



UNITED STATES COAST GUARD

**REPORT OF THE INVESTIGATION
INTO THE
B. No. 255 (O.N. 603622) EXPLOSION, FIRE, AND
DISCHARGE OF OIL APPROX. 3 MILES FROM PORT
ARANSAS, TX WITH TWO CREWMEMBERS
DECEASED OR PRESUMED DECEASED ON
20 OCTOBER 2017**



MISLE ACTIVITY NUMBER: 6291947



16732
December 07, 2020

**TANK BARGE B. NO. 255 (O.N. 603622)
EXPLOSION, FIRE, AND DISCHARGE OF OIL
APPROXIMATELY THREE MILES FROM PORT ARANSAS, TEXAS
WITH TWO CREWMEMBERS DECEASED OR PRESUMED DECEASED
ON OCTOBER 20, 2017**

ACTION BY THE COMMANDANT

The record and the report of the Investigating Officer designated to investigate the subject casualty and the endorsement by the convening District Commander have been reviewed. The record and the report, including the findings of fact, analysis, conclusions, and recommendations are approved subject to the following comments. This marine casualty investigation is closed.

ACTION ON SAFETY RECOMMENDATIONS

Recommendation 1: Recommend Commandant revoke Bouchard's Document of Compliance (DOC) and institute annual external audits of the company's DOC for one five-year inspection schedule. This investigation revealed objective evidence indicating Bouchard failed to implement its Safety Management System (SMS), which also proved ineffective as evidenced by its failure to ensure B. NO. 255's safety at sea, failure to prevent human injury and loss of life, and failure to avoid damage to the environment.

Action: I concur with the intent of this recommendation. A Document of Compliance (DOC) is subject to annual verification by a Coast Guard Recognized Organization (RO) to ensure compliance with the provisions of the International Safety Management (ISM) code. During annual verifications, a company's DOC may be revoked when evidence of major non-conformities (MNCs) are raised.

In response to this incident and to mitigate the risks that it revealed, Coast Guard Headquarters' Flag State Control Division, (CG-CVC-4), performed ISM oversight during subsequent annual verifications, which included a thorough review of Coast Guard and RO activities for Bouchard Transportations Company (BTC) and their fleet. On July 30, 2019, the Coast Guard revoked BTC's DOC certificate based on substantial non-compliance with the functional requirements of the ISM code. Since that time, the Coast Guard has continuously worked with BTC's designated ROs to monitor ISM compliance, which has resulted in additional revocations and the issuance of several short-term DOCs. The increased oversight of BTC's DOC audits has proven to be an effective tool to address safety culture shortfalls and the increased oversight will continue until BTC successfully obtains a full-term (five-year) DOC from their RO.

Recommendation 2: Recommend Commandant require ABS conduct an internal quality review of its Quality Management System, including assessment of the effectiveness of ABS's organizational quality processes to verify vessels conform to applicable U.S. law and ISM Code

requirements. This investigation revealed objective evidence indicating ABS failed to implement its Quality Management System which also proved ineffective as evidenced by ABS' failure to adequately perform applicable delegated functions under mandatory ISM Code requirements, including conducting insufficient SMS audits and issuing Safety Management Certificates without identifying, addressing and causing the repair of B. NO. 255's material and equipment deficiencies.

Action: I concur with the intent of this recommendation. As a member of the International Association of Classification Societies (IACS), ABS is required to have a Quality Management System (QMS) that complies with the IACS Quality System Certification Scheme (QSCS). ABS performs internal and external QMS audits on a periodic basis in accordance with IACS requirements. Additionally, the Coast Guard's Flag State Control Division (CG-CVC-4) (established in 2018) observed external audits of ABS by an independent third party in September 2020 and May 2019. CG-CVC-4 observes a sample of external audits per Coast Guard policy to monitor RO performance. In addition to observing the QMS audits, the Coast Guard observes ABS surveyors and auditors aboard U.S. vessels and at U.S. company offices in the performance of their delegated statutory duties. CG-CVC-4 verifies both the independence and competence of ABS auditors as well as ensuring that the requirements of specific U.S. laws and regulations are integrated into their procedures applicable to U.S. vessels.

Moreover, CG-CVC-4 has published guidance for field units wishing to request that third parties / ROs perform additional focused internal QMS reviews when objective evidence is identified by the Coast Guard that a delegated function is not being satisfactorily fulfilled. The combination of recently updated Coast Guard RO oversight activities and policies, coupled with the internal and external audits required for members of IACS, meet the intent of this recommendation.

Recommendation 3: Recommend Commandant evaluate establishment of a marine inspections standardization team. U.S. Coast Guard Marine Inspectors failed to identify material and equipment deficiencies on B. NO. 255, nor did they hold Bouchard accountable for an ineffective SMS during routine inspection activities. U.S. Coast Guard Marine Inspectors undergo extensive scrutiny while conducting well-established qualification performance standards. Ample policy and guidance, including CG-Form-840 inspection booklets assist U.S. Coast Guard Marine Inspectors during inspection of each inspected vessel. Local unit training officers also ensure U.S. Coast Guard Marine Inspectors conduct inspections in order to meet the cognizant OCMI's intent to mitigate risks posed to the port. However, the U.S. Coast Guard does not perform standardization team evaluations on marine inspections although search and rescue and law enforcement programs do. Standardization Team evaluation of marine inspections will align OCMI mission performance with Commandant (CG-CVC) standards, promote adoption of best practices, provide critical evaluation of U.S. Coast Guard Marine Inspector proficiency and promote harmonization of inspection execution across the U.S. Coast Guard.

Action: I concur with the intent of this recommendation. Specifically, I will expand the Coast Guard Mission Management System (MMS) to include robust marine inspector performance assessments, which will align with standardization team functions within other communities. Generally, standardization teams assess compliance against a standard and assess workforce proficiency. They come in varying forms for communities,

including Command Assessment of Readiness for Training (CART), Small Boat Standardization (BOAT STAN) and Comprehensive Law Enforcement Assessment of Readiness (CLEAR). The Coast Guard Prevention Program currently uses MMS to conduct audits of marine inspection activities to determine compliance with training and competence to help ascertain overall conformance with stated mission requirements. MMS requires external and internal audits of Marine Inspector performance for adherence to standard operating procedures. Under the MMS Program, field commanders receive reports from internal audits led by unit MMS qualified personnel and external audits conducted by Coast Guard FORCECOM auditors. These reports discuss compliance with Prevention Program requirements that include marine inspection activities. Any non-conformities that are identified are tracked to ensure the necessary corrective action is taken to help prevent recurrence. The MMS framework also has a feedback loop to promote adherence to standards and keep performance consistent between audits. Corrective Action Reports (CAR) are to be submitted based on an observed nonconformity and are tracked by the FORCECOM auditors until appropriate corrective action has been taken. The Coast Guard also has a network of Marine Inspector Training Officers (MITO) and Verifying Officers (VO) at field units to promote consistency, quality assurance, and accountability for Marine Inspector training and performance.

The Coast Guard continues to modernize the standards for our Marine Inspection Program via the Marine Inspector Performance Support Architecture (MIPSA). MIPSA will reach Initial Operating Capacity when training, support, maintenance personnel and resources are in place, which is currently targeted to be achieved by March 2022. These results will also inform additional policy or resource needs to enhance marine inspection standards and guide improvements to the MMS program.

However, it is clear we must do more to assess Marine Inspector performance and training through an expanded MMS framework to elevate accountability consistent with other mission areas. As such, CG-5P will mandate and track the expanded use of the Inspector Performance Assessment Tool (IPAT) by VOs and Marine Inspector Training Officers to evaluate Marine Inspector performance, and will work with FORCECOM MMS to expand their audit criteria. CG-5P is working with the Assistant Commandant for capabilities (CG-7) to increase the ratio of VOs to Marine Inspectors at field units and also coordinate with FORCECOM to elevate MMS staffing levels to provide a more robust audit program. Finally, CG-5P will increase Program attendance at future field unit audits via the use of the Traveling Marine Inspection Staff.

Recommendation 4: Recommend Commandant evaluate change to regulation 46 CFR 31.10-21(b) adding “vapor” into the text. Specifically, “(D)uring each inspection or reinspection for certification, all wing voids, rakes, cofferdams, and other void spaces on tank barges must be opened and checked from on-deck for the presence of water, cargo, or vapor indicating hull damage or cargo tank leakage.” Continued, “(I)f water, cargo, or vapor is present, an internal structural examination may be required.”

Action: I concur with this recommendation. The Coast Guard will evaluate the proposed change to the regulations.

I note that the Lead Investigating Officer issued Recommendation 5 to the Eighth Coast Guard District requesting that the District Commander exercise full authorities over every BTC vessel operating within the District's area of responsibility. The Eighth District Commander's endorsement dated June 29, 2020, concurred with the intent of the recommendation and requested that my office, COMDT (CG-5P), take actions to ensure that BTC has properly implemented a SMS in compliance with the ISM Code. The actions taken by my Flag State Control Division (CG-CVC-4) to confirm BTC's SMS compliance are included in my response to Recommendation 1.

ACTION ON ADMINISTRATIVE RECOMMENDATIONS

I note administrative recommendations 1 through 3 made to the Captain of the Port and District Commander were addressed as documented in the Eighth District Commander's endorsement.

Admin Recommendation 4: Recommend Commandant release this report in two parts. Release the Investigating Officer's report to the public at the conclusion of Commandant's review and approval; release the Commandant's Action on Recommendations to the public upon approval.

Action: I concur with the intent of this recommendation. In this instance, Coast Guard Headquarters reviewers from various offices required additional time to evaluate and approve the findings and recommendations contained within the Report of Investigation (ROI). Thus, the negligible time lag between final approval of the ROI and completion of this Final Action Memorandum did not justify releasing the information separately.



R. V. TIMME
Rear Admiral, U.S. Coast Guard
Assistant Commandant for Prevention Policy



16732
June 28, 2019

**B. NO. 255 (O.N. 603622)
EXPLOSION, FIRE, AND DISCHARGE OF OIL
APPROX. THREE MILES FROM PORT ARANSAS, TEXAS
WITH TWO CREWMEMBERS DECEASED OR PRESUMED DECEASED
ON OCTOBER 20, 2017**

**ENDORSEMENT AND ACTION BY THE COMMANDER,
EIGHTH COAST GUARD DISTRICT**

After careful review, I approve the record and the report of investigation, including the findings of fact, analysis, conclusions, and recommendations, subject to the following comments. I recommend this marine casualty investigation be closed.

COMMENTS ON THE REPORT

1. The explosion aboard B. NO. 255 and the loss of both crewmembers was a tragic and preventable accident. I offer my sincere condolences to the families and friends of the mariners who lost their lives. The investigation, report and recommendations contain invaluable information which can be used to address the preventable chain of events that resulted in B. NO. 255's explosion, and to prevent similar incidents from occurring in the future.
2. Thank you to the members of the investigation team for their exhaustive efforts. The investigation included a lengthy public hearing, which was broadcast via live video, audio and online mediums, ensuring the public's access to the proceedings.
3. While an unfortunate and preventable chain of events contributed to this marine casualty, the most significant factor which caused this explosion was the egregious failure of the Bouchard Transportation Co., Inc. (Bouchard) to implement an effective safety management system (SMS).
4. Without an effective SMS, the crewmembers of B. NO. 255 could not obtain the necessary shore side support to properly maintain the equipment and material condition of the tank barge. This caused severe deficiencies, which predated the explosion, and created a dangerously explosive atmosphere onboard the vessel. Specifically, there was corroded steel on the forward transverse bulkhead, on the cargo tank hatches, and on the cargo tank ullage tubes. The corrosion allowed free communication of combustible vapor from the No. 1 port cargo tank into the forepeak (void) and onto the deck of the tank barge. These combustible vapors were most likely

ignited by electrical arcs, either caused by the anchor windlass motor located in the forepeak, or by wasted electrical conduit located on the tank barge's bow.

5. While Bouchard was ultimately responsible for B. NO. 255's material condition and safety, U.S. Coast Guard marine inspectors and American Bureau of Shipping (ABS) surveyors did not identify obvious material condition deficiencies during scheduled inspections.

6. ABS is an approved classification society and is delegated by the U.S. Coast Guard to conduct specific regulatory enforcement for domestic commercial vessels. In this role, ABS ensures that each vessel's construction and equipment conforms to safety standards prescribed by law. This investigation revealed that ABS issued a Safety Management Certificate to B. NO. 255, and allowed the vessel to sail, without properly identifying critically deficient material conditions and equipment. When deficiencies were identified by ABS, some of the deficiencies went uncorrected for unacceptable periods of time. ABS is one of the U.S. Coast Guard's primary approved classification societies, and must ensure that their surveyors are fully trained and prepared to prevent these failures from occurring in the future.

7. The U.S. Coast Guard provides the final level of regulatory enforcement on U.S. vessels and must ensure standards for safety equipment and material condition are met. This investigation revealed that the U.S. Coast Guard's inspections on B. NO. 255 did not properly identify material deficiencies and hazardous conditions. The U.S. Coast Guard is devoted to accomplishing its marine safety mission and must ensure that marine inspectors are fully trained and prepared to prevent these failures from occurring in the future.

ENDORSEMENT ON RECOMMENDATIONS

Safety Recommendation 1. Commandant revoke Bouchard's Document of Compliance (DOC) and institute annual external audits of the company's DOC for one five-year inspection schedule. This investigation revealed objective evidence indicating Bouchard failed to implement its SMS which also proved ineffective as evidenced by its failure to ensure B. NO. 255's safety at sea, failure to prevent human injury and loss of life, and failure to avoid damage to the environment.

Endorsement: I concur with the intent of this recommendation. This report clearly revealed that Bouchard's SMS was not properly implemented at the time of the explosion on B. NO. 255. I recommend COMDT (CG-5P) evaluate the current status of Bouchard's SMS, and determine whether the company has taken appropriate action to improve their SMS. I recommend that this evaluation take into consideration all recent U.S. Coast Guard activities on Bouchard vessels, as well as the deceptive practices used by Bouchard employees in the past.

Safety Recommendation 2. Commandant require ABS conduct an internal quality review of its Quality Management System, including assessment of the effectiveness of ABS's organizational quality processes to verify vessels conform to applicable U.S. law and ISM Code requirements. This investigation revealed objective evidence indicating ABS failed to implement its Quality Management System which also proved ineffective as evidenced by ABS' failure to adequately perform applicable delegated functions under mandatory ISM Code requirements, including conducting insufficient SMS audits and issuing Safety Management Certificates without

identifying, addressing and causing the repair of B. NO. 255's material and equipment deficiencies.

Endorsement: I concur with the intent of this recommendation. This report revealed that ABS did not effectively ensure that B. NO. 255 conformed to the prescribed safety standards. I recommend COMDT (CG-5P) evaluate ABS's current performance, taking into account recent U.S. Coast Guard oversight activities and the changes made by ABS in the wake of the EL FARO Report of Investigation. I recommend that this evaluation take into account the results of this investigation, and pay particular attention to ABS activities performed on non-self propelled vessels.

Safety Recommendation 3. Commandant evaluate establishment of a marine inspections standardization team. U.S. Coast Guard marine inspectors failed to identify material and equipment deficiencies on B. NO. 255, nor did they hold Bouchard accountable for an ineffective SMS during routine inspection activities. Marine inspectors undergo extensive scrutiny while conducting well-established qualification performance standards. Ample policy and guidance, including CG-Form-840 inspection booklets, assist marine inspectors during inspection of each inspected vessel. Local unit training officers also ensure marine inspectors conduct inspections in order to meet the cognizant OCMI's intent to mitigate risks posed to the port. However, the U.S. Coast Guard does not perform standardization team evaluations on marine inspections although search and rescue and law enforcement programs do. Standardization Team evaluation of marine inspections will align OCMI mission performance with Commandant (CG-CVC) standards, promote adoption of best practices, provide critical evaluation of marine inspector proficiency and promote harmonization of inspection execution across the U.S. Coast Guard.

Endorsement: I concur with the intent of this recommendation. There are currently several U.S. Coast Guard initiatives underway to ensure marine inspectors are properly trained and equipped to carry out their duties. The standardization of marine inspectors is just one part of these larger efforts. I recommend FORCECOM and COMDT (CG-5P) consider the establishment of a marine inspections standardization team, in conjunction with the ongoing Marine Inspector Performance Support Architecture (MIPSA) project.

Safety Recommendation 4. Commandant evaluate change to regulation 46 CFR §31.10-21(b) adding "vapor" into the text. Specifically, "(D)uring each inspection or reinspection for certification, all wing voids, rakes, cofferdams, and other void spaces on tank barges must be opened and checked from on-deck for the presence of water, cargo, or *vapor* indicating hull damage or cargo tank leakage." Continued, "(I)f water, cargo, or *vapor* is present, an internal structural examination may be required."

