National Transportation Safety Board
Office of Research and Engineering
Washington, DC 20594

DCA24MM031

VOYAGE DATA RECODER – AUDIO

Group Chairman's Factual Report

July 16, 2024

A. ACCIDENT

Location: Baltimore, Maryland
Date: March 26, 2024
Time: 0129 eastern daylight time (EDT)
0529 coordinated universal time (UTC)
Vessel: *M/V Dali* (IMO 9697428)
Operator: Synergy Marine

B. VOYAGE DATA RECODER – AUDIO

In agreement with the Investigator-In-Charge, a Voyage Data Recorder (VDR) Audio Group was convened on June 5, 2024, at the NTSB's Vehicle Recorder Laboratory in Washington, D.C. This report was prepared. The group consisted of the following members:

Group Chairman:	Sean Payne Branch Chief – Vehicle Recorder Division National Transportation Safety Board (NTSB)
Member:	Derek Johnston Marine Investigator NTSB
Member:	Tarun Poudel Interpreter Indy Translations
Member:	Capt. Harinder Singh Nautical Surveyor and Deputy Director General (Tech) The Directorate General of Shipping, Mumbai
Member:	Capt. Eric Nielsen President Association of Maryland Pilots
Member:	Capt. Ajith Kumar Director Synergy Marine Group

C. CARRIAGE REQUIREMENTS

Chapter V of the International Convention for the Safety of Life at Sea (SOLAS), regulation 20, specifies voyage data recorder (VDR) carriage requirements. Cargo

ships larger than 3,000 gross tons, and all passenger ships regardless of tonnage, must be equipped with a VDR. The VDR for a cargo ship larger than 3,000 gross tons, constructed before July 2002, may be an S-VDR. A full VDR requires a minimum of the most recent 48 hours to be stored in the VDR capsule and a minimum of 30 days to be stored in the bridge mounted electronic cabinet. In the event of an incident or accident, investigation authorities must be able to download and replay the VDR data without delay. Software, instructions, and special parts necessary for data extraction and replay are required to be contained within the main unit of a VDR.[1]

The *Dali* is a cargo ship constructed after July 1, 2014, and was required to be fitted with a VDR meeting the requirements of IMO resolution MSC.333(90).

For additional details related to VDR carriage requirements, specifically, requirements related to parametric data recording, refer to the Voyage Data Recorder (VDR) and Other Electronic Data Group Chairman's Factual report, which will be released in the public docket for this investigation.

D. DETAILS OF THE INVESTIGATION

The NTSB Vehicle Recorder Division received the following electronic devices or files:

Device Manufacturer/Model: JRC JCY-1900 VDR

Device Serial Number: MB39751

This report discusses the details of the audio portion of the VDR from the *Dali*. For a detailed record of the parametric data from the VDR and other data sources on the *Dali*, refer to the Voyage Data Recorder (VDR) and Other Electronic Data Group Chairman's Factual report, which will be released in the public docket for this investigation.

JRC JCY-1900 VDR DEVICE DESCRIPTION

The Japan Radio Co. (JRC) JCY-1900 VDR is a maritime device designed to record and store critical vessel data in compliance with IMO's MSC.333(90) standards. It captures navigation, propulsion, alarms, weather, radar, and Electronic Chart Display and Information System (ECDIS) imagery, and bridge audio and radio communications data, and other operational parameters, enabling detailed analysis in the event of incidents or for vessel management.

[1] Refer to International Maritime Organization (IMO) resolution MSC.214(81) for required download and playback equipment for investigation authorities.

A minimum of 48 hours of data is recorded by the system in the vessel's VDR capsule and a minimum of 30 days must be recorded on the VDR's bridge mounted electronic cabinet. Figure 2 shows the VDR cabinet mounted in an electronic equipment room one deck below the bridge on the *Dali*.

For additional details about the JRC JCY-1900 VDR's data recording capabilities, refer to the Voyage Data Recorder (VDR) and Other Electronic Data Group Chairman's Factual report, which will be released in the public docket for this investigation.

JRC JCY-1900 VDR DATA EXTRACTION

This report deals with the audio extraction from the VDR. Details of the parametric data extraction for the JRC JCY-1900 VDR system fitted on the *Dali* is located in the Voyage Data Recorder (VDR) and Other Electronic Data Group Chairman's Factual report, which will be released in the public docket for this investigation.

