

Fire Aboard Construction Barge *Athena 106*  
West Cote Blanche Bay, Louisiana  
October 12, 2006



ACCIDENT REPORT

NTSB/MAR-07/01  
PB2007-916401



**National  
Transportation  
Safety Board**



# Marine Accident Report

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**NTSB/MAR-07/01  
PB2007-916401  
Notation 7856B  
Adopted June 14, 2007**



**National Transportation Safety Board  
490 L'Enfant Plaza, S.W.  
Washington, D.C. 20594**

**National Transportation Safety Board. 2007. Fire Aboard Construction Barge *Athena 106*, West Cote Blanche Bay, Louisiana, October 12, 2006. Marine Accident Report NTSB/MAR-07/01. Washington, DC.**

**Abstract:** This report discusses the accident in which a 5-ton spud (mooring shaft) unintentionally released from the uninspected construction barge *Athena 106* and struck a natural gas pipeline buried in West Cote Blanche Bay, Louisiana. The *Athena 106* and another barge were both being pushed by the towing vessel *Miss Megan*. The gas ignited and created a fireball that engulfed the *Miss Megan* and both barges. Five people were killed and two survived; one barge worker was officially listed as missing as of the report date. Damages were estimated at \$150,000 for the *Athena 106* and \$650,000 for the *Miss Megan*. The estimated value of the released natural gas was \$6,800; replacing the ruptured pipeline cost an estimated \$800,000.

The National Transportation Safety Board identified the following safety issues during its accident investigation: the failure to use safety devices, and the limited oversight of vessels not subject to inspection.

On the basis of its findings, the Safety Board made recommendations to the Occupational Safety and Health Administration, the U.S. Coast Guard, Athena Construction (*Athena 106* owner/operator), and Central Boat Rentals (*Miss Megan* owner/operator).

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## Acronyms and Abbreviations

<b>CFR</b>	<i>Code of Federal Regulations</i>
<b>MACOSH</b>	Maritime Advisory Committee for Occupational Safety and Health
<b>OSHA</b>	Occupational Safety and Health Administration
<b>psig</b>	pounds per square inch, gauge
<b>SCADA</b>	Supervisory Control and Data Acquisition

## Executive Summary

About 1155 central daylight time on Thursday, October 12, 2006, the uninspected towing vessel *Miss Megan* was pushing two deck barges in the West Cote Blanche Bay oil field in Louisiana, en route to a pile-driving location. Barge *Athena 106* was tied along the port side of barge *IBR 234*. The *Miss Megan* was secured astern of *IBR 234*, pushing both barges. The *Miss Megan* was crewed by a licensed master and a deckhand. The construction barge had six workers on board, consisting of one foreman, one crane operator, and four barge hands. While the vessels were under way, the aft spud (a 5-ton steel shaft used as a mooring device) on the *Athena 106* released from its fully raised position. The spud dropped into the water and struck a submerged, buried high-pressure natural gas pipeline. The resulting gas release ignited and created a fireball that engulfed the towing vessel and both barges. The master of the towing vessel was killed, along with four barge workers. The *Miss Megan* deckhand and one barge worker survived. One barge worker is officially listed as missing.

The National Transportation Safety Board determines that the probable cause of the accident was Athena Construction's failure to require its crews to pin the spuds securely in place on its barges, which allowed the sudden, unintentional release of the *Athena 106*'s aft spud, rupturing a buried pipeline and causing natural gas to surface and ignite. Contributing to the accident was the failure of Central Boat Rentals to require, and of the *Miss Megan* master to ensure, that the barge spuds were securely pinned before getting under way.

The Safety Board's investigation of this accident identified the following safety issues:

- Failure to use safety devices.
- Limited oversight of vessels not subject to inspection.

As a result of its investigation, the Safety Board makes recommendations to the Occupational Safety and Health Administration, the U.S. Coast Guard, Athena Construction, and Central Boat Rentals.



# Factual Information

## Synopsis

On Thursday, October 12, 2006, about 1155 central daylight time,<sup>1</sup> the uninspected towing vessel *Miss Megan*, owned and operated by Central Boat Rentals, Inc., of Morgan City, Louisiana, was pushing two uninspected deck barges through the West Cote Blanche Bay oil field in St. Mary Parish, Louisiana (figure 1).<sup>2</sup> The tow was en route to a pile-driving site in the northwest area of the oil field. Construction barge *Athena 106* (also known as a spud barge), owned and operated by Athena Construction of Morgan City, was tied along the port side of an unmanned deck barge, the *IBR 234*, owned by Inland Barge Rentals of Berwick, Louisiana. The *Miss Megan* was secured astern of the *IBR 234*, pushing both barges. The oil field was operated by Gulfport Energy Corporation. A natural gas pipeline that was involved in the accident was operated by Chevron U.S.A., Inc.

The *Miss Megan* was crewed by one licensed master and one deckhand. The *Athena 106* had six workers on board—a foreman, a crane operator, and four barge hands. While the construction barge was under way, the aft spud (a vertical steel shaft extending through a well in the bottom of the boat and used for mooring) dropped from its fully raised position. The steel spud was 20 inches square, had an overall length of 40 feet, and weighed 10,900 pounds.<sup>3</sup> Spuds, rather than anchors, are used to hold deck barges in place during marine construction work (anchor chains would allow the barges to swing). Two spuds are required to keep a barge stationary.

The spud dropped into the water and struck a submerged, buried high-pressure natural gas pipeline. An unknown source ignited the resulting gas release, creating a fireball that engulfed the towing vessel and both barges. The *Miss Megan* master was killed, as were four barge workers. One barge worker and the *Miss Megan* deckhand survived. One barge worker was officially listed as missing at the time of this report.

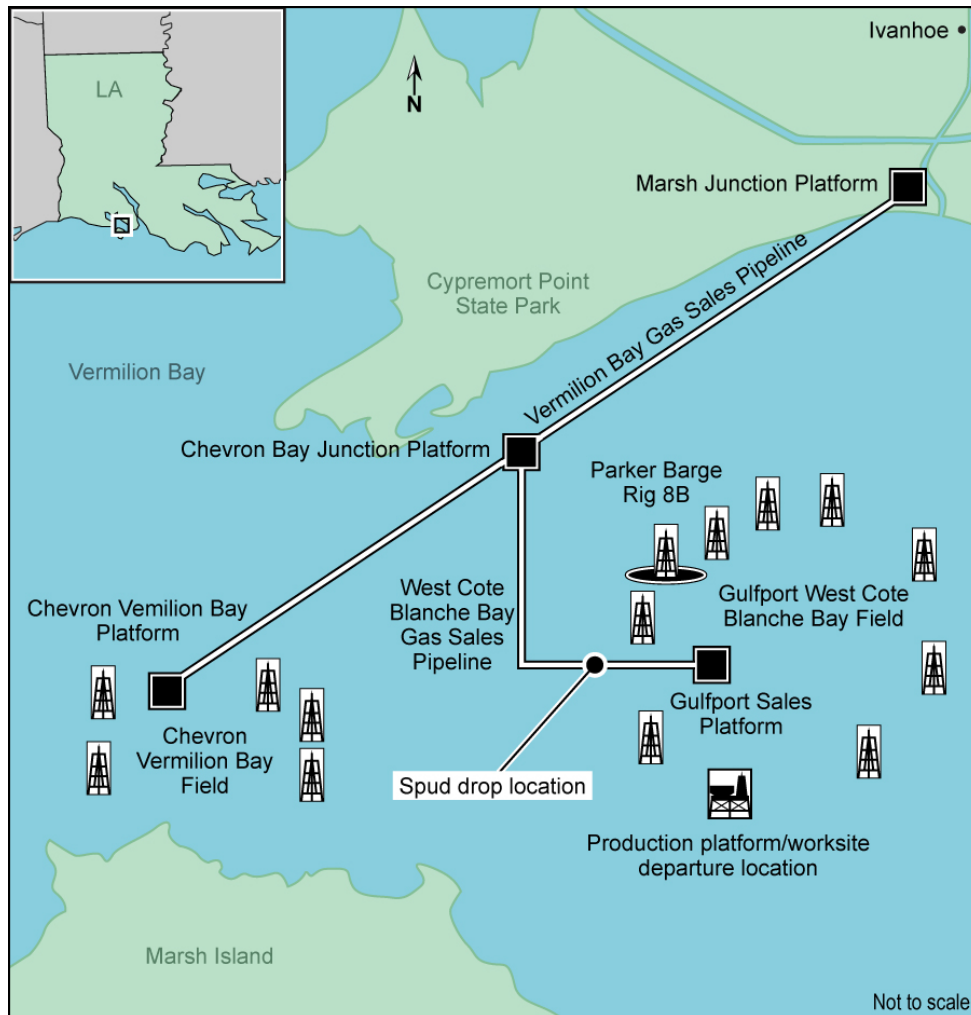
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<sup>1</sup> Times in this report are given in central daylight time according to the 24-hour clock.

<sup>2</sup> A deck barge is a manned or unmanned barge that has a continuous, flat main deck. Deck barges are employed to carry deck cargo and are also used in the marine construction industry for such work as pier or bulkhead construction, dredging, and marine oil service. Deck barges that operate on inland waters are uninspected by the U.S. Coast Guard.

Coast Guard regulations contain a category called “uninspected vessels,” which includes towing vessels like the *Miss Megan* that are subject to certain regulations, such as those concerning lifesaving apparatus, but that are not subject to Coast Guard inspection. This report uses “uninspected” to refer both to vessels that are regulated but not inspected (the *Miss Megan*) and those that do not fall under the regulations for uninspected vessels (the deck barges).

<sup>3</sup> The aft spud was weighed on a calibrated crane scale at the Athena Construction facility after the accident.

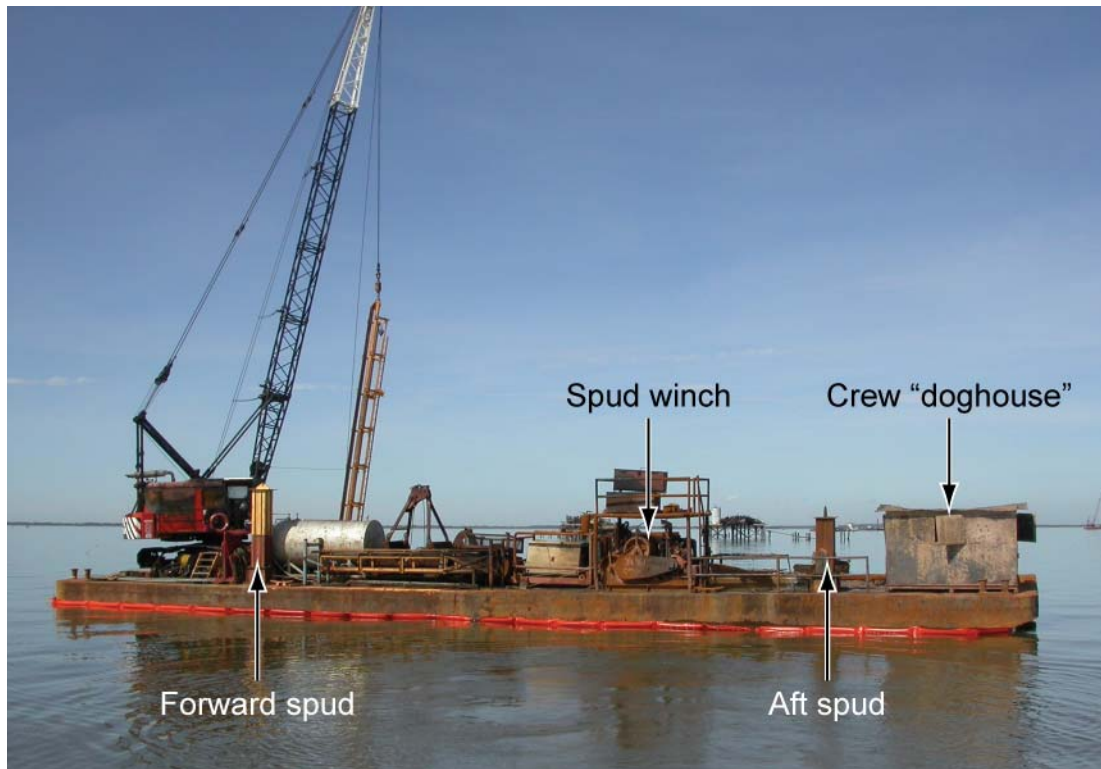


**Figure 1.** Site where construction barge *Athena 106* dropped a 5-ton mooring spud on the West Cote Blanche Bay natural gas sales pipeline. The pipeline carried excess natural gas from the Gulfport sales platform (where extracted natural gas was processed and injected back into oil-producing wells to aid in oil production) to a junction with Chevron’s Vermilion Bay gas sales pipeline. The pipeline between the Gulfport sales platform and the Chevron bay junction platform was about 19,650 feet long. The pipeline between the Vermilion Bay platform and the bay junction platform was about 32,300 feet long.

## Accident Narrative

The day of the accident began uneventfully, according to the operator of the winch that controlled the two spuds on the *Athena 106* (figure 2). The spud winch operator stated that between 0800 and 0830 that morning, he and the other crewmembers (a foreman, a crane operator, and three other barge hands) boarded a crew transport boat docked at Ivanhoe, Louisiana, for the 30-minute trip to the *Athena 106* barge. When they arrived at the *Athena 106*, the crewmembers set about their daily routine. They were scheduled to

extract (pull) pilings that morning until a towboat arrived to push them to their next work location in the same oil field, where they were scheduled to drive (install) pilings around an oil field rig (Parker barge rig 8B).

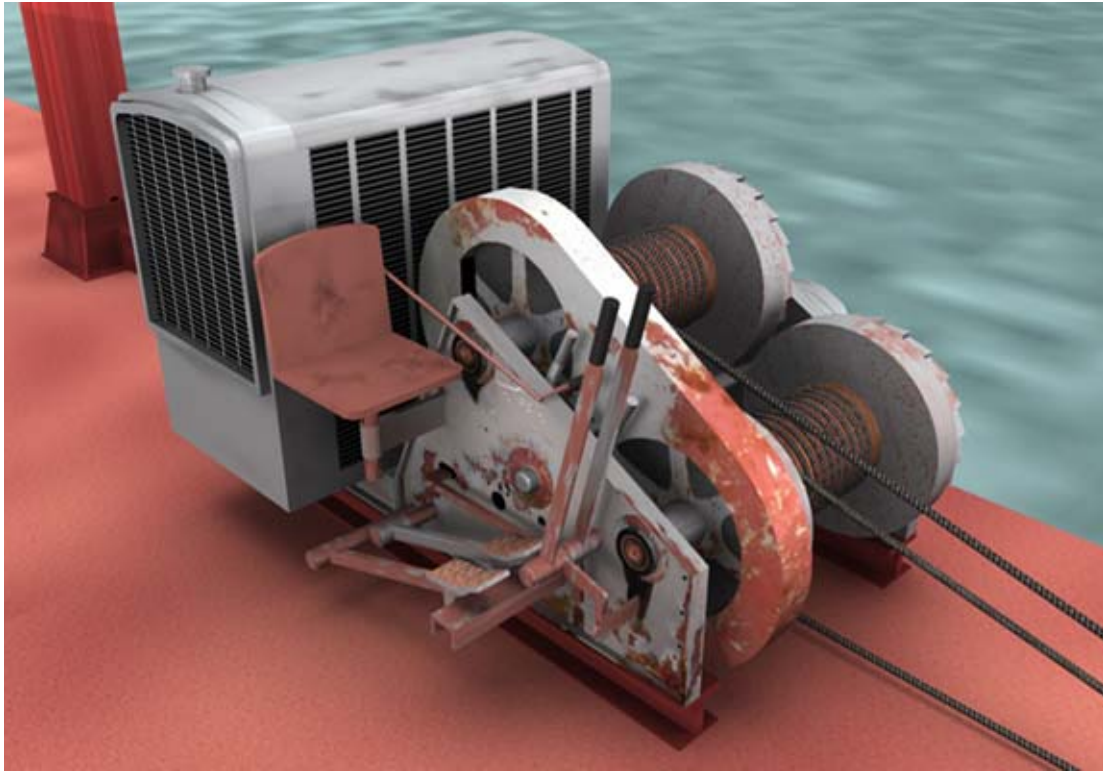


**Figure 2.** *Athena 106* after the fire. The construction barge was equipped with two mooring spuds (shown in the lowered position), both on the port side, one forward and one aft, controlled by a single winch. At the front of the barge was the crane used to hoist and position pilings for driving or to maneuver them to a barge alongside for storage.

The spud winch operator's first duties of the day included checking the diesel and oil levels on the barge crane, checking the barge's air compressor, and checking the oil level in the spud winch gearcase as well as the general condition of the winch. Both spuds were raised and lowered by a single winch equipped with two steel cables, each wound around a drum and attached to one of the spuds (figure 3).<sup>4</sup> The spud winch operator said that he would periodically adjust the winch's foot brakes, which were used to control the speed of the winch drums as they raised or lowered the spuds. He said that on the day of the accident, the foot brakes "felt fine" and did not need adjusting. He stated that he also checked the condition of the spud-lifting cables daily. Both spud winch cables had been

<sup>4</sup> See "Spud Winch Information" section for detailed explanations and illustrations of the spud winch apparatus.

replaced 2 months before the accident, according to documentation provided by the Athena Construction maintenance supervisor.



**Figure 3.** Computer-generated image of a spud winch unit. The spud-lifting cables are wound on the drums to the left of the operator's seat. The winch's foot brakes are below and forward of the seat.

After completing the morning checks, the *Athena 106* crew began extracting pilings. The *IBR 234* was secured alongside the *Athena 106* to store the extracted pilings (figure 4). The barge also housed new pilings that would be driven later.

The extraction work continued until about 1130, when the towboat *Miss Megan* arrived and was secured to the aft end of the *IBR 234* in preparation for propelling the two barges to their next work location (figure 5). While the towboat master and deckhand made fast to the barges, the barge crew stopped its work of extracting pilings.

The *Athena 106* spud winch operator, at the barge foreman's direction, then retracted both spuds to release the barges from their anchorage. The operator said that he encountered no problems with the winch in lifting the spuds. He set the foot brake for each spud drum on the winch to lock the spuds in their fully retracted (lifted) position for the transit to the next work location. The operator said that although the winch was equipped with other safeguards to prevent the unintentional release of a spud, the foot brakes were the only holding or braking mechanism engaged for the transit.



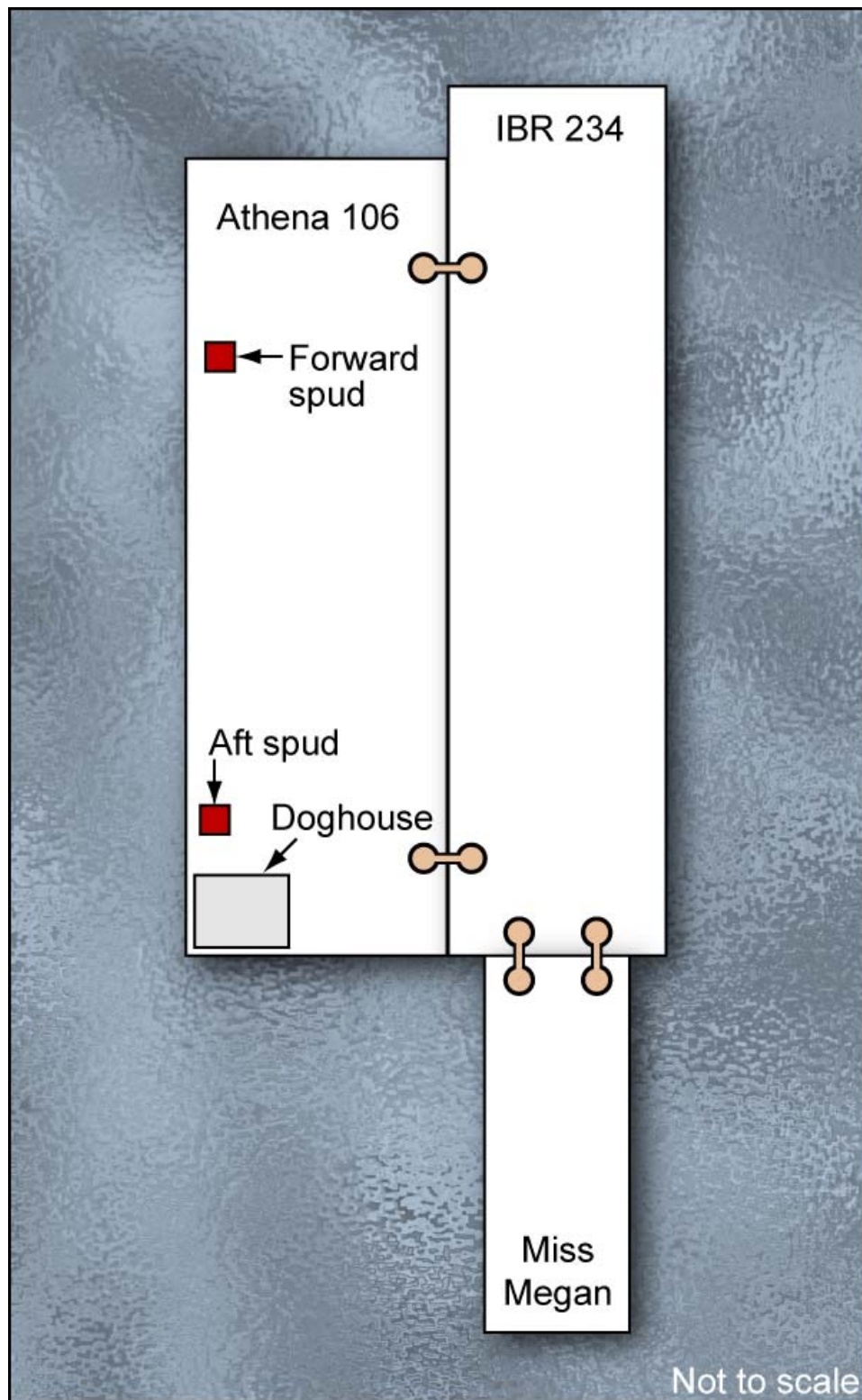
**Figure 4.** Barge *IBR 234* loaded with pilings (being pushed by the *Miss Megan*).

