

**NATIONAL TRANSPORTATION SAFETY BOARD**

Office of Marine Safety

Washington, D.C. 20594

**OPERATIONS GROUP FACTUAL REPORT**

**DCA 08 FM 002**

**A. ACCIDENT**

Vessel: *Axel Spirit*  
Date: November 3, 2007  
Time: 0142 EST (UTC -4)  
Location: 40° 27.0' N, 073° 48.0' W – Voyage from Cayo Arcas, Mexico to  
Perth Amboy, New Jersey  
Owner/Operator: Axel Spirit L.L.C/Teekay Shipping Limited  
Complement: 22 Crew Members

**B. DECK GROUP ONE**

Larry D. Bowling, NTSB Group Chairman  
Washington, DC

CWO James Pritchard, USCG  
New York, NY

Neil Davis, Teekay Shipping Limited  
Vancouver, British Columbia

**C. SUMMARY**

On Saturday, November 3, 2007 at approximately 0143 (EDT) the 819-foot, 62929 gross ton Bahamas-registered tank ship *Axel Spirit*, carrying a cargo of 441,000 barrels of Maya crude oil from the Petroleos Mexicanos (PeMex) marine oil complex in Cayo Arcas, Mexico to the Chevron facility in Perth Amboy, New Jersey, allided with Ambrose Light at the entrance to New York Harbor.

The vessel had departed Cayo Arcas in the Gulf of Campeche on October 27, 2007, headed northeast through the Straits of Florida and continued north along the United States east coast toward New York. Due to the vessel's arrival draft and draft constraints at the intended berth, the vessel's arrival at the Chevron facility was planned around the local high water periods which occurred at 1444 on November 2, with the following period of high water occurring at 0327 on

November 3, 2007.<sup>1</sup> Based on the unfavorable sea conditions in the later part of the voyage, the vessel's Estimated Time of Arrival (ETA) was pushed back from 1200 to 1700 on November 2, 2007. As such, the vessel's agent scheduled the pilot and assist tugs with the targeted arrival time at the facility to coincide with or near the high water period at 0327 on November 3, 2007. When the vessel arrived offshore on the afternoon of November 2, 2007, it proceeded to an anchorage position 3.9 nautical miles north east of Ambrose Light to standby, awaiting the anticipated pilot boarding time of 0200 on November 3, 2007. At 1436, the vessel was anchored. The master issued night orders instructing the watch officer on the bridge to monitor the radio and traffic, observe the vessels anchored position and to call the master at 2345 for the shift into Perth Amboy.

At 0000 on November 3, 2007, the bridge watch consisted of the master, the second officer and a helmsman. The vessel began hauling anchor to prepare for getting underway toward the pilot boarding area. The anchor was aweigh at 0042 and the vessel began to make way in a general direction toward Ambrose Light. After the vessel got under way, an able seaman who was serving on the anchor detail reported to the bridge and assumed the duties of lookout. The master had navigational control of the vessel giving courses and rudder orders to the helmsman and directed the propulsion of the vessel himself by using the engine order telegraph. The engine was set on bridge cControl mode.

The master's stated intention was to pass to the south of Ambrose Light and then turn to the west and north into the pilot boarding area to meet the pilot approximately 1 nautical mile west of Ambrose Light. The bearing to Ambrose Light was about 235 degrees true on the vessel's initial approach and the master ordered a course to the left of that, which he thought would allow the *Axel Spirit* to clear the structure. The master at times adjusted the speed of the vessel, mainly between dead slow ahead and stop in order to keep minimal steerageway on the vessel and to arrive at the pilot station at the scheduled time. The second officer on the bridge was plotting positions by taking radar ranges and bearings from Ambrose Light. The winds were reported to be 22-25 knots, gusting occasionally to 36 knots from the north to northeast with an estimated 1 knot current to the west. The vessel was making a speed of about 4-5 knots over ground.

At 0143 the *Axel Spirit* struck Ambrose Light, causing extensive damage to the tower structure and the rotating beacon. The vessel incurred damage to its sideshell and internals above the waterline and at the turn of the bilge on the starboard side. Various accounts of the incident from each of the bridge team members described the close encounter with Ambrose Light. Some felt a vibration and others stated they saw a very bright light. Just prior to contact, the master gave a left rudder order to maneuver the vessel away and then, when Ambrose Light was close alongside amidships to starboard, he gave a right rudder order to swing the stern away.

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<sup>1</sup> GAC-RUR Shipping e-mails to Teekay Shipping Limited dated October 28, 2007, 5:24 pm, and October 31, 2007, 1:14 pm.



Fig 1. Ambrose Light (Prior to Allision)<sup>2</sup>



Fig 2. Ambrose Light (Post Allision)<sup>3</sup>

Shortly thereafter, at approximately 0200, the Sandy Hook pilot boarded the *Axel Spirit* for the inbound transit via Sandy Hook Channel to Perth Amboy. The pilot boarded the vessel from the port side and therefore did not see any damage. The vessel made the inbound transit without further incident and was moored, port side to, at the Main Dock (also known as Berth #1) of the Chevron facility in Perth Amboy, New Jersey, at approximately 0600 November 3, 2007. The damage to Ambrose Light was estimated to be \$10 million and the cost of repairs completed on the *Axel Spirit* was approximately \$1.5 million. The Coast Guard ultimately decided to replace the Ambrose Light with a floating aid to navigation.

#### **D. DETAILS OF THE INVESTIGATION**

The Operations Group convened in Staten Island on November 5, 2007, at 0900. The group reviewed the vessel's Safety Management System, established a timeline of the incident, interviewed personnel and examined vessel records.

##### **1. Company History:**

Teekay Shipping Group was originally founded in 1973 by Torben Karlshoej in New York, New York. The strategy of the company at that time was to manage and operate a range of tankers not owned by the company, but rather chartered from independent ship owners.<sup>4</sup> In 1985, the company purchased its first tank ship, *Golden Gate Sun*, which began the company's transition into actual vessel ownership. In 1993, the Teekay Shipping Group restructured to Teekay Shipping Corporation (now Teekay Corporation) and began to broaden the scope of services provided to the oil and gas industry to include oil shipping, natural gas shipping, shuttle tanker service, oil storage, marine technical services and Floating Production Storage Offloading (FPSO) vessels.<sup>5</sup> Today, the company's corporate headquarters is located in Hamilton, Bermuda,

<sup>2</sup> Picture by Asbury Park Press, [www.app.com](http://www.app.com), date unknown.