To access bridge audio recordings, raw VDR data must first be downloaded from the ship's VDR. This can be accomplished two ways: using the JRC JCY-1900's bridge mounted USB VDR console (shown in Figure 1), or using an ethernet connection to the bridge mounted VDR electrical cabinet (shown in Figure 2). The authority can access the VDR data using the bridge mounted USB download console. When downloading from the USB console, a time selection is made around an event, and data is downloaded for a selected period onto a USB compatible mass storage device. Alternatively, the data can be downloaded from the VDR cabinet via Ethernet. To utilize an Ethernet download requires the installation of proprietary software from the VDR manufacturer.

Figure 1. The bridge mounted USB VDR console.

Figure 2. The bridge mounted VDR cabinet.

Initially, during the NTSB post-accident on-scene response, the NTSB accessed the VDR data using the bridge mounted USB console. A six-hour window of time around the incident was downloaded using the USB console (0000 to 0600 local time). The download process for the six hour raw VDR download took approximately one hour to complete. This does not include the amount of time required to post process and playback the data, which is discussed later in this report.

The download process, whether by means of the USB console, or the cabinet, results in both parametric and audio data extracted in a proprietary format. Specifically, audio files are output as proprietary .DAT files which cannot be played in commercial audio tools because they are not in a universally accepted format. While the converted files are able to be played back using JRC's proprietary playback software, the interface for listening to the audio using the software is inadequate for accident investigation. For example, the software does not allow fine control of playback time, or basic features such as the ability to easily rewind a segment of audio. To rewind the audio to a specific defined point, the user must first stop the playback and open a time date window, select a specific time and date, close the time and date window, and then activate the playback again. Alternatively, the user can move a slider bar, but the method in which the software allows this to be accomplished is not precise enough to finely adjust the time for purposes of investigation. For example, when moving the slider bar to rewind audio, the minimum amount of playback time that can be manipulated is just under one minute. This means that in order to "scrub" and replay a portion of audio that was just played, the only option is to go back about one minute and relisten to that entire minute. A typical NTSB VDR audio investigation may involve replaying a particularly hard to understand word or phrase numerous times to transcribe. This means that to replay

and transcribe a portion of audio that could be done in a few seconds, could take hours to do in the supplied JRC software.[2]

Additionally, the user can only isolate audio tracks by using the software-based volume control window and the software does not support using a hardware interface. An example of such hardware is a mixing board, which is vastly more efficient and commonly used in the vast majority of NTSB VDR projects involving audio information. Furthermore, the software does not allow the authority to apply any kind of digital audio filter to enhance the intelligibility of speech on the recording. These are few of the many limitations of the playback software but does not encompass all issues encountered when trying to create and accurate transcription of bridge audio. Figure 3 is a screen capture of the VDR playback window with the microphone channel selection window opened.