After the towboat was in position for the transit and the *Athena 106*'s spuds were retracted, the barge crew began assembling for lunch in the crew shelter, which they called the "doghouse." The crewmembers heated their lunch in a microwave oven connected by an extension cord to a small portable generator on the deck. The generator also powered a cooling fan in the doghouse.

The *Miss Megan* master got the towboat under way about 1145. The deckhand then joined the barge crew in the doghouse for lunch. The *Athena 106* spud winch operator said that he and the other three barge hands removed their work vest flotation devices while they ate lunch in the doghouse, as was customary. The towboat deckhand, still wearing his work vest, stood outside the doghouse door to chat while the barge hands ate lunch inside. The deckhand said that neither the barge crane operator nor the foreman was in the doghouse during that time. At some point while the spud winch operator and the other barge hands were eating, one barge hand left the doghouse, leaving the spud winch operator and two barge hands inside and the towboat deckhand standing outside the door.

After finishing his meal, the *Athena 106* spud winch operator called his mother on his cell phone from the doghouse. He said that during the conversation, he heard a large "bam" outside. He estimated that the *Athena 106* had been under way, pushed by the *Miss Megan*, for 8 to 10 minutes. When he heard the noise, he looked out the doghouse door and saw that the aft spud had released and dropped to its fully deployed (down) position.

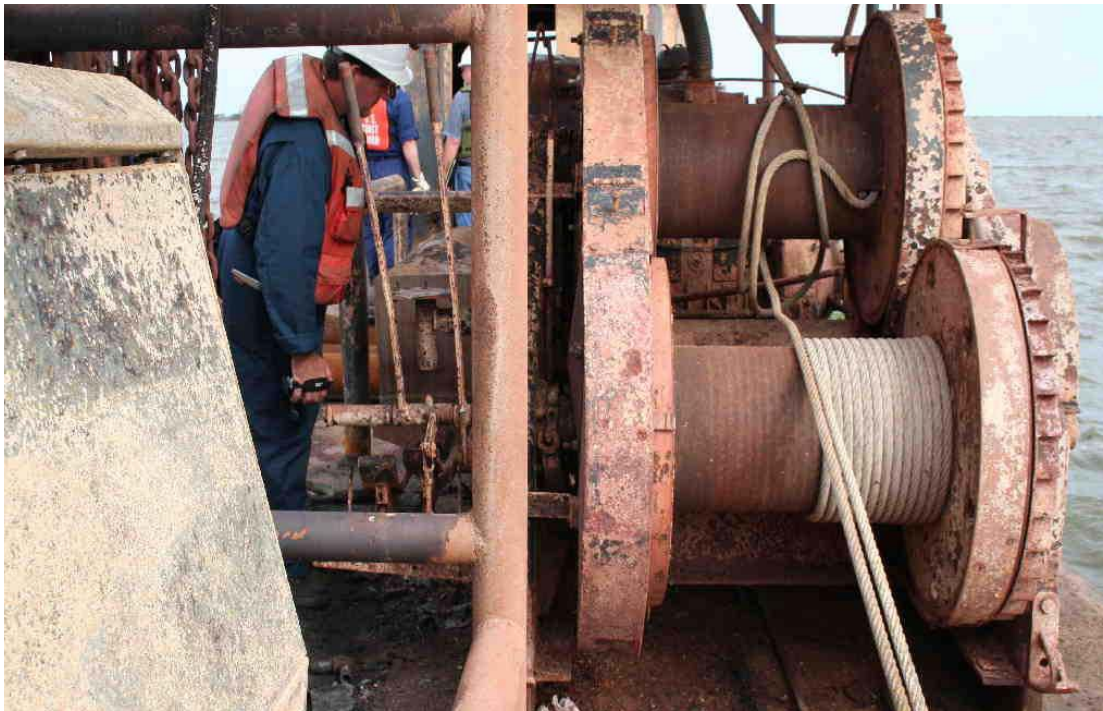




**Figure 5.** Towing arrangement of the *Miss Megan* and the two barges. The barges were tied together, with the *Miss Megan* secured to the aft end of the *IBR 234* and pushing both barges.

The spud winch operator told investigators that he had felt the barge stop, “like the towboat stopped,” before the spud dropped but that he had paid “no attention” because “that’s been known to happen out there . . . the water’s shallow.”<sup>5</sup> Unbeknownst to the crewmembers, the spud had struck a high-pressure natural gas pipeline buried in the bay immediately below them.

The spud winch operator said that he wondered what had caused the spud to drop, looked at the winch, and saw no one near it who might have accidentally released the brake. He noticed that the cable on the upper drum connecting the aft spud to the winch was fouled (“birdnested like [the reel on] a fishing pole”) on the drum (figure 6). The spud winch operator said that he then saw a large “burst” in the water alongside the barge “right where the [aft] spud was.” He was looking toward the towboat behind the barge when a large fireball erupted between the aft end of the *Athena 106* and the towboat, with “flames and water . . . going everywhere.” The fire engulfed the *Miss Megan*. By that time, the barge’s crane operator was beside the spud winch operator and told him to run to the front of the barge, where the crane was stationed. The spud winch operator did not have time to don his flotation work vest after the fireball erupted.



**Figure 6.** Photo showing cable “birdnested” on the winch drum (upper rear) that led to the *Athena 106*’s aft spud. The cable on the lower winch, which led to the forward spud, is properly wound.

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<sup>5</sup> The *Miss Megan* deckhand, the other survivor, remembered that the barge was “moving slow” before the accident.

At the forward end of the *Athena 106*, the barge hand who had left the doghouse earlier met the crane and spud winch operators. The spud winch operator and the barge hand jumped from the *Athena 106*'s forward end into the water and swam away from the barge to escape the flames. The spud winch operator recalled looking back at the barge and seeing the crane operator attempting to untie the barges. The spud winch operator also saw the *Miss Megan*'s deckhand, the only other survivor of the accident, in the water at the forward end of the *Athena 106*. He told investigators that he noticed that the deckhand wore his flotation work vest.

The *Athena 106* spud winch operator swam away from the flames and the barge, eventually finding a short piece of lumber to hold onto. He estimated that he had swum 40 yards from the barge when a crew transport boat in the area, the *Captain Mitch*, arrived about 5 minutes after the accident and picked him up while it searched for survivors. The *Miss Megan* deckhand swam away from the burning *Athena 106* and was rescued by four *Athena Construction* workers in a small boat carried on their nearby barge. Workers on both the *Captain Mitch* and the small boat reported seeing other *Athena 106* crew on or around the burning barge but could not move close enough to help because of the fire's heat.

Pressure readings from Chevron's SCADA system<sup>6</sup> indicated that the natural gas pipeline ruptured about 1155. The SCADA system enabled a rapid shutdown (by about 1210) of the Vermilion Bay gas sales pipeline downstream of the rupture. Pressure gauges sensed a pressure decline in the Vermilion Bay gas sales pipeline, from 700 pounds per square inch, gauge (psig), to 400 psig, and the SCADA system automatically shut it down. As part of the automatic shutdown, a check valve on Chevron's bay junction platform closed and prevented natural gas from backflowing into the ruptured pipeline from the downstream pipeline system. The shutdown of the failed pipeline upstream of the failure was expedited because a workman on the Gulfport sales platform recognized the emergency and, just after 1206, manually shut an upstream valve feeding gas into the failed pipeline.

## Injuries

**Table 1.** Injuries sustained in the *Athena 106* accident.

Type of Injury	<i>Athena 106</i>	<i>Miss Megan</i>	Total
Fatal	4	1	5
Serious	0	1	1
Minor	1	0	1
Missing <sup>1</sup>	1	0	1
<b>Total</b>	6	2	8

NOTE: Title 49 *Code of Federal Regulations* (CFR) 830.2 defines a fatal injury as any injury that results in death within 30 days of an accident. Serious injury means any injury that (1) requires hospitalization for more than 48 hours, commencing within 7 days from the date the injury was received; (2) results in a fracture of any bone (except simple fractures of fingers, toes, or nose); (3) causes severe hemorrhages, nerve, muscle, or tendon damage; (4) involves any internal organ; or (5) involves second- or third-degree burns, or any burns affecting more than 5 percent of the body surface.

<sup>1</sup> At the time of the report, one barge worker was officially listed as missing. After the accident, two barge workers were missing. One was declared dead and is included in the fatalities.

<sup>6</sup> SCADA, an acronym for Supervisory Control and Data Acquisition, is a system that monitors or controls water and power supply systems, gas and oil pipelines, and other distribution systems.



## Damages

Damages to the *Athena 106* and its equipment were estimated at \$150,000. The replacement value of the *Miss Megan* towboat was estimated at \$650,000 in an August 2005 vessel survey. The *Miss Megan* was a total constructive loss.

Chevron estimated that about 973,000 standard cubic feet of natural gas escaped from the pipeline in the 15 minutes before it was shut down after the rupture.<sup>7</sup> Chevron estimated the value of the released gas at \$6,800 and the cost of removing and replacing the ruptured pipeline at \$800,000.

## Personnel Information

### *Miss Megan*

**Master.** Central Boat Rentals hired the 48-year-old master of the *Miss Megan* in June 2001. Because the *Miss Megan* was over 26 feet long, it was required by Federal regulations to be operated by a licensed master.<sup>8</sup> The master of the *Miss Megan* held the required U.S. Coast Guard license, issued in April 2003, as “master of towing vessels upon Great Lakes, inland waters, and western rivers; excepting waters subject to the International Regulations for Preventing Collisions at Sea, 1972; also, radar observer–inland.” The license was due to expire in April 2008. The Coast Guard in Morgan City reported to investigators that the master had not been the subject of any suspension or revocation proceedings.

The master’s work schedule was 21 days on duty, 7 days off duty. When he was on duty, he worked from 0600 until 1630.

**Deckhand.** The *Miss Megan* deckhand, age 44, had been employed by Central Boat Rentals since January 2003. He was one of two survivors of the accident. The deckhand reported no unusual events in his schedule before the accident. His work schedule was 21 days on duty, 7 days off duty. When he was on duty, he worked from 0600 until 1630.

### *Athena 106*

**Spud Winch Operator.** The *Athena 106* spud winch operator, age 25, had been employed by Athena Construction since May 2006. The operator, who survived the accident, reported no unusual events in his schedule beforehand. He was on a regular work schedule that he described as “repetitious.” He arrived home the previous day around 1730 and went to sleep by 2130. On the morning of the accident, he awoke at 0530 and was

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<sup>7</sup> Standard cubic feet of gas is the volume of gas at standard temperature (60° F) and atmospheric pressure (14.7 pounds per square inch).

<sup>8</sup> Title 46 CFR 15.610 states: “Every towing vessel at least 8 meters (26 feet) in length, measured from end to end over the deck (excluding sheer), must be under the direction of a person licensed as master or mate (pilot) of towing vessels . . .” The regulation excludes certain towing vessels, such as those engaged in assistance towing or those of less than 200 gross tons engaged in offshore mineral or oil exploitation.

picked up by two other barge crewmembers at 0620 for the ride to the Ivanhoe dock. From the dock, they were taken out to the barge by a crew transport boat, about a half-hour ride. The spud winch operator indicated that this was his normal daily routine.

**Other Crew.** Four crewmembers on the *Athena 106* died in the accident. The barge foreman was 51 years old at the time of the accident, the crane operator was 59, and the two barge hands were 36. One barge worker, age 33, was officially listed as missing at the time of this report.

The foreman had been employed by Athena Construction since 2000. All the other crewmembers were hired in 2006.

## Vessel Information

### *Miss Megan*

The steel-hulled towing vessel *Miss Megan* was built in 1996 in Morgan City, Louisiana, and was previously owned by Gaudet Boat Rentals of Morgan City. According to the certificate of documentation issued by the Coast Guard in June 2006, the 52-gross-registered-ton<sup>9</sup> vessel was 52 feet long and 20 feet wide. Its draft<sup>10</sup> was about 5 feet and its transit speed was about 6 knots. The *Miss Megan* was not inspected by the Coast Guard, nor was it required to be.

### *Athena 106*

**Construction.** Documents provided by Athena Construction indicate that the construction barge *Athena 106* was delivered new in May 1982 at a cost of \$143,000. The barge, which had a steel hull, was built by Gulf Coast Fabrication, Inc., in Pass Christian, Mississippi. The barge was not inspected by the Coast Guard, nor was it required to be.

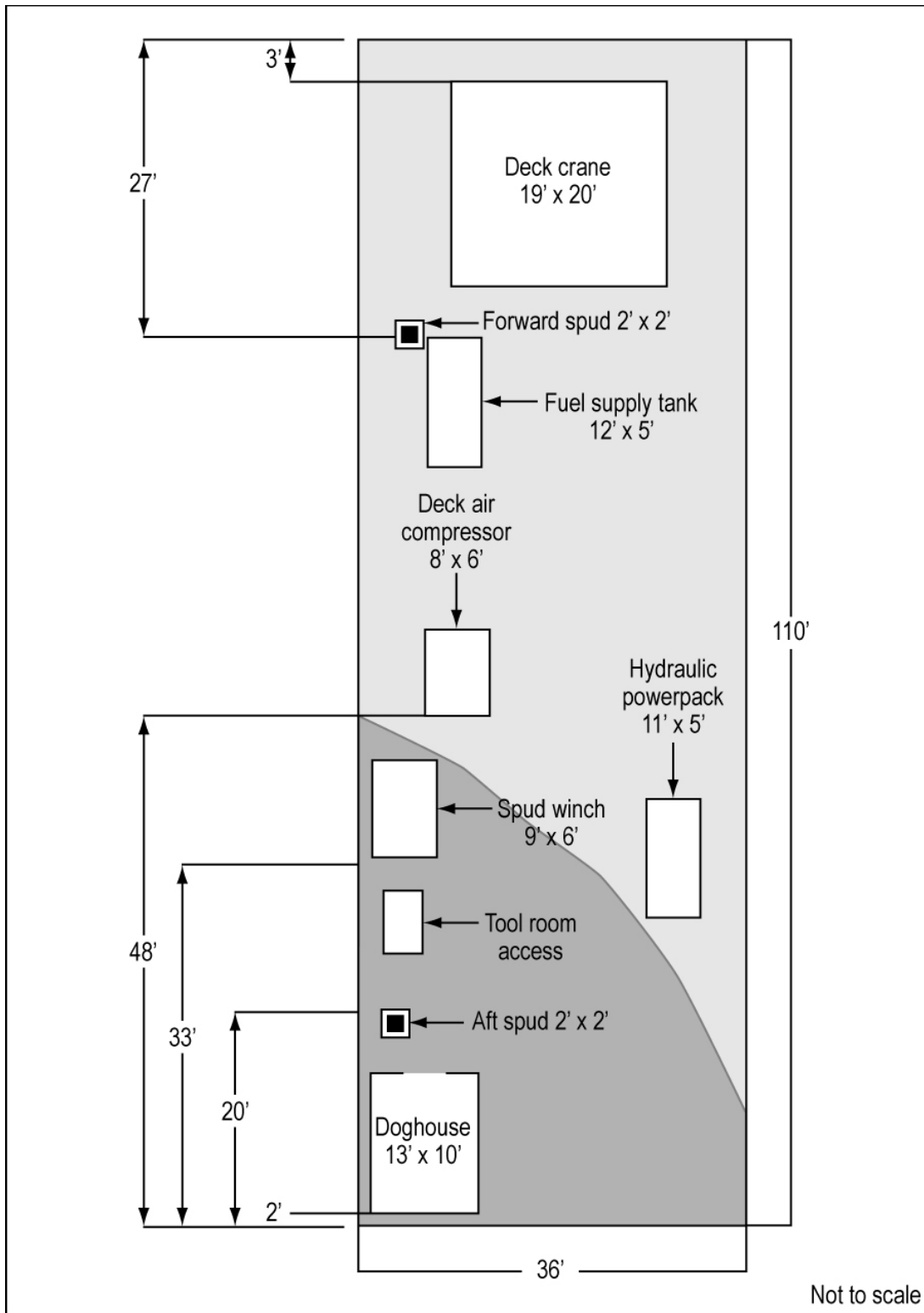
The *Athena 106* was 110 feet long, 36 feet wide, and measured 7 feet from the bottom of its hull to the deck where the crew worked. Both ends were raked, or sloped (figure 2). The bottom of the hull was flat. The draft of the *Athena 106* was approximately 4 1/2 feet.

**Equipment.** The *Athena 106* was the primary working platform for the crew (figure 7). Its deck contained all the equipment necessary for extracting and driving pilings around docks, oil rigs, and other platforms in the oil field. The equipment included the spud winch (described in detail below) used to raise and lower the spuds that anchored the *Athena 106*, and a crane to hoist and position the pilings for driving or to maneuver them onto the barge alongside for storage. Other equipment included a piling extractor with hydraulic powerpack, oxygen and acetylene bottles, chainsaw, deck generator for electrical equipment in the doghouse, air compressor, hand tools, and crane accessories.

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<sup>9</sup> Gross tonnage represents the total internal volume of a vessel, with some exemptions for nonproductive spaces.

<sup>10</sup> Draft is the vertical distance from the lowest point of a ship's hull to the waterline.



**Figure 7.** General layout of the *Athena 106* construction barge. Fire damage to equipment on the barge deck was greatest in the dark-shaded area.

**IBR 234**

Deck barge *IBR 234* was used as a storage platform for the pilings being extracted or installed by the crew of the *Athena 106*. The *IBR 234* had a steel hull and was 120 feet long, 30 feet wide, and 7 feet from the bottom of the hull to the deck. The vessel's draft was about 4 feet. The barge was not inspected by the Coast Guard, nor was it required to be.

