NATIONAL TRANSPORTATION SAFETY BOARD

Office of Marine Safety

Washington, D.C., 20594

December 14, 2007

ENGINEERING OPERATIONS GROUP FACTUAL REPORT

DCA07MM015

A. ACCIDENT

Vessel:	M/V Empress of the North
Date:	May 14, 2007
Time:	About 0130 Alaskan Daylight Savings Time
Location:	58° 10.6' N, 135° 03.1'W
Owner/Operator:	Majestic America Line
Complement:	75 Crew, 206 Passengers

B. ENGINEERING OPERATIONS GROUP

Chairman: Brian Curtis, NTSB
Washington, DC

Lamberto Sazon, USCG
Juneau, AK

Randy Burns, Majestic America Line
Portland, OR

TABLE OF CONTENTS

SUMMARY OF EVENTS

On Monday, May 14, 2007 at approximately 0130[1] local time, the 360-foot passenger vessel *Empress of the North*, one of a fleet of 7 vessels operated by Majestic America Line, grounded on a charted rock as it negotiated a turn to the west out of Lynn Canal into Icy Strait, about 20 miles southwest of Juneau, Alaska. The vessel had departed the port of Skagway at approximately 1720 on May 13th, with 206 passengers and a crew of 75, southbound for Glacier Bay. As the vessel made its way south in Lynn Canal, it was progressing at its typical sea speed of 12 knots. The trip south was uneventful as it neared the area where the mate would navigate the *Empress of the North* westward into Icy Strait, on its way to its next scheduled destination of the 7 day cruise, Glacier Bay. As the mate navigated the vessel towards Icy Strait, the vessel

struck the charted, illuminated Rocky Island. The Coast Guard and several Good Samaritan vessels assisted in evacuating the passengers and non-essential crewmembers, and safely transporting them back to Juneau. No injuries resulted from the accident, but the vessel sustained significant damage to its starboard underside and propulsion system.

ACCIDENT ENGINEERING NARRATIVE

The *Empress of the North* arrived in the port of Skagway, Alaska, at 0710 the morning of May 13, 2007. It was a scheduled port stop on the 7-day cruise. The vessel spent the day in Skagway, and tested gear[2] at 1630, in preparation of leaving for their next stop, Glacier Bay, to the south. No problems were identified during the gear test, and the vessel got underway from Skagway at 1720. According to the vessel bridge logs, shortly after departing the dock, the vessel was making 11.7 knots at 890 revolutions per minute (RPM) on the 2 main propulsion drive motors. Once departing Skagway, the vessel sailed southward on its way to Glacier Bay, with the second engineer on watch in the engine room.

The area of the engine room containing the propulsion controls, power and auxiliary systems monitoring equipment, and communications equipment was referred to as the engineering operating station (EOS). It was in this area where engineering watchstanders would typically be located during their time on watch, when not making rounds of the engine spaces.

[1] All times are Alaskan Daylight Savings Time, on the 24-hour clock.

[2] A marine term used to describe the required testing of propulsion, communications, steering, and other critical systems prior to the vessel's departure from a port.

The first engineer reported to the engine room EOS at 2345 to assume the midnight to noon watch from the second engineer. Normally, he would be on watch from 0800 to 1600 each day. However, since a new third engineer had just reported aboard on May 13th, the first engineer was taking the night watch in order to allow the new engineer to have a proper orientation and familiarization period with the engineering plant before standing his own watch. The first engineer told investigators "the new third engineer was fresh out of school, and I didn't want him standing watch by himself."

Also on watch with the first engineer was an oiler, an unlicensed crewmember in the engineering department responsible for assisting the engineering watch officer during the watch. His responsibilities include making rounds, checking pressures and temperatures of the engineering plant's equipment, and reporting any anomalies to the watch engineer.

Having relieved the second engineer and assumed the watch, beginning at midnight the first engineer began a round of all the engineering spaces. During the round, the first engineer noted no concerns regarding the propulsion equipment or other engineering systems. He said that at the time, 3 of the 4 main generators were running, supplying power to the vessel's electrical bus, in turn supplying the power to the 2 propulsion drive motors. Both the chief engineer and first engineer, in interviews with the Safety Board, stated that the *Empress of the North* was experiencing no propulsion, steering, or any other engineering plant problems prior to the grounding. The master also stated in his interview with Safety Board staff that the vessel's machinery was operating "correctly" at the time of the grounding. The oiler on watch at the time of the accident further stated that he had been on watch since 1800, 7 ½ hours previous to the

grounding, and the engineering plant had been operating with all conditions normal- it was a "normal watch up to the grounding."

The engineering watch continued uneventfully until nearly 0130. The first engineer recalled them running at approximately 900 RPM on the main drive motors, a typical sea speed while underway between destinations. The propulsion controls had been transferred to the bridge before leaving Skagway and were still in bridge control at the time of the grounding. The bow thruster was not running. At the time of the grounding, both the first engineer and his oiler were standing in the EOS, discussing troubleshooting a blast chiller[3] that was not operating properly.