Endorsement: I concur with the intent of this recommendation. This investigation revealed that cargo vapors were leaking into a void space on B. NO. 255, and that these vapors may have been present for an extended period of time. It is important that void spaces are checked for the presence of all potential hazards during inspections, including combustible vapors. I recommend FORCECOM and COMDT (CG-5P) consider whether there is a need to update U.S. Coast Guard guidance, policy and/or regulations to account for vapors in void spaces during inspections.

Safety Recommendation 5. Commander, U.S. Coast Guard Eighth District, ensure each U.S. Coast Guard Eighth District Officer in Charge, Marine Inspection exercise full authorities on every Bouchard vessel operating within or transiting their respective jurisdictional area of responsibility, including increased frequency of inspection, in-service examinations, expanded examinations and revocation of certificates, to ensure Bouchard vessels conform to applicable U.S. law and ISM Code requirements.

Endorsement: I concur with the intent of this recommendation. This report clearly revealed that Bouchard's SMS was not properly implemented at the time of the explosion on B. NO. 255. As noted in my endorsement to Safety Recommendation 1, I recommend COMDT (CG-5P) evaluate the current status of Bouchard's SMS, and determine whether the company has taken appropriate action to improve their SMS. In addition, OCMI's should continue to assess risk for all inspected vessels and determine if there is a need to inspect a vessel operating within their zone. This includes, but is not limited to, consideration of a vessel's deficiency and casualty history, and the history of the vessel's company. If, during an inspection, major deficiencies are discovered, marine inspectors must examine the SMS in accordance with the U.S. Coast Guard Office of Commercial Vessel Compliance (CG-CVC) Mission Management System (MMS) Work Instruction (WI), *USCG Oversight of Safety Management Systems on U.S. Flag Vessels (CVC-WI-003(1))*.

Action: I will share a copy of this report with all Eighth District prevention officers, and I will continue to emphasize the importance of assessing the health of a vessel's SMS. I will convene an Eighth District Prevention Department Head conference to discuss these issues, along with other topics related to improving the safety of vessels operating on our vital marine transportation system.

Administrative Recommendation 1. Recommend the Captain of the Port Corpus Christi recognize the captains and crews of SIGNET POLARIS and SIGNET CONSTELLATION for their actions and efforts to extinguish the fire onboard B. NO. 255 on October 20, 2017.

Endorsement: I concur with this recommendation. The crewmembers aboard SIGNET POLARIS and SIGNET CONSTELLATION placed their own lives at risk and demonstrated exceptional perseverance, courage and compassion during the response to this incident. As such, this recommendation will be referred to the Captain of the Port, Sector Corpus Christi, for review and action, as appropriate.

Administrative Recommendation 2. Recommend Commander, U.S. Coast Guard Eighth District, refer this case to the U.S. Department of Justice for Judicial Civil Penalty proceedings against Bouchard, owner of B. NO. 255 for: 1) the unlawful discharge of oil into the Gulf of Mexico, a United States navigable waterway; 2) making numerous unauthorized repairs to a U.S. Coast Guard inspected vessel.

Endorsement: I concur with this recommendation. The investigation determined there is evidence Bouchard and/or Bouchard employees may have committed violations of law or regulation.

Action: Staff Judge Advocate, U.S. Coast Guard Eighth District, will review the alleged violations identified in this recommendation for referral to the U.S. Department of Justice, as appropriate.

Administrative Recommendation 3. Recommend Commander, U.S. Coast Guard Eighth District, refer this case to the U.S. Department of Justice for criminal investigation.

Endorsement: I concur with this recommendation. The investigation determined there is evidence Bouchard and/or Bouchard employees may have committed violations of law or regulation.

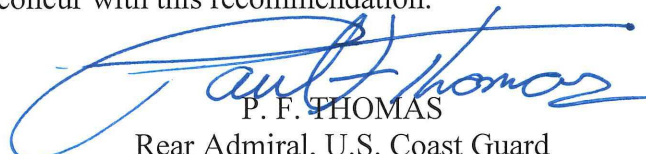
Action: Staff Judge Advocate, U.S. Coast Guard Eighth District, will review the alleged violations identified in this recommendation for referral to the U.S. Department of Justice, as appropriate.

Administrative Recommendation 4. Recommend Commandant release this report in two parts. Release the Investigating Officer's report to the public at the conclusion of Commandant's review and approval; release the Commandant's Action on Recommendations to the public upon approval.

Endorsement: I concur with the intent of this recommendation. This report provides important information and recommendations which could be used to prevent similar incidents from occurring in the future. I recommend Commandant evaluate the most expedient way to release all, or part, of this report to the public, and take appropriate action based on that evaluation.

Administrative Recommendation 5. That the Commandant close this investigation.

Endorsement: I concur with this recommendation.


P. F. THOMAS
Rear Admiral, U.S. Coast Guard
Commander, Eighth Coast Guard District

Enclosure: Investigating Officer's Report 16732 dtd June 1, 2019



16732
June 1, 2019

**B. NO. 255 (O.N. 603622)
EXPLOSION, FIRE, AND DISCHARGE OF OIL
APPROX. THREE MILES FROM PORT ARANSAS, TEXAS
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INVESTIGATING OFFICER'S REPORT

1. Preliminary Statement

1.1. Pursuant to the authority of Title 46, United States Code (USC), Chapter 63, and in accordance with Title 46, Code of Federal Regulations (CFR), Part 4, this report details the formal marine casualty investigation conducted into the explosion, fire, discharge of oil and loss of life on tank barge B. NO. 255 which occurred October 20, 2017. Pursuant to authority of Title 46 USC § 6308, no part of this report of a marine casualty investigation, including findings of fact, opinions, recommendations, deliberations, or conclusions shall be admissible as evidence or subject to discovery in any civil or administrative proceedings, other than an administrative proceeding initiated by the United States (U.S.).

1.2. On October 23, 2017, Commander, Eighth Coast Guard District initiated this investigation which was joined by the National Transportation Safety Board (NTSB). The investigation panel consisted of Mr. [REDACTED] of U.S. Coast Guard Sector Houston-Galveston as the Lead Investigating Officer (LIO), Chief Warrant Officer (CWO) [REDACTED] of U.S. Coast Guard Sector Corpus Christi as the Assistant IO, CWO [REDACTED] of U.S. Coast Guard Sector Ohio Valley as the U.S. Coast Guard Marine Inspector technical expert, Lieutenant Commander (LCDR) [REDACTED] of Marine Safety Unit Houma as the Recorder and LCDR [REDACTED] of U.S. Coast Guard Investigations National Center of Expertise as Legal Counsel.

1.3. The LIO presided over a public hearing held at U.S. Coast Guard Sector Houston-Galveston, Houston, Texas.

1.4. The LIO designated the following persons and organizations as parties-in-interest, Bouchard Transportation Company, Inc. (Bouchard), American Bureau of Shipping (ABS), the estate of Zacharia Jackson, barge captain onboard B. NO. 255 and the estate of Du'Jour Vanterpool, barge mate onboard B. NO. 255. Both the barge captain and barge mate were holders of a merchant mariner credential. As such, their conduct prior to the explosion was part of the investigative inquiry.

1.5. The public hearing began July 16, 2018, and concluded July 26, 2018. Twenty-three witnesses were called and testified under oath. Although subpoenaed, Bouchard's Chief Operating Officer (COO)¹ declined to testify through an attorney representing Bouchard.

1.6. The U.S. Coast Guard was designated as the lead federal agency for initial evidence collection activities. The NTSB was represented at the public hearing until the representative was recalled July 20, 2018 to participate in a different ongoing casualty investigation. Although the NTSB was unable to replace their representative, all transcripts from the hearing were shared with the NTSB. The LIO and NTSB worked separately during the analysis phase of their respective investigations in order to prepare independent conclusions and recommendations. Bouchard's counsel objected² to the absence of a NTSB representative and requested postponement of the public hearing until a NTSB representative could be present. The request was denied by the LIO.

1.7. Throughout the investigation, the public hearing panel obtained helpful information from the public using the e-mail address: Bouchard255@uscg.mil. These e-mails, in addition to the numerous whistleblower reports received, provided substantial assistance to the panel and investigation. We cannot overstate the value of the whistleblower information obtained throughout this investigation and completion of this report.

1.8. During the course of this investigation the U.S. Coast Guard was informed of a vapor leak onboard B. NO. 275, a sister ship³ to B. NO. 255. This unreported hazardous condition was relevant and important to the investigation into the explosion onboard B. NO. 255. Bouchard's failure to report this hazardous condition to the U.S. Coast Guard and subsequent attempt to hide it from U.S. Coast Guard marine inspectors and investigators during a boarding demonstrated Bouchard's obstructive posture towards U.S. Coast Guard personnel conducting oversight of their vessels' safety equipment, operation and overall safety management system. During the public hearing, Bouchard's counsel objected to using this information positing information pertaining to B. NO. 275 was not within the scope of the convening order. Bouchard's counsel subsequently requested testimony be struck from the record. The LIO overruled these objections and denied the request. Bouchard's counsel appealed the decision to Commander, Eighth Coast Guard District, who upheld the LIO's decision to include information pertaining to B. NO. 275.

1.9. The significant deficiencies identified on B. NO. 255 and B. NO. 275, the purposeful deception by Bouchard crewmembers to hide the hazardous condition, as well as the influx of whistleblower reports regarding Bouchard's fleet, compelled the investigation team's comprehensive investigation into Bouchard's safety management system and practices fleet wide. These results and/or testimony are included in this report.

1.10. References to time in this report are listed as 24-hour time and reflect Central Daylight Time, unless otherwise indicated.

¹ [REDACTED] was the VP of Safety and Vetting and later promoted to COO. Documents show Mr. [REDACTED] promotion to COO occurred between September 9, 2017, and October 11, 2017.

² A formal objection was not made; however, Bouchard noted the U.S. Coast Guard was currently under investigation and questioned if the public hearing should proceed without NTSB's presence.

³ A sister ship is a ship of the same class or of virtually identical design to another ship. Sister vessels share a nearly identical hull, superstructure scantlings and comparable features and equipment.

2. Vessels Involved in the Incident



Figure 1: Picture of towing vessel BUSTER BOUCHARD taken by the U.S. Coast Guard on October 20, 2017.

Official Name:	BUSTER BOUCHARD
Identification Number:	605961, Official Number (U.S.)
Flag:	United States
Vessel Class/Type/Sub-Type:	General Towing Vessel
Build Year:	1979
Gross Tonnage:	196 GRT
Length:	119.6 feet
Beam/Width:	37 feet
Draft/Depth:	14.9 feet
Main/Primary Propulsion:	Diesel Reduction, 5750 Ahead HP
Owner:	Tug Buster Bouchard Corp Melville, NY
Operator:	Bouchard Transportation Company, Inc. Melville, NY



Figure 2: Picture of tank barge B. NO. 255 taken by the U.S. Coast Guard on October 22, 2017.

Official Name:	B. NO. 255
Identification Number:	603622, Official Number (U.S.)
Flag:	United States
Vessel Class/Type/Sub-Type:	Bulk Liquid Cargo/General 2/Tank Barge
Build Year:	1979
Gross Tonnage:	9834 GRT
Length:	447.7 feet
Beam/Width:	85.5 feet
Draft/Depth:	38.1 feet
Main/Primary Propulsion:	None
Owner:	B. NO. 255 Corporation Melville, NY
Operator:	Bouchard Transportation Company, Inc. Melville, NY

2.1. Vessel Configurations and Operational Interactions

BUSTER BOUCHARD

2.1.1. A towing vessel primarily operated with tank barge B. NO. 255 in an articulated connection.

2.1.1.1. When connected as an articulated tug and barge (ATB), the configuration allows an independent towing vessel to act as a detachable power unit.

2.1.1.2. The towing vessel is connected into the stern notch of the barge by means of a pair of retractable pins. In addition to the retractable pins, a headline is secured from the towing vessel to the barge.

2.1.2. The towing vessel has two separate wheel houses with the upper wheelhouse providing the best visibility when pushing the barge in the articulated configuration.

2.1.2.1. The distance from the towing vessel's wheelhouse to the bow of the barge when connected is approximately 450 feet.

B. NO. 255

2.1.3. The barge was originally named B. NO. 155, a single hull, ship-shaped tank vessel/barge. A double hull conversion was completed in 2000; the barge was renamed B. NO. 255. B. NO. 255 is designed with 16 cargo tanks, numbered one through eight port and starboard, with a total cargo carrying capacity of 188,400 barrels.

2.1.3.1. According to ABS information, the original cargo envelope hull for B. NO. 255 remained during the double-hull conversion, while a second steel hull enveloped the first on March 16, 2001.⁴ The U. S. Coast Guard and ABS oversaw all modifications to the barge.

2.1.4. The anchor and windlass are located on the forward void space of B. NO 255's bow, forward of the vessel's forward transverse bulkhead.⁵

2.1.4.1. If all cargo tank and void space bulkheads are maintained vapor tight in accordance with B. NO. 255's International Load Line Certificate, the location of the anchor and windlass are outside of the vessel's identified hazardous zone locations. Consequently, no intrinsically safe electrical equipment is required.

2.1.5. The forepeak on the barge is accessed through a small deck house known as a dog house.

2.1.5.1. The forepeak has been designated by Bouchard as a restricted space.

2.1.5.2. An electric motor controller for the windlass is located just inside the dog house. The electric motor control box is connected to the electrical outlet inside the forepeak by a 25-foot umbilical cord. When in use, the umbilical cord prevents the dog house door from closing as it lays across the door's coaming. The umbilical cord allows the windlass operator to move about the bow area during anchoring operations in order to observe the position of the anchor chain while raising (weighing) or lowering anchor.



Figure 3: Picture of the "doghouse", which provides access to compartment 2 of the forepeak, located on the bow of B. NO. 255. The anchor windlass is located on the right side of the doghouse in the picture. Picture provided by ABS.

⁴ On February 10, 2016, ABS issued a letter to Bouchard stating, "All of the subject single skin barges underwent a major modification as noted above whereby the original barge was enveloped by a new hull." The letter lists B. NO. 255's original build date in 1979 and conversion date March 16, 2001.

⁵ See Figure 19.

3. Record of Deceased, Missing, and/or Injured Persons

Relationship to Vessel	Sex	Age	Status
Barge Captain, Tankerman	M		Presumed Deceased
Barge Mate, Tankerman	M		Deceased

4. Findings of Fact

4.1. The Incident:

Vessel Information

4.1.1. BUSTER BOUCHARD is a towing vessel acting as a detachable power module connected to the tank barge B. NO. 255 by rack and pinion into the stern notch of the tank barge. Thusly connected, the towing vessel and tank barge operate as a single ATB unit.

B. NO. 255 Crew Change

4.1.2. On October 11, 2017 a crew change was completed on B. NO. 255. The more experienced senior barge captain⁶ rotated ashore. The oncoming barge captain was new to the barge; this assignment was his first onboard B. NO. 255. The relief process between the off-going and on-coming barge captains reportedly took no longer than 15 minutes.

Cargo Loading

4.1.3. On October 16, 2017, B. NO. 255 and BUSTER BOUCHARD were connected and operated as a single unit ATB loading crude oil at NuStar Terminal in St. James, Louisiana. B. NO. 255 loaded over 130,000 barrels of bonito crude oil at the terminal. Cargo loading was reportedly completed without incident.

Underway

4.1.4. At approximately 1910 on October 16, 2017, ATB BUSTER BOUCHARD/B. NO. 255 cast off mooring lines and was underway from NuStar Terminal enroute Corpus Christi, Texas, where the barge was to undergo repairs and discharge cargo. According to logbook⁷ entries, the voyage from Louisiana to Corpus Christi was completed without incident.

Vessel Overall Condition

4.1.5. Based on the results of a post-accident inspection of B. NO. 255, the transverse bulkhead⁸ separating the No. 1 port and starboard cargo tanks from the forepeak was cracked and had

⁶ "Barge Captain" is a termed used by the Bouchard Transportation Company.

⁷ Logbook entries indicate the voyage occurred without incident.

⁸ A transverse bulkhead is a bulkhead below the main deck that must be maintained watertight in order for the vessel to meet the damage stability and subdivision requirements. When mentioned in this report, the forward transverse bulkhead is referring to the forward bulkhead of the number one port and starboard cargo tanks.

wastage holes in several places. The deck was holed in several areas, and cargo tank hatch covers, ullage tubes and valve stems were corroded and wasted. Deteriorated electrical conduit was also present throughout the barge and in the hazardous zones.