**Spud Winch Information****Construction**

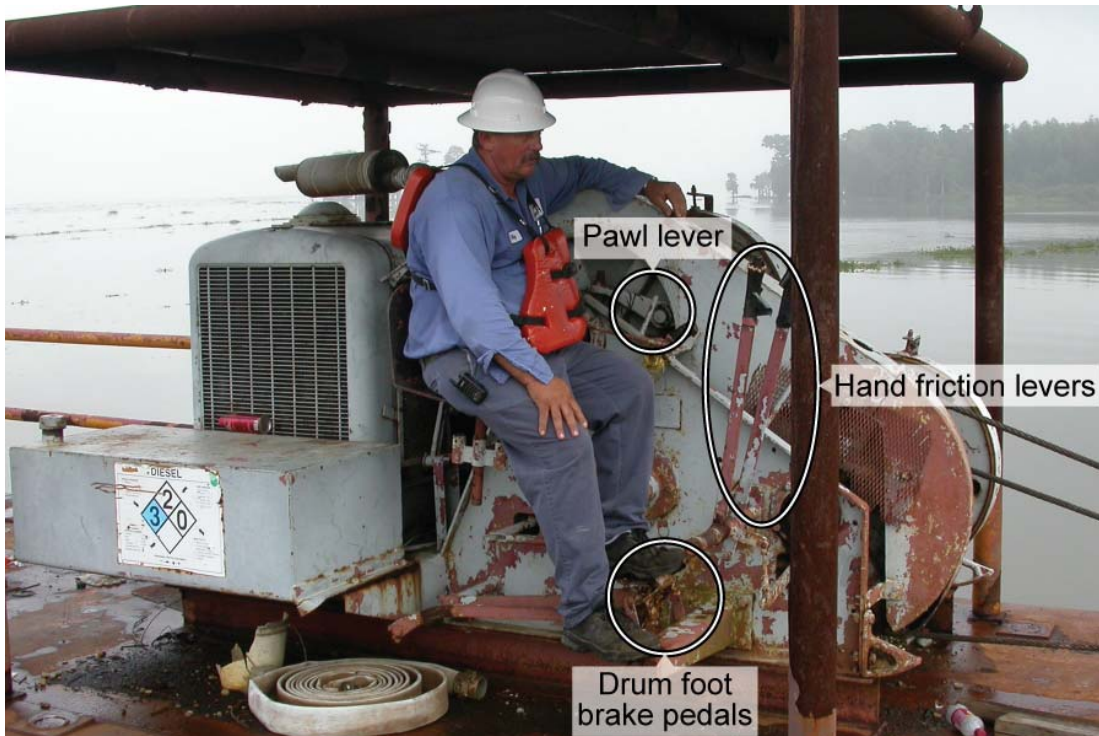
The spud-lifting winch used on board the *Athena 106* was manufactured by American Hoist and Derrick Company. It was a model 120B, manufactured during the 1950s and no longer in production. According to company documents, it had a rated capacity of 12,000 pounds of pull at 270 feet per minute and was chain-driven through a twin-disk clutch by a Detroit Diesel engine, model 3-71, rated at 120 horsepower. The winch was 9 feet long, 6 feet wide, and weighed about 8,000 pounds. According to industry professionals, this make and model of winch is used extensively on marine construction barges and is known for its simple, reliable design and operation.

The Detroit Diesel engine powering the winch was mounted aft of the winch. The engine was fitted with a clutch on its output shaft, which was connected by a chain to the winch's drive gears for the drums. A lever connected to the clutch at the operator's seat allowed the operator to engage or disengage the drive engine from the winch drum drives.

The winch was a two-drum design. The upper drum controlled the raising and lowering of the aft spud, and the lower drum controlled the forward spud. Steel cables 7/8 inch in diameter led from the drums to the spuds through a series of pulleys and sheaves (one for each spud). The cables allowed the winch operator to lower the spuds into the soft bay bottom to anchor the barge or to lift the spuds so the barge could move.

**Operation**

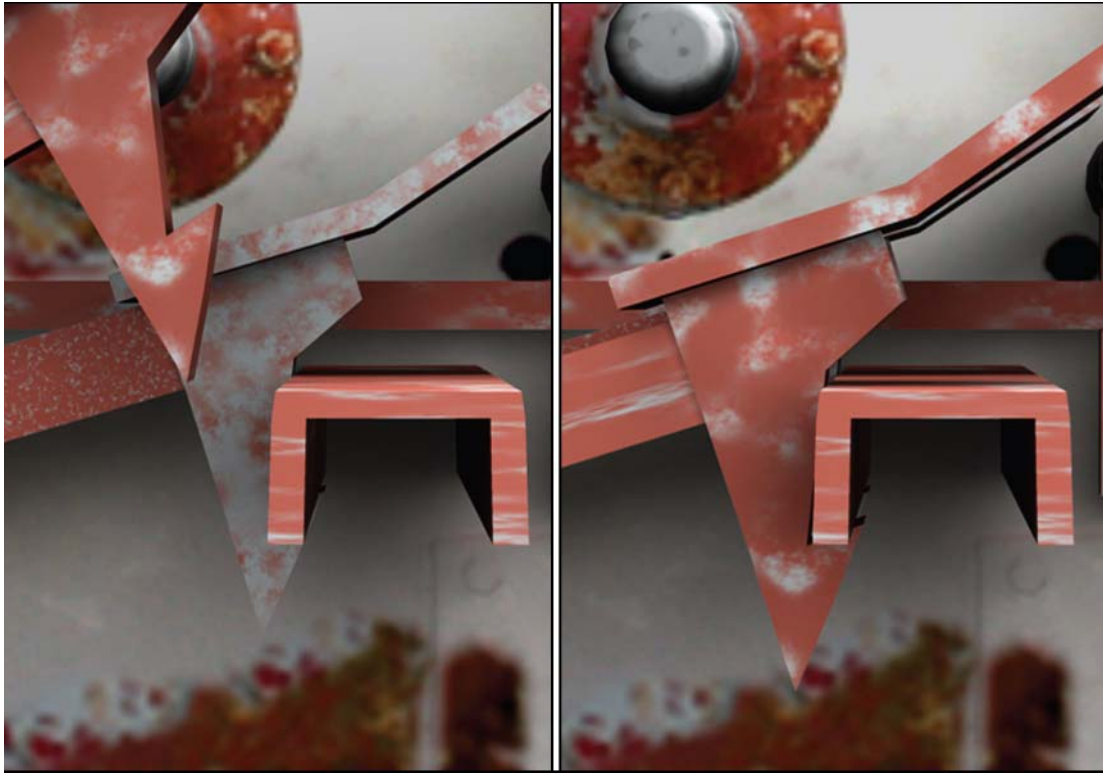
The spud winch operator could control the drums independently, working from a seat mounted on the inboard side of the winch, facing the forward end of the barge (figure 8). Each winch drum had two brake bands, one on the outside and one on the inside nearest the operator. Both bands were controlled from the operator's seat, the outer band by a foot lever and the inner band by a hand control lever. Thus, the operator had two foot brake pedals and two hand levers that acted as friction brakes to control the speed of the winch drums as they lowered or raised the spuds. The operator's winch controls also included (1) a single-lever throttle to control the diesel engine's speed, (2) a lever for engaging or disengaging the diesel engine's clutch from the winch drum driveshaft (used only while lifting the spud; lowering the spud was accomplished by gravity), and (3) a lever for each drum to engage or disengage the drum pawls into a notched ring on the drum's outer edge and prevent its cable from paying out accidentally.



**Figure 8.** Operator in position at the spud winch on another Athena barge, not the *Athena 106*, used in the salvage operation after the accident. Highlighted are the foot brake pedals and hand levers that controlled the speed of the winch drums as they lowered or raised the spuds, and one of the levers that engaged or disengaged the drum pawls into a notched ring on the drums' outer edge to prevent the cables from paying out. Note the operator's work vest, the flotation device worn by barge workers on the job.

According to the *Athena 106* spud winch operator, if the spuds were deployed (lowered) and it was necessary to move to a different work site, he would, at the direction of his foreman, raise the spuds as follows. First, he would start the diesel engine and move to the operator's seat. He would engage the clutch to the winch using the left lever, then increase the engine speed using the throttle lever to develop enough power to lift the 5-ton spuds. The winch drum would not rotate until he actuated the hand friction levers, which controlled the friction between the winch driveshaft and the drums.

With the engine running and the clutch engaged, the spud winch operator would pull back on the appropriate (forward or aft) spud's hand lever to increase friction to that drum, thereby rotating the drum and lifting the spud at the end of its cable. Once the spud was fully raised, the operator would latch the foot brake in place by depressing it. He would press down on the heel section of the foot pedal and secure the depressed pedal to a fixed piece of steel connected to the winch frame (figure 9). After the foot pedal had locked the spud's drum in place, the operator would relax the hand friction control lever and shut down the diesel engine.



**Figure 9.** Operation of *Athena 106* foot brake pedals On the right, both pedals are engaged (depressed) and latched in place by the fixed steel piece shown pressing on a triangular section at the bottom of the pedals. On the left, the front pedal is released and the back pedal is still engaged. To release the pedal, the operator would push down on the pedal and twist the latch out of place, allowing a spring to raise the pedal.

Dropping a spud from its raised position was a matter of engaging the hand friction control lever, releasing the latched foot brake, and easing the spud down with the friction of the brake. The spud winch operator explained that tension had to be kept on the cable while the spud was being lowered, as opposed to letting it freefall, to avoid having the cable recoil and foul (“birdnest”) on the drum. Care had to be taken in lowering the spuds. Investigators observed that if operators felt a spud touch something while it was being lowered, they moved the barge slightly to avoid hitting one of the pipelines buried under the bay.

### **Safety Features**

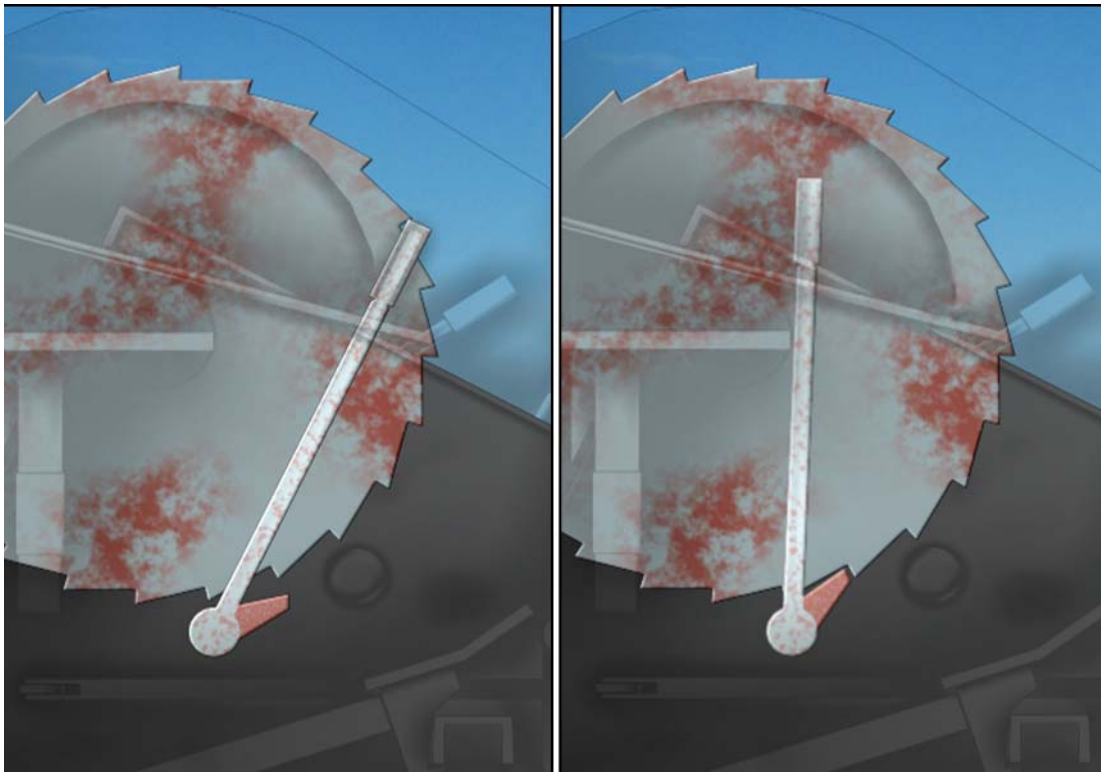
The winch and its associated equipment offered three methods of holding a raised spud in position so it would not drop or slip from its retracted (raised) position:

- Drum brake band foot pedals controlled from the operator’s seat.
- A steel pawl that, when engaged, fit into a notched ring fastened to the outer periphery of the drum to keep it from turning backward if the brake failed (figure 10).

- A 36-inch-long by 2-inch-diameter steel securing pin (figure 11) that could be inserted directly through the spud once it was fully retracted to prevent it from freefalling in the event of a winch or cable failure.

When asked whether he would typically insert the securing pin in a spud after raising it, the *Athena 106* spud winch operator said,

We never put pins in a spud . . . we never had to. We stayed in the field, you know. Usually when you're going a short destination [distance] . . . a couple of hundred yards away, you really don't put a pin through the spud. I mean I'm sure it's a lot safer to do it, but we don't. I don't know why.



**Figure 10.** Operation of the winch pawl on the *Athena 106*. The operator engages or disengages the pawls using the lever, shown in white, that extends downward across the gear. The pawl is the tongue-shaped piece at the bottom of the lever. When disengaged (left illustration), the pawl is outside the gear teeth, allowing the gear to move freely in either direction. When engaged (right illustration), the pawl falls into the spaces between the notches so the gear can move in only one direction. (See figure 8 for location of pawl lever at operator's station.)





**Figure 11.** Photos showing spud with securing pin lying alongside (left) and with securing pin inserted (right).

## Wreckage

### Vessels

Two days after the accident, on October 14, Safety Board investigators documented the damage to the vessels involved in the accident. The *Miss Megan* and barge *IBR 234* were anchored at a separate location from the *Athena 106*, which was still at the accident site.

***Miss Megan.*** The *Miss Megan*, which was secured to the aft end of the barges and in the direct path of the flames from the failed pipeline, had been engulfed by the fire. Above the waterline, paint was intact only on the starboard aft side of the vessel. The vessel's entire forward-facing exterior steel structure was scorched to the steel base metal. All windows facing forward or to port had been severely damaged by the heat, as well as all wheelhouse windows. The starboard wheelhouse entrance door was reduced to molten aluminum. The top of the port side wheelhouse door was also melted, but the bottom was intact. Inside the wheelhouse, all navigational aids and maneuvering equipment sustained extensive damage, leaving the wheelhouse virtually an empty shell.



On the main deck, which was one deck below the wheelhouse, the port aluminum door leading to the vessel's engine space was intact. Flame patterns indicated that the port engine space door was open during the fire. The windows next to the engine space were damaged by the heat, and both of the vessel's propulsion engines sustained extensive heat damage. The engine control devices in the wheelhouse were severely damaged, but the position of the transmission shift levers indicated that both engines were in the neutral position at the time of the fire. The deck winch and other equipment in the forward area of the main deck also suffered extensive heat damage.

The hull below the main deck appeared structurally sound. It showed limited heat damage and no signs of flooding or of having taken on excess seawater after the accident. Investigators did not examine the hull out of the water.

**Athena 106.** Investigators found both the forward and aft spuds on the *Athena 106* in the lowered position (as noted below, they were informed by the recovery crew that the forward spud had been in the raised position until it fell during the recovery effort). The 7/8-inch steel cables connecting the spuds to the barge's winch were examined for signs of preexisting damage and found to be free of any fraying or other visible defects. The cable leading from the winch to the forward spud exhibited a light strain condition, with its remaining turns wrapped uniformly around the lower winch drum. The cable connecting the aft spud to the winch was found completely fouled on the upper winch drum, or "birdnested," with none of its remaining cable turns on the drum still wrapped on the inner drum surface (figure 6).

The brake pedal for the aft spud was found elevated in relation to that of the brake pedal for the forward spud. Investigators noted a 3/32-inch indentation on the leading edge of the fixed steel piece to which the brake pedal latched. No further wear was found on the underside of the fixed piece. On the brake pedal, the latching mechanism displayed no wear.

Both the upper and lower winch drum hand friction control levers were found disengaged. Both spud winch drum pawls were found in the disengaged position. The spud winch's fuel tank, integral with the winch frame, was split open and deformed by the fire's heat. The 36-inch-by-2-inch spud securing pins were found lying next to their respective spud bases, not inserted into the spuds.

Investigators could not enter the barge's tool room, accessible by a steel door leading belowdecks forward of the doghouse, because of the water that had accumulated during the firefighting effort. The surviving barge hand reported that water would accumulate daily in the tool room. As part of their daily morning checks, the crew would check to see how much water had accumulated and pump it out as necessary. The barge hand estimated that they would pump out from 6 to 10 inches a day. The crew had been pumping the compartment during the 2 weeks before the accident but had not determined the source of the bilge water.

The barge suffered the greatest damage on its port side and aft end, where the fire severely damaged the doghouse, the deck generator, the deck air compressor, and the spud winch. Some small portable equipment and hand tools in the area, such as a chainsaw, were also consumed by the fire. Several oxygen and acetylene bottles used by the crew in their day-to-day operations had exploded from the heat of the fire and were strewn about the deck.

The forward end and starboard side of the barge sustained less heat damage. The hydraulic powerpack (which powered the piling extractor) sustained limited fire damage to its outer housing and minimal damage to the engine and hydraulic equipment inside. The only other piece of significant equipment in the forward area of the barge was the crane, with its boom facing aft toward the doghouse. The wooden support on which the crane was mounted, the crane operator's cab area, and the outer right side of the crane operator's cab showed signs of the fire, but they did not display the same catastrophic effects as did the equipment at the aft end of the barge. Immediately aft and to the port side of the crane was a large diesel fuel storage tank that showed virtually no signs of heat damage, although the equipment immediately aft of it was destroyed by the fire.

**IBR 234.** Barge *IBR 234* was secured along the starboard side of the *Athena 106* at the time of the fire. The load of wooden pilings on the deck of the *IBR 234* extended nearly the entire length of the barge. Because the *IBR 234* was close to the *Athena 106*, all its pilings sustained heavy fire damage. The paint was burned off the barge's deck, but the deck appeared structurally sound and intact. The exposed hull periphery of the *IBR 234* sustained minimal damage, except that the paint was burned off, exposing the hull's bare steel.

### **On-Scene Spud and Spud Winch Examination**

**Salvage Operation.** The recovery crew found the forward spud on the *Athena 106* in the lowered position. According to the *Athena* Construction barge supervisor who participated in the recovery, the forward spud was in the raised position after the accident but then "just dropped" during the recovery effort.

The day after the accident, a diving company inspected the pipeline and the crater caused by the gas eruption, as described in the "Postaccident Pipe Recovery and Examination" section. The divers believed that the aft spud was tangled with at least one pipe and was possibly close to several others, according to dive reports. The Coast Guard organized a salvage group to develop a plan to extricate the *Athena 106* from the submerged gas pipeline. Nearby oil and gas production facilities and pipelines were secured, awaiting the repair of the ruptured pipe. After investigators had surveyed the *Miss Megan* and the *IBR 234*, the vessels were moved from the area.

Another *Athena* barge was dispatched to assist with the salvage of the *Athena 106*. The barge waited a quarter-mile from the accident site, then once the sonar surveys were complete, moved to a position alongside the *Athena 106*. Investigators observed that during the move, the spud winch operator on the salvage barge used only the foot brakes, not the pawls or the securing pins, to secure the barge's spuds in the raised position.

The deck end of the aft spud cable was cut and marked. The crane on the salvage barge pulled the *Athena 106* aft spud out of the water for examination. According to markings on the spud and measurements taken at the scene, the lower end of the spud had been submerged in the mud an estimated 17 feet. The cable, sheave, and deck pulleys were found to be in good working order during the recovery. The 4-inch tip of the aft spud displayed a slight concavity (figure 12).



**Figure 12.** Aft spud of the *Athena 106* when raised after it had released from its fully raised position and hit a submerged, buried high-pressure natural gas pipeline.

The forward spud was then recovered. The cable, sheave, and pulleys for the forward spud were found to be in good working order.

**Spud and Cable Examination.** Investigators inspected the aft spud and its support cable 9 days after the accident, on October 21, 2006. The cable was disconnected from the spud so that the underwater portions of the spud could be inspected. The cable was reexamined along its entire length. No fraying or other damage was found.

Athena Construction's maintenance supervisor stated that the cables to both spuds on the *Athena 106* had been changed about 2 months before the accident. The maintenance supervisor supplied documentation of the purchase of two spud support cables in July 2006. No written maintenance records for changing the cable could be produced because, as stated by the maintenance supervisor, such records were not kept.

During the same inspection, all deck pulleys and sheaves through which the spud cables led were examined and found to be working satisfactorily. The aft spud was checked for damage sustained during the accident. The only accident-related damage was cosmetic—paint exposed to the fire's heat had burned from the spud's surface.

### ***Postaccident Pipe Recovery and Examination***

On October 13, 2006, a diving company, Caldive International, Inc., hired by Gulfport, inspected the pipeline and the crater caused by the gas eruption. Underwater visibility was described as very poor. Divers found a 3-1/2-foot-deep crater centered on the spud. The soil around the crater wall was muddy clay. A diagram completed by Caldive showed the spud between two fractured ends of the gas sales pipeline. Caldive performed a second survey on October 19 and produced another, nearly identical, diagram showing the spud between two fractured ends of the gas sales pipeline.

Athena Construction hired a diving company, River Services Company, to examine the underwater damage on October 13-14, 2006. The River Services Company report states: “The west side of the 6-inch [8-inch]<sup>11</sup> pipeline is making contact with the spud” and “the aft spud apparently made contact and cut a 6-inch [8-inch] pipeline.” Chevron then contracted to have the pipe recovered. Two lengths of pipe, an east piece and a west piece, each approximately 50 feet long, were recovered from each side of a transverse (circumferential-like) fracture (figure 13) on November 17, 2006. After a Safety Board investigator photographed the damaged pipe, it was sent to Stress Engineering Services for analysis (see “Tests and Research” section).



**Figure 13.** Fracture on the east piece of the ruptured pipeline.

<sup>11</sup> The pipe was actually 8 inches in diameter, but at the time of the underwater assessment, its diameter was thought to be 6 inches.