<sup>3</sup> Picture by U. S. Coast Guard, Sector New York, November 4, 2007.

<sup>4</sup> International Directory of Company Histories, Volume 25, St. James Press, 1999

<sup>5</sup> The term Floating Production Storage Offloading, or FPSO, is commonly used to refer to a floating tank system used by the offshore oil and gas industry which is designed to receive oil or gas produced from a nearby well or

with the operational headquarters located in Vancouver, Canada. There are 17 branch offices around the world and the company owns, operates or manages a total fleet consisting of 192 vessels of different types and sizes.<sup>6</sup>

The *Axel Spirit* is operated by Teekay Shipping Limited with commercial management provided by Teekay Tanker Services and technical management furnished by Teekay Marine Services.



Fig 3. *Axel Spirit* at anchor<sup>7</sup>

The *Axel Spirit* is one of the company's 52 Aframax class oil tankers. The term Aframax is derived from the Average Freight Rate Assessment tanker rate system. Aframax class oil tankers are generally used for short haul trading and provide the charterer with extreme flexibility since the vessel can transit into most crude oil distribution ports, unlike the Very Large Crude Carriers (VLCCs) and Ultra Large Crude Carriers (ULCCs), which require much wider channels and deeper harbors.<sup>8</sup>

## 2. Safety Management System (SMS):

### 2.1. SMS General

The objectives of Chapter IX, *Management for the Safe Operation of Ships*, International Convention for Safety of Life at Sea (SOLAS) and the *International Safety Management (ISM) Code for the Safe Operation of Ships and for Pollution Prevention*, are to ensure safety at sea, prevent the occurrence of human injury or loss of life, and minimize the risk of environmental or property damage. The provisions of both SOLAS and ISM Code applied to the vessel *Axel Spirit* as an oil tanker over 500 gross tons engaged in international trade.<sup>9</sup>

The company operating the *Axel Spirit*, Teekay Shipping Limited has implemented a Safety Management System (SMS) that the company entitled Marine Operations Management System

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production platform, process and then store the product until it can be offloaded onto a tankship for shipment or transferred through a pipeline.

<sup>6</sup> Teekay Corporation website, [www.teekay.com](http://www.teekay.com).

<sup>7</sup> Teekay Corporation website, [www.teekay.com](http://www.teekay.com), fleet picture

<sup>8</sup> Wikimedia Foundation, Inc., Wikipedia

<sup>9</sup> Chapter IX, *Management for the Safe Operation of Ships*, International Convention for Safety of Life at Sea (SOLAS) 1974 as amended, Regulation 2.1.2.

(MOMS). MOMS is applicable to all of the company's shore side management offices and to all vessels in its fleet. It incorporates the relevant elements of four internationally established management systems standards – ISM (Safety Management), ISO 9001 (Quality Management), ISO 14001 (Environmental Management) and OHSAS 18001 (Occupational Health and Safety Management). This SMS defined roles and responsibilities of all personnel, provided safe practices in ship operation and navigation, and established safeguards against all identified risk. As specifically required by the ISM Code and outlined in the company's SMS, the Master was responsible for implementing the SMS on board, motivating the crew in the observation of that policy, verifying that applicable procedures and requirements were adhered to, periodically reviewing the SMS for areas of improvement and reporting all deficiencies to the Designated Person Ashore (DPA).<sup>10</sup>

Teekay Shipping Limited was issued a Document of Compliance (DOC) by Det Norske Veritas (DNV), acting on behalf of the Bahamas Maritime Authority (BMA), based upon the results of an audit of the company's SMS, which was completed on April 27, 2004. The issuance of a DOC to Teekay Shipping Limited certified the company was itself in compliance with the requirements of the ISM Code. At the time of the casualty, the DOC was valid and subsequent periodic verifications had been performed as required, with the most recent audit being completed by DNV on April 31, 2007, at the company's operational headquarters in Vancouver, Canada.<sup>11</sup>

The *Axel Spirit* was issued a Safety Management Certificate (SMC) by DNV on behalf of BMA, based upon the results of a shipboard audit of the SMS, which was completed on November 3, 2004. At the time of the casualty, the SMC was valid, with an intermediate verification having been successfully performed by DNV on December 19, 2006, and an internal company audit having been successfully performed on October 6, 2007. A valid SMC issued to the vessel by DNV certified that all key elements of the ISM Code were demonstrated to be in place and satisfactorily implemented on board, and that the Master and officers were familiar with the company's SMS.

Under United States law, both a valid vessel SMC and a copy of the company's valid DOC were required to be on board prior to the vessel's operation in waters subject to jurisdiction of the United States.<sup>12</sup> The original SMC and a copy of the DOC were on board and examined by NTSB investigators at the time of this incident. All of the vessel's officers had completed company training regarding SMS procedures, including safety and environmental practices, operational orientation, bridge familiarization and a general review of responsibilities pertinent to their respective position on board the *Axel Spirit*.

## **2.2. SMS Navigational Safety**

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<sup>10</sup> International Safety Management (ISM) Code, and revised guidelines on implementation of the ISM Code by Administrations, 2002 Edition, 5.1, and Teekay Shipping Limited, Organization & Roles (OR0016), *Master Responsibilities and Authorities*, Version 10.

<sup>11</sup> Chapter IX, *Management for the Safe Operation of Ships*, International Convention for Safety of Life at Sea (SOLAS) 1974 as amended, Regulation 3.