The vessel abruptly grounded at 0128.[4] The first engineer said at the time they grounded, from his location in the EOS he could hear a lot of "strange grounding, growling, nasty, vibration, like we had just run over an island." The noise persisted for what he estimated to be about 5 seconds as it continued along the entire vessel's length. Immediately after having grounding, the first engineer noticed the propulsion drives "went slack," stopping the propellers. It was later determined the wheelhouse personnel had intentionally brought the throttle controls to the stopped position after having grounded.

Immediately following the grounding, the first engineer noticed bilge level sensor alarms on the engine room alarm data logger going into alarm status, giving indication of the various

[3] A piece of refrigeration equipment used to rapidly cool hot food for sanitation requirements.
[4] Time derived from engine room alarm data logger.

spaces along the hull beginning to experience flooding from hull damage resulting from the grounding. In reviewing the engine room alarm logging device, investigators found the following spaces along the hull went into alarm status, indicating seawater incursion to those spaces, within the first 5 minutes of the vessel having grounded- the forepeak, or vessel's forward-most underwater space- the chain locker, immediately aft of the forepeak- and numbers 1, 2, and 3 void spaces, which as the name suggests, are empty spaces along the underwater skin of the ship further along the hull. Void number 4 would eventually also alarm as having a high water level. Unbeknownst to the engineering crew, the starboard fuel tank had also been breached, however that tank had been emptied of fuel only about one week previous to the grounding. Also immediately following the grounding, the first engineer noticed the starboard propulsion unit alarmed due to high armature volts, indicating to him that unit had been struck as well during the grounding.

Realizing the situation, the first engineer quickly called and woke the chief engineer via phone, informing him of the grounding. Having contacted the chief, he then sounded the "Engineers Assistance Needed" alarm, waking all engine room personnel, alerting them to report immediately to the EOS.

While waiting for personnel to arrive, the first engineer directed the oiler on his watch to go forward on the vessel and check for any indications of water incursion in the vessel internal spaces. He also started the ship's bow thruster, and passed control of it to the bridge, in the event they should need it to control the vessel following the grounding. The chief engineer arrived in the EOS quickly after being called and took command of the engineering space, their damage control efforts, and his personnel. Shortly after his arrival, the remainder of his staff arrived in

the EOS. The chief immediately began dispatching his personnel to assess damages and report back to the EOS. The 3 unlicensed personnel were sent out to identify sources of vessel water incursion and to shut all tank vents to prevent their discharging water into the vessel in the event that tanks had been breached. Knowing from the alarm data logger that voids 1 through 4 had been breached, the chief assigned his engineers to begin lining up pumping out these spaces. All available engine room pumps were used in their efforts. These pumps included the 2 bilge and ballast pumps, the 2 bilge pumps, and the vessel's fire pump, as it could be crossed over to be used to pump out the spaces as well. Additionally, portable pumps were used to pump out any accommodation spaces that may have been taking on water around the deck manhole seals due to the breached voids beneath being pressurized by the seawater. This occurred in several crew staterooms, but was being easily managed by the portable pumps.

Shortly after arriving in the EOS, the chief engineer contacted the bridge to inform them of which tanks had been identified as having taken on water, and the status of their actions. The phone was primarily used instead of the radios for these conversations to avoid interfering with communications of the deck officers in their responding to the emergency. He called the bridge periodically during his assessments with updates. He also kept them informed as to the degree of starboard list the ship had acquired following the grounding, which the chief estimated had increased to a maximum 8 degrees about 1 hour after the accident. After that period, as the crew got control of the flooding issues and were able to stabilize the ship over the next few hours, the list eased back toward even keel.

About 2 hours after the grounding, the first engineer shut down one of the three running generators due to the lack of a need for the additional power since the vessel was no longer underway. As mentioned before, the bow thruster had been started and its control passed to the bridge shortly after grounding for their use in positioning the vessel. The paddlewheel situated at the after end of the vessel was free-wheeling, and not being powered by its 1,000 horsepower motor prior to the grounding. This was a normal plant configuration to have it free-wheeling during transits due to the limited increase in speed it supplies relative to the fuel required to run it.

The chief engineer stated in his interview that throughout the entire time surrounding the accident, the vessel never lost power from the main generators for the lights or propulsion systems. He stated that although he knew that there was some degree of damage to the starboard propulsion unit, from the alarms they had received, it did not interfere with the vessel's power generation or auxiliary systems. At no time did they operate their emergency generator to provide power to the vessel's emergency lighting and control systems.

Their efforts in pumping the breached spaces, all the while monitoring the vessel's list for the bridge, continued even as the last of the passengers and non-essential crew were transferred off of the *Empress of the North* at approximately 0500. Once the passengers had been evacuated, and the vessel had received the Coast Guard's clearance to transit back to Auke Bay, Juneau, the engineering staff prepared for getting underway.