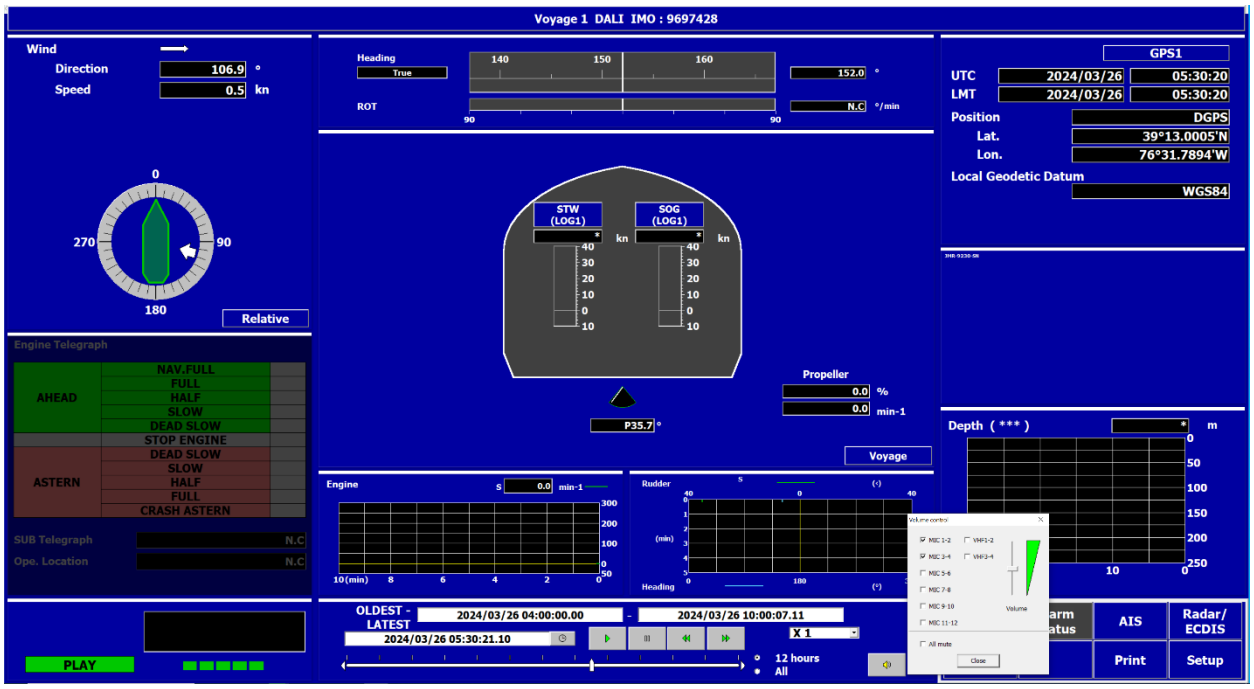

Figure 3. A screen capture of the JRC JCY playback software.

IMO resolution MSC.333(90) defines the performance standards for VDR systems installed on ships after July 1, 2014. The performance standards published in MSC.333(90) generally point to documents published by the International Electrotechnical Commission (IEC). The IEC standards are controlled documents and cannot be appended to this report. As it relates to the IMO resolution, the contents of the documents explicitly state in section 9.2.5, the following:

[2] An alternative method would include hardware capturing the audio, which would convert to a commercial format, however, this process would be lossy and audio information would be degraded.

9.2.5 Where non-standard or proprietary formats are used for storing the data in the VDR, the software for converting the stored data into open industry standard formats should be provided on the portable storage device or resident in the VDR.

Section 9.2.5 of the resolution defines that software shall be available to perform this conversion but does not define any further standards, or detail how this should be accomplished. Furthermore, the IEC performance standards that MSC.333(90) points to, IEC document 61996 (edition 2), do not define that the bridge microphones shall be exported in isolated channels for each microphone or mixed as a single monaural channel. The IEC document only states that, "audio data shall be provided in '.WAV' (PCM WAVE) format" and that "the equipment shall be capable of recording workstations with no more than 2 microphones per channel." The document limits the number of channels that can be mixed, and defines the output format as .WAV, but assuming that the audio is tested and intelligible, no further limitations are placed on the VDR manufacturer.

Different VDR manufacturers have different software tools to playback downloaded VDR data and the quality and usability of these tools vary greatly. Additionally, section 9.2 of the IMO resolution defines how the software should be made available, but the resolution lacks any kind of defined standard for how this type of software should function. The resolution standard is left to the VDR manufacturer to assess the type of features that they believe will be useful to authority to perform an investigation. Additionally, the IEC performance standard document only defines availability and compatibility of the playback software, file types and file naming conventions, and the ability to display recorded proprietary data. The IEC performance standard does not define any further design requirements of the playback software.

The JRC software does allow their proprietary audio .DAT files to be converted to 16 Kilohertz (kHz) .WAV files in compliance with MSC.333(90); however, these files are output as monoaural audio tracks that mix two microphone channels into single thirty second in length .WAV files. Monoaural audio is the opposite of stereoscopic sound. Mono mixes two or more audio channels into a single channel that cannot have its audio inputs isolated. This is allowed per the IMO resolution, specifically in IEC 61966 (Edition 2) which states the following:

(MSC.333(90)/5.5.5) *Microphones* shall *be positioned on the bridge covering all work stations as described in MSC/Circ.982 so that conversation is recorded. The recording* shall *be such that, on playback, a normal speaking voice should provide adequate intelligibility while the ship is performing its normal operations. This performance* shall *be maintained at all work stations while there is a single audio alarm anywhere on the bridge or any noise, including noise from faulty equipment or mounting, or wind. This shall be achieved through the use of at least two channels of*

audio recording. Microphones positioned outside on bridge wings, shall be recorded on at least one additional separate channel.

The equipment shall be capable of recording workstations with no more than 2 microphones per channel.

The IEC document states that microphones can be mixed 2 per channel assuming that the intelligibility of the recording can be maintained while the ship is performing "normal operations" and while "there is a single audio alarm anywhere on the bridge or any noise, including those from faulty equipment or mounting, or wind." Note that IMO does not specify what constitutes "normal operations" and that there is no requirement to test the VDR audio while the ship is operating using its main propulsion unit at sea.

Figure 4 depicts the bridge microphone layout of the *Dali*. The colors on the figure depict independent microphones that are tied together in a monoaural audio track after .DAT file conversion. For example, on the *Dali*, a conversation occurring near the starboard conning station would be mixed with a recorded conversation that took place at the port chart table. Additionally, if an alarm is going off on one console, the audio of the alarm would be mixed with a conversation taking place where there was no alarm, rendering some, if not all, of that conversation unintelligible. There is no way to isolate these channels when output to a monoaural audio format. For this reason, the audio quality of each channel has been rated as "Fair." Appendix A to this report is the audio quality rating scale used by the NTSB laboratory.