<sup>12</sup> Title 33 Code of Federal Regulations (CFR), Part 96, "Rules for the Safe Operation of Vessel and Safety Management Systems"

Per the company's general navigation procedure, the Second Officer had prepared a berth to berth passage plan on October 26, 2007, from the PeMex marine oil complex in Cayo Arcas, Mexico, to the Chevron facility at Perth Amboy, New Jersey.<sup>13</sup> The passage plan was signed and acknowledged that same date by all officers of the vessel's navigation team, including final approval by the master. The written passage plan identified 33 waypoints for the vessel's intended track line and provided the bridge navigation team with detailed navigational information for each waypoint. This navigational information included a latitude and longitude for each waypoint, course to steer from each waypoint, distance of travel for each segment of waypoint to waypoint transit, remaining distance to go from each waypoint, under keel clearance calculations, tide and current tables, as well as minimum intervals for obtaining a position fix by both the primary means of visual and radar, and the secondary means of Global Positioning System (GPS). According to the written passage plan and the associated paper navigational chart, the vessel was to proceed directly from waypoint #18 at sea to waypoint #19 located in the pilot area near Ambrose Light.<sup>14</sup> At that position, the vessel would embark a local pilot and continue passing through the predetermined waypoints to the final destination at the Chevron facility. However, due to the necessity to wait on high water at the Chevron facility, the Master diverted from the passage plan and proceeded to navigate the vessel to a position north east of the Ambrose light and anchored to await shifting into Perth Amboy the next morning.

According to the passage planning procedure found in the SMS, this diversion from the original and agreed upon waypoints identified in the passage plan required the Master to initiate a revision or amendment to the passage plan.<sup>15</sup> The SMS requirement to amend the passage plan when such deviations occur is also restated on the waypoint check list form within the actual passage plan created for the voyage from Cayo Arcas, Mexico to the Chevron facility at Perth Amboy, New Jersey. A special note on that form addresses the exact scenario, which occurred with the diversion of the *Axel Spirit*. The note states, "*closely monitor execution of the passage plan and amend it if any way points are changed (e.g. vessel proceeding to anchorage instead of picking up pilot)*".<sup>16</sup> No such amendment or revision to the passage plan was initiated by the master or completed by the second officer for either the transit from waypoint #18 to the anchorage area, or for the shift from the vessel's position at anchor to the Pilot Area. At some time after the allision, the Second Officer laid down on the vessel's chart the revised intended track line of the vessel for the segment of the voyage from the vessel's position at anchor to the Pilot Area (Shown by the blue line in Figure 4). He also generated an amended waypoint check list form, signed it and inserted the form into the original written passage plan. During an interview with the Second Officer, he stated the last discussion regarding the approved written passage plan and navigational chart occurred prior to the vessel's arrival from Mexico and that on the night of the incident, "*No, it was not discussed. There was no time to discuss.*"<sup>17</sup>

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<sup>13</sup> Teekay Shipping Limited, Policy (PL0018), *General Navigation Policy*, Version 6.

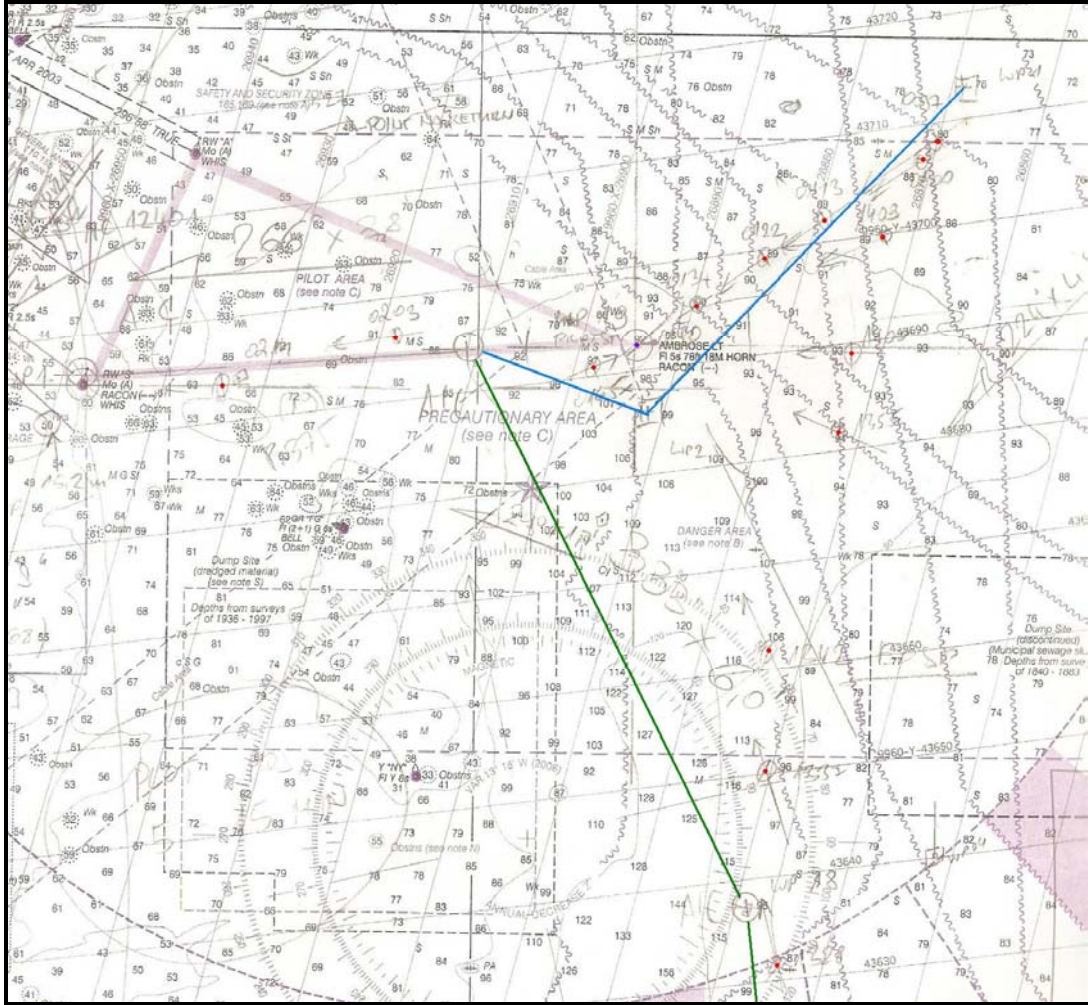
<sup>14</sup> National Oceanographic and Atmospheric Administration (NOAA) Chart 12326, 50<sup>th</sup> Edition, May 2006, from bridge of the *Axel Spirit*.

<sup>15</sup> Teekay Shipping Limited, Standard Operating Practices (SP0237), *Passage Planning Procedure*, Version 7.