The vessel got underway for their transit back to Auke Bay at 0600, according to bridge log entries. Initially, upon leaving the accident site, the vessel was using both port and starboard propulsion drives to propel the vessel. At approximately 0715, after the engineering staff noted the starboard propulsion drive unit drawing less electrical current in comparison to the port unit, and further realizing that the starboard unit was on the same side as the vessel had run aground, it was taken out of service and shut down.

The Empress of the North arrived dockside in Auke Bay, Juneau, at 1030 that same morning.

ENGINEERING PERSONNEL INFORMATION

Engineering staff personnel

The engineering department officer staff was comprised of a chief engineer, one first engineer, one second engineer, and one third engineer. The vessel's Certificate of Inspection requires it carries one chief engineer and 2 assistant engineers. The first, second, and third engineers split the engine room watch standing duties. Typically, the third engineer stood the midnight to 0800 watch, the first engineer the 0800 to 1600 watch, and the second engineer the 1600 to midnight watch.

The third engineer had joined the vessel on May 13th in Skagway. This was his first shipboard employment since graduating from California Maritime Academy the month before. As the day of the grounding was only his second on the vessel, and he had not had time to become sufficiently familiar with the engineering plant to stand his own watch, the first engineer

was standing the midnight to 0800 watch the night of the grounding in his place. His first days on the ship were spent working 0600 to 1800 in the engine room with the other engineers, learning both watch standing procedures and the ship's maintenance systems and practices.

The engineering staff additionally had 3 unlicensed personnel, under the direct supervision of the first engineer. Their individual duties included standing one 8-hour watch each day. Outside of their watch hours, they would clean the engine spaces and assist the engineers in performing plant maintenance.

Chief Engineer

The chief engineer on the *Empress of the North*, 26 years old, held a USCG Second Assistant Engineer's license with Unlimited Horsepower endorsements for Steam, Motor, and Gas Turbine powerplants.

Upon graduation from the US Merchant Marine Academy in 2003, he worked 2 years on various merchant vessels, employed through a union, from the port of Houston. He started working for Majestic America Line in January of 2006, initially as a third engineer. He was promoted to the position of chief engineer on the *Empress of the North* in October of 2006. His typical daily work schedule is 0600 to 1800. His work/vacation schedule was 30 days on, followed by 30 days off of the vessel. He had been on nearly one month at the time of the grounding.

During routine post-accident review of officer licenses, staff looked further into clarifying whether the chief engineer's license was compliant for his position in that no where on his license was there any indication of there being a chief engineer's endorsement. On August 30th, staff contacted Coast Guard Headquarters in Washington, DC, Division of License Credentialing Program Policy, for their clarification in the matter. In their reply to the Safety Board, a member of their staff wrote:

"A person serving as the chief engineer on a vessel must hold an appropriate license as chief engineer or a license authorizing service as chief engineer. See 46 CFR 15.820. The actual chief engineer on the vessel held a license as 2nd Assistant Engineer unlimited with no other endorsements.

No regulations in 46 CFR Subchapter B authorizes a 2nd Assistant Engineer unlimited to serve as a chief engineer.

A 2nd Assistant Engineer unlimited will usually meet the sea service and other requirements to qualify as a Designated Duty Engineer (DDE) or as Chief Engineer (limited-near coastal). Either of those two licenses would meet the regulatory requirements for a chief engineer on the vessel in question. However, without the endorsement for one of those two licenses, a 2nd Assistant Engineer unlimited cannot serve as the chief engineer."

When contacted by staff as to why he felt the chief engineer was properly endorsed to sail as chief engineer on the vessel with the license he held, Majestic America Line's vice president of Technical Operations said that the company was basing the chief's being properly endorsed on the table found at 46 CFR 10.505, assuming that a lateral position on the table would qualify his being properly endorsed to sail as chief on the Empress. He said he was further basing his

position on his staff having contacted Sector Portland's Regional Licensing Exam center, and being told that, with the chief engineer's current license held, the chief's being qualified was "implied" by the table referenced above. He further said that the chief engineer's license qualifications were not questioned when he submitted them to the Coast Guard during his post-incident interview.

Seeking more clarification in the matter, staff contacted Coast Guard Sector Juneau on August 30th, whose position was that the chief should have had the additional endorsement cited above in order to be properly certificated to sail as chief engineer on the Empress of the North.

On August 31, 2007, the chief engineer applied for, and was issued that same day, the additional endorsement of "Designated Duty Engineer of steam, motor, or gas vessels of any horsepower limited to vessels of not more than 500 gross registered tons (Domestic tonnage) when operating beyond the boundary line".

