeon hole ladders



Great Lakes Dredge & Dock Co., LLC: Fall arrest lanyard retrieved with boat hook from tug deck



Great Lakes Dredge & Dock Co., LLC: Accessing pocket ladder via tug forward access platform



Great Lakes Dredge & Dock Co., LLC: Accessing scow via tug port side access area



Great Lakes Dredge & Dock Co., LLC: Change over to Safe Right static line system while maintaining attachment