<sup>16</sup> Teekay Shipping Limited, Waypoint Check List, *Passage Planning Form*, Version 2.

<sup>17</sup> NTSB Interview of Second Officer dated November 6, 2007.





**Fig 4. Extract of Navigational Chart 12326 from the *Axel Spirit* with color enhancement added. Intended track line per the vessel’s passage plan is overlaid in green, with waypoints #18 and #19 marked using small circle to intersect track line. The amended track line placed on the chart by the second officer after the vessel’s allision with the Ambrose Light is overlaid in blue. Actual position fixes taken by the second officer on the 1200 to 1600 watch on November 2, and on the 0000 to 0400 watch on November 3, have been identified on the chart extract using a red dot.**

**2.3. Bridge Resource Management (BRM)**

The company SMS contains a procedure “to guide the Master and bridge watchkeeping officers in the management of the bridge team,” which details expectations of the bridge team and the expected use of personnel and equipment during navigation which may reduce the potential for human error or omissions during operation.<sup>18</sup> This procedure reinforces the need for berth to berth passage planning, and also addresses effective use of electronic navigation aids,

<sup>18</sup> Teekay Shipping Limited, Standard Operating Practices (SP0412), *Bridge Resource Management (BRM) Procedure*, Version 3.

adequate briefing of the bridge team prior to getting underway, crew communications, watch keeping practices and the need for heightened situational awareness while on the bridge.

When the master arrived on bridge around 0000 hours, the second officer had the 0000 to 0400 navigation watch. The master began issuing verbal commands relative to heaving the vessel's anchor, actually using the engine order telegraph and directing the vessel's course to steer, without informing the bridge team he was taking control over the direction and speed of the vessel.<sup>19</sup> The company's BRM procedure and a separate *Bridge Watch Handover at Sea Procedure* both require a clear announcement to the bridge team members regarding who has navigational control of the vessel.<sup>20</sup> The master began adjusting engine rpm levels to arrive at the pilot station around 0200 and ordered a course of 230° with the intent to pass south of Ambrose Light, and then proceed in west on a course of 275° when the Ambrose Light was abeam of the vessel.<sup>21</sup> The master stated he did not relay his intentions to pass south of the Ambrose Light or provide a specific course to the second officer, but based upon communications captured on the VDR, he did relay his transit intentions to pass south of the Ambrose Light to the pilot vessel *New York* via VHF radio around 0110.

Time	Source	Communication
0110:52	Pilot Boat	<i>Axel Spirit</i> , pilot boat <i>New York</i>
0110:58	Master	Pilot Boat <i>New York</i>
0111:01	Pilot Boat	Good morning again sir. I just wanted to confirm, are you gonna pass north or south of the, ah, Ambrose Light Tower?
0111:16	Master	I'm heading south of the, ah, Ambrose

At 0113, the second officer using the vessels 10 cm radar recorded the vessel's position upon the paper navigation chart with the Ambrose Light bearing 235° at distance of 2.2 nm. At 0122, he recorded the vessel's position along the same bearing line of 235° to the Ambrose Light with the distance now reduced to 1.6 nm, and at 0134, he recorded the vessel's position at 0.7 nm from the Ambrose Light, still bearing 235°. In his interview with investigators, the second officer stated that he reported to the master the bearing and distance to Ambrose Light. In the VDR audio recording, the second officer is not heard communicating this information. Nor did the VDR record the master asking for the vessel's bearing and distance to Ambrose Light, only for the vessel's distance to the pilot boarding area.

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<sup>19</sup> NTSB Interview of master, *Axel Spirit* dated November 5, 2007.

<sup>20</sup> Teekay Shipping Limited, Procedure (SP0236), *Bridge Watch Handover at Sea Procedure*, Version 4.

<sup>21</sup> E-mail statement of master, *Axel Spirit*, to Teekay Shipping Limited shore side personnel dated November 3, 2008.





**Fig 5. Layout of the Navigation Bridge on board the *Axel Spirit*.**

#### **2.4. Voyage Data Recorder**

The *Axel Spirit* was outfitted with a Samsung Voyage Data Recorder (VDR) per the requirement found in SOLAS.<sup>22</sup> The most recent VDR Annual Performance Test was conducted by a representative of Compagnia Generale Telemar, Limited, of Rome, Italy on January 28, 2007, who issued documentation attesting to the completion of this performance test and stated the VDR was operational as defined in the manufacturer's specification.<sup>23</sup> To meet the intent of IMO guidelines on the ownership and recovery of VDR information, the company had implemented an SMS procedure to ensure the timely preservation of this data.<sup>24</sup> Specifically, the procedure required the Master to "*be aware of the functions of the VDR/S-VDR*", and to "*ensure recovery of information from VDR/S-VDR information is undertaken as soon as possible after any significant incident or accident.*"<sup>25</sup> After the incident, the Master took no such action to preserve the information on the VDR, nor did any other member of the vessel's navigation team. The action to secure and recover the information on the VDR was actually taken at 1300 by a member of the initial U.S. Coast Guard boarding team more than 11 hours after the incident when the vessel was boarded at the Chevron facility. The time stamp on the vessel's VDR was determined to be minus 3 minutes and 9 seconds from Coordinated Universal Time (UTC).

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<sup>22</sup> Chapter V, *Safety of Navigation*, International Convention for Safety of Life at Sea (SOLAS) 1974 as amended, Regulation 20.1.4.

<sup>23</sup> Certificate of Compliance issued by Compagnia Generale Telemar dated January 28, 2007.

<sup>24</sup> International Maritime Organization, Marine Safety Committee Circular 1024 dated May 29, 2002, *Guidelines on Voyage Data Recorder (VDR) Ownership and Recovery*.

<sup>25</sup> Teekay Shipping Limited, Standard Operating Practices (SP0812), *Use of Voyage Data Recorder (VDR) or Simplified Voyage Data Recorder (S-VDR)*, Version 1.