First Engineer

The first engineer on the Empress of the North was 30 years old. He held a USCG license as "Chief Engineer (Limited- Near Coastal) of Motor or Gas Turbine Vessels of any Horsepower; Also, Second Assistant Engineer of Motor or Gas Turbine Vessels of any Horsepower; Also, Third Assistant Engineer of Steam Vessels of any Horsepower."

He graduated Maine Maritime Academy in 2003, and sailed various commercial maritime vessels until July 2005, at which time he began his employment for Majestic. He

began with the company as a third engineer, moving into the first engineer position in November of 2006.

His duties include management and oversight of the engineering personnel, assigning maintenance responsibilities, and arranging watch assignments, all under the supervision of the chief engineer.

His daily schedule called for him to stand the engine room watch from 0800 to 1600, and work 0600-0800 and 1600-1800 carrying out his other responsibilities.

VESSEL INFORMATION

General

The *Empress of the North* was built by Nichols Brothers Boat Builders in Freeland, Washington. Its design and look imitated that of a 19th century Mississippi paddle wheeler. Its keel was laid February 7, 2002, and it was delivered for service on August 7, 2003.

It is a welded steel vessel, listed at 299.3 feet on its Certificate of Inspection. With its paddlewheel at the stern, and it forward-reaching gangway allowing access to passengers at the bow, it measures a total of 360 feet.

The vessel is 296 gross registered tons, and has a breadth of 58.3 feet.

The *Empress of the North* has 4 decks with passenger accommodations, and was certificated to carry a maximum of 237 passengers and 90 crewmembers.

Propulsion and Associated Engineering Equipment

The Empress of the North's main and propulsion power was supplied by 4 main engines, directly coupled to 1,825 kilowatt generator sets. The model 3516B 16-cylinder diesel engines were manufactured by Caterpillar, Inc. Each of the engines was a 4-stroke, turbocharged, after-cooled, and developed 2450 horsepower at 1800 RPM.

The generator sets could be run independently, or in parallel (simultaneously) with each other, depending on the power load requirements at any given time on the vessel. In order to run the vessel at a normal sea speed and supply the vessel's remaining power needs, 3 engines were typically run at a time. These generators supplied power to a common switchboard, from which the power was distributed for consumption throughout the ship, as well as to the propulsion thruster drive motors.

The vessel was propelled by 2 Schottel-manufactured thrusters at the stern, one on each side of the vessel. Each of the thrusters had 2 propellers, which, by the twin propeller design, resulted in less noise being transmitted to the vessel above. Each of these thrusters was driven by a 2,000 horsepower General Electric (GE) direct current (DC) motor located within the vessel's engine room. The thrusters were capable of 360 degree directional thrust, affording the *Empress of the North*'s operator a high degree of maneuverability and speed control from its control stations in the engine room and wheelhouse.

Additionally propelling the vessel, a paddle wheel at the stern was driven by a 1,000 horsepower GE motor on the paddle wheel deck. Due to the relative speed benefit versus fuel consumption of the paddle wheel, it was commonly allowed to freewheel during the vessel transits, and not under its driving motor's power, as was the case at the time of the May 14th grounding.

At the forward end of the vessel, The *Empress of the North*'s bow thruster was powered by a 1,000 horsepower GE electric motor. The bow thruster unit was manufactured by Schottel, capable of 360 degree azimuthing thrust. It was of the water jet pump design.

WRECKAGE

The day following the grounding, May 15th, a preliminary dockside hull survey was conducted by divers in Juneau, and emergency repairs to seal the breached spaces were effected. A further damage assessment was undertaken May 24th in Ketchikan, Alaska, with the vessel in drydock at the Alaska Ship and Drydock shipyard. The following wreckage assessment is based on resultant findings from these surveys, as well as Majestic America Line's Temporary Repair Plan.

As a result of the grounding, the underwater hull's starboard side sustained significant damage to its steel plating and internal structural framing. The starboard propulsion thruster propeller blading was also damaged. All of the underwater damage was contained to the starboard side of the vessel.

The following details the damage to the underwater section of the hull, working from the bow towards the stern of the vessel. The vessel was comprised of 150 transverse frames, numbered starting with 0 at the bow. The damage to the vessel's underside is referenced along the length of the hull via frame number.

The vessel's stem, below the waterline just forward and above the point where the keel transitions upward toward the bow, sustained damage resulting in this section of the hull being

distorted and bent to the port side. Aside from being bent, the stem was also cracked open for a distance of several feet at in this same damaged area.

The starboard fuel tank, located between frames 37 and 53, also was breached during the grounding. This tank was empty of any fuel at the time of the grounding. The tank was split at the chine.[5] The split was intermittent from frame 40-53, about ½" wide, for a distance of approximately 30 feet.

Void 1 was situated aft of the starboard fuel tank along the ship's bottom skin, comprised of frames 53-73. It had been breached along its flat centerline keel plate, as well as at the chine at frame 73. Some vertical internal framing members were also "tripped", or bent back by the force of the grounding.