Anchoring

4.1.6. On October 19, 2017, ATB BUSTER BOUCHARD/B. NO. 255 anchored in the Corpus Christi anchorage with six shots of anchor chain while awaiting berth at Gulf Copper shipyard repair facility. The plan was to make repairs to a leaking fuel tank on the tug and repairs to non-essential equipment on the barge prior to offloading cargo.

4.1.6.1. The Corpus Christi anchorage is located approximately three nautical miles from the entry to Port Aransas, Texas.⁹ The depth of the water at the anchorage was at least 40 feet.¹⁰

4.1.6.2. The sea state was three to five feet with an easterly wind blowing at 15-20 knots.

4.1.6.3. The ATB lay at anchor until the following morning. No problems were encountered during the night and the vessel rode at anchor without incident.

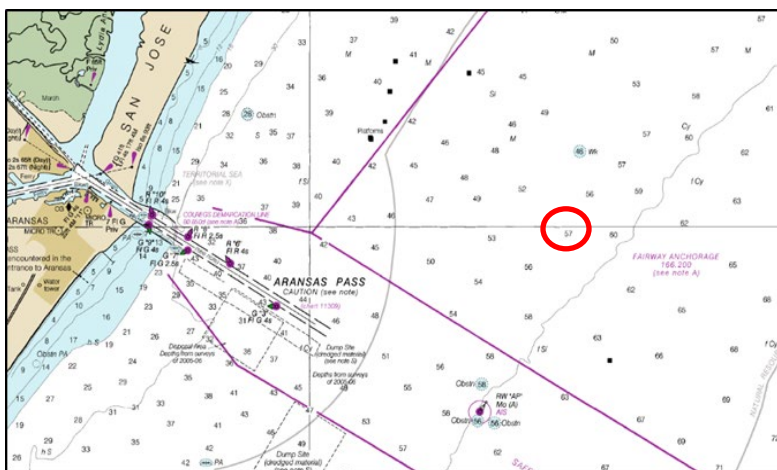


Figure 4: Section of nautical chart 11307. The red circle (added) depicts location of ATB BUSTER BOUCHARD/B. NO. 255 at anchor and subsequent location of explosion.

Weighing Anchor

4.1.7. At approximately 0345 on October 20, 2017, BUSTER BOUCHARD's mate woke the sleeping crew, including the two barge crewmembers, in order to prepare for duties associated with weighing anchor.

4.1.8. During preparations, BUSTER BOUCHARD's mate, located in the towing vessel's upper wheelhouse, witnessed both B. NO. 255 tankermen, specifically the barge captain and barge mate, preparing to weigh anchor on the bow of B. NO. 255, approximately 450 feet away.

⁹ The log book listed the anchorage position as 27° 49.9 N; 096° 59.1 W.

¹⁰ See Figure 4, Chart No. 11307.

4.1.8.1. The towing vessel's mate then witnessed one of the tankerman energize power to the barge by shifting from towing vessel-supplied power to barge-supplied power.¹¹

4.1.8.2. The towing vessel's mate then witnessed B. NO. 255's mate walk to the dog house on the bow of the barge, reach inside, and retrieve the portable windlass control box attached to a 25 foot electrical umbilical cord. The dog house door remained open due to the umbilical cord blocking the door's coaming.

4.1.8.3. One of B. NO 255's tankerman then secured the barge deck lights and radioed BUSTER BOUCHARD's mate using a handheld radio and reported he was ready to weigh anchor.

4.1.9. The towing vessel's mate then witnessed both barge tankermen operating the anchor windlass, located on the bow of the vessel, and the anchor chain as it began to lift.

4.1.9.1. The towing vessel's mate then heard B. NO. 255's barge captain, positioned on the bow, use his handheld radio to inform the barge mate the direction and strain on the anchor chain.

4.1.9.2. B. NO 255's barge captain then used his handheld radio and informed BUSTER BOUCHARD'S mate that four shots of anchor chain were on deck; followed by his report that five shots of chain were on deck.

4.1.9.3. When two shots of anchor chain were reportedly still out, B. NO. 255's barge captain reported to the towing vessel's mate the chain showed a heavy strain and the anchor was off the bottom.

4.1.10. BUSTER BOUCHARD's mate was confused by this report. Therefore, he asked the barge captain why there was a heavy strain on the chain when two shots were still out, which would normally indicate the anchor was still on the sea floor in 45 feet of water. The towing vessel's mate then asked B. NO. 255's barge captain if the anchor was off the bottom.

4.1.10.1. As BUSTER BOUCHARD's mate was talking to B. NO. 255's barge captain on the radio, he looked at the onboard electronic charting display and noted ATB BUSTER BOUCHARD/B. NO. 255 was still anchored in 45 feet of water. As he looked at the computer, something out of his peripheral vision caused him to look towards the bow of the barge.

Explosion on B. NO. 255

4.1.11. BUSTER BOUCHARD's mate turned his attention back to the bow of B. NO. 255 and witnessed blue flames migrating along the surface of the deck in the vicinity of the windlass, on the barge's bow where both barge tankermen were standing.

¹¹ B. NO. 255 was powered by three generators. Two generators powered the barge's machinery and a "hotel" generator powered the lights and crew quarters.

4.1.12. There was an explosion which knocked¹² BUSTER BOUCHARD's mate to the deck of the upper wheelhouse. A second and third explosion followed, further damaging the bow of B. NO. 255.



Figure 5: Picture of B. NO. 255 on fire in the Corpus Christi anchorage taken by the U.S. Coast Guard on October 20, 2017. Lights of the other vessels anchored in the area can be seen in the background.

Action by the Crew

4.1.13. Directly following the explosion, BUSTER BOUCHARD's mate attempted to contact the barge captain on his handheld radio as he simultaneously sounded the general alarm.

4.1.14. During these initial chaotic moments, BUSTER BOUCHARD's mate sent a distress call via VHF radio and contacted a Port Aransas pilot boat in their vicinity and asked for assistance locating the two tankermen who were thought to be in the water. The towing vessel's mate then contacted the U. S. Coast Guard reporting the incident.

4.1.15. At this point, BUSTER BOUCHARD's crew was fully engaged and rapidly responded to the life-threatening emergency. The captain and mate quickly concluded they lacked the equipment and capabilities to fight a fire of this size and intensity. The captain and mate decided in order to save the lives of the tug's crew, it was essential to decouple the towing vessel from the barge and move the towing vessel out of danger.

4.1.16. The captain encountered problems while trying to retract the pin connecting the towing vessel to the barge.¹³ The mate, aware of the apparent difficulties retracting the pins, headed to the engine room to tell the assistant engineer to engage an additional generator in order to provide the necessary power to retract the securing pins.¹⁴

4.1.16.1. After the generator was online, the pins were retracted, but a headline remained connected from the towing vessel to the barge.

¹² BUSTER BOUCHARD log book lists only one explosion occurring at 0435. Crewmember testimony described additional explosions onboard B. NO. 255.

¹³ The pin connection system is referred to as the "Intercon" system.

¹⁴ The captain's and mate's testimony regarding the problems retracting the securing pins differ as to what caused the difficulties.

4.1.16.2. One crewmember rushed to the bow of the towing vessel and dropped the headline.

4.1.17. The towing vessel was able to back out of the notch of the barge and travel a safe distance away from the barge.

4.1.17.1. The towing vessel's captain began circling the barge and running search patterns in an effort to find the two missing tankermen.

4.1.17.2. Crewmembers of BUSTER BOUCHARD stood on the bridge wings and used lights, attempting to locate the two barge tankermen, but were unsuccessful finding survivors.

4.1.17.3. Crewmembers recovered shoes, boots, gloves and hardhats (believed to be from the two missing crew members) at approximately 0930 from a "tide grip" line where other trash, cans and bottles accumulated.

Assistance Provided

4.1.18. An early radio call following the explosion from the Port Aransas pilot boat reported they found a body. BUSTER BOUCHARD rendezvoused with the pilot boat and transferred two of its crew members onboard the pilot boat to assist the recovery. However, the attempt to recover the body was unsuccessful.

4.1.19. U.S. Coast Guard Sector Corpus Christi dispatched both fixed wing and rotary wing air assets to conduct a search for survivors. Once on-scene, a HC-144 Ocean Sentry, a fixed wing, twin turbo-prop aircraft, equipped with an infrared camera and night vision goggles, searched for the missing crewmembers, deployed a self-locating data marker buoy as close to the burning barge as possible and coordinated the efforts of other assets assisting in the search. A MH-65 Dolphin, single main rotor, twin engine helicopter, executed search patterns for the missing crewmembers. The helicopter searched until depleting its fuel, at which time it landed, refueled and returned to the area to continue searching.

4.1.20. Texas Parks and Wildlife conducted a shoreline search for survivors but did not locate the missing tankermen.

4.1.21. Nearby towing vessels SIGNET POLARIS and SIGNET CONSTELLATION, owned by the Signet Corporation, were unable to initially extinguish the fire onboard the barge by using high velocity water fog. The barge fire continued to re-flash.

4.1.21.1. Both Signet vessels returned to port where the Refinery Terminal Fire Company provided the vessel with fire-fighting foam. Upon return to the burning B. NO. 255, each Signet vessel applied a blanket of fire-fighting foam onto the barge and ultimately extinguished the fire at approximately 1100.

4.1.22. On October 23, 2017, a Customs and Border Patrol agent found a body on the Padre Island seashore, later identified as the missing barge mate. The barge captain's body was never found and he is presumed deceased.



Figure 6: Picture of SIGNET POLARIS and SIGNET CONSTELLATION conducting firefighting efforts on the burning B. NO. 255. A U. S. Coast Guard and pilot small boat are in the background. Picture taken by the U.S. Coast Guard on October 20, 2017.

Damage to B. NO. 255

4.1.23. B. NO. 255's forepeak and No. 1 port and starboard cargo tank spaces below deck, and topside bow deck were severely damaged by the explosions.



Figure 7: Overhead view of the explosion damage onboard B. NO. 255 post-explosion. Picture taken by the U.S. Coast Guard on October 22, 2017.

4.1.24. Approximately 2,000 barrels of cargo were burned by the explosions and fire, or discharged into the Gulf of Mexico.

Mandatory Chemical Testing

4.1.25. In accordance with 46 CFR Part 16, post incident drug and alcohol testing was conducted for each BUSTER BOUCHARD crew member. Toxicology tests were conducted on the barge mate during the post-mortem examination. All tests were [REDACTED]

4.2. Regulatory Framework and Safety Management Oversight

U.S. Coast Guard

4.2.1. In accordance with 46 USC §3301, B. NO. 255 is subject to U.S. Coast Guard inspection and must conform to tank vessel inspection requirements contained within 46 CFR Subchapter D.

4.2.1.1. An inspection for certification is completed once every five years; four annual topside examinations are also conducted. In addition, for vessels operating in salt water, a dry dock inspection is required once every five years, an internal structural examination is required every 2.5 years, and a cargo tank internal examination is required every five years. If the results of the inspections are satisfactory, a Certificate of Inspection (COI) is issued to the vessel. A COI is typically valid for five years.¹⁵

4.2.2. At the time of the incident, B. NO. 255 was operating under a valid COI issued by the U.S. Coast Guard on February 19, 2015. B. NO 255 was certificated for carriage of grade “A” and lower flammable and combustible liquids upon ocean routes.

4.2.2.1. At the time of the incident, B. NO. 255’s last annual inspection was conducted on May 11, 2017; her last dry dock examination was conducted on February 9, 2015; her last internal structural examination was conducted January 3, 2013; and her last cargo tank internal examination was conducted on February 5, 2015.

4.2.2.2. At the time of the incident, the next U.S. Coast Guard internal structural exam was due January 31, 2018; the next dry dock exam was due February 29, 2020.¹⁶

4.2.3. In accordance with 46 CFR Subchapter D, no extensive repairs or alterations involving the safety of a tank vessel in regard to hull or machinery shall be made without the approval of the U.S. Coast Guard.

4.2.4. 46 CFR Subchapter D requires the master owner, operator, or agent of the vessel notify the Officer in Charge, Marine Inspection (OCMI) whenever the vessel is to be dry docked regardless of the reason for dry docking. Further, no extensive repairs involving the safety of a tank vessel, either in regard to hull or machinery, shall be made without the approval of the Commandant.

¹⁵ Inspection type and criteria for tank vessels is found in 46 C.F.R. Part 31.

¹⁶ B. NO. 255 COI issued on February 15, 2015.

4.2.5. Tank barges which carry flammable cargoes are also subject to provisions of 46 CFR Subchapter J, the regulations governing electrical installations in hazardous classed zones onboard tank vessels.

4.2.6. In accordance with 33 CFR Subchapter P, whenever there is a hazardous condition aboard a vessel, the owner, agent, master, operator, or person in charge shall immediately notify the nearest U.S. Coast Guard office.

American Bureau of Shipping

4.2.7. ABS is a classification society delegated authority to conduct inspections and examinations on behalf of the U.S. Coast Guard. ABS issues and endorses certain certificates¹⁷ for vessels of the United States.

4.2.7.1. ABS will issue a certificate of classification to a vessel if it is found in compliance with applicable rules, guides, standards or other criteria of the ABS.

4.2.7.2. B. NO. 255 was issued Certificate of Classification Number 7901748 by ABS on March 31, 2015. The certificate's expiration date was March 31, 2020.

4.2.7.3. Each vessel with an ABS certificate of class is subject to applicable hull surveys, including Annual, Intermediate, or Special Periodical. Each annual survey, as required by the ABS Rules for Survey after Construction, examines weather decks, hull plating, closing appliances and watertight penetrations.

4.2.7.4. At the time of the incident, ABS conducted B. NO. 255's last annual hull survey on May 2, 2017.

International Safety Management Code

4.2.8. The ISM Code provides an international standard for the safe management and operation of ships and pollution prevention. According to the ISM Code, the cornerstone of good safety management is commitment at all levels of an organization, including from executive management and ownership.¹⁸

4.2.8.1. ATB BUSTER BOUCHARD/B. NO. 255 did not sail on international voyages. Therefore, it was not required to conform to the International Safety Management (ISM) Code. However, Bouchard elected to voluntarily operate the ATB under the ISM Code. As such, the ATB was required to conform to applicable provisions of the ISM Code, including requirements issued by the U.S. Coast Guard on a Document of Compliance (DOC) and Safety Management Certificate (SMC).

4.2.9. The U.S. Coast Guard is signatory to the International Convention for the Safety of Life at Sea (SOLAS). As the flag state for the United States, the U.S. Coast Guard is empowered to

¹⁷ . Memorandum of Understanding between U.S. Coast Guard and ABS concerning delegation of vessel inspections and examinations.

¹⁸ ISM Code Preamble.

delegate specific regulatory oversight functions to recognized organizations, including approved classifications societies.

4.2.9.1. ABS is an approved classification society delegated authority by the U.S. Coast Guard to issue DOCs and SMCs.

4.2.10. Bouchard managed its fleet of vessels through a Safety Management System (SMS) instituted in 2007. At the time of the incident, Bouchard possessed a valid DOC issued by ABS, on behalf of the U.S. Coast Guard, on July 26, 2017. The DOC was valid until September 18, 2022.¹⁹

4.2.11. At the time of the incident, B. NO. 255 was operating under a valid SMC²⁰ issued by ABS, on behalf of the U.S. Coast Guard, on February 21, 2014. The certificate was valid for five years.²¹

Ship Inspection Report (SIRE)

4.2.12. In addition to U.S. Coast Guard and ABS regulatory oversight, tank vessels and oil, petrochemicals, and gas cargo transportation companies with membership in the Oil Companies International Marine Forum (OCIMF) use SIRE as a voluntary risk assessment tool.²²

4.2.12.1. In accordance with OCIMF, SIRE is a major source of technical and operational information to prospective charterers and other program users. SIRE supports the oil industry's intent to ascertain whether vessels are well managed and maintained.

4.2.13. At the time of the incident, SIRE conducted B. NO. 255's last risk assessment on April 29, 2017.

4.3. Damage Survey Results

Transverse Bulkhead Wastage

4.3.1. Following the explosion and fire on B. NO. 255, the U.S. Coast Guard and NTSB conducted a joint investigation of the damaged barge.

4.3.1.1. Investigators identified two horizontal cracks in the transverse bulkhead separating the forepeak and No. 1 port cargo tank. The cracks opened the bulkhead between these adjacent spaces allowing free communication of vapor and liquid. The upper crack was 13.8 inches long; the lower crack was 13.5 inches long. (*See Figure 8*)

4.3.1.2. The NTSB identified a five foot by five foot section (approximate) of steel²³ to be cut, removed and sent to the NTSB Materials Laboratory for analysis in Washington, D.C.

¹⁹ Bouchard DOC Certificate.

²⁰ Bouchard DOC Audit.