## 2.5. Incident Reporting

From the port state perspective, the regulations for reporting this type of marine casualty, as they apply to a foreign tank ship operating in the navigable waters of the United States, required the *Axel Spirit*'s master to make immediate notification of the allision with Ambrose Light to the nearest U.S. Coast Guard office after addressing any resultant safety concerns on board.<sup>26</sup> The vessel's flag state of the Bahamas required the master to make immediate notification to BMA, to be followed up as soon as practicable in written format using BMA Casualty Reporting Form #1.<sup>27</sup> In addition, the company's SMS procedure regarding incident notification stated "*if in doubt, then notify,*" and required vessel masters to not only report all incidents to shore side management personnel which met the company's established criteria of a casualty, but also situations that were considered significant near misses as well.<sup>28</sup> Per this existing company procedure, the master was required to initiate a series of notifications to minimize the potentially adverse impact of any such incident upon the safety of shipboard personnel, the vessel, the environment and other waterway users.<sup>29</sup> The procedure also specifically advised the master to take "*into account any potential regulatory and commercial implications of not raising a first alert when the incident may subsequently be closely scrutinized by third parties such as customers, charterers, external auditors, and regulatory officials.*" Per the President of the company, seafarers are also encouraged to send e-mails to the President or other senior-level executives if problems arise on shipboard. The standing order from the President of the company is that all such e-mails will be responded to within 24 hours of receipt.<sup>30</sup>

After the allision with Ambrose Light, the second officer made the following entry in the vessel's deck log, "*0140 Vsl drifting near Ambrose LT, awaiting pilot. Due weather conditions & heavy sea vessel probably touched Ambrose LT.*"<sup>31</sup> The master stated he did not perform any damage assessment of the vessel or direct the crew to perform such action because "*there was absolutely no alarm on the bridge*" from the vessels automated ballast tank and void space monitoring system indicating signs of water intrusion into the vessel's voids or ballast tanks.<sup>32</sup>

Around 0813, shortly after the first light of the morning, the master personally observed damage to the exterior hull plating of starboard ballast wing tanks #4 and #5 while the vessel was berthed at the Chevron facility and he contacted the company's call center telephone service and made a "First Alert" report that the vessel had made contact with the Ambrose Light while

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<sup>26</sup> Title 46 Code of Federal Regulations (CFR), Part 4.05-2(a), "Incidents involving foreign tank vessels", Part 4.05-20, "Report of accident to aid to navigation" and Part 4.05-1, "Notice of marine casualty".

<sup>27</sup> BMA Information Bulletin #4, *Accident Reporting*, dated August 23, 2007.

<sup>28</sup> Teekay Corporation, First Alert Incident Notification for Personnel/Ship/Environment poster (PT0054), Version 2, and Teekay Shipping Limited, Standard Operating Practices (SP0451), *Flag and National Incident Reporting Requirements Procedure*, Version 4

<sup>29</sup> Teekay Shipping Limited, Standard Operating Practices (SP0268), *First Alert – Incident Notification for Personnel/Ship/Environment Procedure*, Version 7.

<sup>30</sup> NTSB Interview with President, Teekay Marine Services on August 26, 2008.

<sup>31</sup> Teekay Shipping Limited, Deck Logbook, Version 3, April 2007, page 172, dated November 3, 2007.

<sup>32</sup> Statement of Master dated November 3, 2007. However, the vessel's VDR recorded multiple alarms on the bridge immediately after the vessel's impact with the tower.

proceeding to the pilot area that morning. At about 0820, after receiving the “First Alert” from the call center, a company vessel manager in Glasgow, Scotland, telephoned the vessel and spoke with the master about the incident and the need to notify the U.S. Coast Guard of the allision. Around 0850, the master contacted the vessel agent to request assistance in making the report of the allision to the U.S. Coast Guard, Sector New York office. The vessel agent was contacted on his cellular telephone by the master who, according to the agent, stated, “*I forgot to tell you something when you were on board,*” and “*I touched the Ambrose light platform on the way in this morning.*”<sup>33</sup> The vessel agent further stated he wanted to ensure he correctly understood the master and asked, “*You’ve touched the platform? Do you mean you hit the platform?*” The master’s response was, “*Yes*”. Then, at the master’s request, the vessel agent notified Vessel Traffic Service (VTS) New York of the allision via telephone around 0852, thus triggering the various aspects of the U.S. Coast Guard response actions after more than 7 hours had elapsed.<sup>34</sup> A representative from the company verbally notified the BMA of the incident on November 3, 2007, via telephone and followed up with a written report on November 4, 2007. The master submitted written notification via e-mail on November 6, 2007, and attached the required form, BMA CRF #1.<sup>35</sup>

## 2.6. Drug and Alcohol Policy

Federal requirements mandate that a marine employer “*take all practicable steps*” to have each individual directly involved in a serious marine incident (SMI) chemically tested for evidence of drug and alcohol use.<sup>36</sup> Alcohol testing must be conducted within 2 hours of the incident and a drug-test specimen must be collected within 32 hours of the incident, unless these actions are precluded by other safety concerns directly related to the incident. If more than 8 hours has elapsed from the time of the incident, alcohol testing is not required. However, drug-test specimens must be collected even if the 32 hour targeted window for collection has passed.

Besides the federal requirements for chemical testing, the company’s SMS included a drug and alcohol policy which required third party unannounced drug and alcohol testing to be carried out at least once a year on every vessel, and mandated that testing be “*carried out in the event of a maritime incident or a serious personnel injury where alcohol or drugs may have been a factor.*”<sup>37</sup> In the event of a maritime incident or a serious personnel injury in which alcohol testing was conducted by ship’s staff, the basic information pertaining to date, time, name and rank of person being tested, type of test performed, person administering the test and the actual results of the test were required to be logged on a SMS form. Per that company policy the master was charged with “*ensuring that all ship staff complies with the drug and alcohol procedures and other external laws relevant to the trade of the vessel.*”

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<sup>33</sup> Statement of Vessel Agent dated January 16, 2008.

<sup>34</sup> U.S. Coast Guard, Marine Information, Safety and Law Enforcement, Case # 381278, Activity # 3092473, Event Log

<sup>35</sup> E-mail from BMA to the NTSB dated April 18, 2008, and E-mail from the Master, *Axel Spirit*, to the BMA dated November 6, 2007.

<sup>36</sup> Title 46 Code of Federal Regulations, Part 4.06, *Mandatory Chemical Testing following Serious Marine Incidents involving Vessels in Commercial Service.*

<sup>37</sup> Teekay Shipping Limited, *Drug and Alcohol Policy* (PL0016) Version 6.