Void 2 was located on the vessel's bottom from frames 73 to 89. This space was holed by the same damage encountered by Void 1 at the chine at frame 73. This split ran for a distance of approximately 3 feet along the length of the hull, and was about 1 ½" wide. This damage at the chine at frame 73 had also buckled the internal bulkhead between Void 1 and 2, causing a loss of watertight integrity between the 2 spaces internal to the vessel. Void 2 also had tripped internal frames.

Void 3 ran along the hull's underside from frames 89 to 109. It was breached at the keel at frame 99. The crack was approximately 1 ½ feet long, and ½ inches wide. As with Voids 1 and 2, Void 3 also encountered internally tripped frames.

[5] The transitional section from the relatively flat underside of the vessel's hull to the upward vertical side plating along its exterior.

Void 4, from frames 109 to 113, had also taken on water following the grounding. This space had lost its watertight integrity due to the bulkhead between it and Void 3 having buckled at frame 109.

In addition to the above-mentioned damages, the underside of the hull had encountered numerous areas of damage by the vessel having dragged over the rock pile during the grounding. These areas include scraping of the steel, as well as areas of the hull having been "set in" by the steel being pressed inward from its normal position by the action of the vessel hitting the rocks during the grounding.

The starboard propulsion thruster's center was located at frame 145 at the vessels after end. It sustained extensive damage to both propellers on the thruster. As a result of the damage, both propellers were damaged beyond repair, and were replaced.

The vessel left Juneau on May 20 for initial repairs in Ketchikan, Alaska, at Alaska Ship and Drydock. Once those initial repairs were complete, the *Empress* transited to Cascade General Shipyard in Portland, Oregon for final repair work, arriving there June 9th. The repairs were completed on June 27th, and the vessel returned to service in Alaska on July 7, 2007. A total of approximately 52.5 tons of steel was replaced in the course of repairing the vessel, and bringing it back into service.

VESSEL DAMAGE

The total estimated costs to repair damages to the hull and machinery incurred by the *Empress of the North* during the May 14, 2007 grounding, and return the vessel to service, are

approximately $4,756,000, according to company officials. Majestic America Line incurred an additional $ 3,409,000 in lost revenue while the ship was out of service for repairs.

SAFETY MANAGEMENT SYSTEM (SMS)

A safety management system is a structured, documented system developed to enhance the safe operation of vessels, prevent human injury or loss of life, and avoid damage to the environment. With a safety management system, ship owners and operators are encouraged to resolve safety problems before casualties or incidents occur ("self-regulate"), rather than simply comply with regulations imposed from outside, which usually means waiting for notification of defects before taking corrective action.

Background

International safety management standards were developed in the early 1990s in response to a number of serious marine casualties whose cause was identified as human error or management failure and that occurred despite improvements in engineering and technology designed to prevent them. One of the most serious was the March 1987 capsizing of the passenger/car ferry *Herald of Free Enterprise* off the Belgian coast, which killed 193 people. The investigating British justice described the ferry management's failures as "the disease of sloppiness."[6]

In the aftermath of that disaster, the International Maritime Organization (IMO), a specialized agency of the United Nations, began developing guidelines for safe ship management, focusing at first on roll-on, roll-off ferries such as the *Herald of Free Enterprise*. In

[6] Department of Transport (United Kingdom), *MV Herald of Free Enterprise*, Report of Court No. 8074—Formal Investigation, Hon. Mr. Justice Sheen, Wreck Commissioner (London: Her Majesty's Stationery Office, 1987).

May 1991, work began on what became the International Safety Management (ISM) code,[7] whose stated purpose is "to provide an international standard for the safe management and operation of ships and for pollution prevention." In 1993, the IMO decided to make the ISM code mandatory, and in May 1994, IMO members, including the United States, adopted the ISM code as chapter 9 of SOLAS. Chapter 9 of SOLAS went into force on July 1, 1998. On that date, the ISM code became mandatory for the following vessels on international voyages: passenger ships, high-speed craft (passenger and cargo) of 500 gross tons or more, tankers, and cargo carriers. For other cargo ships, the code came into force on July 1, 2002.

U.S. Regulations

The ISM code has the force of law in countries that are signatories to SOLAS. In October 1996, Congress revised 46 U.S.C. chapter 32 ("Management of Vessels") to incorporate the ISM code into the laws of the United States. In May 1997, the Coast Guard published a Notice of Proposed Rulemaking setting out Federal regulations for safety management systems for U.S. vessels "engaged on a foreign voyage."[8] The proposed regulations included standards that would allow companies to satisfy international certification requirements for safety management systems and also to seek voluntary certification of safety management systems for U.S. domestic vessels. On December 24, 1997, the Coast Guard issued final regulations for implementing the ISM code (33 CFR 96, "Rules for the Safe Operation of Vessels and Safety Management Systems"); the final rule became effective on January 23, 1998.