²¹ B. NO. 255 SMS Certificate.

²² OCIMF.org.

²³ *See Figure 20*

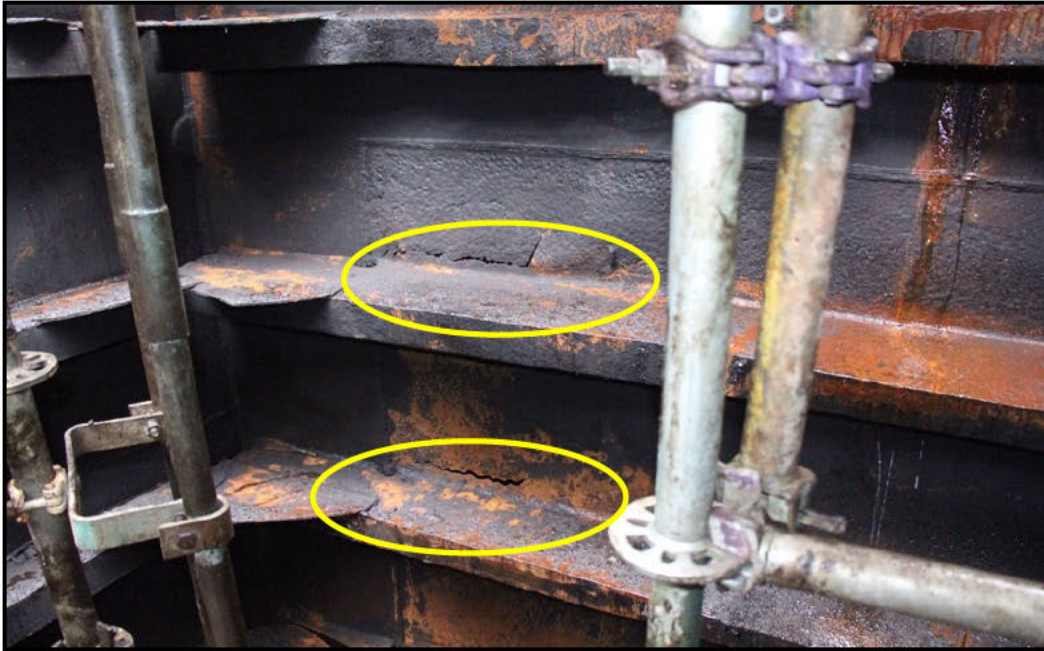


Figure 8: Picture of the number one port cargo tank forward bulkhead as viewed from inside the forward rake looking aft. Circles added to identify cracks. Picture taken by the U.S. Coast Guard on December 6, 2017.

4.3.1.3. The NTSB Materials Laboratory conducted a comprehensive exam of the steel including chemical composition, phase identification, hardness, and micro-indentation testing. The report concluded that of the two cracks identified, the top crack was present prior to the explosion.²⁴ The report also concluded the steel was pitted on the forepeak side of the bulkhead and severe corrosion was present around both cracks consisting of pitting and holes. (See Figure 9)

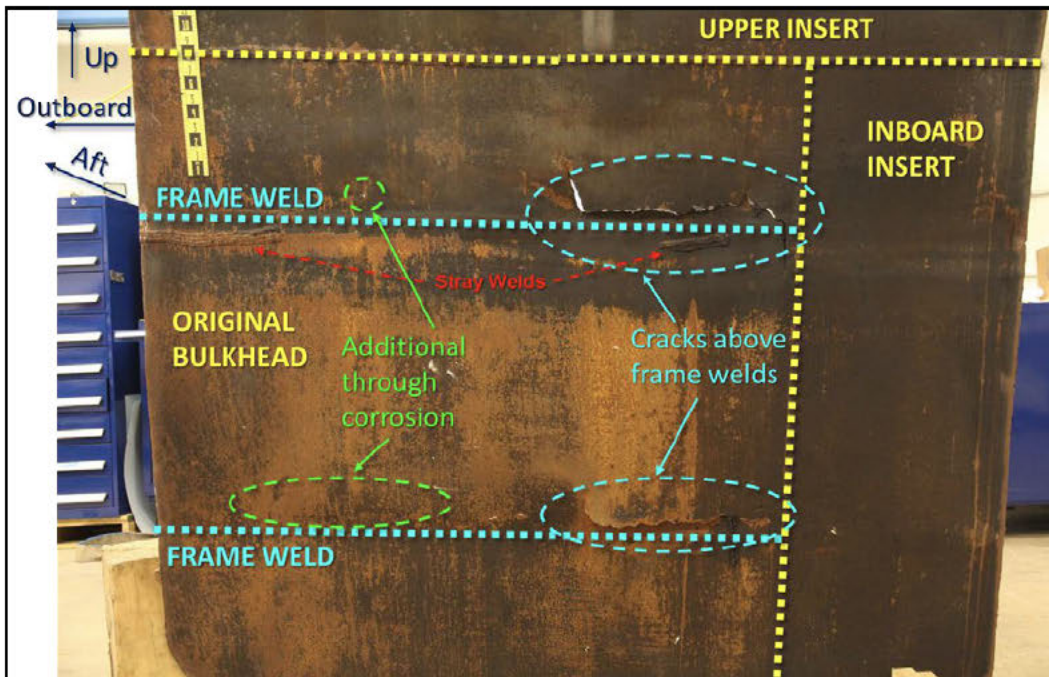


Figure 9: Removed bulkhead section from B. NO. 255, as viewed from number 1 port cargo tank. (Photo by NTSB)

²⁴ NTSB Report No. 18-034, dated June 6, 2018.

4.3.2. In addition to the NTSB's analysis, the U.S. Coast Guard hired an independent metallurgist to review the NTSB's findings. Based on the NTSB's report and other evidence, the U.S. Coast Guard's expert concluded both cracks were present prior to the explosion.²⁵

4.3.2.1. Specifically, the U.S. Coast Guard expert reported a peripheral section of the bulkhead was removed and replaced with inserts welded into place. The repair and replacement was irregular as evidenced by the large difference in thickness between the inserted plates and the original bulkhead plate.

4.3.2.2. The variance in thickness between the inserted plate and original bulkhead plate led to increased stress on the bulkhead plate and accelerated stress-assisted corrosion.

4.3.2.3. Additionally, the material selected for the replacement insert is compositionally different from the original bulkhead steel. The carbon content of the inserted plate was 0.032 wt%, while the carbon content of the original bulkhead steel was 0.17 wt%. Such variance in carbon content impacts the microstructure of steel and accelerated the corrosion rate of the original bulkhead along the frame welds, ultimately causing both cracks within the original bulkhead located above the frame welds.

Topside Steel Wastage

4.3.3. U.S. Coast Guard Investigators discovered significant corrosion at the base and top of the ullage tube for the No. 1 starboard cargo tank. The holes allowed free communication of vapor from the cargo tank to the topside of the barge. The wasted areas were determined to predate the incident. (See Figures 10 and 11)



Figure 10: Picture of the number one starboard cargo tank ullage tube leading directly to the cargo tank on B. NO. 255. Circles added. Picture taken by the U.S. Coast Guard on November 6, 2017.

²⁵ U.S. Coast Guard Metallurgist Expert Report.



Figure 11: Closer view of the area pictured in Figure 10. Picture taken by the U.S. Coast Guard on November 6, 2017.

Wasted Armored Electrical Conduit

4.3.4. Additionally, U.S. Coast Guard Investigators discovered numerous sections of wasted armored electrical conduit exposing the electrical wire to weather and spindrift. The wasted areas were determined to predate the incident. (See Figures 12 and 13)

4.3.4.1. Exposed wires on a tank barge present a hazardous condition as combustible vapors may ignite.



Figure 12: Deteriorated wiring located in bow area on B. NO. 255. Picture taken by the U.S. Coast Guard on November 6, 2017.

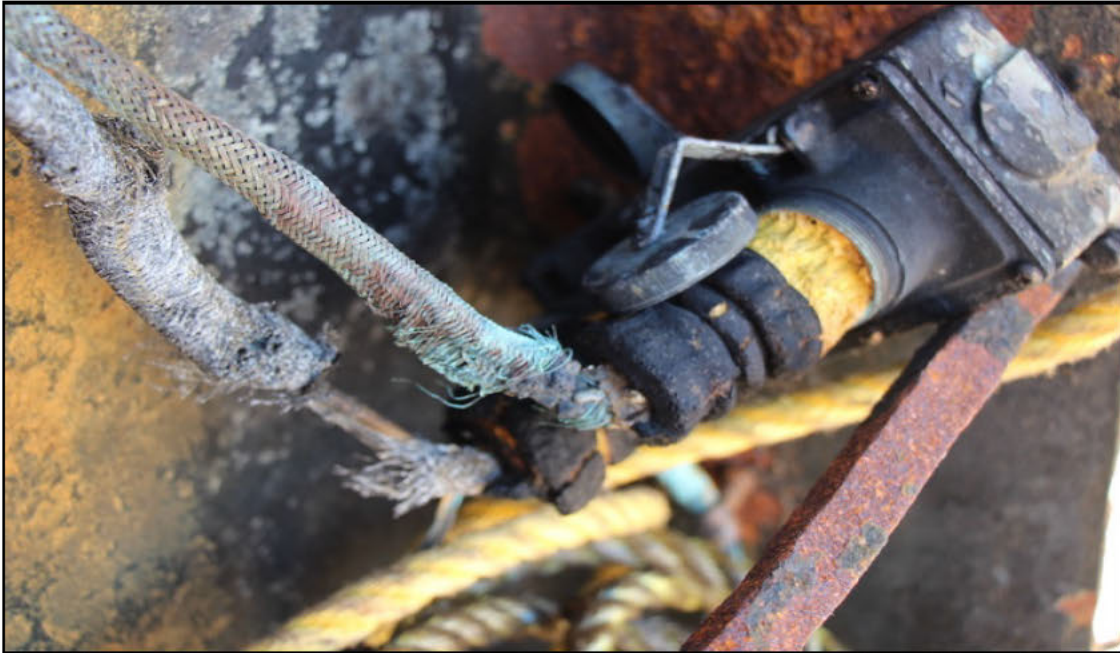


Figure 13: Picture of the outlets for the forward navigation light mast located on the bow area of B. NO. 255. Picture taken by the U.S. Coast Guard on November 6, 2017.

Wasted Cargo Tank Top Hatches

4.3.5. U.S. Coast Guard investigators also discovered extensive corrosion on cargo tank top hatches. The wasted areas were determined to predate the incident. Severe penetrations on the cargo tank hatch lids allowed free communication of vapors from the cargo tank to the topside of the barge.



Figure 14: Picture of wasted cargo tank hatch on B. NO. 255. Circle added. Picture taken by the U.S. Coast Guard in June 2018.



Figure 15: Close up view of the wasted cargo tank hatch in Figure 14. Picture taken by the U.S. Coast Guard in June 2018.

4.4. Overall B. NO. 255 Material Condition

4.4.1. The following information, while not exhaustive, provides a history of known conditions, repairs or identified deficiencies related to the forepeak, forward transverse bulkhead, No. 1 port cargo tank, as well as the electrical system, anchor windlass, and other equipment essential to maintaining cargo tank vapor tightness or testing for hazardous conditions on B. NO. 255.

Forepeak Tank

4.4.2. On March 17, 2005, U.S. Coast Guard marine inspectors conducted a scheduled dry dock examination in accordance with B. NO. 255's COI and identified extensive corrosion in transverse frames 5, 6, 7, 10 and 11 in the port forepeak tank.²⁶ Bouchard did not notify the U.S. Coast Guard of this hazardous condition. U.S. Coast Guard marine inspectors also required readings for the transverse bulkhead because the area showed signs of significant corrosion.²⁷ As noted, the forepeak shares a transverse bulkhead and is directly adjacent and forward of the No. 1 port cargo tank. On April 29, 2005, the attending U.S. Coast Guard marine inspector cleared the forepeak tank deficiencies and noted the vessel was fit for route and service as specified on its COI.

²⁶ See Figure 20

²⁷ U.S. Coast Guard Inspection Activity 2313050.

4.4.3. On February 25, 2008, an ABS survey noted the overall coating within the forward rake as fair²⁸, which was downgraded from good as noted in a survey conducted on April 21, 2006.²⁹ The forward rake coating condition was noted as fair for all subsequent ABS surveys. No ABS surveys after June 28, 2016, made note of the coating condition.

4.4.3.1. Testimony from an ABS surveyor indicated that downgrading a tank from fair to poor is a “very difficult task”. He stated he would request a second opinion from a colleague before doing so and would also request an owner’s representative to attend to view the tank to make sure they understood the downgrade and agreed.³⁰

4.4.4. On February 7, 2016, ABS conducted an annual survey of B. NO. 255. The ABS surveyor noted in his report the forepeak was not made accessible by Bouchard. Subsequent reports from ABS do not state whether this internal space was entered by an attending ABS surveyor during subsequent surveys, including up to the time of the incident.

Forward Transverse Bulkhead

4.4.5. On December 2, 1991, U.S. Coast Guard marine inspectors discovered oil leaking from the bow thruster tunnel during discharge operations. Black oil was found in the bottom of the chain locker located in the forepeak, immediately forward of the No. 1 port and starboard cargo tanks. The oil was leaking through a weld in the transverse bulkhead shared between the forepeak and the No. 1 port and starboard cargo tanks.³¹ Bouchard did not notify the U.S. Coast Guard of this hazardous condition.

4.4.6. On October 21, 1996, the U.S. Coast Guard discovered extensive wastage on the transverse bulkhead shared by the forepeak and No. 1 port and starboard cargo tanks.³² Bouchard did not notify the U.S. Coast Guard of this hazardous condition.

4.4.7. On March 4, 2008, the U.S. Coast Guard conducted an internal structural exam and annual inspection³³ in conjunction with an ABS surveyor conducting a scheduled survey.³⁴ Both the U.S. Coast Guard and ABS discovered wastage and various holes in the forward transverse bulkhead of the No. 1 port and starboard cargo tanks.³⁵ Bouchard did not notify the U.S. Coast Guard of this hazardous condition. The following diagram illustrates 10 years of substandard steel and/or welds and repairs.

²⁸ Fair coating is described as a breakdown of coating or rust penetration in less than 20% of the area under consideration. Hard rust scale is less than 10% of the area under consideration. Rusting at edges or welds is less than 50% of edges or weld lines in the area under consideration.

²⁹ ABS Report Number T958761_B.

³⁰ Formal Hrg Transc. [REDACTED]

³¹ U.S. Coast Guard Inspection Activity 961736.

³² U.S. Coast Guard Inspection Activity 1160160.

³³ U.S. Coast Guard Inspection Activity 3159355.

³⁴ ABS Report Number T958761_B

³⁵ U.S. Coast Guard Inspection Activity 3159355 and Sector St. Petersburg B. NO. 255 file.

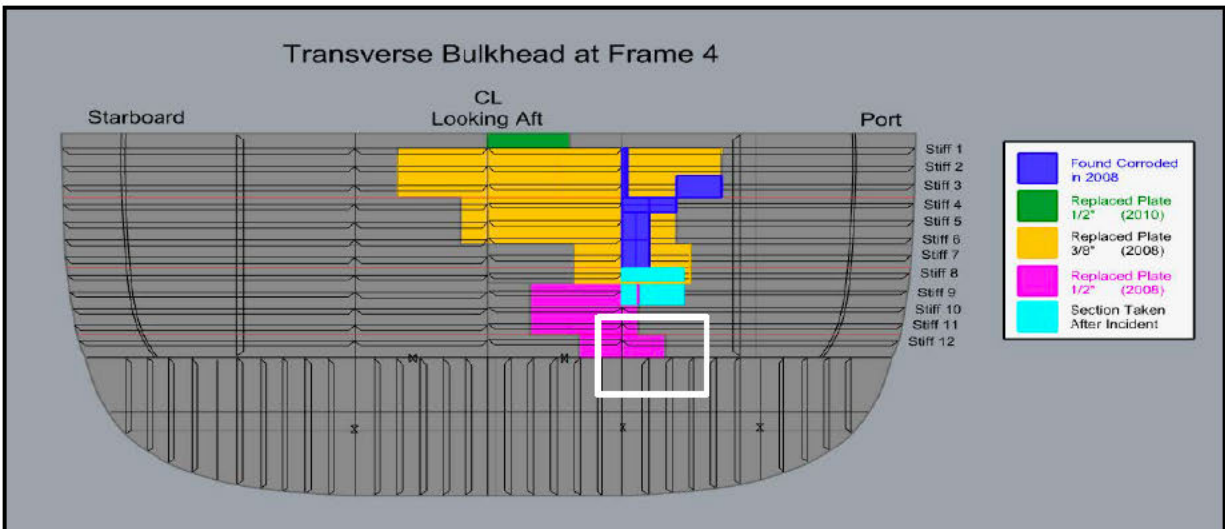


Figure 16: Diagram of repairs to transverse bulkhead forward of number 1 port and starboard cargo tanks. The light blue section is the damaged area analyzed by the NTSB and the U.S. Coast Guard, discussed later in this section. Diagram provided by ABS.