## Waterway and Pipeline Information

According to the *United States Coast Pilot*,<sup>12</sup> East Cote Blanche Bay, West Cote Blanche Bay, and Vermilion Bay form a large body of water separated from the Gulf of Mexico by Marsh Island (figure 1). The water area, which extends west-northwest from Atchafalaya Bay, is about 32 miles long and 5 to 15 miles wide. The water averages from 5 to 9 feet deep, and “the shores of the bays and Marsh Island are low and marshy.” The *Miss Megan* was on a northwesterly heading moving through the area.

Hydrographic surveys completed after the accident by John Chance Land Surveys, Inc. (see “Tests and Research” section), found that the water in the accident area was between 6 and 7 feet deep, corrected for tidal height. The survey reported that the crater created by the accident was “approximately 3.5 and 4.0 feet lower in elevation than that of the normal seafloor elevation, which is probably a result from the explosion.”

The pipeline was an 8.625-inch (outer diameter), X46-grade, electric-resistance-welded steel pipe with a 0.250-inch wall thickness. The pipe was manufactured in Bethlehem Steel’s factory at Sparrows Point, Maryland, in November 1965. The pipeline was externally coated with a spiral-wrapped, asphalt-type material, followed by a 1.5-inch-thick concrete coating.

A postaccident dive survey estimated that the pipeline had about 3 feet of cover when the accident occurred. Texaco<sup>13</sup> had performed a depth-of-cover survey on the pipeline in 1992 that showed a burial depth of between 2 and 2 1/2 feet. The pipeline was cathodically protected to inhibit corrosion. During a cathodic protection survey on August 24, 2005, readings of -1.323 and -1.069 volts were recorded at two different platforms, meeting the criteria of NACE International<sup>14</sup> publication RP0176-2003, *Corrosion Control of Steel Fixed Offshore Structures Associated with Petroleum Production*. In a February 2006 pressure test after Hurricane Katrina, the pipeline held a pressure of 1,000 psig for 4 hours. Chevron reported that the pipeline did not need repairs and that there were no problems with it until it ruptured on October 12, 2006.

At the point where it was struck, the gas sales pipeline ran roughly east to west under the bay (figure 1). West of where it was struck, the pipeline made a 90-degree turn north. At the east end, the pipeline began at the Gulfport sales platform (figure 14). The sales platform was in Gulfport’s West Cote Blanche Bay production field (state lease 340). At the west end, the pipeline terminated at Chevron’s bay junction platform, where it tied into Chevron’s Vermilion Bay gas sales pipeline. A check valve downstream of the tie-in prevented backflow from the downstream gas-gathering system.

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<sup>12</sup> National Oceanic and Atmospheric Administration, National Ocean Service, *United States Coast Pilot*, vol. 4 (Gulf of Mexico, Puerto Rico, and Virgin Islands), 32nd ed., 2004, p. 466.

<sup>13</sup> Texaco constructed the pipeline about 1966 (the date when the pipeline construction bid was approved). In 1987, Texaco sold a 50 percent interest in the pipeline and in the West Cote Blanche Bay production field to Tesla Resources, Inc., the predecessor to Gulfport. In 2001, Texaco merged with Chevron, and Texaco’s 50 percent interest stayed with the new company.

<sup>14</sup> NACE International is an organization concerned with corrosion issues. The organization produces consensus standards.



**Figure 14.** Beginning of the gas sales pipeline (vertical pipe entering water) at the Gulfport sales platform in the West Cote Blanche Bay oil field. The pipeline was ruptured by the *Athena 106*'s aft spud in an east-west section near the Gulfport platform. The pipe's concrete coating is visible above the waterline.

## Meteorological Information

According to National Weather Service data from its station in Patterson, Louisiana, 25 nautical miles east of the accident site, skies were clear at 1155 on the day of the accident and visibility was 10 miles. The temperature was 81° F and the wind was from the south at 6 knots. The area forecast was for seas of 1 to 3 feet.

## Medical and Pathological Information

### **Medical Information**

The Athena Construction workers who rescued the *Miss Megan* deckhand also recovered the body of the barge foreman from the water. The deckhand and the foreman's body were brought to the Ivanhoe dock, where St. Mary Parish sheriff's officers and Acadian Ambulance personnel met them.

Acadian Ambulance Unit 24 transported the *Miss Megan* deckhand to Iberia General Hospital in New Iberia, Louisiana, about 16 miles away. He suffered second-degree burns over 27 percent of his body and spent one night in the hospital's emergency room before being transferred to a nearby burn unit. The *Athena 106* spud winch operator, who swam away from the fire and was rescued by the crew boat *Captain Mitch*, did not suffer any injuries as a result of the accident and was not hospitalized.

The *Miss Megan* master died on the towing vessel. His remains were found on the *Miss Megan's* deck outside the wheelhouse. Searchers recovered three bodies of barge personnel, each suffering varying degrees of burns. The bodies of two barge hands were not found. One of those individuals has been declared dead and the other was officially listed as missing at the time of this report.

### **Toxicology Testing**

Coast Guard regulations at 46 CFR 4.06 require that drug tests be conducted within 32 hours of a serious marine incident and that alcohol tests be conducted within 2 hours "unless precluded by safety concerns directly related to the incident."<sup>15</sup> Alcohol testing is not required more than 8 hours after a serious marine incident.

The bodies of the four recovered crewmembers were tested for both drugs and alcohol. The results were negative.

The two survivors were tested for drugs but not alcohol. The *Athena 106* spud winch operator was tested for drugs immediately after his rescue. The *Miss Megan* deckhand was not tested until 6 days after the fire because of his injuries. Both drug tests were negative.

The deckhand was taken to the hospital immediately after he returned to shore and was not tested for alcohol. The spud winch operator did not return to shore within the 2-hour testing limit because, after the crew boat rescued him, he stayed on board while the

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<sup>15</sup> Federal regulations at 46 CFR 4.06 require postaccident drug and alcohol testing on "each individual engaged or employed on board the vessel who is directly involved in" any accident meeting the criteria of a serious marine incident, defined at 46 CFR 4.03-2 as (a) a marine casualty or accident that results in any of the following: (1) one or more deaths, (2) injury that requires medical treatment beyond first aid and renders the individual unfit to perform routine duties, (3) property damage exceeding \$100,000, (4) actual or constructive total loss of an inspected vessel, or (5) actual or constructive total loss of any uninspected vessel that exceeds 100 gross tons; (b) discharge of 10,000 or more gallons of oil into U.S. waters; or (c) the release of a reportable substance into the environment of the United States.

crew shut off valves for wells to secure the oil field. A sergeant from the St. Mary Parish sheriff's office met both survivors as they arrived at the Ivanhoe dock. The sergeant did not report evidence of alcohol use by either survivor.

## Company Information

### **Central Boat Rentals**

Central Boat Rentals, Inc., owned and operated the *Miss Megan*. The company had been in business since 1967 in the inland and offshore waters of Louisiana, Texas, Mississippi, and Alabama. The company primarily serviced the inland and offshore oil and gas industry. Central Boat operated 20 vessels and 118 barges, including 7 spud barges.

Central Boat Rentals had a health and safety manual and an employee-training program. The manual outlined the company's safety policies and contained guidance for its workers on safe workplace practices. It did not contain specific guidance or any requirement for a barge in tow to have its equipment properly secured before getting under way.

### **Athena Construction**

Athena Construction was under contract to Gulfport Energy of Oklahoma City, Oklahoma, to perform construction operations in its oil field in the West Cote Blanche Bay area. The company operated nine spud barges, had 40 employees, and had been in the marine construction business for over 30 years at the time of the accident. Each barge was equipped for a variety of work, including driving and extracting pilings. The *Athena 106* barge worked steadily in the Gulfport Energy oil field after hurricanes Katrina and Rita.

At the time of the accident, Athena Construction was repairing the pilings used to secure oil and gas drilling and production facilities. Gulfport officials would tell the Athena supervisors what needed to be done, and the barge supervisors would complete the work.

Athena Construction had a health and safety manual and an employee-training program. The manual outlined the company's safety policies and contained guidance for its workers on safe workplace practices. The manual included a procedure for securing barge spuds when performing electrical work, but it did not contain specific guidance or requirements for securing the spuds with safety devices before moving a barge during normal operations.

Athena Construction was involved in a previous spud barge accident. On February 7, 1997, the *Athena 107* barge was "spudded down" in the Rabbit Island Field in Atchafalaya Bay, Louisiana, installing pipe. The barge had been left unmanned. In the early morning hours of February 8, 1997, wind and sea moved the *Athena 107*, causing it to strike and rupture a 20-inch natural gas pipeline owned by Bridgeline Gas Distribution, LLC. No fire was reported as a result of the accident.



## Survival Factors

### *Emergency Response*

The local 911 dispatcher received a call at 1158 from a man on a boat in West Cote Blanche Bay, near Marsh Island. The caller reported what he thought was a platform or a boat on fire in the bay. Dispatch transferred the call to the Coast Guard District 8 Command Center, which transferred him to the Coast Guard Sector New Orleans Command Center. Sector New Orleans is responsible for the traditional Coast Guard services of search and rescue of the Captain of the Port Morgan City area, including West Cote Blanche Bay. Marine Safety Unit Morgan City is responsible for the traditional Coast Guard services of the Captain of the Port and the Officer in Charge of Marine Inspection for the area.

At 1205, Sector New Orleans received notification of the fire and began coordinating the Coast Guard response. Sector New Orleans briefed District 8 and requested air support. Within 15 minutes, at 1220, an HU-25 Falcon jet aircraft (CG 2127) launched from the Coast Guard Aviation Training Center in Mobile, Alabama, about 225 miles from the accident site, and proceeded to the accident site. At 1223, an HH-65 Dolphin helicopter (CG 6565) took off from Coast Guard Air Station New Orleans, about 100 miles from the accident site. Sector New Orleans contacted St. Mary and Iberia parishes to request surface search and rescue support. The parishes each launched two patrol boats, based about 12 miles from the accident site. The Louisiana Department of Wildlife and Fisheries, also notified by 911 dispatch, sent several boats.

The Coast Guard HU-25 Falcon aircraft, the first official response asset on scene, confirmed flames on the *Miss Megan* and both barges, as well as flames from the ruptured pipeline rising approximately 100 feet from the water surface. Two Louisiana Department of Wildlife and Fisheries officers were the first law enforcement personnel to arrive. They were working 15 miles away from the closest boat launch at Cypremort Point, about 2 miles from the accident site, when they received a call from 911 dispatch. They said they saw smoke from miles away as they drove to the boat launch. It took approximately 20 minutes for them to get to Cypremort Point, launch the boat (a 19-foot Boston Whaler), and travel to the accident site.

Marine units from St. Mary and Iberia parishes were on scene by 1300, along with the Coast Guard Dolphin helicopter and two additional Louisiana Department of Wildlife and Fisheries patrol boats. Law enforcement and Coast Guard assets organized grid searches for survivors. Also assisting with the search efforts were various crew boats, small boats, and fishing vessels in the area. An incident command post was established at Cypremort Point at 1615 and staffed by personnel from St. Mary and Iberia parishes and Coast Guard personnel.

Two land-based fire departments responded to the emergency. Cypremort Point Volunteer Fire Department was closest to the accident site. Four Corners Volunteer Fire Department provided medical assistance at the Ivanhoe dock. Neither fire department had

marine firefighting capabilities. Two towing vessels equipped with fire pumps and hoses,<sup>16</sup> the *Yancy O* and the *Miss Joann*, and one jack-up boat,<sup>17</sup> the *Tiger*, all of which were working in the field, diverted to assist after seeing flames and smoke. Over the course of several hours, the three vessels extinguished the fires on the *Miss Megan* and the two barges (figure 15).



**Figure 15.** Towboats *Miss Joann* and *Yancy O* fighting the fire on the *Miss Megan* and the deck barge *IBR 234*. (Photo courtesy Louisiana Department of Wildlife and Fisheries)

The first towing vessel to arrive on scene was the *Yancy O*. The captain of the *Yancy O* estimated that he was working 3/4 mile from the fire when he noticed it. The captain stated that the only part of the three vessels not engulfed in flames was the stern of the *Miss Megan*. He got under way immediately but said that it took him between 15 and 20 minutes to reach the scene because his vessel was slowed by a low tide.

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<sup>16</sup> Requirements for fire suppression equipment on towing vessels are found at 46 CFR 27.301.

<sup>17</sup> A jack-up boat is a self-propelled motorized boat with three or four adjustable legs that ratchet up to lift the boat out of the water.

At first, because of the intensity of the fire, all he and his deckhand could do was scan the water for survivors and wait for the fire to calm. After 15 to 20 minutes, the lines holding the two barges together burned away, and the *Miss Megan* and barge *IBR 234* began to drift into the oil field. As soon as the towboat and the deck barge cleared the *Athena 106*, the *Yancy O* began to fight the fire. The captain piloted the vessel while the deckhand manned the firehose.

The *Yancy O* put water on the fire for over 30 minutes, then maneuvered close enough to attach a 20-foot towline to the *Miss Megan*'s port quarter and tow the *Miss Megan* and the *IBR 234* to a perimeter light,<sup>18</sup> where they were secured. Meanwhile, another tugboat, the *Miss Joann*, arrived, followed shortly by the jack-up boat *Tiger*. Both vessels helped fight the fire while the *Miss Megan* and barge *IBR 234* were being towed. According to the *Miss Joann* captain, it took 2 1/2 to 3 hours to put out the fires on the *Miss Megan* and the *IBR 234* and another hour to extinguish the fire on the *Athena 106*. The Coast Guard reported that the fires were extinguished at approximately 1530.

### **Emergency Equipment**

The *Miss Megan* was considered an uninspected towing vessel for the purpose of Coast Guard regulations. As the name implies, uninspected towing vessels are not required to be regularly inspected. They must, however, comply with minimum Federal safety regulations. Civil penalties can be assessed if uninspected towing vessels are boarded by the Coast Guard and found to be noncompliant. The regulations for uninspected vessels are found at 46 CFR Parts 24-28 (subchapter C). The last Coast Guard examination of the *Miss Megan* was on May 11, 2006.

Deck barges such as the *Athena 106* and *IBR 234* are not subject to Coast Guard inspection.

**Lifesaving Equipment.** The *Miss Megan* was required by 46 CFR 25.25-5(c) and (d) to carry a serviceable Coast Guard-approved life preserver for each person on board and one approved ring buoy. The deckhand was recovered wearing a flotation work vest. The master was not wearing a flotation device at the time of the accident.

According to Athena Construction company policy, employees were required to wear Coast Guard-approved flotation-type work vests when working on the deck of a barge or other vessel. The flotation vest was to be fastened when worn.<sup>19</sup> The only body recovered wearing a flotation work vest was that of the barge foreman. All crewmembers in the *Athena 106* doghouse had taken their work vests off while eating lunch, a normal practice allowed by company policy. A ring buoy was found attached to the crane's catwalk after the accident.

**Firefighting Equipment.** As a towing vessel, the *Miss Megan* was required by 46 CFR 27.303 to carry three B-I hand-portable fire extinguishers based on its length, and either

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<sup>18</sup> A four-piling cluster with a blinking light on a platform used to mark the perimeter of an oil field.

<sup>19</sup> Athena Construction Company Policy Manual, section 2, pp. 14 and 40.

an approved B-V semiportable fire-extinguishing system or a fixed fire-extinguishing system to protect the engineroom.<sup>20</sup> According to a Coast Guard inspector stationed in Morgan City, the *Miss Megan* carried a type B-V extinguisher. The vessel survey done in 2005 lists two 20-pound extinguishers in the engineroom and one extinguisher each in the wheelhouse, upper bunkroom, and galley. Investigators were unable to examine the firefighting equipment on board at the time of the accident because of the extensive fire damage.

Athena Construction company policy contained general instructions for preventing workplace fires. The policy did not include requirements for firefighting equipment on barges. According to a company representative, the *Athena 106* carried at least three fire extinguishers. Two identifiable extinguishers were found during the postaccident examination.

## Regulators

### ***Coast Guard Authority***

Although the towing vessel *Miss Megan* was not inspected, the Coast Guard and Maritime Transportation Act of 2004 (Public Law 108-293, enacted August 9, 2004) added towing vessels to “Vessels Subject to Inspection” under Title 46 *United States Code*, section 3301. In addition, section 3306 was amended by adding the following: “The Secretary [of Homeland Security] may establish by regulation a safety management system appropriate for the characteristics, methods of operation, and nature of service of towing vessels.” Therefore, the Coast Guard now has the authority the Safety Board recommended it seek after a 1998 accident in which a tow rammed a bridge in St. Louis Harbor, Missouri, causing three barges to break away and strike a moored casino vessel.<sup>21</sup> No deaths resulted from the accident. The Board’s accident report made the following recommendation to the Coast Guard:

#### M-00-10

Seek authority to require domestic towing companies to develop and implement an effective safety management system to ensure adequate management oversight of the maintenance and operation of all towing vessels.

On April 21, 2005, the Safety Board classified Safety Recommendation M-00-10 as “Open—Acceptable Response” after the Coast Guard advised the Board of the changes

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<sup>20</sup> Class B extinguishers are for fires involving flammable liquid, grease, or gas. B-I extinguishers hold 2.5 pounds of dry chemical. B-V extinguishers are available in a variety of sizes and with different types of extinguishing agents.

<sup>21</sup> National Transportation Safety Board, *Ramming of the Eads Bridge by Barges in Tow of the M/V Anne Holly With Subsequent Ramming and Near Breakaway of the President Casino on the Admiral, St. Louis Harbor, Missouri, April 4, 1998*, Marine Accident Report NTSB/MAR-00/01 (Washington, DC: NTSB, 2000).

to the *United States Code* described above. The Board's classification was made "pending confirmation from the Coast Guard that requirements for safety management systems will be promulgated for all towing companies."

The Coast Guard is expected to propose a safety management system that would place towboat masters clearly in charge of safety, and that would require companies to establish safe operating procedures that take into account the risks of each voyage. The new law will apply to the *Miss Megan*, if it is brought back into service. At the time of this report, the Coast Guard was drafting the new regulations.

Deck barges such as the *Athena 106* will remain not subject to inspection.<sup>22</sup> According to American Waterway Operators, the national trade association for the U.S. tugboat, towboat and barge industry, more than 4,000 deck barges operate across the country, using different types of winches and other equipment in a variety of different operations. Coast Guard data show that 305 people were fatally injured on barge/tow combinations between 1997 and 2006 and that 379 explosions or fires occurred on barges or towboats during the same period, killing 14 people.

The Coast Guard regulates all aspects of maritime safety on inspected vessels. The Occupational Safety and Health Administration (OSHA), an agency of the U.S. Department of Labor, refers complaints regarding workplace conditions of seamen on inspected vessels to the Coast Guard, but regulates workplace safety for employees other than seamen working on inspected vessels. OSHA has jurisdiction over workplace safety for workers on uninspected vessels. On the same vessels, Coast Guard oversight is limited to fire and lifesaving equipment and overall navigational matters.

In 1983, the Coast Guard and OSHA signed a memorandum of understanding describing their respective roles in relation to inspected vessels (appendix B). The memorandum of understanding was "intended to eliminate confusion among members of the public with regard to the relative authorities of the two agencies." The memorandum of understanding did not address uninspected vessels.

### **OSHA Authority**

The maritime safety role of OSHA involves primarily the regulation of shipyards, longshoring, and marine terminals. The agency acts when there is an accident, a complaint, or as part of a nationwide "special emphasis program" focused on particular workplace safety hazards. The Maritime Advisory Committee for Occupational Safety and Health (MACOSH) was reestablished in 2006 to advise OSHA on matters relevant to the safety and health of workers in the maritime industry, including enforcement, training, and outreach. OSHA issued guidance about its role in marine safety on November 8, 1996.<sup>23</sup>

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<sup>22</sup> The Coast Guard inspects barges that carry hazardous materials, petroleum products, or other oils (46 CFR subchapters D and O).

<sup>23</sup> Occupational Safety and Health Administration, "OSHA/U.S. Coast Guard Authority Over Vessels," OSHA Instruction CPL 2-1.20 (see appendix C).

The state of Louisiana defers to the Federal Department of Labor and does not have its own occupational health and safety rules. After the accident, Athena Construction notified OSHA that it had been involved in an accident resulting in fatalities. The local OSHA office in Baton Rouge was first told that it was a marine accident and deferred to the Coast Guard to investigate. OSHA later joined the Safety Board investigation as a party.