The vessel's last unannounced drug and alcohol screen occurred on February 8, 2007, while the *Axel Spirit* was in the port of Venice, Italy. At that time, a representative from Marine Medical, Incorporated visited the vessel to collect specimens for drug and alcohol testing from all 22 crew members on board.<sup>38</sup> All specimens collected were later determined to be drug and alcohol free.<sup>39</sup> At the time of this unannounced drug and alcohol test, the master in charge of the vessel was the same individual serving as master at the time of the allision with Ambrose Light. The helmsman, the lookout and the second officer on watch at the time of the allision with the Ambrose Light were not assigned to and on board the vessel at the time, and were therefore not subjected to that unannounced test.

Immediately after the vessel's allision with Ambrose Light, no drug or alcohol testing was conducted or ordered by the master. At 0930, 7 hours and 47 minutes after the incident, the chief officer conducted the first alcohol screening of the master, second officer, helmsman and lookout using the onboard Draeger Alcotest Tube, series CH 222. The particular Draeger Alcotest Tubes used by the chief officer designed for initial screening of alcohol in the field, and not for evidential breath analysis. When exposed to alcohol in a measured amount of exhaled air, a yellow reagent in the tube changes from yellow to green in color to indicate the presence of alcohol in the blood, with an increment marking on the CH 222 series tubes at a known percentage rate of 0.05%.<sup>40</sup> The higher the level of alcohol is in the blood, the longer the discoloration of zone becomes in reagent.

The chief officer recorded the pertinent information for each crewmember and noted each individual had "0.0" blood alcohol concentration.<sup>41</sup> At the request of the company, the vessel's agent contacted independent specimen collectors from Drug Testing Services of Bensalem, Pennsylvania, at 1630 to attend the ship. The team arrived on board the vessel at berth around 1840, November 3, 2007, and collected urine specimens from the lookout, helmsman, second officer and master using the ship's infirmary as a collection point. Drug Testing Services departed the vessel 1930.<sup>42</sup> On November 6, 2007, the medical review officer reported and verified the result of each individual's specimen as being negative for the presence of amphetamines, cocaine, marijuana, opiates and phencyclidine.<sup>43</sup> The alcohol testing of the crew involved in this SMI was not conducted in accordance with the time limit outlined in the federal requirements for mandatory chemical testing of crewmembers involved in an SMI.

### **3. Vessel Traffic Service (VTS) Sector New York:**

#### **3.1. VTS General**

The U.S. Coast Guard uses a wide range of activities and tools to achieve order and predictability upon the waterways of the United States, including establishing aids to navigation, implementing vessel routing systems and navigation rules, and operating VTSS. Coast Guard

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<sup>38</sup> Certificate of specimen collection from Marine Medical, Inc., dated February 8, 2007

<sup>39</sup> Teekay Shipping Limited E-mail to *Axel Spirit* dated March 9, 2007.

<sup>40</sup> Draeger Safety "Alcotest-Tube" instruction sheet.

<sup>41</sup> Teekay Shipping Limited, *Drug and Alcohol Testing Log* (FM0063) Version 2, dated November 3, 2007 at 0930.

<sup>42</sup> Drug Testing Services e-mail to NTSB dated April 20, 2008 and gangway record for the *Axel Spirit* dated November 3, 2007.

<sup>43</sup> Report of Medical Review Officer, Secure Results, LLC to Drug Testing Services, dated November 6, 2007.

management of the waterways is accomplished on two distinct levels that may be categorized as “passive” or “active.”<sup>44</sup> *Passive* management is a form of vessel traffic management in which the waterway user is solely responsible for compliance, such as that which would occur in a regulated navigation area (RNA) or a vessel traffic separation scheme.<sup>45</sup> *Active* management is used primarily when passive management is deemed inadequate to meet the desired level of safety or protection of the environment. Active management involves direct interaction between a representative of the U.S. Coast Guard and the waterway user to ensure compliance. VTS is the most common active management tool used by the U.S. Coast Guard.

VTS New York is an element of the U.S. Coast Guard Sector New York Command Center (SCC) located at Fort Wadsworth on Staten Island, New York. VTS New York was initially established in 1978 and operated until 1988, when it was decommissioned, along with VTS New Orleans, due to severe Coast Guard-wide budget cuts. Following the *Exxon Valdez* grounding in 1989, VTS New York was reestablished in 1995 under what used to be called U.S. Coast Guard Activities New York at its present location.<sup>46</sup>

The Vessel Traffic Center (VTC) is staffed by a total of 49 trained civilian and military personnel whose stated mission is to “*instill good order and predictability on the waters of the Port of New York and New Jersey*” by providing active monitoring, information services, traffic management and navigational assistance to vessels within the VTS area.<sup>47</sup> Watch sections at VTS New York normally consist of four VTS sector operators, a VTS watch supervisor and a watch officer. Due to the large size of the waterways subject to VTS control and the high volume of vessel traffic being managed, VTS New York has subdivided the coverage area into three sectors, or monitoring areas.<sup>48</sup> The four VTS sector operators rotate through the three monitoring positions every 60 minutes, with the entire watch section being rotated every 12 hours. Sailing plans are provided to the VTC on VHF channel 11. Communications for the East River, Arthur Kill and Anchorage sector are managed on VHF channel 12, and communications for the Upper and Lower Bay, Kill Van Kull and Newark Bay sector are managed on VHF channel 14. The VTS watch supervisor is assigned to oversee each 12-hour watch section and is responsible for ensuring all watch positions are properly manned and all VTS sector operators perform in accordance with established standards, policies and procedures. In addition to the management functions of the VTS watch supervisor, he or she assists with communications between VTS and the Sector Command Center (SCC), as well as monitoring VHF channels 11, 12, 13, 14 and 16. The VTS watch officer has overall responsibility for the management and conduct of the watch

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<sup>44</sup> U.S. Coast Guard, *Marine Safety Manual*, Volume VI, Chapter 4

<sup>45</sup> A Regulated Navigation Area, or RNA, is a water area within a defined boundary for which regulations for vessels navigating within the area have been established under 46 CFR, Part 165, *Regulated Navigation Areas and Limited Access Areas*. RNAs may be used in an area of the waterway which is determined to have hazardous conditions to control vessel traffic and may include specific times of entry or departure, size, speed or draft limitations, or any other measure considered necessary for the safe operation of the vessel under the circumstances. 46 CFR 165.10 and 165.11.