4.4.8. On February 18, 2010, the U.S. Coast Guard and ABS conducted scheduled dry dock examinations in accordance with the vessel’s COI. U.S. Coast Guard marine inspectors discovered holes near the No. 1 port cargo tank top. The transverse watertight bulkhead under the main deck was also corroded.³⁶ Bouchard did not notify the U.S. Coast Guard of this hazardous condition.

4.4.9. On January 29, 2015, ABS began a scheduled dry dock examination in accordance with the vessel’s COI. An ABS surveyor identified wastage and holes throughout the vessel, including on access hatches to seven different cargo tanks. The wire conduit was found holed and wasted in various areas as well. The U.S. Coast Guard began its dry dock examination on February 19, 2015, alongside ABS surveyors. The ABS survey describes extensive steel replacement of the main deck plating.³⁷ Bouchard did not report this hazardous condition to the U.S. Coast Guard.

Electrical System

4.4.10. On February 7, 2016, ABS began an annual survey and discovered numerous sections of electrical conduit and wiring deteriorated and in poor condition³⁸ throughout the vessel. Bouchard did not report this hazardous condition to the U.S. Coast Guard. ABS did not notify the U.S. Coast Guard of this and the U.S. Coast Guard did not approve or oversee any repairs to the conduit and wiring replacement that was conducted over the next several months.

4.4.11. On May 09, 2016, three months after ABS discovered numerous electrical system deficiencies onboard B. NO. 255, and over one month prior to ABS clearing the deficiencies (*See* Finding 4.4.13), U.S. Coast Guard Marine Inspectors conducted an annual topside inspection of B. NO. 255; no deficiencies were issued. The following pictures were taken by ABS during the annual survey.³⁹

³⁶ U.S. Coast Guard Inspection Activity 3666161.

³⁷ ABS Report Number NY2819343-_B.

³⁸ ABS Report Number T3070370_A.

³⁹ Formal Hrg. ABS Exhibit 008.



Figure 17: Dead-end wires in forward rake. Picture provided by ABS.



Figure 18: Exposed forward mast plugs located on the forward section of the barge. Picture provided by ABS.

4.4.12. Following the issuance of the electrical system deficiencies by ABS on February 7, 2016, and prior to ABS-approved repair of all electrical deficiencies on June 28, 2016, B. NO. 255 conducted 29 cargo operations, regardless of the unsafe electrical system.

4.4.12.1. Megger testing was required as a result of the electrical system deficiencies. Three tests conducted from February 2, 2016 to April 10, 2016 showed several electrical systems had insufficient insulation including the forward deck lights and the green and red running lights, and receptacles.

4.4.13. On June 28, 2016, an ABS surveyor cleared the outstanding deficiencies related to the deck conduit transit and deficient wiring in the hazardous zones. No additional megger testing results were included to provide evidence insulation of these systems had improved. The surveyor noted, “No deficiencies were observed during this survey relating to possible Safety Management System failures.”⁴⁰

4.4.14. For the next several months, multiple invoices from Blue Water Electric indicated repair and/or replacement of deficient electrical components indicating replacement of the electrical components occurred after ABS cleared the outstanding deficiencies on June 28, 2016.

4.4.14.1. July 6, 2016: Blue Water Electric invoice indicated all deficient conduit for pump house #2 was replaced including replacement of the wiring.

4.4.14.2. September 14, 2016: Bluewater Electric invoice indicated all rotten conduit that ran to the anchor windlass and forward hold was removed and replaced with new conduit.

4.4.14.3. September 30, 2016: Bluewater Electric invoice indicated 100⁴¹ feet of deck conduit was removed and replaced with new conduit and wiring.

4.4.15. On September 9, 2016, a little more than three months after ABS cleared the electrical system deficiencies, ATB BUSTER BOUCHARD/B. NO. 255 was ordered to depart the Sunoco facility in Nederland, Texas, after facility personnel discovered an extensive amount of vapor leaking from the vessel and feared the vessel posed a high risk of ignition and explosion. Bouchard did not report this hazardous condition to the U.S. Coast Guard.

4.4.16. On April 29, 2017⁴², OCIMF conducted a SIRE inspection where Bouchard provided the inspector megger test results from 2015, despite having megger test results from February, March, and April of 2016. The 2015 megger test results indicated sufficient insulation within the electrical system; whereas, each of the three 2016 megger test results indicated insufficient insulation and substantial electrical system deficiencies.⁴³ (See Figure 19)

⁴⁰ ABS Report Number T3070370_A.

⁴¹ The invoice lists 400' of conduit replaced, but we believe this number may be a typo. The e-mails requesting and granting a purchase order for repairs both state 100'.

⁴² SIRE Report Number BHBQ-8602-6414-4934, dated April 29, 2017

⁴³ Date of first megger testing report.

11.4

Are all electrical wiring and plugs intrinsically safe and megger tested regularly?

Y N NS NA

Other Inspector Comments: Last electrical megger testing performed during ABS Machinery Survey on 1 Apr 2015.

Figure 19: Snapshot taken from SIRE checklist for inspection conducted on B. NO. 255 on April 29, 2017. Report provided by the SIRE.

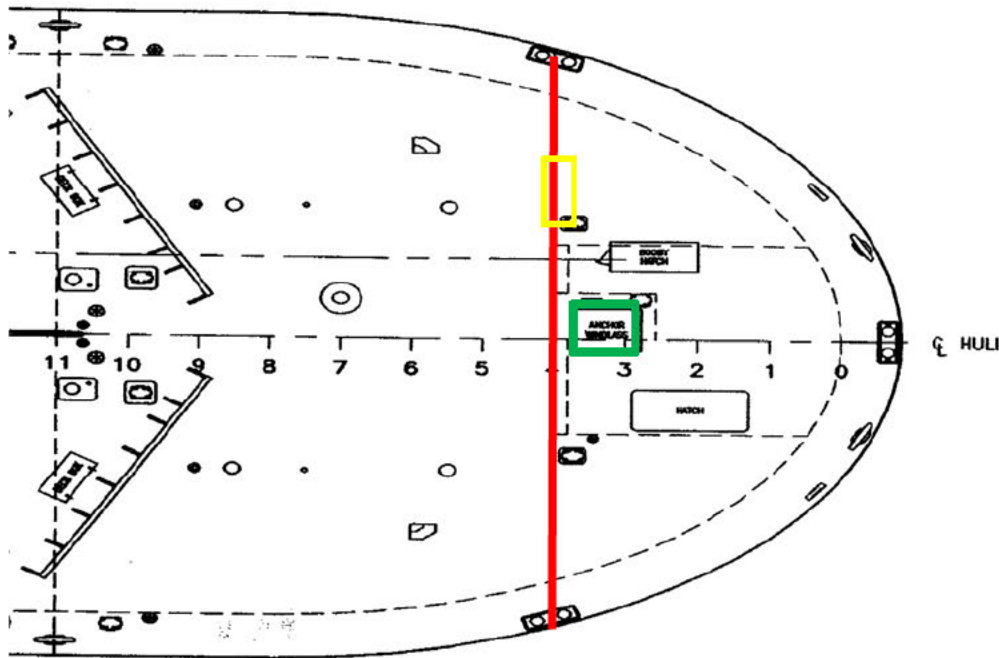


Figure 20: General Arrangement Diagram provided by ABS. Closer view of B. NO. 255's bow below deck. The number 1 port/starboard cargo tanks are located aft of the transverse bulkhead (left of vertical red line indicating transverse bulkhead). The chain locker, located beneath the anchor windlass, is identified by the green box. The location of steel analyzed as part of the damage survey is identified by a yellow box. Colored lines added. Diagram provided by ABS.

Anchor Windlass and Motor

4.4.17. On December 11, 2012, a new anchor windlass was installed in the chain locker⁴⁴ located in the forepeak tank of B. NO. 255.⁴⁵

4.4.17.1. The anchor windlass manual the U.S. Coast Guard received from Bouchard included information for the windlass, gear unit, electric motor and failsafe brake.

4.4.17.1.1. The gear unit portion in the manual provided the following caution:

Before starting up the unit, check and make sure that:

- the unit is not assembled in a potentially explosive atmosphere (oil, acid, gas, vapour (sic), radiation) and is free of dust build ups greater than 5 mm in depth
- during operation the cooling air does not exceed 40° C⁴⁶
- all accessories mounted to the gear unit are ATEX⁴⁷ certified⁴⁸

⁴⁴ See Figure 20

⁴⁵ ABS Report Number NO2241077-A.

⁴⁶ 104° F.

⁴⁷ European Union directives for equipment in explosive atmospheres.

⁴⁸ Anchor Windlass Manual.

4.4.17.1.2. The electronic motor in the windlass referred to a Marathon electric motor; the motor actually installed was a Baldor Reliance electric motor.

4.4.17.2. In the Bouchard Fleet Management Software (FMS) system, the anchor windlass is listed as hydraulically powered.

4.4.17.2.1. Testimony from B. NO. 255's senior barge captain indicated he performed all maintenance on the windlass that was recommended by the manufacturer.⁴⁹

4.4.17.3. Testimony from B. NO. 255's senior barge captain indicated that when inexperienced personnel operated the windlass remote it would cause the breaker to trip.⁵⁰ Testimony further indicated that as late as September 16, 2017, the senior barge captain experienced the breaker trip repeatedly while raising the anchor chain on B. NO. 255.⁵¹

Valve Deck Stands and Packing

4.4.18. On July 28, 2016, while conducting blowback operations⁵² at the Sunoco terminal in Nederland, Texas, oil was spilled on deck of B. NO. 255. When the Sunoco Marine Technical Advisor (MTA) investigated this incident, he found the No. 1 starboard valve did not have packing in place. After the investigation, the MTA found the source of the spill was failure of the gland in the No. 1 starboard valve.⁵³ The MTA observed "severe signs of degradation" in the valve shaft. Upon further inspection, he found multiple valves onboard the barge that showed the "same lack of maintenance and metal fatigue."⁵⁴

4.4.18.1. The MTA requested records showing that barge personnel were conducting valve maintenance and inspection. Despite the request from the MTA, Bouchard employees did not provide any records.⁵⁵ An internal Bouchard document titled, Oil Spill/Cargo Problem Report, found that a "review of maintenance [and] NS5⁵⁶ did indicate 1 month missing of cargo deck inspection."⁵⁷

4.4.18.1.1. The verification of valve packing is required on a monthly basis.

⁴⁹ Formal Hrg. Transc. [REDACTED]

⁵⁰ Id.

⁵¹ Email from BUSTER BOUCHARD crewmember to the U.S. Coast Guard, dated December 11, 2018.

⁵² A blowback operation is when air pressure is applied to a cargo line/hose to clear it of all cargo. The line/hose contents are placed back on the vessel.

⁵³ Sunoco Logistics Marine Incident Report, dated July 28, 2016.

⁵⁴ Id.

⁵⁵ Sunoco Logistics Marine Incident Report, dated July 28, 2016.

⁵⁶ NS5 and the Fleet Maintenance Software are one in the same.

⁵⁷ Oil Spill/Cargo Problem Report, Bouchard, dated July 28, 2016.

4.4.19. On September 9, 2016, B. NO. 255 was loading crude oil at Sunoco Terminal in Nederland, Texas. The MTA arrived at the dock to conduct a check of operations due to concerns after the blowback oil spill on deck incident that occurred on July 28th. When the MTA arrived at the dock, he could smell an alarming level of vapors. He went onboard the barge to investigate and could hear and feel vapor escaping from cargo tanks through multiple cargo tank ullage pipes and cargo hatch covers, including No. 1 starboard, No. 4 port, No. 7 starboard, and No. 8 starboard cargo valves; as well as the No. 8 port stripping valve, and No. 4 starboard, No. 2 starboard, and No. 1 starboard cargo tank hatches.⁵⁸

4.4.19.1. The MTA ordered the transfer shut down and the barge to depart the dock. He later issued several conditions before B. NO. 255 would be allowed to return to a Sunoco dock. One of those conditions was to have a third party remove and replace all cargo tank ullage pipe packing. The MTA testified, “they previously told us they had done it internally. However, that proved to be either insufficient or they did not do it because we had another issue on a return trip, so we wanted to have a third party monitor it.” The facility also required the barge to have a new vapor tightness test.⁵⁹

4.4.19.2. At the time of the incident, the MTA was provided with what appeared to be a valid vapor tightness certificate by the tankerman on the barge but he considered it to be invalid. He further stated that “if the packing and the hatches are letting vapors escape, then the barge can't be vapor tight.”⁶⁰

4.4.19.3. Testimony from the B. NO. 255's senior barge captain regarding this incident revealed that he had a limited understanding of vapor leaks and their potential hazards. He testified that he didn't want to be able to smell or feel vapor coming out of a valve but didn't believe a leaking valve could cause an explosion because the vapors were released into the atmosphere.⁶¹ He further testified that he did not routinely conduct valve packing replacement despite having been on the barge for 530 days out of the previous 658 days before the explosion.⁶²

4.4.20. On November 10, 2016, Bouchard met with Valero representatives at their request to discuss the above incident. Bouchard conducted an investigation into the matter. A Bouchard letter regarding the investigation stated, “Sun Nederland Vapor Valve Leaks: Bouchard vessel supervisor was on the vessel and although the valves were not leaking, Bouchard was proactive and replaced them.”⁶³

4.4.21. No evidence was provided to indicate Bouchard replaced or conducted maintenance on these items prior to the explosion on B. NO. 255.

4.4.22. Vapor leaks are not listed as a type of emergency on Bouchard's Emergency Response Checklist located in the SMM.

⁵⁸ Sunoco Logistics Marine Incident Report, dated September 9, 2016.

⁵⁹ Formal Hrg. Transcr. [REDACTED]

⁶⁰ Id.

⁶¹ Formal Hrg. Transcr. [REDACTED]

⁶² B. NO. 255 log book entries. These days also include crew change days.

⁶³ Bouchard Document BTC006364-BTC006368.



Figure 21: Picture of the number one starboard cargo tank main valve stem on the B. NO. 255. Picture taken by the U.S. Coast Guard on December 12, 2017

Gas Detection Equipment/Calibration Gas

4.4.23. On February 21, 2014, ABS conducted an ISM audit on B. NO. 255, and issued non-conformity 183⁶⁴ after discovering the fixed and portable gas detection equipment was inoperable and manuals for their operation were not onboard.

4.4.23.1. On March 29, 2014, a Bouchard correction plan was accepted by ABS for this non-conformity. The plan was to purchase new meters as Bouchard indicated the meters currently onboard “have proven to be troublesome as a whole and become difficult or impossible to calibrate overtime.”⁶⁵

4.4.24. On February 13, 2017, ABS closed non-conformity 183.⁶⁶

4.4.25. On September 3, 2017, B. NO. 255’s crew noted on an internal safety checklist the fixed gas detection system in the accommodation space was inoperable.⁶⁷ This hazardous condition was not reported to the U.S. Coast Guard and no evidence was provided indicating Bouchard repaired this system.

⁶⁴ ABS ISM Survey PA2554131-A-ISM Renewal Audit 1, 21 Feb 2014

⁶⁵ ABS Survey Manager - ISM CARS - Plan Accepted.

⁶⁶ ABS Report Number CX3281291.

⁶⁷ Safety and Fire Fighting Equipment Checklist, dated September 3, 2017.

4.4.26. On October 11, 2017, nine days before the explosion on B. NO. 255, the barge captain submitted a Captain's Relieving Report indicating the fixed gas detection system was inoperable.⁶⁸ This hazardous condition was not reported to the U.S. Coast Guard and no evidence was provided indicating Bouchard repaired this item.

4.4.27. On October 16, 2017, B. NO. 255's tankerman e-mailed the vessel supervisor indicating the fixed gas detector in the galley was inoperable.⁶⁹ This hazardous condition was not reported to the U.S. Coast Guard and no evidence was provided indicating Bouchard repaired this item.

4.4.28. The gas detection equipment onboard the B. NO. 255 is not listed as critical equipment in the Bouchard SMM.

4.4.28.1. The company did issue four safety memos regarding this equipment, three of which were after this incident.

Recent Equipment Deficiencies

4.4.29. On April 24, 2017, a Captain's Relieving Report was completed by B. NO. 255's barge captain.⁷⁰ The report listed multiple equipment and material condition deficiencies, including an inoperable ballast valve, hydraulic leaks on the winch motor, and deteriorated steel on No. 1 and 2 cargo pump valves and ullage pipes, all of which needed replacement.