OSHA also conducted its own enforcement investigation to determine whether any of its standards had been violated. On March 29, 2007, OSHA issued a citation to Athena Construction (appendix D) for a serious violation of section 5(a)(1) of the Occupational Safety and Health Act of 1970. According to information received from Athena Construction, OSHA and Athena reached a settlement agreement on April 20, 2007, in which they agreed that setting the brakes and pinning the spuds in the raised position could be safely done. The agreement contained the following abatement method and remedial measures:

All employees have been instructed that before a barge is moved, the spuds are to be raised such that the pin hole is above the resting area of the pin. Each spud is to be pinned in the up position. Each spud and the winch are to be manned throughout the barge's move. In the event of a power failure of the tug or an imminent collision or allision, and it is necessary to lower the spuds to stop the barge, the Supervisor will direct the workers at the spuds to remove the pins, and the winch operator will be directed by the Supervisor on how and when to lower the spuds. When the equipment is not manned and is under tow, the spuds will be raised and pinned.

### ***Coast Guard/OSHA Relationship***

The OSHA instruction of November 1996 broadly outlines the role of each agency. Regarding the Coast Guard, the instruction states (p. 9):

The U.S. Coast Guard conducts limited safety checks on "uninspected vessels." The Coast Guard has regulations dealing with, and conducts safety checks of, working conditions on commercial uninspected vessels involving personal flotation devices, lifesaving equipment, fire extinguishing equipment, fire fighting equipment, ventilation of engine bilges and fuel tank compartments, and back-fire traps/flame arresters on inboard engine carburetors using gasoline as a fuel. Any other working condition on board a commercial uninspected vessel is subject to OSHA authority.

Regarding OSHA, the instruction states (p. 10):

OSHA may exercise its authority to cite all employers for all violative working conditions affecting their employees on uninspected vessels when such violations occur within OSHA's geographical jurisdiction and when such violations are not specifically addressed by a Coast Guard regulation.

1. An owner, operator, agent or master of an uninspected vessel may be cited for hazards to which **any employees, including seamen** [emphasis in original], it employs are exposed if the hazard is not regulated by the U.S. Coast Guard.

a. . . .

b. Identified recognized hazardous situations that are causing or are likely to cause death or serious physical harm for which there are no specific standards will be cited under the provisions of Section 5 (a) (1) of the OH Act.

In October 2001, the U.S. Supreme Court heard the *Chao v. Mallard Bay Drilling Company* case (00-927). The case involved an explosion on an uninspected oil and gas exploration barge (rig 52) in Louisiana that killed or injured several workers. The Coast Guard did not cite the operator for violations, but OSHA did. The operator challenged OSHA on jurisdictional grounds, but in a decision dated January 9, 2002,<sup>24</sup> the Supreme Court held 8-0 that in areas where the Coast Guard did not exercise inspection authority, OSHA could. Specifically,

[t]o determine whether Coast Guard regulations have pre-empted jurisdiction over Rig 52's working conditions, it is thus necessary to examine the contours of the Guard's exercise of its statutory authority. With respect to *inspected* vessels, the parties do not dispute that OSHA's regulations have been pre-empted because the Coast Guard has exercised its broad statutory authority over workers' occupational health and safety, 46 U.S.C. §3306. Indeed, OSHA and the Coast Guard signed a Memorandum of Understanding recognizing that the Guard has displaced OSHA's jurisdiction over all working conditions on inspected vessels, including those not addressed by specific regulations. In contrast, the Guard's regulatory authority over uninspected vessels is more limited. Its general maritime regulations do not address the occupational safety and health concerns faced by inland drilling operations on such vessels and, thus, do not pre-empt OSHA's authority in this case. And, although the Guard has engaged in a limited exercise of its authority to regulate specific working conditions on certain types of uninspected vessels, respondent has not identified any specific regulations addressing the types of risk and vessel at issue here.

### **State of Louisiana Authority**

As noted above, Louisiana does not exercise any occupational health jurisdiction and defers to the Federal agency (OSHA). The state does not inspect commercial vessels in navigable waters, a role reserved for the Coast Guard. The state's Department of Natural Resources exercises limited authority over the pipelines in Louisiana and was a party to this investigation.

## **Tests and Research**

### **Sonar Survey**

Chevron contracted with John Chance Land Surveys, Inc., by agreement of the National Oceanic and Atmospheric Administration and the Coast Guard, to conduct extensive sonar surveys of the area after the accident to determine the water depths and to detect any hazards to the salvage operation. A preliminary sonar scan around the *Athena 106* showed a

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<sup>24</sup> *Chao v. Mallard Bay Drilling, Inc.*, 534 U.S. 235 (2002).

depression in the bay floor and extensive scarring of the area. On the basis of the sonar scan, a hydrographic survey, using a side-scan sonar and a single-beam echo sounder, was conducted to map the water bottom near the accident site. The echo sounder results indicated that the corrected mean lower low water depths in the vicinity of the accident were 6 to 7 feet.

The surveyors could not determine exactly what caused the scarring of the bay floor, although some scars were identifiable as made by a propeller. The report stated: “the depression in the seafloor near the pipeline has disturbed the natural bottom significantly enough that a determination of the ATHENA barge dragging an object, which may have caused the pipeline to rupture, cannot be made.”

### ***Spud Winch Examination***

On December 6, 2006, Safety Board investigators visited Athena Construction’s maintenance facility in Morgan City to further examine the *Athena 106*’s spud winch. The winch, still secured to the deck of the barge, was unfastened and lifted by crane to shore where it could be examined in detail.

The team first briefly reexamined the physical condition of the winch. The paint had burned from all external surfaces, and the top of the fuel tank, mounted on the winch’s base, had split open. The diesel engine powering the winch also sustained extensive damage. The winch’s chain guard, on the aft end of the winch opposite the operator’s seat, was removed to access the chain and drive sprockets on the clutch and winch drive ends. The drive chain, sprockets, gearing, and all associated components appeared in satisfactory condition, with no sign of accident-related or preexisting damage.

The metal guard covering the winch drum drive gears was removed. Both the drum drive gears and the pinion gear driving them were inspected for shaft, bearing, or tooth failure or other signs of damage. All components were found in satisfactory condition, with no signs of damage or failure. Both drum pawls were inspected and found to be working satisfactorily, with no signs of damage or wear.

The connections and linkages for both the foot pedal brakes and the hand lever friction controls were found in satisfactory condition, with no signs of wear, damage, or disconnected components except for the small amount of wear, noted in the postaccident examination, where the hooked edge of the brake pedal would engage the steel latching bar. The turnbuckles<sup>25</sup> used to adjust the brake bands for both control mechanisms were inspected and found to have threads remaining for further adjustment. The brake band on the upper drum was removed to check for damage to the drum or to the lining on its inside surface. The lining, which was fastened to the inside surface of the steel brake band with steel rivets, was removed and checked for thickness along its entire 5-foot length. The material thickness of the brake band lining for the upper spud winch drum varied from 0.172 to 0.314 inch.

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<sup>25</sup> Devices consisting of a link with screw threads at both ends, used to bring the ends closer together and adjust the length of a linkage or connection.



Investigators were unable to acquire a complete, original owner's manual for the winch<sup>26</sup> to determine the allowable minimum thickness for the lining material. However, once the lining was removed, all the lining fastening rivets, still fastened in place on the band, were checked for wear. None of the rivet heads showed any signs of wear, damage, or fracturing, which could have occurred if insufficient brake lining material had allowed the drum's steel surface to contact the outer steel brake band surface.

### ***Material Analysis of Pipeline***

At the Safety Board's request and in coordination with Safety Board investigators, Stress Engineering Services, Inc., in Houston, Texas, examined and tested samples of the ruptured pipeline. The stated objectives of the Stress Engineering Services work were to

document the overall condition of the pipe, including fracture and weld locations; identify fracture mechanisms, directions, and origins; inspect for foreign object damage and pre-existing conditions; measure the pipe diameter and wall thickness; measure the hardness of the steel; and visually characterize external coatings.

The report completed on February 27, 2007, by Stress Engineering Services described the fractured pipeline as follows:

The rupture produced both a transverse fracture and a longitudinal fracture in the pipeline. The transverse fracture was located approximately 2.1 feet east of a field girth weld located in the section of pipe referred to as the "west portion." The longitudinal fracture extended from the transverse fracture to the east for a distance of approximately 43.4 feet.

The report identified a reversal in the direction of fracture surface markings and stated that the reversal was "consistent with a fracture origin area in the bend [in the longitudinal fracture surface]." The report noted that "internal and external corrosion were insignificant."

The Safety Board's materials laboratory reviewed the report and found that "the origin area was associated with a large dent on the pipe exterior above the fracture." The laboratory noted that the features of a bulge in the fracture surface were "consistent with the east portion moving downward relative to the west portion as would occur from contact at the location of the bulge with a spud moving downward." The laboratory's report stated that, according to the Stress Engineering Services document, "no evidence of preexisting cracks or significant corrosion was observed at the origin area." The laboratory's report stated further: "Results documented in the [Stress Engineering Services] report support the conclusion that the pipe ruptured in overstress due to contact with the spud."

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<sup>26</sup> According to its serial number, the winch was built in the 1950s. The manufacturer is out of operation.

# Analysis

## General

The analysis first identifies factors that can be eliminated as causal or contributory to the accident. It then analyzes the cause of the accident and discusses the safety issues identified by the accident investigation:

- Failure to use safety devices.
- Limited oversight of vessels not subject to inspection.

## Exclusions

The prevailing weather conditions near the accident site did not affect the ability of the three vessels to operate normally. The wind was slight, and the sea conditions would not have hindered the *Miss Megan* master from controlling the barges his vessel was towing.

The recovered bodies of four crewmembers were tested for drugs and alcohol, with negative results. The two workers who survived were tested for drugs, with negative results. They were not tested for alcohol because of the lengthy postaccident rescue operations. However, an officer from the St. Mary Parish sheriff's office who met the survivors at the dock did not detect evidence of alcohol use by either of them.

The crews aboard the *Athena 106* and the *Miss Megan* were working a normal, routine shift. The accident occurred at midday, and survivors indicated in interviews that they had not experienced any abnormal change in work habits or worked excessive hours in the days before the accident. Therefore, the Safety Board concludes that the following were not factors in the *Athena 106* accident: weather, drug or alcohol use, and fatigue.

The postaccident inspection of the *Miss Megan* revealed no obvious mechanical defects on the towboat. The engines of the *Miss Megan* suffered extensive damage in the fire. Investigators observed that the transmission shift levers indicated that both engines were in the neutral position at the time of the accident. The transmission could only have been changed by the master—that is, the shift levers could not have vibrated into the neutral position. Because the master's remains were discovered outside the wheelhouse, it is likely that he put the towboat's engines into neutral and left the wheelhouse for some reason before the fire. Thus, it is unlikely that the *Miss Megan*'s transmission malfunctioned and caused the towboat to suddenly accelerate, jar the barges, and cause the spud winch brake to dislodge the *Athena 106*'s aft spud. The Safety Board therefore concludes that the engine transmission of the *Miss Megan* was not a factor in the accident.

## Cause of Accident

The timing of the rupture with the position of the barge above the gas sales pipeline, the loss of pressure recorded by Chevron's SCADA system, the observation of the fire by witnesses, and the reports of postaccident divers who noted the spud's proximity to the failed pipeline all indicate that the pipeline ruptured when the spud hit it. An estimated 973,000 cubic feet of natural gas escaped from the ruptured pipeline. A number of possible ignition sources existed on the accident vessels, such as generators and other motors, but the specific ignition source for the fire could not be determined.

The Stress Engineering Services examination, which was reviewed by the Safety Board's materials laboratory, identified the proximity of the pipe damage with the fracture origination area. According to the materials laboratory report, Stress Engineering Services found no evidence of preexisting cracks or significant corrosion in the fracture origin area. A cathodic protection survey on the pipeline in August 2005 produced readings that met NACE International criteria for acceptable cathodic protection against corrosion, and a February 2006 hydraulic pressure test of the pipeline for 4 hours at 1,000 psig pressure proved the pipeline's structural integrity. Since the 2006 pressure test, the pipeline had not required repairs and had experienced no problems before it ruptured during the accident. Thus, no evidence suggests that the pipeline was in a weakened state before the accident.

The aft spud, which weighed 5 tons, had penetrated an estimated 17 feet into the muddy bottom of the bay, according to markings and measurements made after the accident. (The forward spud remained raised after the accident until, according to an Athena Construction barge supervisor, it "just dropped" during the recovery effort. The forward spud had not been pinned.) In reviewing the Stress Engineering Services report, the Safety Board's materials laboratory found that "the origin area was associated with a large dent on the pipe exterior above the fracture" and that "the pipe was deformed downward in the vicinity of the bulge, consistent with the spud moving downward." Although the John Chance surveyors could not rule out the possibility that the pipeline had been ruptured when the *Athena 106* dragged an object across it because the bottom of the bay around the accident site was significantly disturbed, the Board's materials laboratory found: "Results documented in the [Stress Engineering Services] report support the conclusion that the pipe ruptured in overstress due to contact with the spud."

The tangled cable found after the accident on the winch drum for the aft spud shows that the cable paid out in a sudden, uncontrolled release and indicates that the spud fell rapidly (that is, was not dragged). The spud winch operator said that he looked at the winch after the spud fell and saw no one near it who might have accidentally released the brake. Given the witness statement and the postaccident condition of the pipeline and the aft spud's cable, the Safety Board concludes that the pipeline was ruptured by the impact of the aft spud falling downward, and that the release of the spud was unintended, sudden, and uncontrolled.

Safety Board investigators considered four possible explanations of why the spud had unintentionally released from the winch. One possibility was that the release resulted

from a mechanical defect. The spud winch used on the *Athena 106* and its associated lifting equipment were transported for examination to Athena Construction's facility in Morgan City, Louisiana. Investigators searched for any mechanical conditions that might have allowed the aft spud to fall free from its lifted position and strike the high-pressure natural gas line. None of the driving components (chain, sprockets, gearing, transmission) showed any abnormalities or defects. All linkages associated with the spud winch operator's drum controls were intact, and none were positioned at their endpoints of adjustment, an indication of excessively worn or improperly adjusted brakes or controls. The only mechanical abnormality was a small section of worn steel where the foot brake for the aft spud latched to the winch. Because the material wear was slight, the worn area would have had minimal effect on the holding ability of the pedal's latching mechanism. Finally, the brake pad lining to the aft spud drum was found to have sufficient material thickness to control the braking action of the spud's drum.

During his interview, the *Athena 106* spud winch operator said that he had conducted a routine check of the winch the morning of the accident and had found nothing abnormal. He also told investigators that the spud winch was working "fine" before the accident. He further stated that he had not needed to adjust the brakes that morning, as was periodically required to remove excessive free play from the control linkages. Thus, the evidence indicates that the winch on the *Athena 106* was free of any mechanical defects or abnormalities.

Investigators also examined the condition of the cable attaching the aft spud to the winch drum and the hardware used to run the cable between the winch and the spud. The cable was found free of damage or fraying along its entire length. Further, a company invoice indicated that the cable was nearly new, having been replaced about 2 months before the accident. The sheaves and other hardware between the spud and winch were in satisfactory operating condition.

A second possible explanation for the spud's sudden release is that the spud winch operator did not set the foot brake properly. The operator told investigators that the brakes were working properly the day of the accident and that he did not have to adjust them that morning. Since the brake released during the accident, it was impossible to determine its position beforehand. Therefore, the possibility that the brake released because it was improperly set cannot be ruled out.

A third possible explanation for the spud release is that one or more of the vessels ran aground in the shallow bay and vibrated the spud's foot brake loose. According to echo sounder data from the John Chance survey, the water in the area around the crater caused by the release of high-pressure gas was 6 to 7 feet deep (the crater was 3.5 to 4 feet lower than the surrounding area). Since the draft of the barges was between 4 and 4 1/2 feet, it is unlikely that either barge ran aground.

The *Miss Megan*'s draft was about 5 feet. Although the John Chance survey found propeller marks on the bay floor, the marks could not be identified with the *Miss Megan*. The spud winch operator told investigators that he had felt the barge stop just before the spud dropped, "like the towboat stopped," but that he had paid "no attention" because

“that’s been known to happen out there . . . the water’s shallow.” If the towboat had stopped suddenly, the motion might have been sufficient to loosen the aft spud winch brake and cause the spud to fall.

A fourth possibility, related to the possibility of a grounding, is that the vessels in the tow jostled each other enough to jar the foot brake loose and cause the aft spud to drop. The tow, which was traveling at about 6 knots, might have created enough motion to cause the vessels to hit each other with enough force to dislodge the foot brake.

The investigation found evidence that the spud winch and its associated lifting hardware were free of mechanical damage or defect before the accident. There is, however, little or no evidence to establish which, if any, of the other possible scenarios accounted for the spud’s sudden fall—the spud winch operator failing to set the foot brake properly, one or more of the vessels grounding in the shallow bay, or the vessels in the tow jostling each other enough to loosen the foot brake on the *Athena 106*’s aft spud. The Safety Board therefore concludes that while it is unlikely that a mechanical defect in the spud winch or its associated apparatus caused the accident, the reason the foot brake for the aft spud released cannot be determined.

## Failure to Use Safety Devices

The *Athena 106* spud winch operator followed his usual and customary method of operating the spud winch on the day of the accident. His practice was to employ only the foot brakes at the operator’s station to secure both spuds once they were fully retracted. The spud winch operator had two additional means of locking the spuds in the retracted position, but he did not use either of them on either spud:

- A steel pawl that, when engaged at the operator’s station, fit into a notched ring fastened to the outer periphery of the winch drum to stop it from turning backward if the brake failed.
- A 36-inch-long, 2-inch-diameter steel securing pin that could be inserted directly through the spud slightly above deck level once it was fully retracted.

The steel securing pin was a fail-safe device that would have kept the aft spud from falling even if the winch or the supporting cable failed. The *Athena 106* spud winch operator told investigators that the securing pins were generally inserted only on long transits, not on the short trips the barges made between one work site and another. The operator stated in his interview, “I mean I’m sure it’s a lot safer to do it [use the pins], but we don’t. I don’t know why.” The *Athena* Construction barge supervisor confirmed that in day-to-day operations, crews used only the foot brakes to hold the retracted spuds. Further, after the accident, investigators witnessed company personnel moving another barge next to the *Athena 106* so that its crane could pull the aft spud out of the mud. While moving the other barge, the spud winch operator used just the foot brake, neither of the other two safety devices, to hold the retracted spuds.

Thus, after the *Athena 106* spud winch operator raised the forward and aft spuds shortly before the accident, he failed to take two available and redundant safety actions. First, he did not position the lever that would have engaged the pawls into the notched ring on the drums' outer edge and eliminate the chance of the winch "running away" in the event of brake failure. Second, he did not insert the steel securing pins through the retracted spuds to prevent the spuds from falling if the winch or a supporting cable failed. During the postaccident inspection of the *Athena 106*, the pins used for securing the spuds in place were found lying on the deck, one at the base of each spud.

If the *Athena 106* crew had used the steel pins to secure the retracted spuds in place during their transit, a pin would have prevented the aft spud from accidentally deploying. The spud would have remained locked in its lifted position regardless of whether the winch brake mechanism, the spud's supporting cable, or a piece of connecting hardware had failed. Athena Construction's health and safety manual contained no procedures mandating the use of the safety devices on the spud winch except during electrical work. OSHA cited Athena Construction for not providing a safe workplace and indicated that the securing pins were an important part of a safe operation. Therefore, the Safety Board concludes that the accident could have been prevented if Athena Construction had required the spuds on its barges to be securely pinned while the barges were in transit. In March 2007, Athena Construction reached a settlement agreement with OSHA according to which company employees will be instructed to pin each spud in the raised position before a barge is moved. The Safety Board agrees that the spud securing pins are an important safety element on barges such as the *Athena 106* and believes that Athena Construction should develop procedures and provide initial and recurrent training to the employees on its barges to use the securing pins to hold spuds safely in place before transiting from one site to another.

Investigators found no evidence that the *Miss Megan* master or deckhand checked whether the spuds had been properly secured before the tow began. A towboat crew occasionally moves barges that do not carry construction crews. The *Miss Megan* was operated by a licensed master who was responsible for the safe operation of his vessel. Before getting under way, a licensed mariner should ensure that the vessels under his control are safe to move. (A tow essentially operates as a single vessel because the towboat and the barges are lashed together.) In the case of the *Athena 106*, the *Miss Megan* master may have deferred to the construction crew. However, a master cannot delegate the responsibility for the safety of his crew and vessel to others. The deckhand left the towboat and could have quickly checked whether the spud securing pins were in place before the tow got under way.