<sup>46</sup> Interview of Commander B. Tetreault, U.S. Coast Guard, Chief, Vessel Traffic Services (CG-7413), January 4, 2008.

<sup>47</sup> U.S. Coast Guard Vessel Traffic Service New York, *User's Manual*, Revised January 2005.

<sup>48</sup> 33 CFR, Part 161, Table 161.12(c).

and for ensuring proper notifications are made to the SCC and other necessary command representatives.<sup>49</sup>

This mission is accomplished by integrating a variety of sensors and communications systems, such as radar, closed-circuit television, VHF radio and Automated Identification System (AIS) data, into a traffic image which can be used by the VTS personnel, or controllers, to manage the risk associated with vessel movement in the congested waterways of the Port of New York and New Jersey. VTS New York utilizes software created by Lockheed Martin Corporation called *Marine Traffic Management (MTM-200) System*, developed under the *Port and Waterways Safety System (PAWSS)* project in 1997, to integrate these sensors and communication devices into usable traffic imagery for the watch standers.



Fig 6. VTS New York<sup>50</sup>

In addition to the sensors, equipment, and software already noted, VTS New York and other VTSs utilize a vessel movement reporting system (VMRS) to monitor and track vessel movements. This system requires that waterway users provide a sailing plan, position report and a final report, to the VTS.<sup>51</sup> The sailing plan, which must be provided to VTS via VHF radio 15 minutes before a vessel navigates in VTS waters, must include the vessel name, vessel type, current position, time and point of entry into VTS-controlled waters, vessel destination, intended route of travel, estimated time of arrival at destination or exit from VTS-controlled waters, and any dangerous cargo, if applicable.<sup>52</sup> A position report is required upon a vessel's actual entry into VTS-controlled waters, at designated points within a VTS area, and as directed by the VTC.<sup>53</sup> The final report is required upon a vessel's arrival at its destination or when leaving a VTS area, and it must include the vessel's name and position.<sup>54</sup> Although these regulations afford certain exemptions for vessels on published routes or vessels that operate within a small nautical area, vessel participation in the VRMS is mandatory for all power-driven vessels of 40 meters (approximately 131 feet) or more, all towing vessels of 8 meters (approximately 26 feet)

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<sup>49</sup> LT S. Whaley, VTS New York e-mail dated February 25, 2008.

<sup>50</sup> Photo by U.S. Coast Guard, PA M. Hvozda of watch stander at VTS New York, date unknown.

<sup>51</sup> Title 33 CFR 161.15.

<sup>52</sup> Title 33 CFR 161.19.

<sup>53</sup> Title 33 CFR 161.20.

<sup>54</sup> Title 33 CFR 161.22.

or more, and all passenger vessels carrying 50 or more passengers.<sup>55</sup> The information provided from the vessel to VTS is entered into an electronic form called a “Universal Track Data Card,” or UTDC, and this data can be retrieved or displayed by the VTS controller as the vessel transits the coverage area.

The local waterways actively monitored by VTS New York include the entrance to the harbor via Ambrose and Sandy Hook Channels, through the Verrazano Narrows Bridge to the Throgs Neck Bridge in the East River, to the Holland Tunnel in the Hudson River, the Kill Van Kull including Newark Bay and all of Arthur Kill and Raritan Bay.<sup>56</sup> The VTS New York active monitoring area does not include the portion of the precautionary area identified on the NOAA Chart 12326 where vessels routinely make the transition from either Sandy Hook Channel or Ambrose Channel, into either the Nantucket to Ambrose, Hudson Canyon to Ambrose, or Barnegat to Ambrose traffic lanes. Although the locations of Ambrose Light, the pilot area and a significant portion of the precautionary area where the three traffic lanes merge are not within the VTS New York mandatory participation area, sensors within the VTS New York system can receive some AIS signals and radar imagery in the area, as was the case in this incident. VTS New York does encourage prospective VTS users to voluntarily report in beyond those mandated boundaries in order to facilitate advance vessel traffic management within the VTS area and to allow vessels to obtain navigational or safety related waterway advisories.

### **3.2. *Axel Spirit*’s transit through VTS-controlled waters**

The *Axel Spirit* did not take advantage of this advance opportunity to report into VTS New York while the vessel was in the precautionary area, but did meet all VMRS mandated reporting requirements. Around 0200, the *Axel Spirit* embarked a Sandy Hook Pilot who provided the vessel’s sailing plan at 0225 to VTS New York. The vessel entered VTS positive control waters at 0226 under the navigational control of the pilot to begin the transit to Berth #1, at the Chevron facility in Perth Amboy.

The significant damage to the support structure of Ambrose Light and the rotating beacon had gone undetected by other vessels in the area and the pilot boat *New York* for 1 hour and 32 minutes after the allision. At 0315, the mate serving in the 0001 to 0600 watch rotation on board the *New York*, which was still positioned in the precautionary area near Ambrose Light, noticed that the aid to navigation (ATON) was not functioning properly and reported the discrepancy to VTS New York personnel.<sup>57</sup> The VTS New York watch supervisor immediately acted upon the report and began broadcasting a safety broadcast notice to mariners (BNTM) via channel 16, VHF radio, which informed local mariners monitoring the radio of the reported discrepancy, and urged caution while transiting the area.<sup>58</sup> Due to the darkness, increasing winds and unfavorable sea conditions brought about by the remnants of Hurricane Noel passing the area offshore, immediate verification of the status of Ambrose Light could not be safely performed by U.S. Coast Guard assets.

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<sup>55</sup> Title 33 CFR 161.16 and 161.23.

<sup>56</sup> Title 33 *Code of Federal Regulations* (CFR), Part 161.25, “*Vessel Traffic Service New York Area.*”

<sup>57</sup> U.S. Coast Guard, *Vessel Traffic Service New York ATON Discrepancy Report* form dated November 3, 2007, time stamped 03:15.

<sup>58</sup> U.S. Coast Guard, *Broadcast Notice to Mariners*, Number BNM-NEW-0237-07.