4.4.30. On May 2, 2017, 8 days after B. NO. 255's Captain's Relieving Report identified the equipment and material condition deficiencies, including visible wastage on the No. 1 and 2 cargo pump valves and ullage pipes, ABS conducted an annual survey on B. NO. 255 and did not issue any discrepancies.⁷¹

4.4.31. On May 11, 2017, 17 days after B. NO. 255's Captain's Relieving Report identified equipment and material condition deficiencies, including visible wastage on the No. 1 and 2 cargo pump valves and ullage pipes, U.S. Coast Guard Marine Inspectors conducted an annual inspection on B. NO. 255 and did not issue any deficiencies.⁷²

4.4.32. On May 25, 2017, Bouchard began extensive repairs to B. NO. 255 while still at Caddell Drydock and Repair Co. These repairs were made to critical safety equipment including replacement of a ballast tank valve, replacement of boiler fuel lines and replacement of two cargo tank hatch coamings.⁷³ The U.S. Coast Guard was not notified.

4.4.33. On October 11, 2017, 9 days before the incident, a Captain's Relieving Report and Vessel Status Report was completed by B. NO. 255's barge captain. The reports listed several equipment and material condition deficiencies.⁷⁴ These deficiencies were not reported to the U.S. Coast Guard, nor is there evidence they were repaired.

⁶⁸ Captain's Relieving Report, dated October 11, 2017.

⁶⁹ E-mail from B. NO. 255, Bouchard, to [REDACTED] [REDACTED] dated October 16, 2017.

⁷⁰ B. NO. 255 Captain's Relieving Report, dated April 24, 2017.

⁷¹ ABS Report Number NY3324027, dated May 2, 2017.

⁷² U.S. Coast Guard Inspection Activity 6141934.

⁷³ Subpoenaed records for repair invoices and e-mail correspondence.

⁷⁴ B. NO. 255 Captain's Relieving Report and Vessel Status Report, dated October 11, 2017.

4.4.34. On October 16, 2017, B. NO. 255's tankerman e-mailed the vessel supervisor a list of equipment and material condition deficiencies on the barge, including an inoperable fixed gas detector in the galley.⁷⁵ These deficiencies were not reported to the U.S. Coast Guard, nor is there evidence they were repaired.

4.5. Bouchard Transportation Company Safety Culture

4.5.1. During the course of the investigation and public hearing, the U.S. Coast Guard received information through various sources that other barges operating in Bouchard's fleet were seriously deficient. One of the more significant deficiencies reported to the U.S. Coast Guard was a vapor leak onboard B. NO. 275, a sister vessel to B. NO. 255.

4.5.2. A whistleblower informed the U.S. Coast Guard that B. NO. 275 had vapor leaking from a cargo tank through a bulkhead into a void space.

4.5.2.1. B. NO. 275's official log, dated May 9, 2017, contains an entry indicating a vapor leak was reported by the barge captain to Bouchard's COO/VP of Safety and Vetting and to Bouchard's Maintenance and Repair Manager.⁷⁶

4.5.2.2. A BOATRACS⁷⁷ report indicated a vapor leak from the aft peak void on B. NO. 275 was reported to Bouchard's management on October 22, 2017, two days after the explosion on B. NO. 255.

4.5.3. On November 7, 2017, the U.S. Coast Guard boarded B. NO. 275 to test for explosive atmospheres on the barge. The crew denied a vapor leak existed and did not provide any information regarding where the vapor leak may be located.⁷⁸

4.5.3.1. The following day, on November 8, 2017, the U.S. Coast Guard boarded B. NO. 275 again and discovered the vapor leak in the aft peak void space. The aft peak shared a bulkhead with the most aft cargo tank. The void registered 28% lower explosive limit (LEL) concentration.⁷⁹

4.5.3.2. During the inspection, the barge captain told the U.S. Coast Guard the void continuously built up hazardous vapors requiring ventilation every 4 days.

4.5.4. U.S. Coast Guard marine inspector testimony during the public hearing revealed during equipment and material condition repairs on B. NO. 295 from October 2017, to March 21, 2018, U.S. Coast Guard marine inspectors witnessed deceptive practices during ultra-sonic testing (UT) of the hull and during steel repair.

⁷⁵ E-mail from B. NO. 255, Bouchard, to [REDACTED] [REDACTED] dated October 16, 2017.

⁷⁶ A B. NO. 275 log book entry on May 9, 2017, states, "...Called [REDACTED] & [REDACTED] about vapors in aft. peak [.] Possible hole between aft. peak & #8 [port]." Complete copy of log book page provided by Bouchard during the U.S Coast Guard Formal Hearing.

⁷⁷ BOATRACS is a wireless method to send text messages used in the maritime field.

⁷⁸ Formal Hrg. Transcr. [REDACTED]

⁷⁹ U.S. Coast Guard Inspection Activity 6305653.

4.5.4.1. U.S. Coast Guard marine inspectors testified B. NO 295 representatives falsely claimed gauging shots were completed when they had not occurred. Although U.S. Coast Guard marine inspectors provided clear instruction to Bouchard employees to conduct steel gauging only during the presence of the U.S. Coast Guard and ABS, Bouchard employees continued to conduct UT gauging without the U.S. Coast Guard present.

4.5.4.2. U.S. Coast Guard marine inspectors testified, although they provided B. NO. 295 representatives' clear instructions for UT gauging in specific locations with steel wastage, the Bouchard employee conducted UT gauging in locations not identified by the U.S. Coast Guard.

4.5.4.3. U.S. Coast Guard marine inspectors testified B. NO. 295 representatives erased steel replacement identification marks made by the U.S. Coast Guard marine inspector intended to indicate specific areas of wasted steel requiring replacement. Shipyard workers reported to the U.S. Coast Guard marine inspector Bouchard's vessel representative and Maintenance and Repair Manager erased the U.S. Coast Guard marine inspector's marks from the steel.

4.5.5. On February 13, 2017, ABS issued non-conformity 264 to B. NO. 255 for failure to keep records aboard for required entries documenting crewmember entry into restricted spaces. The root cause was "determined to be a lack of training and attention to record keeping requirements." Bouchard issued the following preventative measure to ABS:

VP of Safety and Vetting followed up with the vessel and requested to see a copy of the latest record book entry to ensure the proper action was taken. Upon reviewing the entry dated 2/14/2017 it appears that the crew has a full understanding of the proper procedure and company policy regarding restricted access space entry.⁸⁰

4.5.5.1. A review of the logbook by the U.S. Coast Guard for that day did not show any training, understanding of company policy, or any entry into any restricted space following proper procedures. In fact, the only entry for the logbook that day states that the tug and barge were at anchorage. Further, the logbook contained no entries for restricted space entrance of any restricted spaces for the barge or towing vessel on February 14, 2017. From January 1, 2016, to October 20, 2017, the only restricted space entries in B. NO. 255's logbook was on April 28, 2017, and June 20, 2017, for crewmember entry into the stern space.⁸¹

4.5.6. Bouchard tasked an internal ISM auditor with ensuring vessel crews were knowledgeable about gas meters as part of the internal audit checklists.

4.5.6.1. The auditor testified that he did not have any documented training on the gas detection systems or how to calibrate one.⁸²

⁸⁰ ABS Report Number CX3297117

⁸¹ B. NO. 255 Log Book Entries.

⁸² Formal Hrg. Transcr. [REDACTED]

4.6. Bouchard's Safety Management System and Manual

4.6.1. Bouchard's Voluntary Safety Management Certificate (SMC) is dependent on successful implementation of the company's Safety Management Manual (SMM) which establishes procedures for maintaining material condition of their fleet of vessels, including B. NO. 255. Sections of Bouchard's SMM relevant to the U.S. Coast Guard's investigation are included below.

4.6.2. On July 24, 2017, ABS conducted an ISM audit. An observation was made regarding vacant Bouchard management positions. The auditor stated although this is not a non-conformity, the absence of essential personnel could lead to a non-conformity. When asked why unfilled positions may lead to a non-conformity, he stated:

Well, they have certain job descriptions. Just like any organization, they have a job description and that particular job has responsibilities, and part of my audit process is to look at the organizational chart, look at the job descriptions for the individuals, do those individuals impact the safe management of a vessel, do they have to make decisions on maintenance, whether it gets completed, funding, whatever the case may be.⁸³

4.6.2.1. Testimony indicated that at one point there was only one person working in purchasing for a fleet of 27 vessels making it impossible to keep up with orders⁸⁴ and only one person in the company could authorize repairs for the entire fleet.⁸⁵

4.6.3. Job Hazard Analysis (JHA): Section 1.6, states the JHA is a tool used to reduce hazards and potential for accidental loss in the workplace. JHAs include a pre-job review involving defining tasks, identifying the hazards associated with each task, and creating a safe working procedure to eliminate or mitigate related hazards to a tolerable level.

4.6.3.1. An internal audit conducted on April 29, 2017 contained an observation that JHAs were not completed in accordance with procedures.

4.6.3.2. No evidence was provided indicating a JHA was conducted prior to weighing anchor on October 20, 2017, although megger test results from February, March, and April of 2016 indicated insufficient insulation and substantial electrical system deficiencies on B. NO. 255. (See Finding 4.4.13.)

4.6.4. Safety Memos: Section 1.12, Part A1, states safety alerts and lessons learned may be communicated "via email to communicate significant issues to the fleet for prevention purposes."

4.6.4.1. On December 12, 2016, the Vice President of Safety and Vetting issued Safety Memo 12/2016, titled *Documentation Report*. The memo prohibited the sharing of any Captain's Relieving Report or Vessel Status Reports with SIRE inspectors.

⁸³ Formal Hrg. Transcr. [REDACTED]

⁸⁴ Formal Hrg. Transcr. [REDACTED]

⁸⁵ Formal Hrg. Transcr. [REDACTED]

4.6.4.2. Safety Memo 12/2017, titled *Incident/Accident/Injury Reporting and Notification* was issued to Bouchard employees on an unknown date in 2017. The memo directed employees to report all issues internally and the vessel will not make notifications to any other persons or agencies unless instructed to do so by a member of the BTC ERT.

4.6.5. Captain's Relieving Reports and Vessel Status Reports: Section 2.1., states "conditions or materials deemed unsatisfactory must be so noted and explained in the Captain's Relieving Report." These reports are considered "comprehensive" in identifying a vessel's activities and conditions and are used by vessel crews to notify the company of needed repairs.

4.6.5.1 During crew relief, each barge captain reviews these reports thoroughly together before the crew change is completed and the off-going captain departs the vessel.

4.6.5.1.1. No evidence was provided indicating the relief process during the crew change aboard B. NO. 255 on October 11, 2017 included a joint review of any Captain's Relieving Reports or Vessel Status Reports. According to testimony, the off-going barge captain indicated that while he did not conduct a vessel familiarization with the on-coming barge captain despite procedures requiring it, he spent about one and a half hours going over the barge.⁸⁶ Testimony from a BUSTER BOUCHARD crewmember refuted that claim and indicated the relief process reportedly took no longer than 15 minutes.⁸⁷ (See Finding 4.1.2)

4.6.5.2. Testimony regarding these reports indicated that items that were considered major or negative were not always captured on these reports as personnel were afraid to lose their job⁸⁸ or told to not include them.⁸⁹

4.6.5.3. An internal audit on April 29, 2017⁹⁰, included an observation that these reports were not completed consistently.

4.6.6. Fleet Management Software: Section 1.6, states the software is used to effectively plan, schedule and manage compliance, operations and maintenance tasks. It is the primary maintenance and record tool used by Bouchard and is covered in the Bouchard SMM Section 9.2. Overall, the FMS is used to schedule and track planned maintenance, place and track supply orders, and notifies of upcoming inspections and repairs.

4.6.6.1. The crew of B. NO. 255 appeared familiar with entering requests into the FMS system. A data printout from the FMS and other records showed numerous requests for supply items, parts, and repairs.

⁸⁶ Formal Hrg. Transcr. [REDACTED]

⁸⁷ Formal Hrg. Transcr. [REDACTED]

⁸⁸ Formal Hrg. Transcr. [REDACTED]

⁸⁹ Formal Hrg. Transcr. [REDACTED]

⁹⁰ Bouchard Internal ISM Audit and Internal Checklist, dated April 29, 2017

4.6.6.1.1. Testimony indicated that requisition requests for vessel equipment were fulfilled very slowly. Also, many calls and emails had to be made to produce any action. At one point a vessel was using money intended to buy groceries to purchase batteries and other crew protective equipment that was needed.⁹¹

4.6.6.1.2. The vessel supervisor for B. NO. 255 emailed the Maintenance and Repair Manager on April 4, 2017 stating the “crew has numerous purchase requests submitted. Many since last year.”⁹²

4.6.6.2. Management, including vessel supervisors, have direct oversight of the FMS system on each vessel and can log in remotely to monitor progress of each vessel’s various requests and activities.

4.6.6.2.1. Testimony from one vessel supervisor indicated he was not familiar with the company’s preventative maintenance program and had never used the FMS.⁹³

4.6.6.2.2. Testimony from the VP of Regulatory Compliance indicated that Bouchard was responsive in getting repairs done and stated, “As far as I know, a lot of the high priority things, especially if it came – you know, if it was a[n] 835 item or it was a high priority, they would get it done, you know? They would get it done.”⁹⁴

4.6.6.2.3. Testimony from vessel supervisors indicated that daily recommendations for vessel repairs were often put off until a dry dock or when there was time in between commercial movements. Even when in a scheduled dry dock the vessel did not always receive the needed repairs⁹⁵ or temporary repairs were made in place of permanent repairs and the vessel would depart.⁹⁶

4.6.6.2.4. A U.S. Coast Guard marine inspector recalled hearing various Bouchard employees including vessel supervisors mention they would be fired if too many call outs were made on the vessels in the shipyard.⁹⁷

5. Analysis

5.1. Safety Management System Failures

Serious, longstanding, unreported and non-compliant material and safety equipment deficiencies and hazardous conditions noted throughout this report indicate Bouchard failed to implement an effective SMS and ensure B. NO. 255’s conformance with its COI, issued by the U.S. Coast Guard, and its SMC, issued by ABS.

⁹¹ Formal Hrg. Transcr. [REDACTED]

⁹² Email from [REDACTED] to [REDACTED] dated April 4, 2017.

⁹³ Formal Hrg. Transcr. [REDACTED]

⁹⁴ Formal Hrg. Transcr. [REDACTED]

⁹⁵ Formal Hrg. Transcr. [REDACTED]

⁹⁶ Formal Hrg. Transcr. [REDACTED]

⁹⁷ Formal Hrg. Transcr. [REDACTED]

A Concentrated Inspection Campaign discussed in Section 7 of this report revealed Bouchard's failure to implement its SMS not only impacted the safety of B. NO. 255, but over 90% of tank barges in Bouchard's fleet. The results of those inspections and testimony can be viewed in Appendix 1.

5.1.1. Bouchard failed to implement an effective maintenance and inspection program.

The SMM addresses maintenance and repair with the use of the FMS which was designed to manage compliance, operations, and maintenance tasks. The Captain's relieving reports were another measure used to comprehensively communicate the material condition and repair needs of a vessel to the company for completion. However, Bouchard did not ensure maintenance or repairs were completed or ensure specialized equipment was available for maintenance tasks requiring safety equipment. Rather, Bouchard used ABS and the U.S. Coast Guard to identify needed repairs instead of conducting their own internal inspections at appropriate intervals, taking action on received reports, or simply completing repairs that were started. If and when repairs were conducted the company failed to report these repairs to the regulatory authorities for proper oversight as required by 46 CFR § 2.01-15(a) (4).

The transverse bulkhead separating the forepeak from the No. 1 port cargo tank was cracked and holed prior to the explosion. Bouchard failed to identify, report or correct the wasted transverse bulkhead. Even after facility personnel reported the presence of vapors on B. NO. 255's deck, Bouchard failed to identify the deficiency which ultimately permitted the free communication of combustible vapors between the No. 1 port cargo tank and the forepeak.

Multiple cargo tank ullage tubes and cargo tank hatches, including the No. 1 starboard cargo tank hatch and ullage tube were wasted and holed prior to the explosion. Bouchard's failure to repair the wasted steel permitted the free communication of combustible vapors between the No. 1 starboard cargo tank and the deck. Further, although Bouchard was made aware of these severely deficient items through reports made by marine inspectors, surveyors, and other industry representatives, the company failed to implement maintenance and repair measures designed to maintain the material condition of B. NO. 255 and other tank barges in its fleet.