Central Boat Rentals had a health and safety manual and trained its crews. However, the written procedures did not specifically warn masters about the need to secure spuds or other barge equipment before navigating. Central Boat Rentals owned and operated a variety of vessels, including spud barges, and should have been aware of this important safety requirement. The company's crews should have been trained to identify potential safety hazards on vessels under their control. The Safety Board therefore concludes that the failure of Central Boat Rentals to require, and of the *Miss Megan* master to ensure, that the spuds on the *Athena 106* were securely pinned before getting

under way contributed to the accident. The Safety Board believes that Central Boat Rentals should develop procedures and provide initial and recurrent training to the employees on its barges to use the securing pins to hold spuds safely in place before transiting from one site to another.

### Limited Oversight of Vessels Not Subject to Inspection

In this accident, the material condition of the towboat and the barges was not an issue. However, according to American Waterway Operators, more than 4,000 deck barges similar to the *Athena 106* and *IBR 234* operate across the country, using different types of winches and other equipment in a variety of operations. Coast Guard data show that 305 people were fatally injured on barge/tow combinations between 1997 and 2006 and that 379 explosions or fires occurred on barges or towboats during the same period, killing 14 people.

No regulatory agency inspects operations—general working conditions, safety gear, equipment, and operating practices—on barges that are not subject to inspection. Coast Guard oversight is limited to examining the lifesaving and firefighting equipment on certain uninspected vessels such as the *Miss Megan*. OSHA investigates only after an accident, in the case of an employee complaint, or as part of a “special emphasis program” focusing on particular workplace safety hazards. In this accident, the condition of the *Athena 106* barge and winch components was unlikely to have offered grounds for an OSHA action until after the fact.

The Coast Guard acted under its authority to investigate the *Athena 106* accident because it occurred on a navigable waterway. However, if a similar accident had occurred with no towboat present, OSHA would probably have investigated. After the accident, Athena Construction was found to be in violation of a general workplace safety provision of the Occupational Safety and Health Act of 1970. However, this accident illustrates that before an accident occurs, no agency currently inspects operations involving barges not subject to inspection, and that even if a material defect or unsafe work practice exists, in the absence of a complaint no preventive regulatory action will take place.

The Coast Guard and Maritime Transportation Act of 2004 gives the Coast Guard the authority to require towing vessels such as the *Miss Megan* to have a towing safety management system.<sup>27</sup> A safety management system would assist both the Coast Guard and the towing industry in providing for safe practices in vessel operation and a safe working environment on board towing vessels, establish and implement safeguards against identified risks, establish and implement actions to continuously improve the safety management skills of personnel on shore and on board towing vessels, and ensure compliance with rules and regulations. The Safety Board has previously addressed the need for safety management systems in the U.S. towing industry and concludes that the lack of a safety management system requirement for all U.S. towing industry companies

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<sup>27</sup> The Coast Guard has no plans to inspect barges that are not currently subject to inspection. The Coast Guard already inspects barges that carry hazardous materials, petroleum products, or other oils.



poses a threat to waterway safety. The Safety Board therefore believes that the U.S. Coast Guard should finalize and implement the new towing vessel inspection regulations and require the establishment of safety management systems appropriate for the characteristics, methods of operation, and nature of service of towing vessels. This recommendation supersedes Safety Recommendation M-00-10, which is therefore classified as “Closed—Acceptable Action/Superseded.”

When the new regulations supporting the Coast Guard and Maritime Transportation Act of 2004 are promulgated, they should restate the master’s responsibility for his vessel and for the safety of vessels in tow. The new regulations will add a layer of oversight for vessels under tow that are not subject to inspection. Although towboats will be inspected under the new rules, monitoring of workplace safety aboard barges such as the *Athena 106* needs to be improved. The memorandum of understanding that the Coast Guard and OSHA signed in 1983 was “intended to eliminate confusion among members of the public with regard to the relative authorities of the two agencies.” The memorandum does not address uninspected vessels. Although OSHA has exercised its jurisdiction over workplace safety on barges after accidents, responsibility has been divided between the two agencies. With the advent of new regulations for towing vessels, the gap will shrink between vessels subject to inspection and uninspected barges such as the *Athena 106*. The Safety Board concludes that workplace safety on uninspected vessels should be more closely observed before accidents occur, and that the agreement between the Coast Guard and OSHA should reflect the new regulatory scheme, address all aspects of workplace and navigational safety, and encourage communication between the two agencies and industry.

The Safety Board therefore believes that OSHA and the Coast Guard should review and update their memorandum of understanding to specifically address their respective oversight roles on vessels that are not subject to Coast Guard inspection. The Board further believes that OSHA should direct MACOSH to issue the following documents to the maritime industry: (1) a fact sheet regarding the accident, and (2) a guidance document regarding the need to secure the gear on barges, including spud pins, before the barges are moved, and detailing any changes to its memorandum of understanding with the Coast Guard.

## Response to Emergency

Chevron’s SCADA system shut down the Vermilion Bay gas sales pipeline downstream of the rupture by about 1210. Pressure gauges associated with the SCADA system sensed a pressure decrease in the Vermilion Bay gas sales pipeline and automatically shut it down. As part of the automatic shutdown, a check valve on Chevron’s bay junction platform closed and prevented natural gas from backflowing into the ruptured pipeline from Chevron’s downstream pipeline system. The shutdown of the failed pipeline upstream of the failure was expedited by a workman on the Gulfport Sales Platform, who recognized the emergency and manually shut a valve feeding gas into the failed pipeline shortly after 1206. The Safety Board therefore concludes that the damaged natural gas pipeline was shut down in a prompt and timely fashion.

Emergency response to the accident came from both traditional response assets and other vessels working in the West Cote Blanche Bay oil field. Because of the remote location of the accident, no traditional emergency response assets were in the immediate vicinity. The two closest fire departments were staffed by volunteers and had no waterborne firefighting equipment. Other vessels working in the field were closest and best prepared to deal with the fire emergency. Two towing vessels and one jack-up boat with firefighting capabilities quickly responded to the accident scene and used their firefighting equipment to extinguish the fires on the *Miss Megan* and the two barges.

Crew transport boats and other small boats near the accident site were instrumental in the search-and-rescue efforts. The crew boat *Captain Mitch* arrived about 5 minutes after the accident. The crew pulled the *Athena 106* spud winch operator from the water before traveling around the field to shut down wells. Workers from another *Athena* Construction barge arrived next on a small boat kept on the barge. They rescued the *Miss Megan* deckhand from the water and found the body of the *Athena 106* barge foreman. Individuals on both the *Captain Mitch* and the small boat reported seeing other *Athena 106* crew on or around the burning barge but could not move close enough to help because of the fire's heat.

Assets from the Coast Guard, the Louisiana Department of Wildlife and Fisheries, and St. Mary and Iberia parishes responded quickly on notification. The Coast Guard launched a jet aircraft and a helicopter within 20 minutes. Louisiana Department of Wildlife and Fisheries officers launched a vessel from Cypremort Point, about 2 miles from the accident site, and arrived within 20 minutes of receiving a 911 call. Marine units from Iberia and St. Mary parishes, which had to travel about 12 miles to reach West Cote Blanche Bay, arrived by 1300, an hour after the accident.

A command center on nearby Cypremort Point was used to direct searches for missing crew from the towboat and barges. Marine units working together conducted grid searches of the accident site and surrounding areas. After the Coast Guard helicopter located one body, a boat from the St. Mary's Parish sheriff's office recovered it from the water. The boat also recovered the master's body from the *Miss Megan*.

Responding individuals and organizations worked effectively and cooperatively in the firefighting and search-and-rescue aspects of the emergency. Those closest to the accident responded immediately, while the Coast Guard and law enforcement groups sent assets as quickly as possible. There were no reports of issues or difficulties other than that of traveling to the remote accident location. Therefore, the Safety Board concludes that the actions by rescuers were timely and effective.

# Conclusions

## Findings

1. The following were not factors in the *Athena 106* accident: weather, drug or alcohol use, and fatigue.
2. The engine transmission of the *Miss Megan* was not a factor in the accident.
3. The pipeline was ruptured by the impact of the aft spud falling downward, and the release of the spud was unintended, sudden, and uncontrolled.
4. While it is unlikely that a mechanical defect in the spud winch or its associated apparatus caused the accident, the reason the foot brake for the aft spud released cannot be determined.
5. The accident could have been prevented if Athena Construction had required the spuds on its barges to be securely pinned while the barges were in transit.
6. The failure of Central Boat Rentals to require, and of the *Miss Megan* master to ensure, that the spuds on the *Athena 106* were securely pinned before getting under way contributed to the accident.
7. The lack of a safety management system requirement for all U.S. towing industry companies poses a threat to waterway safety.
8. Workplace safety on uninspected vessels should be more closely observed before accidents occur, and the agreement between the Coast Guard and the Occupational Safety and Health Administration should reflect the new regulatory scheme, address all aspects of workplace and navigational safety, and encourage communication between the two agencies and industry.
9. The damaged natural gas pipeline was shut down in a prompt and timely fashion.
10. The actions by rescuers were timely and effective.

## Probable Cause

The National Transportation Safety Board determines that the probable cause of the accident was Athena Construction's failure to require its crews to pin the spuds securely in place on its barges, which allowed the sudden, unintentional release of the *Athena 106*'s aft spud, rupturing a buried pipeline and causing natural gas to surface and ignite. Contributing to the accident was the failure of Central Boat Rentals to require, and of the *Miss Megan* master to ensure, that the barge spuds were securely pinned before getting under way.

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# Recommendations

## New Recommendations

As a result of its investigation of the *Athena 106* accident, the National Transportation Safety Board makes the following new safety recommendations:

### To the Occupational Safety and Health Administration:

Review and update your memorandum of understanding with the Coast Guard to specifically address your respective oversight roles on vessels that are not subject to Coast Guard inspection. (M-07-4)

Direct the Maritime Advisory Committee for Occupational Safety and Health (MACOSH) to issue the following documents to the maritime industry: (1) a fact sheet regarding the accident, and (2) a guidance document regarding the need to secure the gear on barges, including spud pins, before the barges are moved, and detailing any changes to your memorandum of understanding with the Coast Guard. (M-07-5)

### To the U. S. Coast Guard:

Finalize and implement the new towing vessel inspection regulations and require the establishment of safety management systems appropriate for the characteristics, methods of operation, and nature of service of towing vessels. (M-07-6) (Supersedes M-00-10)

Review and update your memorandum of understanding with the Occupational Safety and Health Administration to specifically address your respective oversight roles on vessels that are not subject to Coast Guard inspection. (M-07-7)

### To Athena Construction and Central Boat Rentals:

Develop procedures and provide initial and recurrent training to the employees on your barges to use the securing pins to hold spuds safely in place before transiting from one site to another. (M-07-8)

## Previously Issued Recommendations Classified in This Report

### To the U. S. Coast Guard:

#### M-00-10

Seek authority to require domestic towing companies to develop and implement an effective safety management system to ensure adequate management oversight of the maintenance and operation of all towing vessels.

Safety Recommendation M-00-10 (previously classified as “Open—Acceptable Response”) is classified as “Closed—Acceptable Action/Superseded” in the “Limited Oversight of Vessels Not Subject to Inspection” section of this report.

## BY THE NATIONAL TRANSPORTATION SAFETY BOARD

**MARK V. ROSENKER**  
Chairman

**ROBERT L. SUMWALT**  
Vice Chairman

**DEBORAH A. P. HERSMAN**  
Member

**KATHRYN O’LEARY HIGGINS**  
Member

**STEVEN R. CHEALANDER**  
Member

**Adopted: June 14, 2007**

# Appendix A

## Investigation

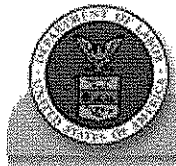
The Safety Board was notified of the *Athena 106* accident on October 12, 2006, through the National Response Center. The five-person investigative team sent to the scene arrived at 1400 on October 13. The following investigative groups and technical specialists were assigned to the investigation: deck operations, survival factors, engineering, pipeline, meteorology, and materials analysis. The on-scene investigation was completed on October 21.

The Safety Board investigated the accident according to its rules under the authority of the Independent Safety Board Act of 1974. The designated parties to the investigation were the U.S. Coast Guard, the Occupational Safety and Health Administration, the Louisiana Department of Natural Resources, the National Oceanic and Atmospheric Administration, Athena Construction, Central Boat Rentals, Gulfport Energy Corporation, and Chevron U.S.A.

## **Appendix B**

### **Memorandum of Understanding Between Coast Guard and OSHA**



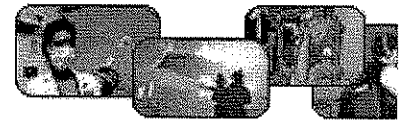


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Memorandums of Understanding

**Authority of Coast Guard and OSHA regarding enforcement of safety and health standards aboard vessels inspected and certified by the Coast Guard.**

Memorandums of Understanding - Table of Contents

- **Information Date:** 03/04/1983
- **Agreement Agency:** United States Coast Guard U.S. Department of Transportation

MEMORANDUM OF UNDERSTANDING  
BETWEEN THE  
UNITED STATES COAST GUARD  
U.S. DEPARTMENT OF TRANSPORTATION  
AND THE  
OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION  
U.S. DEPARTMENT OF LABOR  
CONCERNING THEIR AUTHORITY TO  
PRESCRIBE AND ENFORCE STANDARDS OR REGULATIONS  
AFFECTING THE OCCUPATIONAL SAFETY AND HEALTH OF SEAMEN  
ABOARD VESSELS INSPECTED AND CERTIFICATED BY THE  
UNITED STATES COAST GUARD

PURPOSE.

It is the purpose of this memorandum of understanding (MOU) to set forth clearly the boundaries of the authority of the United States Coast Guard (Coast Guard) of the U.S. Department of Transportation and the Occupational Safety and Health Administration (OSHA) of the U.S. Department of Labor in prescribing and enforcing standards or regulations affecting the occupational safety and health of seamen aboard vessels inspected and certificated by the Coast Guard (hereinafter "inspected vessels"). This MOU is intended to eliminate confusion among members of the public with regard to the relative authorities of the two agencies. Nothing in this MOU pertains to uninspected vessels. The Coast Guard and OSHA agree to work together to fulfill their respective authorities.

AUTHORITY OF THE COAST GUARD.

The Coast Guard is the dominant federal agency with the statutory authority to prescribe and enforce standards or regulations affecting the occupational safety and health of seamen aboard inspected vessels. Under the Vessel Inspection Laws of the United States, the Coast Guard has issued comprehensive standards and regulations concerning the working conditions of seamen aboard inspected vessels.

These comprehensive standards and regulations include extensive specific regulations

governing the working conditions of seamen aboard inspected vessels as well as ample general authority regulations to cover these seamen with respect to all other working conditions that are not addressed by the specific regulations. These standards and regulations are generally set forth at 46 C.F.R. Chapter 1, and in the Coast Guard's Marine Safety Manual and its Navigation and Vessel Inspection Circulars.

#### AUTHORITY OF OSHA.

OSHA has a general statutory authority to assure safe and healthful working conditions for working men and women under the Occupational Safety and Health (OSH) Act of 1970. Section 4(b)(1) of the OSH Act defines the relationship between OSHA and the other federal agencies whose exercise of statutory responsibilities may affect occupational safety and health. Based on OSHA's interpretation of section 4(b)(1), and as a result of the Coast Guard's exercise of its authority, described above, OSHA has concluded that it may not enforce the OSH Act with respect to the working conditions of seamen aboard inspected vessels. Nonetheless, OSHA retains the following responsibilities.

OSHA retains its authority under section 11(c) of the OSH Act, which forbids discrimination in any manner against employees who have exercised any right afforded them under the OSH Act. Pursuant to this provision, OSHA has the authority to require vessel owners to post a notice that informs employees of their right to complain about working conditions to the Coast Guard, OSHA, or the employer and to be free from retaliatory discrimination. OSHA has concluded that its exercise of authority under section 11(c) is not precluded by the scope of section 4(b)(1) of the OSH Act.

OSHA agrees to refer to the Coast Guard, for its consideration, any complaints, other than section 11(c) discrimination complaints, OSHA receives from seamen working aboard inspected vessels. However, the Coast Guard, consistent with the statement of its authority above, has the sole discretion to determine, under its applicable standards and regulations, whether the events complained of constitute hazardous conditions and the extent of any remedy that may be required.

#### RECORDKEEPING.

OSHA and the Coast Guard will continue to discuss the extent of their respective jurisdictions to require owners of inspected vessels to keep records concerning occupational injuries and illnesses. This MOU does not resolve any issues concerning recordkeeping obligations.

#### EFFECTIVE DATE AND PUBLICATION.

This MOU shall take effect upon signature by the parties. It shall be promptly published in the Federal Register.

Commandant  
United States Coast Guard  
U.S. Department of  
Transportation  
Date: March 8, 1983

Assistant Secretary for  
Occupational Safety and Health  
U.S. Department of Labor  
Date: March 4, 1983

Assistant Secretary for  
Occupational Safety and Health  
U.S. Department of Labor  
Date: March 4, 1983

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## **Appendix C**

### **OSHA Guidance Document (CPL 2-1.20)**



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**Directives**

## CPL 2-1.20 - OSHA/U.S. Coast Guard Authority Over Vessels

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• <b>Record Type:</b>	Instruction
• <b>Directive Number:</b>	CPL 2-1.20
• <b>Title:</b>	OSHA/U.S. Coast Guard Authority Over Vessels
• <b>Information Date:</b>	11/08/1996

OSHA Instruction CPL 2-1.20 November 8, 1996 Directorate of Compliance Programs

SUBJECT: OSHA/U.S. Coast Guard Authority Over Vessels

**A. Purpose.** This instruction provides current policy, information and guidance with respect to OSHA/U.S. Coast Guard authority over inspected vessels, commercial uninspected fishing vessels, and commercial uninspected vessels in accordance with Section 4(b)(1) of the OSH Act, 29 U.S.C. Section 653(b)(1).

**B. Scope.** This instruction applies OSHA-wide.

### C. References.

1. OSHA Instruction STP 2.22A, CH-5, March 10, 1995, Changes to the State Plan Policies and Procedures Manual.
2. Memorandum of Understanding, U.S. Coast Guard and the Occupational Safety and Health Administration, 48 Federal Register 11366, March 17, 1983, effective date of March 8, 1983.
3. Public Law 100-424, enacted September 9, 1988, "Commercial Fishing Industry Vessel Safety Act of 1988," 46 U.S.C. 4501 et seq.
4. 46 CFR Part 28, "Commercial Fishing Industry Vessel Regulations," Final Rule.
5. 46 CFR Parts 24, 25, and 26 - "Uninspected Vessels."
6. Jones Act, 46 U.S.C. 688.
7. 46 CFR Part 197, Subpart B - "Commercial Diving Operations."
8. OSHA Instruction STD .2, November 4, 1985, Identification of General Industry Safety and Health Standards (29 CFR 1910) Applicable to Shipyard Work.

R-347

9. OSHA Instruction CPL 2-1.3B, June 14, 1982, Enforcement of Cargo Gear Regulations and the Requirements for Gear Certification in the Maritime Program.
10. 29 CFR 1926, Construction Industry Standards.
11. 29 CFR 1910, General Industry Standards.
12. Occupational Safety and Health Act (OSH Act) of 1970, Section 5(a)(1) General Duty Clause, and Section 4(b)(1) preemption of OSHA authority by other Federal or State agencies.
13. OSHA Instruction CPL 2.51 (Series), Exemptions and Limitations Under the Current Appropriations Act.

**D. Cancellation.** The following guidance documents addressing OSHA and U.S. Coast Guard authority and enforcement with respect to vessels are canceled:

1. Memorandum from Thomas J. Shepich, Directorate of Compliance Programs, April 5, 1989, "OSHA/U.S. Coast Guard Jurisdiction."
2. Memorandum from Gerald P. Reidy, Office of Construction and Maritime Compliance Assistance, to Region X, November 1, 1990, "OSHA/U.S. Coast Guard Jurisdiction; Commercial Fishing Industry Vessels."
3. Memorandum from Gerald P. Reidy, Office of Construction and Maritime Compliance Assistance, to Region X, January 18, 1991, "OSHA/U.S. Coast Guard Jurisdiction, Commercial Fishing Vessels."
4. Memorandum from Patricia K. Clark, Directorate of Compliance Programs, to Region X, July 6, 1990, "OSHA/ U.S. Coast Guard Jurisdiction; Commercial Fishing Industry Vessels."

**E. Action.** OSHA Regional Administrators and Area Directors shall use the guidelines and procedures set forth in this instruction to determine OSHA's authority with respect to the enforcement of occupational safety and health violations on vessels.

**F. Federal Program Change.** This instruction describes a Federal Program Change which affects State plan coverage of public sector employees engaged in maritime employment and those States whose programs also cover portions of the private sector maritime issue. States which cover private sector maritime employment and/or have public sector employees engaged in maritime operations are encouraged to follow the guidelines and jurisdictional limitations established by this instruction within the context of applicable State law, i.e., comparable to Section 4(b)(1) of the OSH Act.