[7] The full name of the code is International Management Code for the Safe Operation of Ships and for Pollution Prevention.
[8] *Federal Register*, vol. 62, no. 84 (May 1, 1997), p. 23705.

Objectives

The objectives of a safety management system, as given in 33 CFR 96.230, are as follows:

(a) Provide for safe practices in vessel operation and a safe working environment onboard the type of vessel the system is developed for.

(b) Establish and implement safeguards against all identified risks.

(c) Establish and implement actions to continuously improve safety management skills of personnel ashore and aboard vessels, including preparation for emergencies related to both safety and environmental protection.

(d) Ensure compliance with mandatory rules and regulations.

Main Elements

A safety management system aims to create a "culture of safety" throughout an organization by documenting a vessel owner's operational policy, chain of authority, and operational and emergency procedures; specifying the responsibilities of the owner or operator, managers, and masters; and outlining procedures for management review, internal audits, and correction of nonconformities (failure to adhere to procedures or regulations). Procedures are compiled in a safety management manual and a copy is kept on board the vessel. A person or persons are designated in writing to monitor the safety management system, and managers conduct regular audits to ensure that employees follow the procedures. Checklists are supplied for critical areas.

When deficiencies are noted or an accident or a nonconformity occurs, corrective action is taken until the problem is resolved, and the problem is documented from start to finish.

Application

The Federal regulations for safety management systems apply to U.S. vessels "engaged on a foreign voyage" that carry more than 12 passengers or that are tankers, bulk freight vessels, or mobile offshore drilling units of 500 gross tons or more (33 CFR 96.210). The regulations do not apply to barges, recreational vessels not engaged in commercial service, fishing vessels, vessels operating only on the Great Lakes or its tributary and connecting waters, or public vessels.

Requirements

Operators whose vessels fall under the Federal regulations must prepare internal audit reports that demonstrate compliance with the ISM code (33 CFR 96 subpart B). They must also hold a valid Document of Compliance certificate and a Safety Management Certificate as evidence of compliance with the ISM code (33 CFR 96 subpart C). Organizations can be authorized by the Coast Guard to act on behalf of the United States to perform safety management audits and certification (33 CFR 96 subpart D).

A complete list of documents required for a safety management system under the Federal regulations is found at 33 CFR 96.250. Briefly, they include the following:

(e) Safety and environmental impact statements, which are to be carried out and kept current at all levels.

(f) Statements of responsibilities and authority.

(g) Designation in writing of a person or persons to monitor the safety management system.

(h) Written statements defining the master's responsibilities and authorities.

(i) Written statements that the master has overriding responsibility and authority to make vessel decisions.

(j) Personnel procedures and resources available on shore and on board ship.

(k) Vessel safety and pollution prevention operation plans and instructions for key shipboard operations.

(l) Emergency preparedness procedures.

(m) Reporting procedures on required actions.

(n) Vessel maintenance procedures.

(o) Safety management system document and data maintenance.

(p) Safety management system internal audits that verify the vessel's safety and pollution prevention activities.

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Audit Procedures

The ISM code requires companies to demonstrate how safety is managed on shore and on its vessels, through both internal and external audits. Internal audits allow companies to measure the effectiveness of their own systems. Companies prepare their own internal procedures for auditing their safety management systems, setting out the objectives, scope, and responsibilities involved. They develop an audit schedule that specifies which ships and office locations to audit and target dates for carrying out and completing the audits. Reporting lines are clearly defined and reports are distributed to all relevant personnel.[9]

External audits are performed at the request of the operating organization by an approved outside organization, usually a marine classification society, for a fee paid to the auditor by the requestor organization. The external auditor reviews the results of the operating organization's internal audits and all elements of its management system. The auditor questions management and vessel crews about their knowledge of the system, examines safety records, and verifies that procedures are followed. It may take an entire day to audit one vessel. If the audit is successful, a Safety Management Certificate is issued and the ship can continue operations. If critical areas have deficiencies, a vessel operator can lose its Document of Compliance. A loss of a company's DOC would invalidate their individual vessel Safety Management Certificates (SMC) for all vessels within their SMS.

MAJESTIC AMERICA LINE SMS

According to company managers, Majestic America Line operated with an SMS due to one of its vessels operating on an international route, the *Empress of the North*. On occasion, it would sail into international waters and make port calls in cities outside the U. S., such as Vancouver, British Columbia. Due to SOLAS requirements for international operations, the company was required to maintain a Safety Management System (SMS). According to the Majestic America Lines' senior vice president of operations, the company intended to modernize its SMS and voluntarily apply it to the entire fleet, eventually resulting in all of its vessels becoming SMS compliant. The American Bureau of Shipping (ABS) was the classification society responsible for oversight and issuance of all company and vessel documentation regarding their Safety Management System.