Multiple sections of armored electrical conduit located on the deck were wasted prior to the explosion. Bouchard failed to identify the wastage and repair the electrical system, and when energized the wasted armored electrical conduit was capable of creating an electric arc and may have been the source of ignition causing the vapors to explode on B. NO. 255.

Beginning in 2016, Bouchard conducted extensive repairs to the barge's electrical system without proper oversight. The U.S. Coast Guard was neither notified of these repairs involving the safety of electrical machinery, nor were these repairs approved by the U.S. Coast Guard. Repairs to the electrical system included removal and replacement of hundreds of feet of electrical conduit transiting the barge's hazardous zones; replacement of wasted conduit for the No. 2 cargo tank pump house; and replacement of rotten conduit for the anchor windlass located in the forepeak.

When Bouchard's internal inspection program did identify issues, as was the case in May 2017 at Caddell Shipyard, repairs were made to critical safety equipment, including replacement of a ballast tank valve, replacement of boiler fuel lines and replacement of two cargo tank hatch coamings. However, the U.S. Coast Guard was neither notified of these repairs, nor were these repairs approved by the U.S. Coast Guard.

At multiple levels of Bouchard's organization, unresolved reports including Captain's Relieving Reports and Vessel Status Reports completed by B. NO. 255's barge captain, and emails of equipment and material condition deficiencies completed by B. NO. 255's tankermen, although correctly submitted up the Bouchard chain of command in accordance with the company's SMM, failed to correct known material deficiencies and hazardous conditions. In fact, testimony revealed employees stopped submitting these reports because no action was being taken by the company to resolve the deficiencies.

Testimony revealed Bouchard failed to repair or replace deficient equipment. Vessels were often required by the company to leave shipyards without completing critical repairs in order to accommodate the movement of cargo. Additionally, temporary repairs were often used in lieu of permanent repairs.

Bouchard failed to conduct maintenance or repair inspections without prompting from ABS or the U.S. Coast Guard. For example, B. NO. 255's electrical system received poor megger test results which indicated insufficient electrical insulation throughout the system. Bouchard, however, failed to implement an internal maintenance and repair schedule allowing the electrical system to continue to degrade.

The anchor windlass system was also neglected. Testimony revealed, on a frequent basis, too much strain was placed on the winch causing it to trip a breaker. A constant resetting of a breaker generally indicates resistance damage to the wiring as well as an electrical short in the system. Tripping the breaker too many times can cause the breaker itself to fail as well as an inability to be reset.

Bouchard failed to implement use of its Fleet Management Software (FMS) system. Testimony revealed vessel supervisors responsible for maintenance and repair of Bouchard vessels were unfamiliar with the system and unable to actively monitor the internal reports made by vessel crews to repair safety equipment. As such, deficient equipment was not being repaired. A senior barge captain, for example, admitted he conducted maintenance on the anchor windlass, yet the maintenance items listed in the FMS system were for a hydraulically powered windlass motor, although the motor on board B. NO. 255 was electric. Another example includes the cargo tank valves which, according to the FMS system, are required to be packed on a monthly basis. However, the senior barge captain revealed he only replaced valve packing twice between January 2016, and the incident.

5.1.2. The company failed to adequately identify potential emergency shipboard situations and procedures to respond to them.

Gas detection equipment is not identified by the company as critical equipment. Critical equipment is defined by Bouchard as "any vessel-based operating system or alarm that, were it to fail, would result in the crew or the vessel being placed at risk or that could lead to an accident."

Gas detection is critical to crewmembers when testing for explosive and toxic atmospheres. Bouchard failed to provide gas detection equipment with proper calibration gas capable of testing the spaces containing hazardous and combustible cargo. Further, this investigation revealed the gas detection hose length was too short and incapable of conducting tests in B. NO. 255's voids.

Bouchard determined B. NO. 255's forepeak a restricted area and required a JHA be used before entering the space. An internal audit revealed that JHAs were not being used. While weighing anchor immediately before the explosion, the door to the dog house, located on deck, was opened to accommodate the tankerman's use of the anchor windlass motor control box which was connected to the electric motor of the anchor windless located in the forepeak via an umbilical cord. This should be considered entry into the restricted space. It wasn't being logged and Bouchard blatantly lied to ABS regarding these entries. Because vapor migrated from the No. 1 port cargo tank into the forepeak via the wasted transverse bulkhead, the open dog house door allowed free communication of combustible vapors from the forepeak onto the barge's deck.

The anchor windlass was installed in the chain locker located in the forepeak. The anchor windlass motor was not manufactured intrinsically safe nor was it required to be. However, the manual for this gear unit on this equipment advised the operator to ensure the equipment wasn't started without first ensuring the space was vapor free. When energized, the operation of the equipment in the space was capable of creating an electric arc capable of igniting combustible vapor accumulated in the forepeak.

5.1.3. The company failed to investigate and analyze non-conformities, accidents, and hazardous situations with the objective of improving safety through the implementation of corrective action, including measures to prevent recurrence.

Even after the vapor leak was discovered on B. NO. 275, six months prior to B. NO. 255's explosion, Bouchard failed to investigate or notify the fleet of potential vapor leaks in void spaces or more importantly, issue corrective actions if vapor leaks were detected.

5.1.4. Bouchard failed to provide personnel adequate training on the company's SMS, nor did the company ensure SMS rules, regulations, codes, guidelines, and company policies were effectively implemented.

For example, Bouchard failed to ensure proper reliefs between crews were conducted. The oncoming barge captain was new to the B. NO. 255 which, according to the SMM, required the senior barge captain conduct a new crewmember vessel familiarization where all known deficiencies were to be discussed. The senior barge captain testified he did not conduct a vessel familiarization with the on-coming barge captain.

Bouchard failed to ensure the crew was trained in recognition of unsafe conditions. The senior barge captain testified he had a limited understanding of vapor leaks and their potential hazards.

5.1.5. The company failed to provide procedures for reporting non-conformities.

Our review of the SMM did not show any guidelines or procedures for reporting deficient conditions to the U.S. Coast Guard or ABS. The company does however have an internal policy forbidding the sharing of information related the vessel's material condition to anyone outside of the company. This is inconsistent with U.S. laws and regulations. 46 CFR § 4.05-1 requires marine casualties be reported and 33 CFR § 160.215 requires hazardous conditions be reported. Further, during inspections all licensed officers are required by 46 U.S.C. 3315 to assist the marine inspector and to point out all known defects and imperfections.

Bouchard has a history of failing to report hazardous conditions on the vessel to the Coast Guard. Beginning as early as 1991 and through the next 26 years, U.S. Coast Guard marine inspectors and ABS surveyors, conducting both scheduled inspections and unscheduled in-service inspections, discovered numerous egregious deficiencies which Bouchard failed to report to the U.S. Coast Guard.

The unreported deficiencies included extensively corroded transverse frames in the forepeak; severe wastage on the transverse bulkhead shared between the No. 1 port cargo tank and the forepeak; oil leaking through corroded welds on the transverse bulkhead from the No. 1 port and starboard cargo tanks into the forepeak; holes on the deck serving as the steel envelope to the No. 1 cargo tank; extensive wastage on multiple cargo tank hatches; and numerous sections of wasted armored electrical conduit.

Following a whistleblower's report of a vapor leak onboard B. NO. 275, U.S. Coast Guard marine inspectors conducted an in-service inspection during which the crew denied a vapor leak existed. Only after returning to the vessel the next day did crewmembers acknowledge a vapor leak existed. The U.S. Coast Guard marine inspector was then shown the location of the vapor leak in the aft peak void space.

Bouchard's failure to report these hazardous conditions and deficient equipment purposefully conceals the company's improper and unapproved repair procedures and keeps ABS and the U.S. Coast Guard unaware of the vessel's hazardous condition.⁹⁸

5.1.6. Bouchard employed deceptive practices and failed to implement a culture of safety.

Although U.S. Coast Guard marine inspectors provided explicit direction to Bouchard employees to conduct UT gauging on B. NO. 295 only with an attending U.S. Coast Guard marine inspector or ABS surveyor, shipyard personnel reported Bouchard employees conducted UT gauging without an attending U.S. Coast Guard marine inspector or ABS surveyor, Bouchard personnel conducted UT gauging in locations not identified by the U.S. Coast Guard marine inspector, and Bouchard personnel erased the U.S. Coast Guard marine inspector's marks on steel which indicated required locations for steel repair and/or replacement.

During a SIRE inspection onboard B. NO. 255, Bouchard employees withheld the three most recent megger test results from 2016 and submitted an old report from 2015. Submitting the old megger test results showed old data which indicated B. NO. 255's electrical system was sufficiently insulated. Further, Bouchard purposefully deceived the surveyor electing to not

⁹⁸ Inspection results for vessels are made public at cgmix.uscg.mil/PSIX/PSIXSearch.aspx

submit any of the three new reports which indicated B. NO. 255's electrical system was not sufficiently insulated and contained multiple system deficiencies.

5.2. Regulatory Enforcement Failures

5.2.1. On two occasions, U.S. Coast Guard marine inspectors failed to identify serious safety equipment and material condition deficiencies on B. NO. 255.

During two consecutive annual inspections, specifically May 9, 2016, and May 11, 2017, U.S. Coast Guard marine inspectors endorsed B. NO. 255's COI without issuing any deficiencies despite the fact the vessel was at a shipyard undergoing extensive repairs to the seriously deficient electrical system (2016), and extensive repairs to visible wastage on the No. 1 and 2 cargo pump valves (2017).

While Bouchard was ultimately responsible for ensuring B. NO. 255 conformed to safety regulations and restrictions prescribed by the COI and the SMC, the U.S. Coast Guard, along with ABS, conducted regulatory oversight of B. NO. 255 to ensure the barge was fit for service. The U.S. Coast Guard marine inspectors' failure to identify substandard safety equipment and material condition deficiencies allowed B. NO. 255 to sail at increased risk to crewmembers and the maritime environment.

5.2.2. On multiple occasions, ABS surveyors failed to identify serious safety equipment and material condition deficiencies on B. NO. 255.

According to evidence collected during this investigation, ABS's last internal inspection of the forepeak occurred on January 29, 2015. As such, no ABS surveyor entered the forepeak to inspect the transverse bulkhead for nearly 2 years, 9 months, despite longstanding equipment and material condition deficiencies on B. NO. 255. It is important to note, the forepeak was not made accessible to ABS surveyors by Bouchard employees during an annual inspection on February 7, 2016 although they should have required access to this space especially since the condition of the coating in this area had been downgraded.

On June 28, 2016, an ABS surveyor cleared numerous outstanding electrical conduit deficiencies noting none of the deficiencies observed during the survey indicated failures with B. NO. 255's SMS. However, over the next three months, invoices submitted to Bouchard from Blue Water Electric reported completion of these same deficiencies; specifically, removal and replacement of hundreds of feet of electrical conduit transiting the barge's hazardous zones; replacement of wasted conduit for the No. 2 cargo tank pump house; and replacement of rotten conduit for the anchor windlass located in the forepeak. This suggests the surveyor cleared the deficiencies before they were actually completed and likely did not provide the required oversight to the repairs being made.

On February 13, 2017, an ABS surveyor closed a non-conformity issued three years before against the inoperable fixed and portable gas detection equipment. However, six months later, on September 3, 2017, B. NO. 255's crew submitted an internal safety checklist indicating the fixed gas detection system was inoperable. Further, on October 22, 2017, nine days before the explosion, B. NO. 255's barge captain submitted a Captain's Relieving Report indicating the fixed gas detection system was inoperable. This non-conformity should have been identified by

ABS as a major non-conformity, as this failure of the gas detection system posed an immediate serious threat to life and property, considering the vessel carried explosive and combustible cargoes.

During an annual survey conducted on May 2, 2017, an ABS surveyor issued the survey report without issuing any deficiencies. However, eight days prior to the survey, a Captain's Relieving Report was submitted by the barge captain indicating an inoperable ballast valve, hydraulic leaks on a winch motor and deteriorated steel on No.'s 1 and 2 cargo pump valves. Further, 23 days after the ABS survey, Bouchard began extensive repairs to B. NO. 255 while in dry dock at Caddell Drydock and Repair Co. These repairs were made to critical safety equipment including replacement of a ballast tank valve, replacement of boiler fuel lines and replacement of two cargo tank hatch coamings.

While Bouchard was ultimately responsible for ensuring B. NO. 255 conformed to safety regulations and restrictions prescribed by the COI and the SMC, ABS, along with the U.S. Coast Guard, conducted regulatory enforcement of B. NO. 255 to ensure the barge was fit for service. The surveyors' failure to identify substandard safety equipment and material condition deficiencies allowed B. NO. 255 to sail with combustible cargo at increased risk to crewmembers and the maritime environment.

6. Conclusions

6.1. Determination of Cause:

6.1.1. In accordance with Marine Safety Manual, Volume V, the initiating event (or first unwanted outcome) for this casualty was the material failure of B. NO. 255's transverse bulkhead, which separated the No. 1 port and starboard cargo tanks from the forepeak. Causal factors contributing to the failure of the transverse bulkhead were:

6.1.1.1. Bouchard failed to effectively implement its SMS, or ensure B. NO. 255 conformed to provisions of applicable U.S. and ISM Code regulations.

6.1.1.1.1. The NTSB's analysis and the analysis of the independent metallurgist concluded that cracks were present in the forward transverse bulkhead prior to the explosion.

6.1.1.2. The U.S. Coast Guard and ABS provided inadequate oversight of the repairs made to the transverse bulkhead in 2008.

6.1.1.2.1. The metallurgical analysis of the steel plate repaired in 2008 revealed the insert was compositionally different than the original bulkhead material used. Also, the steel bulkhead was not sufficiently cut back to good steel as evidenced by the use of multiple weld passes to overcome the large difference in thickness between the inserted plate and original plate. The dissimilar carbon content and thickness of materials led to increased stress on the bulkhead plate and accelerated stress-assisted corrosion.

6.1.2. Subsequent to the material failure of the transverse bulkhead, an explosion occurred. Causal factors contributing to the explosion were:

6.1.2.1. Bouchard failed to effectively implement its SMS, failed to investigate and analyze hazardous conditions occurring onboard their vessels, and failed to provide corrective action, including measures to prevent recurrence.

6.1.2.1.1. On September 9, 2016, the MTA at Sunoco Terminal shut down crude oil cargo loading after discovering an alarming level of vapors escaping from multiple corroded cargo tank hatches and ullage pipes. One month later, Bouchard submitted a letter to Valero indicating all valves were replaced. Bouchard was unable to provide evidence any valves were replaced. (*See Finding 4.4.19.-4.4.21.*)

6.1.2.1.2. Bouchard was aware of the severely deteriorated cargo tank hatches, valves, and ullage tubes allowing vapors to escape the cargo tank envelope in 2016. There is no evidence that the company investigated why this was occurring or took action to prevent its reoccurrence.

6.1.2.2. The SMS, as implemented, failed to provide crew instructions in the event of finding an accumulation of vapors in the forward bow rake and on deck.

6.1.2.2.1. Bouchard failed to include the detection and response to vapor leaks as part of their emergency checklist.

6.1.2.3. The SMS, as implemented, failed to ensure the crew was adequately preparing for tasks they were performing.

6.1.2.3.1. The opening of the dog house door on the bow of the barge to gain access to the forepeak where the motor controller umbilical cord was located allowed for vapors which had accumulated in the forward bow rake to migrate onto the deck just prior to weighing anchor.

6.1.2.3.2. The company identified the forepeak as a restricted area requiring a JHA. However, employees were not using JHAs, personal protective equipment, or logging crewmember entry into the forepeak as required by the SMS.

6.1.2.4. Bouchard provided vessel crewmembers improper equipment to test for explosive atmospheres.

6.1.2.4.1. Bouchard provided the crew with portable gas detection equipment determined by U.S. Coast Guard marine inspectors to be insufficient for testing and identifying explosive atmospheres in void spaces prior to entry and prior to starting electrical equipment in the void space.

6.1.2.4.2. There is no evidence that suggests crewmembers were using the gas detection meters to alert them to the presence of vapors while working on the barge.

6.1.2.5. The SMS, as implemented, failed to identify the electrical system was not maintained in accordance with regulated electrical standards.

6.1.2.5.1. Beginning in January of 2016, B. NO. 255 experienced ongoing electrical deficiencies including deteriorated conduit, transformer replacement, uncorrected ground faults, incorrect wiring and connections, breakers tripping due to overloads, and generators dropping phases. Megger testing required by ABS in February 2016 determined the electrical system was deficient.

6.1.3. The explosion ejected two crewmembers from the barge into the water. The body of one crewmember was later found; the other crewmember was not located and is presumed deceased.

6.1.3.1. The duration of time between ignition of the vapors and the explosion was practically instantaneous. The crewmembers did not have sufficient time to react and safely escape.