1. The Regional Administrator shall ensure that this change is promptly forwarded to each State designee, using a format consistent with the Plan Change Two-Way Memorandum in Appendix P of the State Plan Policies and Procedures Manual (reference C.1., OSHA Instruction STP 2.22A).
2. The Regional Administrator shall explain to each State designee, as requested, the

technical content of this change.

3. States which cover private sector maritime employment and/or have public sector employees engaged in maritime operations shall be asked to provide preliminary notification to the Regional Administrator within 30 days from the date of this instruction of their intent to adopt an identical or equivalent policy or not to adopt such jurisdictional limitations based on interpretations of differing provisions of State law.

**G. Background.** The delineation of OSHA and the U.S. Coast Guard authority over **inspected vessels** has been unchanged since the signing of a Memorandum of Understanding (reference C.2.) in 1983. The Coast Guard has statutory authority to prescribe and enforce regulations affecting the safety and health of seamen on board vessels inspected and certificated by the agency, and has issued comprehensive standards for working conditions on inspected vessels. Therefore, OSHA may not enforce the OSH Act with respect to "seamen" on inspected vessels including the master, ship's officers and crew members.

The extent of the Coast Guard preemption of OSHA authority over **commercial uninspected fishing vessels** underwent significant changes in 1991. In response to Public Law 100-424 (reference C.3.), the U.S. Coast Guard developed and issued specific regulations (reference C.4.) for commercial uninspected fishing, fish processing, and fish tender vessels to improve the overall safety and health working conditions of **commercial fishing industry vessels**.

OSHA authority over **commercial uninspected vessels** (other than uninspected fishing vessels) remains unchanged. The U.S. Coast Guard has published applicable regulations for uninspected vessels (See reference C.5.).

Due to the complexity of determining the extent to which the Coast Guard preempts OSHA authority over inspected vessels, uninspected fishing vessels, and uninspected vessels, additional clarification of OSHA and U.S. Coast Guard authority and enforcement activities on vessels is provided herein.

**H. Definitions.** Since most definitions related to this instruction are derived from longstanding U.S. Coast Guard rules, where applicable the pertinent U.S. Coast Guard reference is provided within brackets. The following definitions are applicable to this instruction.

1. **Barge** means a non-self propelled vessel. [46 USC Section 2101(2)]
2. **Boundary Line** means a line of demarkation established under Section 2(b) of 33 U.S.C. 151. Generally, boundary lines follow the general trend of the shoreline and cross entrances to small bays, inlets and rivers. For specific descriptions of boundary lines refer to 46 CFR Part 7.
3. **Certificate of Inspection** means a U.S. Coast Guard document issued to United States vessels inspected by the U.S. Coast Guard and which contains, among other information: the description of the vessel, the route the vessel may travel, the minimum crew requirements, the safety equipment and appliances required to be on board, the total number of persons that may be carried, and the names of the owners and operators. [46 USC Section 3309]



4. **Commercial Fishing Industry Vessel** means a fishing vessel, fish tender vessel, or a fish processing vessel which is licensed or registered to engage in commercial fishing industry operations. [46 CFR Section 28.50]

5. **Fish** means finfish, mollusks, crustaceans, and all other forms of marine animal and plant life, except marine mammals and birds. [46 USC Section 2101(11)]

6. **Fish Processing Vessel** is a U.S. Coast Guard **classification for a vessel** that commercially prepares fish or fish products other than by gutting, decapitating, gilling, skinning, shucking, icing, freezing, or brine chilling. [46 USC Section 2101(11b)]

7. **Fish Processing**, as defined by OSHA, is a production function which involves any preparation of a fish or fish product by a worker including gutting, decapitating, gilling, skinning, shucking, icing, freezing, or brine chilling. It is important to note that the definition of fish processing, as defined by OSHA, is predicated on worker function and, therefore, may occur on vessels other than a U.S. Coast Guard classified "Fish Processing Vessel" (e.g.; "Fish Tender Vessel", "Fishing Vessel").

8. **Fish Tender Vessel** is a U.S. Coast Guard **classification for a vessel** that commercially supplies, stores, refrigerates, or transports fish, fish products, or materials directly related to fishing or the preparation of fish to or from a fishing, fish processing, or fish tender vessel or a fish processing facility. [46 USC Section 2101(11b)]

9. **Fishing Vessel** is a U.S. Coast Guard **classification for a vessel** that commercially engages in the catching, taking, or harvesting of fish or an activity that can reasonably be expected to result in the catching, taking, or harvesting of fish. [46 USC Section 2101(11a)]

10. **Inspected Vessel** means a vessel subject to inspection by the U.S. Coast Guard under 46 U.S.C. 3301 and which is issued a Certificate of Inspection (COI) by the Coast Guard.

11. **Navigable Waters** includes all rivers, tributaries, lakes, bays, and sounds which in their natural and ordinary condition are accessible to and from the high seas by vessels. The U.S. Coast Guard is the agency responsible for making any determination of whether a body of water is considered to be "Navigable Waters."

12. **Seaman** is an individual engaged or employed in any capacity on board a vessel, and who has a more or less permanent connection with a vessel, and who contributes to the function of the vessel or to the accomplishment of its mission. [46 USC Section 10101(3)]

13. **Uninspected Vessel** means a vessel not subject to inspection under 46 USC Section 3301 and not a recreational vessel under 46 USC Section 2101(43). A vessel classified as an "uninspected vessel" by the U.S. Coast Guard is subject to limited Coast Guard inspection of the following areas only: safety check of basic fire fighting equipment, safety check of approved life jackets and lifesaving equipment, ventilation of engine bilges and fuel tank compartments, and backfire traps/flame arresters on inboard engine carburetors using gasoline as a fuel.

**I. Geographical Considerations for All Vessels.** The authority of OSHA over any vessel is limited to employment performed within a jurisdiction covered by the OSH Act (See Section 4(a), 29 U.S.C. 653(a)). This provision, as modified by later international agreements, states that the OSH Act applies to employment performed in a State of the United States, the District of Columbia, Puerto Rico, the Virgin Islands, American Samoa, Guam, Northern Mariana Islands, Wake Island, Johnston Island, and the Outer Continental Shelf Lands defined in the Outer Continental Shelf Lands Act. For the purposes of this instruction, the term "State" means each of the jurisdictions previously mentioned, except the Outer Continental Shelf Lands. OSHA only has authority over vessels when they are operating within the limits of State territorial waters.

1. For coastal States, the State territorial waters extend 3 nautical miles seaward from the coast line, except for the Gulf Coast of Florida, Texas and Puerto Rico where the territorial waters extend for 3 marine leagues (approximately 9 nautical miles). "Coast line" is defined as the line of ordinary low water along that portion of the coast which is in direct contact with the open sea and the line marking the seaward limit of inland waters.

2. For States bordering the Great Lakes and St. Lawrence River, all waters in the Great Lakes and associated rivers up to the international boundary line with Canada are State territorial waters.

**J. Authority Over Inspected Vessels.** The U.S. Coast Guard exercises full authority over the safety and health of seamen on board vessels which are inspected and certificated by the U.S. Coast Guard; i.e., "inspected" vessels. With respect to inspected vessels, OSHA refers all safety and health complaints regarding the working conditions of seamen to the U.S. Coast Guard for its consideration to determine whether the events complained of constitute hazardous conditions. OSHA retains authority with respect to recordkeeping requirements for seamen on inspected vessels.

1. OSHA may exercise authority over the working conditions of employees, other than seamen, who are exposed to occupational hazards while working on inspected vessels. This includes employees engaged in longshoring operations, and employees engaged in shipbuilding, ship repair, or shipbreaking operations. This authority also includes other employees, such as construction workers (e.g., those on pipe-laying barges) who are not permanent members of the vessel. However, with respect to employees who are not seamen, OSHA may not cite an owner, operator or master of an inspected vessel for hazards specifically addressed by Coast Guard regulations.

2. The following guidance is provided with respect to making a determination as to whether a worker is a "seaman". A seaman is an employee who:

a. Is engaged or employed in any capacity on board a vessel and has a more or less permanent connection with the vessel, and

b. Contributes to the function of the vessel or to the accomplishment of its mission. To be a seaman one need not aid in navigation or contribute to the transportation of the vessel, but one must do the ship's work. Land-based maritime workers are not seamen (e.g., shipyard employees, longshoremen).

3. In making a determination of whether an individual or group of individuals would be classified as a "seaman", the vessel's "Certificate of Inspection" (COI) should be reviewed since it will provide relevant information on the crew. However, this document is not absolutely determinative.

4. The COI may specifically indicate crew member billets which would, thereby, classify members of the officer rating by a license, and seamen by the issuance of a Merchant Mariners Documents. This is commonly referred to as a "MMD" (Merchant Mariners Document) or "Z-Card" (identification number starts with the letter Z). However, other individuals may be seamen if they meet the above noted two-part test. (See J.2.a. and b.) Any individual who can be determined to be subject to the Jones Act (reference C.6.), would be classified as a "seaman". Local U.S. Coast Guard offices and staff are willing and helpful in those situations where it is difficult to determine whether an individual or group of individuals would be defined as a "seaman." In situations where a dispute or disagreement arises, or a question remains, the OSHA National Office, Office of General Industry Compliance Assistance (Maritime Division), shall be contacted through the respective OSHA Regional Office before any violation is cited.

**K. U.S. Coast Guard Inspected Vessel Regulations.** The U.S. Coast Guard regulates safety and health working conditions for seamen on inspected vessels through the issuance of standards which are contained in 46 CFR Chapter I. The enforcement of the U.S. Coast Guard requirements is set forth in their Marine Safety Manual and Navigation and Vessel Inspection Circulars. The U.S. Coast Guard also regulates commercial diving conducted from inspected vessels per 46 CFR Part 197, Subpart B regulations. (See reference C.7.)

1. The types of inspected vessels are set forth in 46 U.S.C. 3301. They are freight vessels, nautical school vessels, off-shore supply vessels, passenger vessels, sailing school vessels, seagoing barges, seagoing motor vessels, small passenger vessels, steam vessels, tank vessels, fish processing vessels of more than 5,000 gross tons, and fish tender vessels of more than 500 gross tons.

2. Inspected vessels must carry a valid "Certificate of Inspection" issued by the U.S. Coast Guard.

**L. OSHA Requirements Enforceable on Inspected Vessels.** OSHA may exercise its authority to cite employers (other than the owners, operators, agents or masters of inspected vessels **employing only "seamen"**) for all violative working conditions on a vessel when such violations occur within OSHA's geographical jurisdiction. Primarily these employers are those who employ longshoremen and workers engaged in ship repairing, shipbuilding, and shipbreaking.

1. An owner, operator, agent or master of an inspected vessel may be cited for hazards to which non-seamen it employs are exposed if the hazard is not specifically subject to a particular regulation of the U.S. Coast Guard. The reporting of accidents by employers to OSHA is required for all situations where OSHA has geographical jurisdiction in accordance with 29 CFR Section 1904.8.

2. OSHA requirements which remain enforceable on inspected vessels for **employees other than seamen** are as follows:

- a. 29 CFR 1915 for ship repair, shipbuilding and shipbreaking (including applicable 29 CFR 1910 requirements. (See reference C.8.)
- b. 29 CFR 1918 for long shoring operations.
- c. 29 CFR 1919 for cargo handling operations as referenced under 29 CFR 1918 longshoring requirements. (See reference C.9.)
- d. 29 CFR 1926 for marine construction activities. (See reference C.10.)
- e. 29 CFR 1910 for general working conditions not otherwise regulated. (See reference C.11.)
- f. Identified recognized hazardous situations that are causing or are likely to cause death or serious physical harm for which there are no specific OSHA or U.S. Coast Guard standards will be cited under the provisions of Section 5(a)(1) of the Occupational Safety and Health Act (OSH Act). (See reference C.12.)

NOTE 1: Situations will occur where the employee is covered by OSHA, but the vessel hazard is regulated by the U.S. Coast Guard. A common example is the height of guardrails--OSHA requires 42 inches, but the U.S. Coast Guard allows various heights not specifically allowed in the OSHA standards. In such cases involving hardware design specifications, OSHA compliance officers shall not cite the employer for the condition if it complies with the Coast Guard requirements. However, if a longshoring employee were exposed to a fall into a hatch because an installed guard-rail or lifeline was missing or had been taken down, then OSHA compliance officers shall cite the violation.

NOTE 2: Inspected vessels in an immobile status which have been determined to be substantially a land structure are issued a "Certificate of Permanently Moored" by the Army Corps of Engineers and, thereby, lose status as a vessel (i.e., prior U.S. Coast Guard COI is invalid). A "Certificate of Permanently Moored" may include prior vessels being used as a theater, hotel, restaurant, museum, factory, etc. OSHA may exercise its authority to cite employers for all violative working conditions on such prior vessels. If there is any question, call the National Office, Office of General Industry Compliance Assistance (Maritime Division) for guidance.

NOTE 3: Inspected vessels used as gambling boats, tour boats and similar vessels are subject to the 1983 MOU between the Coast Guard and OSHA (reference C.2.). If the worker is determined to be a "seaman" per paragraph J. of this instruction, then the U.S. Coast Guard regulates the working conditions.

**M. OSHA Authority Over Commercial Uninspected Fishing Vessels.** Authority over commercial uninspected fishing vessels is shared by the U.S. Coast Guard and OSHA, with the Coast Guard being the lead agency. OSHA is precluded under Section 4(b)(1) of the OSH Act (reference C.12.) from enforcement with respect to working conditions regulated by other Federal agencies. Therefore, the promulgation of 46 CFR Part 28 (reference C.4.) by the U.S. Coast Guard has expanded the extent of the Coast Guard's regulations over "commercial" uninspected fishing vessels, and preempts OSHA with respect to those working conditions specifically addressed by Coast Guard regulations.

1. OSHA will continue to regulate working conditions on uninspected fishing vessels that are not otherwise covered by U.S. Coast Guard standards, within the geographical limits specified in section I for the protection of all employees including seamen. A list of enforceable OSHA requirements is provided in Appendix A of this instruction.

2. Pursuant to 29 C.F.R. 1910.6(a)(3), OSHA deems it necessary to assure the presence of Coast Guard personnel during OSHA inspections of fishing vessels, as a general rule. Therefore, when practical and feasible, the OSHA Area Director will advise the Coast Guard in advance of inspections to be conducted aboard fishing vessels, and OSHA compliance officers will allow U.S. Coast Guard personnel to accompany them at the option of the Coast Guard.

a. OSHA shall advise the Coast Guard on a case-by-case basis of OSHA's requirement that vessel owners and employers are not given advance notice of the inspection.

b. Specific occupational hazards noted by OSHA compliance officers which are addressed by U.S. Coast Guard regulations will be referred to the local U.S. Coast Guard District Office in writing through the use of the OSHA 90 Form with a cover letter. This procedure will allow Integrated Management Information System queries to be conducted on referrals submitted to the U.S. Coast Guard by OSHA. Otherwise, the violations will be cited by OSHA compliance officers under OSHA procedures and regulations.

3. Pursuant to appropriations limitations, OSHA is currently precluded from conducting "programmed" safety inspections of worksites in the fishing industry with 10 or fewer employees. Field personnel are reminded to review OSHA Instruction CPL 2.51 (reference C.13.) for any applicable limitations placed on OSHA activities by the Congress in the law providing appropriations for the Department of Labor.

**N. U.S. Coast Guard Commercial Uninspected Fishing Vessel Regulations.** The U.S. Coast Guard regulations for commercial "uninspected" fishing vessels (reference C.4.) are applicable to fish processors up to 5,000 gross tons, fish tenders up to and including 500 gross tons, and all commercial fishing vessels. Fish processors and fish tenders which exceed these limits are "inspected" vessels. Currently, there is only one known vessel (fish processor) which exceeds these limits. The U.S. Coast Guard regulations are primarily performance-oriented requirements. Applicable U.S. Coast Guard regulations in force, which preempt OSHA for commercial uninspected fishing vessels, can be found in Appendix B.

**O. OSHA Requirements Enforceable on Commercial Uninspected Fishing Vessels.** OSHA may exercise its authority to cite employers using commercial uninspected fishing

vessels for all violative working conditions on a vessel when such violations occur within OSHA's geographical jurisdiction, and when such violations are not specifically addressed by Coast Guard vessels. Primarily these employers are those who employ fishing industry employees (e.g., processing line workers), longshoremen and workers engaged in ship repairing, shipbuilding, and shipbreaking.

1. An owner, operator, agent or master of an uninspected fishing vessel may be cited for hazards to which **any employee, including seamen**, are exposed if the hazard is not regulated by the U.S. Coast Guard.

a. OSHA compliance officers will ensure compliance with 29 CFR 1910 standards except for ship repair, shipbuilding, and shipbreaking where 29 CFR 1915 standards apply; and cargo handling operations where 29 CFR 1918 standards apply.

b. Identified recognized hazardous situations that are causing or are likely to cause death or serious physical harm for which there are no specific OSHA or U.S. Coast Guard standards will be cited under Section 5(a)(1) of the OSH Act. (See reference C.12.)

c. The reporting of accidents by employers to OSHA is required for all situations where OSHA has geographical jurisdiction over the working condition(s). (See Appendix A for specific conditions that continue to be subject to OSHA enforcement.)

**P. Authority Over Commercial Uninspected Vessels (Other than Commercial Fishing Vessels).** The U.S. Coast Guard conducts limited safety checks on "uninspected vessels." The Coast Guard has regulations dealing with, and conducts safety checks of, working conditions on commercial uninspected vessels involving personal flotation devices, lifesaving equipment, fire extinguishing equipment, fire fighting equipment, ventilation of engine bilges and fuel tank compartments, and back-fire traps/flame arresters on inboard engine carburetors using gasoline as a fuel. Any other working condition on board a commercial uninspected vessel is subject to OSHA authority.

1. U.S. Coast Guard regulations for uninspected vessels are **not applicable** to:

a. Any vessel operating exclusively on inland waters which are not navigable waters. The nearest U.S. Coast Guard Marine Safety Office will provide a determination of navigable inland waters upon request. Any waters from which a vessel cannot access the high seas would generally not be considered navigable waters (e.g., a land locked lake, or a river/lake up-stream of a dam).

b. Any vessel while laid up and dismantled and out of commission.

c. Any vessel with title vested in the United States which is used for public purposes, except vessels of the U.S. Maritime Administration.

2. Towing vessels and tugboats are not listed by the U.S. Coast Guard as "Vessels Subject to Inspection" and are, therefore, uninspected vessels. The two exceptions are **steam powered** towing vessels and tugboats, and **seagoing** towing vessels and

tugboats **over 300 gross tons** which operate beyond the Boundary Line and, thus, are inspected vessels.

NOTE: If the vessel always operates within U.S. inland waters then it is not required to be inspected.

**Q. U.S. Coast Guard Uninspected Vessels (Other than Commercial Fishing Vessels) Regulations.** U.S. Coast Guard uninspected vessel regulations (reference C.5.) provide clarification of the extent of U.S. Coast Guard authority and enforcement in this area. Applicable U.S. Coast Guard regulations in force which preempt OSHA on uninspected vessels are summarized in Appendix C.

NOTE: U.S. Coast Guard regulations (reference C.5.) shall be reviewed prior to conducting inspections of uninspected vessels and prior to the issuance of citations for violations.

**R. OSHA Requirements Enforceable on Uninspected Vessels (Other than Commercial Fishing Vessels).** OSHA may exercise its authority to cite all employers for all violative working conditions affecting their employees on uninspected vessels when such violations occur within OSHA's geographical jurisdiction and when such violations are not specifically addressed by a Coast Guard regulation.

1. An owner, operator, agent or master of an uninspected vessel may be cited for hazards to which **any employees, including seamen**, it employs are exposed if the hazard is not regulated by the U.S. Coast Guard.
  - a. OSHA compliance officers will ensure compliance with 29 CFR 1910 standards except for ship repair, shipbuilding, and shipbreaking where 29 CFR 1915 standards apply; longshoring and cargo handling operations where 29 CFR 1918 and 1919 standards apply; and marine construction activities where 29 CFR 1926 standards apply.
  - b. Identified recognized hazardous situations that are causing or are likely to cause death or serious physical harm for which there are no specific standards will be cited under the provisions of Section 5(a)(1) of the OH Act. (See reference C.12.)
  - c. A list of the hazards regulated onboard uninspected vessels by the Coast Guard is provided in Appendix C of this instruction.
2. The reporting of accidents by employers to OSHA is required for all situations where OSHA has geographical jurisdiction.