At the time of the grounding, as a requirement of its SMS, Majestic America Line had a Document of Compliance (DOC), issued by the America Bureau of Shipping (ABS) on July 5, 2005. In accordance with the ISM code, the DOC was to be endorsed during an annual verification process, within a 3 month period before or after the document's issue date. The only verification of the DOC, which was conducted by ABS, was completed on July 5, 2005.

Some days after the accident,[10] the company's compliance officer discovered that the *Empress of the North's* DOC was invalid due not to its expiration date, but rather to the document never having subjected to its required annual verification. By virtue of the company's DOC being invalid, the vessel's Safety Management Certificate (SMC) was therefore deemed invalid. It

[9] For further information, see *Guidelines on the Application of the IMO International Safety Management (ISM) Code*, 3rd ed. (London: International Chamber of Shipping and International Shipping Federation,

states on the vessel's SMC that to remain valid, the company's DOC must be valid. The company reported this discrepancy to USCG Sector Juneau and to ABS. An interim DOC was issued on May 30th 2007, after the company conducted an initial company and shipboard audit.[11]

About 2 weeks before the accident, Majestic America line hired a former passenger cruise vessel captain to serve as Director of Marine Compliance. As the senior vice president explained, this position was created as part of the company's efforts to upgrade its safety management system (SMS). Although the *Empress of the North* was the only company vessel required to comply with their SMS, the company intended to ultimately upgrade it and voluntarily apply it to all vessels in its fleet.

COAST GUARD OVERSIGHT

The U.S. Coast Guard, Sector Portland, conducted a required annual inspection to issue the vessel's Certificate of Inspection (COI). The inspection was completed, and the COI was reissued on February 17, 2007. Part of this inspection would have included the inspection of the vessel's critical documents, which would have included the company's DOC and the vessel's SMC. There was no indication of the inspectors having identified- a) DOC; or, b) the vessel's SMC- as having been invalid. In the Coast Guard's Activity Summary Report for the February

1996), pp. 34-51.
[10] The company did not record the date they made this discovery.
[11] The company must conduct and pass a final audit 6 months from the date of issuance of the DOC to obtain a new DOC and an SMS certificate for the vessel.

17th inspection, in the Inspection Results section, under Documentation, it simply noted that the vessel's documents had been inspected satisfactorily, with no outstanding deficiencies noted. 46 CFR 71.75-13 states that "all vessels to which 33 CFR pat 96 applies, on an international voyage must have a valid Safety Management Certificate and a copy of their company's Document of Compliance certificate on board."[12]

During the chief engineer's interview by U.S. Coast Guard investigators during the late afternoon following the grounding, his license information was recorded. The *Empress'* chief engineer held an unlimited horsepower Coast Guard license as second engineer of steam, motor, and gas turbine. Proper credentials to sail as chief engineer on the *Empress of the North* would have required an endorsement to his license.

COMPANY AND VESSEL SMS ISSUES

Tracking of ISM Documentation

The American Bureau of Shipping (ABS) served as the vessel's classification society. As such, Majestic America Line had access to their web-based program referred to as "Safenet". This program allows the operator an easy, convenient method of tracking several aspects of their operational management of their company. A component of the system allows the operator to track, on a real-time basis, the status of all mission-critical documents for their vessels, including the company Document of Compliance, as well the fleet vessel Safety Management Certificates. The company DOC and vessel SMC were found to be invalid at the time of the grounding.

[12] 33 CFR 96.210 states that this subpart applies "to all US vessels engaged on a foreign voyage that are…transporting more than 12 passengers…"

When asked, the company Designated Person[13] at the time of the accident, acknowledged having access to Safenet. He indicated, however, that he was checking it only sporadically, and that only the 5 year span for the issue and expiration dates for the DOC appeared in Safenet, and that it didn't identify the required annual verification dates.

In the company's Fleet SMS, it states that the captain is responsible to make sure that all "controlled" vessel documentation is up to date, and that he reports directly to the Designated Person Ashore. In the 10/27/06 Internal Audit Report of the Empress of the North, the audit report states that the vessel documentation is all up to date. In fact, by this point, the DOC was already out of compliance due to its being over 1 year and 3 months past the previous annual verification date.

Part A, Section 11.1 of the ISM code stipulates that the company should establish and maintain procedures to control all documents and data which are relevant to the SMS.

Emergency Response Checklists

Investigators identified emergency response checklists, located on the *Empress of the North* bridge, housed in a binder that was separated from the SMS. The captain used 2 emergency procedures checklists when responding to the grounding, a flooding checklist as well an abandon ship-underway checklist, both from the vessel's Emergency Response Checklists binder. Written emergency procedures are required by ISM code to be part of any safety management system.

[13] In regards to the International Safety Management Code (ISM): 33 CFR 96.120 (b) Designated person means a person or persons in writing designated by the company responsible person who monitors the

The Emergency Response Checklists binder was not mentioned in the vessel's safety management system, but was kept on the bridge and readily accessible. Copies of the completed checklists were provided to Safety Board investigators.