The transit of the *Axel Spirit* through VTS-controlled waters was uneventful and at approximately 0454, the vessel was alongside the Chevron facility and in the process of mooring. At 0600 the *Axel Spirit* had all mooring lines secured to the facility; at 0606 was finished with engines (FWE); and at 0612 had the gangway deployed at which time the Sandy Hook pilot departed the vessel. During the transit through VTS waters, the master had not reported the vessel's allision with Ambrose Light to watch standing personnel at VTS New York via the vessel's VHF radio, nor reported this casualty directly to the Sandy Hook pilot while he was on the bridge of the *Axel Spirit*.

At 0852, the vessel agent contacted the VTS New York watch stander via telephone and reported that the *Axel Spirit* may have allided with Ambrose Light, but stated he was unsure whether there was damage to the structure.<sup>59</sup> The VTS New York watch stander then initiated a series of risk mitigation and response actions, including notifying the command duty officer (CDO). As a direct representative of the sector commander, the CDO had local responsibility for the management of an incident and the coordination of response resources.

Although the casualty occurred well outside the VTS managed waterway, VTS New York personnel were able to capture continuous imagery detailing the vessel's maneuvering action beginning around 0030 on November 3, 2007 and its proximity to the Ambrose Light. This PAWSS imagery includes the vessel's course and speed over the ground, as derived from both VTS New York radar information and AIS data of the *Axel Spirit*.

#### **4. Timeline of Events:**

Some of the times in this chronological sequence of events were established by converting Coordinated Universal Time (UTC) into local eastern daylight time. Daylight saving time (DST) ended at 0200 local time on November 4, 2007, and was accounted for in this timeline of events.

##### **November 2, 2007**

- **0942** First Coast Guard District (D1) Command Center (CC) set internal Hurricane Condition II for all U.S. Coast Guard units within the Area of Responsibility (AOR), including Sector New York, in anticipation of the passing of the low pressure system remaining from Hurricane Noel.
- **1044** Sector New York set external Hurricane Condition Yankee for the ports of New York and New Jersey in the anticipation of potential gale forces winds along the coast within the next 24-hour period.
- **1436** *Axel Spirit* anchored 3.9 nautical miles from Ambrose Light at position 40° 29.467' N, 073° 43.956' W
- **1920** D1 CC set internal Hurricane Condition I for all U.S. Coast Guard units and assets within AOR, including Sector New York.

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<sup>59</sup> U.S. Coast Guard, *Vessel Traffic Service New York Report of a Marine Incident* form dated November 3, 2007, time stamped 09:01, Incident #1448.

- **2018** Sector New York set external Hurricane Condition Zulu for the ports of New York and New Jersey in the anticipation of potential gale forces winds along the coast within the next 12-hour period.

### **November 3, 2007**

- **0000** Master arrived on the bridge of the *Axel Spirit*.
- **0015** Master ordered crew to begin heaving up on anchor.
- **0042** Anchor aweigh and the *Axel Spirit* began shift from the anchorage in route to the pilot area.
- **0143** *Axel Spirit* allided with Ambrose Light.
- **0200** *Axel Spirit* arrived in Pilot Area and embarked Sandy Hook pilot.
- **0225** Sandy Hook Pilots provided Vessel Traffic Service (VTS) New York with *Axel Spirit*'s sailing plan.
- **0226** *Axel Spirit* entered waters subject to VTS New York control.
- **0315** VTS received communication from Sandy Hook pilot vessel *New York* that Ambrose ATON is extinguished. VTS logs ATON Discrepancy Report and began broadcasting, as necessary, broadcast notice to mariners via VHF.
- **0410** Docking pilot embarked *Axel Spirit*.
- **0454** First line passed from the vessel to the Chevron facility at Perth Amboy.
- **0600** *Axel Spirit* secured at facility.
- **0606** *Axel Spirit* finished with engines.
- **0612** Gangway in place and both pilots disembarked vessel.
- **0618** Vessel agent embarked *Axel Spirit*.
- **0630** Vessel commenced transfer of cargo to facility ashore.
- **0642** Vessel agent disembarked *Axel Spirit*.
- **0813** Master made notification of allision to company's "First Alert" center.
- **0850** Master contacted vessel agent to request assistance in notifying the U.S. Coast Guard of the allision.
- **0852** VTS received communication from vessel agent reporting master informed agent vessel that *Axel Spirit* may have allided with ATON. Sector New York Command Center (CC) Command Duty Officer LT Erica Mack, initiates action and notification procedures detailed in Quick Response Card (QRC) VTS-6, Vessel Grounding or Collisions.
- **0905** Sector New York Investigators/Response team notified and dispatched.
- **0910** Sector New York briefed First Coast Guard District (D1) Command Center.
- **1000** Sector New York commanding officer (CO) briefed.
- **1045** Atlantic area staff updated on situation by CWO Warren.
- **1130** Sector New York requested assistance from pilot vessel *New York* in assessing damage to the ATON.
- **1230** Sector New York Investigators/Response team arrived on *Axel Spirit*.
- **1250** D1 CC contacted USCG HQ Command Center (CC)
- **1257** Pilot vessel *New York* reported to Sector New York SCC that significant damage to ATON was observed.

- **1300** Sector New York Investigator initiated data capture function of vessel's voyage data recorder (VDR).
- **1343** VTS began broadcast of safety marine information bulletin (SMIB) via VHF radio informing mariners of the ATON discrepancy.
- **1800** D1 stood down units from Hurricane Condition 1 status.

**November 4, 2007**

- **0334** HQ CC watchstander initially notified NTSB Communications Center via e-mail of the vessel allision and condition of ATON.
- **0927** USCG representative from Commandant, Ocean Engineering Division copied NTSB Communications Center on e-mail, expanding on contents of earlier e-mail from USCG HQ CC.
- **0932** NTSB Communications Center forwarded USCG e-mail string to deputy director, Office of Marine Safety, and MS duty officer.
- **1104** Duty officer forwarded USCG e-mail string to deputy director and director, Office of Marine Safety.
- **1137** Deputy director, Office of Marine Safety contacted senior marine investigation staff via telephone, forwarded e-mail notification to same and initiated launch of Go Team.
- **1218** Sector New York submitted written synopsis of casualty to HQ CC.