Joseph A. Dear Assistant Secretary

DISTRIBUTION: National, Regional and Area Offices All Compliance Officers State Designees NIOSH Regional Program Directors 7(c)(1) Project Managers

#### Appendix A



SPECIFIC CONDITIONS ON UNINSPECTED FISHING VESSELS  
SUBJECT TO OSHA ENFORCEMENT

1. Onboard cranes and their maintenance and use. [29 CFR 1910 Subpart N; 29 CFR 1915 Subpart G; 29 CFR 1918 Subpart B, F, G, and H]

NOTE: Cranes used to support ship repair or longshoring operations (i.e., the transfer of cargo to or from a vessel) require certification by a recognized Federal OSHA agency accredited under 29 CFR 1919.

2. Chains, hooks, and slings. [29 CFR 1910 Subpart N; 29 CFR 1915 Subpart G; 29 CFR 1918 Subparts F, G and H]

3. Ropes (wire, manila, and synthetic). [29 CFR 1910 Subpart N; 29 CFR 1915 Subpart G; 29 CFR 1918 Subpart G]

4. Powered vehicles on board. [29 CFR 1910.178; 29 CFR 1918.73]

5. Maintenance and repair (painting, lockout/tagout, deck holes). [29 CFR 1915 Subparts B, C and E]

6. Open-sided floors and platforms. [29 CFR 1910 Subpart D; 29 CFR 1915 Subpart E; 29 CFR 1918 Subpart D]

7. Tools and portable equipment. [29 CFR 1910 Subpart P; 29 CFR 1915 Subpart H]

8. Warning signs and labeling of control switches. [29 CFR 1910.147 and .335; 29 CFR 1915 Subpart J]

9. Temporary cords (use, maintenance, and material construction). [Public Law 91-596 Section 5(a)(1), 29 CFR 1915.92]

10. Exposed electrical wiring related to factory processing equipment. [Public Law 91-596 Section 5(a)(1)]

11. Steam hose use and fittings. [29 CFR 1915.93]

12. Working around radar and other emission devices. [29 CFR 1915.95]

13. Illumination of work areas and accommodation spaces. [29 CFR 1915.92]

14. Washing, bathing, toilet, and clothes washing facilities. [29 CFR 1910.141]

15. Noise. [29 CFR 1910.95]

16. Elevators and dumbwaiters. [29 CFR 1910.212]

NOTE: For vessels classified by the Coast Guard as a "Fish Processing Vessel" hazardous conditions of elevators and dumbwaiters which are identified by OSHA are referred to the Coast Guard for appropriate action.

17. Vessel access (gangways). [29 CFR 1915 Subpart E, 29 CFR 1918 Subpart C]
18. Gas cylinder storage (use and compatibility). [29 CFR 1910 Subpart H, 29 CFR 1915.55]
19. Sources of ignition, including smoking (e.g., tobacco). [29 CFR 1915 Subpart B]
20. Testing of oxygen-deficient atmospheres. [29 CFR 1915, Subpart B]
21. Cutting and welding permits, testing prior to work, and competent persons in these areas. [29 CFR 1915, Subpart B]
22. Confined spaces. [29 CFR 1915, Subpart B]
23. Personal protective equipment, except lifesaving equipment, life preservers, immersion suits, exposure suits, other personal flotation devices; and on 46 CFR Part 28, Subparts C and D vessels, equipment dealing with refrigerant ammonia and the protection of firefighters. [29 CFR 1910 Subpart I; 29 CFR 1915 Subpart I; 29 CFR 1918 Subpart J]
24. Gas masks and canisters, except equipment dealing with ammonia used as a refrigerant; and on 46 CFR Part 28, Subparts C and D vessels, equipment for firefighters. [29 CFR 1910.134; 29 CFR 1915.152]
25. Respiratory protective programs and respirator checks, except ammonia used as a refrigerant; and on 46 CFR Part 28, Subparts C and D vessels, equipment for firefighters. [29 CFR 1910.134; 29 CFR 1915.152]
26. Asbestos and other chemical exposures, except refrigerant ammonia on 46 CFR Part 28, Subparts C and D vessels. [29 CFR 1910 Subpart Z; 29 CFR 1915 Subpart Z]
27. Materials handling and storage. [29 CFR 1910 Subpart N; 29 CFR 1915 Subpart G; 29 CFR 1918 Subpart H]
28. Hazard communication. [29 CFR 1910.1200, 29 CFR 1915.1200]
29. Bloodborne pathogens. [29 CFR 1910.1030, 29 CFR 1915.1030]
30. Emergency response and spill clean up. [29 CFR 1910.120]
31. Reporting of accidents and fatalities. [29 CFR 1904]

NOTE: Section 4(b)(1) of the OSH Act does not apply to reporting; therefore, OSHA and the U.S. Coast Guard may enforce their own rules. Accidents and fatalities which occur within OSHA's geographical jurisdiction are required to be reported to OSHA in accordance with 29 CFR 1910.8.

32. Recording of illnesses and injuries. [29 CFR 1904]

NOTE: Section 4(b)(1) of the OSH Act does not apply to recordkeeping; therefore, OSHA and the U.S. Coast Guard may enforce their own rules.

**APPENDIX B**

**APPLICABLE U.S. COAST GUARD REGULATIONS FOR  
COMMERCIAL UNINSPECTED FISHING VESSELS**

1. U.S. Coast Guard requirements which apply to all commercial uninspected fishing vessels (46 CFR Part 28, Subpart B). (See reference C.4.)

a. General lifesaving equipment.

- (1) Personal floatation device (PFD) and immersion suits. [46 CFR 28.110]
- (2) Ring life buoys. [46 CFR 28.115]
- (3) Survival craft. [46 CFR 28.120]
- (4) Stowage of survival craft. [46 CFR 28.125]
- (5) Lifesaving equipment markings. [46 CFR 28.135]
- (6) Readiness, maintenance and inspection of lifesaving equipment. [46 CFR 28.145]

b. Distress signals. [46 CFR 28.145]

c. Emergency Position Indicating Radar Beacons (EPIRBs). [46 CFR 28.150, 46 CFR 25.26].

d. Excess fire detection and protection equipment. [46 CFR 28.155].

e. Portable fire extinguishers. [46 CFR 28.155].

f. Injury placard. [46 CFR 28.165]

g. Casualty reporting. [46 CFR 4.05]

h. Injury reporting. [46 CFR 4.05]

2. Additional U.S. Coast Guard requirements which apply to documented commercial fishing vessels that operate beyond the Boundary Lines or with 16 or more individuals on board (reference C.4., Subpart C):

a. Fireman's outfit and self-contained breathing apparatus (SCBA). Each vessel with 49 or more passengers onboard must have two such outfits. Each vessel that uses ammonia as a refrigerant must have two SCBAs, each with a spare bottle. [46 CFR 28.205]

b. First aid equipment and training. [46 CFR 28.215]

c. Guards for exposed hazards (including machine guarding). This includes, but is not limited to, factory processing equipment on fish processing vessels. [46 CFR 28.215]

(1) Each space on board a vessel must meet the requirements of this section.

(2) Suitable hand covers, guards, or railing must be installed in way of machinery which can cause injury to personnel, such as gearing, chain or belt drives, and rotating shafting. This is not meant to restrict necessary access to fishing equipment such as winches, drums or gurdies.

(3) Each exhaust pipe from an internal combustion engine which is within reach of personnel must be insulated or otherwise guarded to prevent burns.

d. Navigational information. [46 CFR 28.225]

e. Compass with deviation table. [46 CFR 28.230]

f. Anchors and radar reflectors. [46 CFR 28.235]

g. General alarm system. [46 CFR 28.240]

h. Communication equipment. [46 CFR 28.245]

i. High water alarms. [46 CFR 28.250]

j. Bilge pumps, bilge piping, and dewatering systems. [46 CFR 28.250 and .255]

k. Electronic position fixing devices. [46 CFR 28.260]

l. Emergency instructions, training, drills and safety orientation. [46 CFR 28.265 and .270]

(1) Abandoning the vessel, fighting fires, recovering an individual from the water, minimizing the effects of unintentional flooding, launching survival craft, recovering lifeboats and rescue boats;

(2) Donning a fireman's outfit and a SCBA, making a voice radio distress call and using visual distress signals, activating the general alarm and reporting inoperative alarm systems and fire detection system; and

(3) Drills, and vessel safety orientation.

3. In addition to the aforementioned regulations, commercial fishing vessels which have had their keel laid or are at a similar stage of construction or which undergo a major conversion completed on or after September 15, 1991, and that operate with more than 16 individuals on board must comply with the following U.S. Coast Guard requirements (reference C.4., Subpart D):

a. Lifesaving/Deck Equipment.

- (1) Lifesaving and signaling equipment. [46 CFR 28.305]
- (2) Launching survival craft. [46 CFR 28.310]
- (3) Means of escape. [46 CFR 28.390]
- (4) Embarkation stations. [46 CFR 28.395]
- (5) Radar & depth sounding devices. [46 CFR 28.400]
- (6) Deck rails, lifelines, storm rails and hand grabs. [46 CFR 28.410]

b. Fire Fighting/Engineering Equipment.

- (1) Fire pumps, mains, hydrants and hoses. [46 CFR 28.315]
- (2) Fixed gas fire extinguishing systems. [46 CFR 28.320]
- (3) Fire detection systems. [46 CFR 28.335]
- (4) Galley hood and other fire protection equipment. [46 CFR 28.330]
- (5) Fuel systems. [46 CFR 28.335]
- (6) Ventilation of enclosed engine and fuel tank spaces. [46 CFR 28.340]
- (7) Electrical standard for vessels greater than 79 feet in length. [46 CFR 28.345]
- (8) General requirements for electrical systems. [46 CFR 28.350]
- (9) Main source of electrical power. [46 CFR 28.355]
- (10) Electrical distribution systems. [46 CFR 360]
- (11) Overcurrent protection and switched circuits. [46 CFR 28.365]
- (12) Wiring methods and materials. [46 CFR 28.370]
- (13) Emergency source of electrical power. [46 CFR 28.375]
- (14) General structural fire protection. [46 CFR 28.380]
- (15) Structural fire protection for vessels with more than 49 individuals on board. [46 CFR 28.385]
- (16) Hydraulic equipment. [46 CFR 28.405]

4. Stability requirements which apply to documented commercial fishing industry vessels greater than 79 feet (See reference C.4., Subpart E).

5. Requirements which apply to fish processing vessels (See reference C.4., Subpart F).
6. Requirements which apply to fish tender vessels engaged in the Aleutian Trade Act (See reference C.4., Subpart G).

## APPENDIX C

### U.S. COAST GUARD REGULATIONS FOR UNINSPECTED VESSELS

#### 1. Personal Flotation Devices (PFD) and Other Lifesaving Equipment [46 CFR 25.25].

- a. An approved and readily available PFD is required to be on board the vessel for each individual on board. An exposure suit is considered to be an acceptable substitute for a PFD. **All lifesaving equipment designed to be worn is required to be readily available and in serviceable condition.**
- b. Each vessel 26 feet or longer must have at least one approved ring life buoy which is immediately available. **All lifesaving equipment designed to be thrown into the water is required to be immediately available and in serviceable condition.**
- c. An approved commercial hybrid PFD is acceptable if worn when the vessel is underway and the intended wearer is not within an enclosed space; labeled for use on uninspected commercial vessels; and used as marked and in accordance with the owner's manual.
- d. An approved light is required for all PFDs and exposure suits. Also, all PFDs must have approved retro-reflective material installed.

#### 2. Fire Extinguishing Equipment [46 CFR 25.30].

- a. Hand-portable fire extinguishers and semi-portable fire extinguishing systems must be of the "B" type (i.e.; suitable for extinguishing fires involving flammable liquids, greases, etc.).
- b. Hand-portable fire extinguishers and semi-portable fire extinguishing systems must have a plate listing the name of the item, rated capacity (gallons, quarts or pounds), name and address of person/firm for whom approved, and manufacturer's identifying mark.
- c. Portable fire extinguishers must be inspected and weighed every 6 months.
- d. Minimum number of B-II hand portable fire extinguishers required to be on board motor vessels: one if less than 50 tons, two if 50-100 tons, three if 100-500 tons, six if 500-1000 tons, and eight if over 1000 tons.
- e. Fixed fire extinguishing systems must be an approved carbon dioxide type and must meet the U.S. Coast Guard requirements. (See reference C.5., Part 25.30-15.)

3. Backfire Flame Control [46 CFR 25.35].

Every gasoline engine installed after April 25, 1940, except outboard motors, must be equipped with an acceptable means of backfire flame control.

4. Ventilation of Tanks and Engine Spaces [46 CFR 25.40].

Fuel tanks and engine spaces, using fuel with a flashpoint of 110 degrees Fahrenheit or less, must be provided with adequate ventilation to remove explosive or flammable gases from the fuel tank compartment or bilges.

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Occupational Safety & Health Administration  
200 Constitution Avenue, NW  
Washington, DC 20210



## **Appendix D**

### **OSHA Citation of Athena Construction**

**U.S. Department of Labor**

Occupational Safety and Health Administration

Suite 201

9100 Bluebonnet Centre

Baton Rouge, LA 70809-2985

Phone: (225)298-5458 FAX: (225)298-5457



## Citation and Notification of Penalty

**To:**  
Athena Construction, LLC  
and its successors  
P.O.Box 0  
Morgan City, LA 70381

**Inspection Number:** 310249578  
**Inspection Date(s):** 03/06/2007 -  
**Issuance Date:** 03/29/2007

**Inspection Site:**  
1105 Levee Rd.  
Morgan City, LA 70380

*The violation(s) described in this Citation and Notification of Penalty is (are) alleged to have occurred on or about the day(s) the inspection was made unless otherwise indicated within the description given below.*

This Citation and Notification of Penalty (this Citation) describes violations of the Occupational Safety and Health Act of 1970. The penalty(ies) listed herein is (are) based on these violations. You must abate the violations referred to in this Citation by the dates listed and pay the penalties proposed, unless within 15 working days (excluding weekends and Federal holidays) from your receipt of this Citation and Notification of Penalty you mail a notice of contest to the U.S. Department of Labor Area Office at the address shown above. Please refer to the enclosed booklet (OSHA 3000) which outlines your rights and responsibilities and which should be read in conjunction with this form. Issuance of this Citation does not constitute a finding that a violation of the Act has occurred unless there is a failure to contest as provided for in the Act or, if contested, unless this Citation is affirmed by the Review Commission or a court.

**Posting** - The law requires that a copy of this Citation and Notification of Penalty be posted immediately in a prominent place at or near the location of the violation(s) cited herein, or, if it is not practicable because of the nature of the employer's operations, where it will be readily observable by all affected employees. This Citation must remain posted until the violation(s) cited herein has (have) been abated, or for 3 working days (excluding weekends and Federal holidays), whichever is longer. The penalty dollar amounts need not be posted and may be marked out or covered up prior to posting.

**Informal Conference** - An informal conference is not required. However, if you wish to have such a conference you may request one with the Area Director during the 15 working day contest period. During such an informal conference you may present any evidence or views which you believe would support an adjustment to the citation(s) and/or penalty(ies).

If you are considering a request for an informal conference to discuss any issues related to this Citation and Notification of Penalty, you must take care to schedule it early enough to allow time to contest after the informal conference, should you decide to do so. You may request one with the Area Director during the 15 working day contest period. During such an informal conference you may present any evidence or views which you believe would support an adjustment to the citation(s) and/or penalty(ies).

If you are considering a request for an informal conference to discuss any issues related to this Citation and Notification of Penalty, you must take care to schedule it early enough to allow time to contest after the informal conference, should you decide to do so. Please keep in mind that a written letter of intent to contest must be submitted to the Area Director within 15 working days of your receipt of this Citation. The running of this contest period is not interrupted by an informal conference.

If you decide to request an informal conference, call this office between 8:00 a.m. and 4:30 p.m. for an appointment, then complete, remove and post the page 4 Notice to Employees next to this Citation and Notification of Penalty as soon as the time, date, and place of the informal conference have been determined. Be sure to bring to the conference any and all supporting documentation of existing conditions as well as any abatement steps taken thus far. If conditions warrant, we can enter into an informal settlement agreement which amicably resolves this matter without litigation or contest.

**Right to Contest** - You have the right to contest this Citation and Notification of Penalty. You may contest all citation items or only individual items. You may also contest proposed penalties and/or abatement dates without contesting the underlying violations. Unless you inform the Area Director in writing that you intend to contest the citation(s) and/or proposed penalty(ies) within 15 working days after receipt, the citation(s) and the proposed penalty(ies) will become a final order of the Occupational Safety and Health Review Commission and may not be reviewed by any court or agency.

**Penalty Payment** - Penalties are due within 15 working days of receipt of this notification unless contested. (See the enclosed booklet and the additional information provided related to the Debt Collection Act of 1982.) Make your check or money order payable to "DOL-OSHA". Please indicate the Inspection Number on the remittance.

OSHA does not agree to any restrictions or conditions or endorsements put on any check or money order for less than the full amount due, and will cash the check or money order as if these restrictions, conditions, or endorsements do not exist.

**Notification of Corrective Action** - For violations which you do not contest, you should notify the U.S. Department of Labor Area Office promptly by letter that you have taken appropriate corrective action within the time frame set forth on this Citation. Please inform the Area Office in writing of the abatement steps you have taken and of their dates, together with adequate supporting documentation, e.g., drawings or photographs of corrected conditions, purchase/work orders related to abatement actions, air sampling results, etc. Attached is a fill-in-the-blank form letter for your use to assist you in meeting this requirement.

**Employer Discrimination Unlawful** - The law prohibits discrimination by an employer against an employee for filing a complaint or for exercising any rights under this Act. An employee who believes that he/she has been discriminated against may file a complaint no later than 30 days after the discrimination occurred with the U.S. Department of Labor Area Office at the address shown above.

**Employer Rights and Responsibilities** - The enclosed booklet (OSHA 3000) outlines additional employer rights and responsibilities and should be read in conjunction with this notification.

**Notice to Employees** - The law gives an employee or his/her representative the opportunity to object to any abatement date set for a violation if he/she believes the date to be unreasonable. The contest must be mailed to the U.S. Department of Labor Area Office at the address shown above and postmarked within 15 working days (excluding weekends and Federal holidays) of the receipt by the employer of this Citation and Notification of Penalty.

**Abatement Methods** - The employer is not limited to abatement methods suggested by OSHA; i.e. methods explained are general and may not be effective in all cases. Other methods of abatement may be equally or more appropriate. Ultimate responsibility for determining the most appropriate abatement method rests with the employer, given its superior knowledge of the specific conditions at its worksite.

**Inspection Activity Data** - You should be aware that OSHA publishes information on its inspection and citation activity on the Internet under the provisions of the Electronic Freedom of Information Act. The information related to your inspection will be available 7 calendar days after the Citation Issuance Date. You are encouraged to review the information concerning your establishment at [WWW.OSHA.GOV](http://WWW.OSHA.GOV). If you have any dispute with the accuracy of the information displayed, please contact this office.

**U.S. Department of Labor**  
Occupational Safety and Health Administration



## NOTICE TO EMPLOYEES OF INFORMAL CONFERENCE

An informal conference has been scheduled with OSHA to discuss the citation(s) issued on 03/29/2007. The conference will be held at the OSHA office located at Suite 201, 9100 Bluebonnet Centre, Baton Rouge, LA, 70809-2985 on \_\_\_\_\_ at \_\_\_\_\_.

Employees and/or representatives of employees have a right to attend an informal conference.

**U.S. Department of Labor**  
Occupational Safety and Health Administration

**Inspection Number:** 310249578  
**Inspection Dates:** 03/06/2007 -  
**Issuance Date:** 03/29/2007



**Citation and Notification of Penalty**

**Company Name:** Athena Construction, LLC  
**Inspection Site:** 1105 Levee Rd., Morgan City, LA 70380

**Citation 1 Item 1** Type of Violation: **Serious**

Section 5(a)(1) of the Occupational Safety and Health Act of 1970: The employer did not furnish to each of his employees a place of employment which was free from recognized hazards that were causing or likely to cause death or serious physical harm to employees in that employees were exposed to the hazard of fire and explosion related to the release of a spud that was not pinned on a spud barge while spud barge was being moved.

Among other methods, one feasible and acceptable method to correct this hazard is to ensure before the spud barge is moved that the spud winch peddle brakes are set and that any dogs for the winch are engaged in to brake position and that the spud is pinned in the up position.

**DISCLAIMERS:**

1. You are not limited to the abatement methods suggested above.
2. The methods explained are general and may not be effective in all cases.
3. The employer is responsible for selecting and carrying out an appropriate method.

Date By Which Violation Must be Abated:	04/04/2007
Proposed Penalty:	\$ 4200.00

[Redacted Signature]

GREG HONAKER  
Area Director

See pages 1 through 4 of this Citation and Notification of Penalty for information on employer and employee rights and responsibilities.