6.1.3.2. Despite immediate assistance by BUSTER BOUCHARD, Good Samaritan vessels and the U.S. Coast Guard, the force of the explosion created limited survival expectations for the crewmembers.

6.1.4. Subsequent to the death of two crewmembers, the vessel discharged oil into the Gulf of Mexico.

6.1.4.1. No expectation existed for the prevention of the discharge of oil into the waterway considering the cargo tank envelope was breached by the explosion.

6.2. Evidence of Act(s) or Violation(s) of Law by any U.S. Coast Guard Credentialed Mariner Subject to Action Under 46 USC 77.

6.2.1. On September 9, 2016, BUSTER BOUCHARD's captain failed to report the numerous vapor leaks on B. NO. 255 to the U.S. Coast Guard, a violation of 33 C.F.R. § 216 - Notice of Hazardous Conditions. This is considered a violation of law or regulation as defined in 46 C.F.R. §5.33 subjecting the captain to Suspension and Revocation proceedings.

6.3. Evidence of Act(s) or Violation(s) of Law by U.S. Coast Guard Personnel, or any other person:

6.3.1. U.S. Coast Guard marine inspectors did not identify safety equipment and material condition deficiencies and allowed B. NO. 255 sail at increased risk to crewmembers and the maritime environment.

6.3.2. ABS Surveyors did not identify safety equipment and material condition deficiencies and allowed B. NO. 255 sail at increased risk to crewmembers and the maritime environment.

6.4. Evidence of Act(s) Subject to Civil Penalty:

6.4.1. The discharge of oil into the Gulf of Mexico, a navigable waterway of the United States, represents a violation of 33 U.S.C. § 1321(B)(1) - The Federal Water Pollution Control Act. This unlawful violation subjects Bouchard to civil penalties.

6.4.2. The numerous unauthorized repairs affecting the safety of B. NO. 255 or its machinery without notifying the U.S. Coast Guard represents a violation of the requirements listed in 46 C.F.R. § 2.01-15 - Vessel Repairs. This unlawful violation by the owner subjects Bouchard to civil penalties.

6.5. Evidence of Criminal Act(s):

6.5.1. Every captain, engineer, pilot, or other person employed on a vessel, by whose misconduct, negligence, or inattention to his duties on such vessel the life of any person is destroyed, and every owner, charterer, inspector, or other public officer, whose fraud, neglect, connivance, misconduct, or violation of law represents a violation of 18 U.S.C.A. § 1115 - Misconduct or Neglect of Ship officers. There is evidence Bouchard's owner, the COO, the VP of Maintenance and Repair, as well as the senior barge captain neglected their duties. This violation subjects them to a criminal investigation.

6.5.2. Providing false testimony after taking an oath in a case in which a law of the United States authorizes an oath to be administered to testify truthfully represents an unlawful violation of 18 U.S.C.A. § 1621 - Perjury generally. There is evidence the senior barge captain on B. NO. 255 provided false testimony during the U.S. Coast Guard Formal Hearing. This violation subjects him to a criminal investigation.

6.5.3. Making any false writing or document knowing the same to contain any materially false, fictitious, or fraudulent statements or entry knowingly and willingly in any matter within the jurisdiction of the executive branch of the Government of the United States represents a violation of 18 U.S.C. § 1001 - Statements or entries generally. There is evidence the owner of B. NO. 255 and the technician that signed the Vapor Tightness Certificate issued on September 8, 2017, misrepresented the condition of the barge. This violation subjects them to a criminal investigation.

6.5.4. Sending or attempting to send a vessel of the United States to sea in an unseaworthy condition represents a violation of 46 U.S.C.A. § 10908 - Penalty for sending unseaworthy vessel to sea. Sending B. NO. 255 and B. NO. 275 to sea in a known unseaworthy condition on multiple occasions in 2016 and 2017 subjects Bouchard to criminal investigation.

6.5.5. The failure to report a hazardous condition immediately to the U.S. Coast Guard represents a violation of 33 C.F.R. § 216 - Notice of Hazardous Conditions. The owner, the VP of Safety and Vetting/COO, and the VP of Maintenance and Repair did not notify the U.S. Coast Guard of multiple hazardous conditions onboard B. NO. 255 and B. NO. 275 in 2016 and 2017. This violation subjects Bouchard and offending employees to criminal investigation.

6.6. Need for New or Amended U.S. Law or Regulation:

6.6.1. This marine casualty revealed the need to amend 46 CFR Subchapter D, Part 31, Subpart - 31.10-21(b). Section 8.1.4 of this report addresses specific recommended changes.

6.7. Unsafe Actions or Conditions that Were Not Causal Factors:

6.7.1. An irreconcilable conflict exists between what Bouchard's SMS dictates and the condition of the fleet. Bouchard voluntarily complies with ISM. Bouchard's SMM outlines procedures for employees to follow and describes methods to respond to safety incidents. The SMM includes nineteen separate employee positions and describes the duty and responsibilities for each. On paper, it seems to be comprehensive and an adequate system to address safety management issues, but the condition of barges in the company's fleet point to a systemic failure in proper implementation.

Evidence collected during the public hearing revealed numerous examples of safety management failures described in e-mail correspondence, Captain's Relieving Reports and Vessel Status Reports. Testimony at the hearing indicated policies and procedures in place to support the crew and fleet were inconsistent at best and simply non-existent at worst. Bouchard failed to utilize its own "stop work authority" even after self-identifying no-sail items on B. NO. 255. Furthermore, the company was notified of a vapor leak on B. NO. 275 on two separate documented occasions but failed to use its "stop work authority" for that hazardous condition.

6.7.2. Bouchard was given an unwarranted amount of time to correct serious safety deficiencies. During the conduit and wiring repair on B. NO. 255, ABS provided Bouchard over five months to correct the problem despite having a megger reading report that indicated serious defective wiring throughout the hazardous location zones on the barge. Moreover, the U.S. Coast Guard should have been notified of these serious deficiencies.

6.7.3. Bouchard corrective action reports are not conducted in accordance with the intent of the ISM Code. For example, the root cause analysis of the incident that occurred at Sunoco Terminal in September 2016 failed to conduct an investigation or analysis to determine the cause of the vapor leaks. Another example pertains to B. NO. 275: the U.S. Coast Guard has no evidence an investigation or analysis was completed to determine the cause of the vapor leaks or any steps taken to prevent a recurrence. While a fleet safety memo was issued instructing crews to conduct vapor leak checks in voids throughout the barge, no safety memos were issued regarding steel wastage in cargo tanks, the actual cause of the vapor leaks.

6.7.4. The most senior barge captain on B. NO. 255 testified under oath vapor escaping from cargo valves were not an explosion hazard because these vapors were released into the atmosphere. His failure to comprehend the hazards associated with the explosive conditions found onboard tank barges carrying flammable cargoes poorly reflects on Bouchard's safety training. Despite the excessive vapor leaks discovered on September 9, 2016, and the explosion onboard the barge killing two fellow crewmembers, the senior barge captain still fails to grasp the seriousness of vapor leaks onboard tank barges.

7. Actions Taken Since the Incident

7.1. Following reports from multiple U.S. Coast Guard Eighth District units of serious deficiencies onboard Bouchard tank barges, Commander, Eighth Coast Guard District initiated a Concentrated Inspection Campaign (CIC) directing units within the Eighth District inspect all Bouchard barges that entered their ports.⁹⁹ These inspections, conducted from October 20, 2017, to December 2018, included review and/or detection of fire and safety hazards, material condition, condition of electrical equipment, vapor tightness in void spaces and crew training in use of fire and safety equipment. Additionally, following numerous whistleblower reports regarding the unsafe conditions onboard Bouchard vessels, U.S. Coast Guard Districts One, Five and Seven joined the CIC.

This focused inspection program subjected 23 of the 25 operating barges in the Bouchard fleet to an in-service inspection and revealed:

- 22 of the 23 (96%) barges were issued deficiencies
- 251 deficiencies were discovered fleet-wide
- 11 of the 23 (48%) barges' deficiencies warranted a Coast Guard operational control

The deficiencies identified exposed wiring on electrical equipment rendering a component no longer intrinsically safe, lack of vapor tightness between cargo tanks and void spaces, inoperable equipment related to fire safety, excessive steel wastage and pitting, and safety management failures in confined space entry and fire safety. (See Figure 22)

Inspecting CG Districts	7,8	8	1,5,8	8	7,8	5,7,8	7	7,8	1,5,8	8	1,5,8	8	7,8	1	1	1	1	1	1	1	1	1,8	1	1		
Operational Control	245	272	220	285	240	215	295	265	242	275	205	230	270	233	210	260	231	250	282	264	262	284	235	225	280	
Build Date	1997	2016	1999	1987	1993	1999	1989	1979	2004	1981	2006	1993	2015	2008	1995	2008	2007	2012	2007	2010	2009	2009	1995	2003	2006	Totals
Electrical	3		1	3	Maj.	14	2	1	1		4	1						1				3	2		36	
Ground/Detection																		1		2		1	2			8
SMS		1	1	2	2	1					2		2													11
Fire Pres/Ext/Fighting	1	2		1		6					1			2				1		1						15
Inert Gas System	3																									3
Cargo piping, equip, Ballast	5	2			1	12	1	2	1		5				2								1	2		34
Water/Pumps/Piping	1	3			1	5									1											11
Class 1, Division 1 Boundaries	2	1	1	1	2	1								1	1		1						1			12
Vapor Tightness	1			1	1			2															1			6
Lifesaving	2		1		1	1			1						1									1		9
Load Line	1		1			1										1										4
Cargo Bulkhead Wastage						Maj.	Maj.	Maj.	Maj.														1			1
Other Steel Damage			1	Maj.	Maj.	Maj.	Maj.	Maj.	Maj.	1	1				1	4					2			1		11
Gas Detection Equip.	1			1						1																4
Cargo Pump	2			2		8		3			1															16
Generator/Leaks/Maint.	2	2	1	2	2	4			3					2										1		19
Misc.	9		3		3	13	3	2	2		4				2	2	2				1		2			51
	33	11	10	13	13	66	6	11	8		20	2	2	5	8	7	3	3	1	6	2	1	11	9	0	251

Figure 22: Table of deficiencies identified during CIC. Graphic provided by the U.S. Coast Guard.

Each deficiency is associated with equipment or material condition managed by Bouchard's SMC and/or each barge's International Load Line Certificate, issued by ABS on behalf of the Coast Guard. (See Appendix 1 for the full CIC results)

⁹⁹ U.S. Coast Guard internal e-mails, dated December 1, 2017.

7.2. On December 11, 2017, the U.S. Coast Guard office of Commercial Vessel Compliance (CG-CVC) issued a letter to Bouchard directing the company to schedule a Document of Compliance (DOC) verification audit to be completed by the Recognized Organization, ABS.

The letter noted, following the recent explosion on B. NO. 255 multiple deficiencies have been identified in the areas of electrical safety, vapor tightness, crew competency, and excessive pitting/wastage onboard several Bouchard Transportation Co. Inc. barges. This constitutes objective evidence the Bouchard Transportation Co. Inc. Safety Management System (SMS) may be inadequate or not effectively implemented.¹⁰⁰

On December 22, 2017, ABS conducted the DOC verification audit witnessed by U.S. Coast Guard personnel. Seven minor non-conformities and three observations were documented. However, none of the non-conformities or observations were associated with the issues identified in the CG-CVC letter or during the CIC.

On March 15, 2018, ABS completed the DOC verification audit where all of Bouchard's plans for correction of the non-conformities and observations were accepted and verified. ABS auditors stated in the report:

In addition to the above, two possible PR17 notices were recently (last two weeks) received by the Company. Records and interviews confirmed that all survey items that initiated the potential PR17 notice had been readily rectified; a final response to ABS management (sic) was in process, but not complete at the time of this audit.

No additional information for the two possible PR17 notices was provided.

7.3. On March 27, 2018, Commander, U.S. Coast Guard Atlantic Area initiated the Bouchard Barge Inspection Task Force to "perform a fast-track internal U.S. Coast Guard examination of vessel inspection related activities conducted by U.S. Coast Guard Marine Inspectors on the active Bouchard Barge fleet".

The Task Force made several specific observations regarding Bouchard's lack of adherence to regulations, use of intimidation tactics when dealing with U.S. Coast Guard personnel, and blatant deceit especially during shipyard periods. Moreover, the Task Force observed the reluctance of Bouchard's personnel to communicate to the U.S. Coast Guard known safety defects for fear of being fired.

8. Recommendations

8.1. Safety Recommendations

¹⁰⁰ Letter from CG-CVC to Bouchard Transportation Co. Inc., dated December 1 and 5, 2017.

8.1.1. Recommend Commandant revoke Bouchard's Document of Compliance (DOC) and institute annual external audits of the company's DOC for one five-year inspection schedule. This investigation revealed objective evidence indicating Bouchard failed to implement its SMS which also proved ineffective as evidenced by its failure to ensure B. NO. 255's safety at sea, failure to prevent human injury and loss of life, and failure to avoid damage to the environment.

8.1.2. Recommend Commandant require ABS conduct an internal quality review of its Quality Management System, including assessment of the effectiveness of ABS's organizational quality processes to verify vessels conform to applicable U.S. law and ISM Code requirements. This investigation revealed objective evidence indicating ABS failed to implement its Quality Management System which also proved ineffective as evidenced by ABS' failure to adequately perform applicable delegated functions under mandatory ISM Code requirements, including conducting insufficient SMS audits and issuing Safety Management Certificates without identifying, addressing and causing the repair of B. NO. 255's material and equipment deficiencies.

8.1.3. Recommend Commandant evaluate establishment of a marine inspections standardization team. U.S. Coast Guard Marine Inspectors failed to identify material and equipment deficiencies on B. NO. 255, nor did they hold Bouchard accountable for an ineffective SMS during routine inspection activities. U.S. Coast Guard Marine Inspectors undergo extensive scrutiny while conducting well-established qualification performance standards. Ample policy and guidance, including CG-Form-840 inspection booklets assist U.S. Coast Guard Marine Inspectors during inspection of each inspected vessel. Local unit training officers also ensure U.S. Marine Inspectors conduct inspections in order to meet the cognizant OCMI's intent to mitigate risks posed to the port. However, the U.S. Coast Guard does not perform standardization team evaluations on marine inspections although search and rescue and law enforcement programs do. Standardization Team evaluation of marine inspections will align OCMI mission performance with Commandant (CG-CVC) standards, promote adoption of best practices, provide critical evaluation of U.S. Coast Guard Marine Inspector proficiency and promote harmonization of inspection execution across the U.S. Coast Guard.

8.1.4. Recommend Commandant evaluate change to regulation 46 CFR 31.10-21(b) adding "vapor" into the text. Specifically, "(D)uring each inspection or reinspection for certification, all wing voids, rakes, cofferdams, and other void spaces on tank barges must be opened and checked from on-deck for the presence of water, cargo, or vapor indicating hull damage or cargo tank leakage." Continued, "(I)f water, cargo, or vapor is present, an internal structural examination may be required."

8.1.5. Recommend Commander, U.S. Coast Guard Eighth District, ensure each U.S. Coast Guard Eighth District Officer in Charge, Marine Inspection exercise full authorities on every Bouchard vessel calling or transiting their respective jurisdictional area of responsibility, including increased frequency of inspection, in-service examinations, expanded examinations and revocation of certificates, to ensure Bouchard vessels conform to applicable U.S. law and ISM Code requirements.

8.2. Administrative Recommendations

8.2.1. Recommend the Captain of the Port Corpus Christi recognize the captains and crews of SIGNET POLARISs and SIGNET CONSTELLATION for their actions and efforts to extinguish the fire onboard B. NO. 255 on October 20, 2017.

8.2.2. Recommend Commander, U.S. Coast Guard Eighth District, refer to the U.S. Department of Justice for Judicial Civil Penalty proceedings against the owner of the B. NO. 255 for: 1) the unlawful discharge of oil into the Gulf of Mexico, a United States navigable waterway; 2) making numerous unauthorized repairs to a U.S. Coast Guard inspected vessel.

8.2.3. Recommend Commander, U.S. Coast Guard Eighth District, refer this case to the U.S. Department of Justice for criminal investigation.

8.2.4. Recommend Commandant release this report in two parts. Release the Investigating Officer's report to the public at the conclusion of Commandant's review and approval; release the Commandant's Action on Recommendations to the public upon approval.

8.2.5. Recommend Commandant close this investigation.



GS-13, U.S. Coast Guard
Lead Investigating Officer

Enclosure: (1) Formal Marine Casualty Investigation Convening Order

Appendices: (1) Results of Eighth Coast Guard District initiated CiC
(2) Bouchard's Actions during the Investigation
(3) Other Issues Directly Related to ABS Oversight