Use of vessel familiarization checklists

The third mate on watch at the time of the grounding had joined the vessel on Saturday, May 13th, 2 days previous to the grounding. The company SMS called for a familiarization checklist to be completed by new employees prior to sailing.[14] The SMS also cites 46 CFR 199.180 (b) 1 where it states that all crewmembers must be familiar with their assigned duties before the voyage begins. The third mate did not complete this familiarization checklist prior to sailing. Additionally, records could not be obtained indicating where this SMS requirement was being adhered to for all previous-joining crewmembers.

Vessel internal audits

In section 12 of the ISM code, the code states the company should carry out periodic internal safety audits to verify whether safety and pollution-prevention activities comply with the SMS. The code's only guidance as to how frequently these internal audits should be conducted is "periodically". The frequency is therefore left up to the individual company to establish in their respective SMS as they feel appropriate.

safety management system of the company and vessel.
[14] Fleet SMS Manual, Page 9.

In documentation supplied by Majestic America Line, 4 internal audits were identified as having been conducted on the *Empress of the North*. In its SMS, it calls for internal audits to be conducted at least on a semi-annual basis, either scheduled or unscheduled.[15] The Designated Person Ashore is listed as responsible for ensuring these audits are conducted, both onshore and on the vessel.[16] His duties further include responsibility for effective implementation and maintenance of the company's SMS.

Semi-annual internal audits were conducted in 2004, in May and November of that year. However, in 2005 the only audit listed occurred on September 25th. Also, 2006 listed only one internal audit, that being on October 27th.

POST ACCIDENT DEVELOPMENTS

On October 1, 2007, Sector Juneau Coast Guard's Officer In Charge Of Marine Inspections (OCMI) sent a correspondence to Majestic America Line's Senior Vice President of Operations. The letter detailed Sector Juneau's concerns of Majestic's "weaknesses" in several areas of their SMS. The letter further stated that if evidence of corrective actions to their SMS were not provided in writing by November 1, 2007, "I will not allow your vessel to operate in Southeast Alaska during the 2008 season until corrective actions are provided." A copy of this letter was also sent to the ABS, the classification society responsible for the oversight of their SMS.[17]

[15] Fleet SMS Manual, Page 35.
[16] Majestic America Line Marine Safety Manual, page 24.
[17] Docket item titled "10-7-07 CG Ltr. to MAL"

Majestic America Line responded to this letter on October 30, 2007. In their reply, Majestic indicated they "have been taking very strong and positive steps to improve the operation of the EMPRESS and our other vessels."

Majestic's reply states that they concur "that their Safety Management System should be more robust and more detailed", and further that the "Safety Management System had never been implemented fully, neither onboard nor in the office."

As corrective actions, Majestic goes on in their letter to detail:

- Company senior management strategies going forward in regards to timeframes to implement safety and environmental improvements to their system.
- Changes to personnel, and new positions created to improve their safety oversight of their vessels
- Vessel inspections and investigations undertaken to expose needs for further corrective actions
- Planning and coordination of projects to further enhance their capability to effectively and safely manage their fleet

Attached with this letter to the OCMI were details of proposed document changes and additions to Majestic's SMS to satisfy the Coast Guard's concerns as they related to their SMS.[18]

On November 5, 2007, Coast Guard Sector Juneau responded to Majestic America Line's proposal letter of October 30th. In an email, Sector Juneau responded that, although their

[18] Docket item titled "10-30-07 MAL Response Letter to USCG"

evaluation of the corrective action material is ongoing, "we believe you have satisfied the requirement of our October 1, 2007 correspondence."

In an email correspondence to Sector Juneau Coast Guard dated November 5, 2007, Majestic America Line has further asked that they meet with Sector Juneau responsible personnel at a future date to "elaborate on our new and revised SMS."[19]

That meeting between the company and Sector Juneau Coast Guard did not materialize. Rather, on December 3rd, 2007, Sector Juneau's Officer in Charge of Marine Inspections forwarded an email correspondence to the Senior Vice President of Marine Operations for Majestic America Line.[20] In it, the Coast Guard once again endorsed Majestic's efforts outlined in the company's letter dated October 30, 2007. The letter stated that he was "pleased to see that Majestic America Line has taken numerous tangible steps toward making vessel safety an integral part of the company's evolving corporate culture." Further, it said based on the information provided to the Coast Guard regarding the company's outline of their revised SMS, "I am confident that my concerns have been fully addressed."

The letter additionally detailed a plan whereby Sector Juneau Coast Guard inspectors will visit the *Empress of the North* when they arrive in May for the 2008 cruising season. At that time, they will assess the implementation of the revised SMS.

Brian Curtis

[19] CG 11-5-07 response to MAL ltr of 10-30-07
[20] Docket item titled "12-3-07 CG Ltr to MAL"

1 Engineering Group Chairman