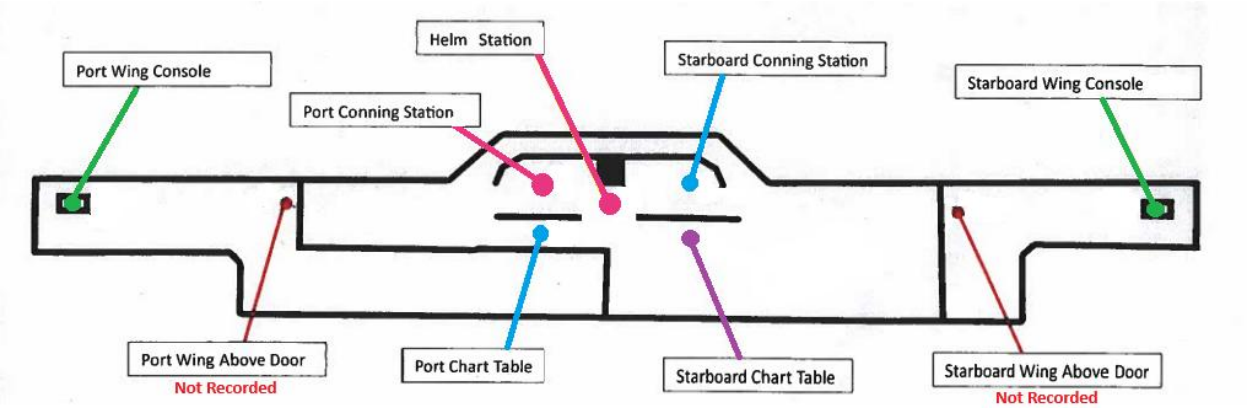

Figure 4. A plan view of the microphone locations on the *Dali*'s bridge. The colors depict the microphones which are mixed to the same monoaural audio channel. The top of the figure would indicate toward the bow of the ship and the bottom of the figure would indicate toward the stern of the ship.

The JRC conversion software can produce .WAV files. As stated above, these .WAV files are monoaural mixes of two bridge microphone channels. The converted output audio data is produced as only one-minute files per VDR monoaural audio channel. These one-minute files are grouped in subfolders containing only 30-

minutes' worth of audio data. For a 30-minute converted output of audio, the software would export 180 .WAV files. In this case, 30 files would come from each channel. Table 1 defines the audio channels recorded on the bridge, the quality of each channel according to the rating scale and the output number of files for each channel after a hypothetical 30-minute converted data segment.

Table 1. Audio channels recorded on *Dali*, the mixed bridge microphones, the audio quality, and the number of output .Wav files for each 30 minute segment.

Channel Number	Microphones Contained	Audio Quality	Number of .Wav files Produced per 30 Min. Segment
Channel 1	Helm Station	Fair	30
	Port Conning Station	Fair	
Channel 2	Starboard Conning Station	Fair	30
	Port Chart Table	Fair	
Channel 3	Port Wing Console	Fair	30
	Starboard Wing Console	Fair	
Channel 4	Starboard Chart Table	Good	30
Channel 5	VHF[3] Radio #1	Excellent	30
Channel 6	VHF Radio #2	Excellent	30

These 180 files are put into a single folder, organized by channel number and start time. To listen to a continuous audio file from one track, groups of .WAV files in the 30-minute subfolders must be sorted by channel number and concatenated. This is accomplished using Windows command line tools and a non-linear audio processing software tool. While custom scripting was used to accelerate the organization of files in this process, the process is still bottlenecked as there is no way to accelerate the time the JRC software takes to convert the .DAT files to monoaural .WAV files.

In summary, to playback audio from the 6 hour download initially retrieved from the USB console on the *Dali*'s bridge, in an audio format that allows commercial playback, the following steps and time must be taken:

- Download the raw VDR data from the USB consol – **1 hour**
- Convert the raw VDR audio data (.DAT) to a commercial format (.WAV) using JRC software – **1 hour** and results in 2,160 one minute long .WAV files
- Organize and concatenate the 2,160 .WAV files into one file per channel for continuous playback using scripts and command line tools – **30 minutes**
- Total time for download, conversion and playback of 6 hours of audio data ~ **2 hours and 30 minutes**

[3] VHF – Very High Frequency radio. Generally used by the crew to communicate ship to ship.

DOWNLOADING THE FULL VDR DATASET

Two days following the accident, a marine electronics technician certified to service JRC VDRs was provided by the ship's operator. The marine electronics technician attempted to perform an ethernet cable download of the entire contents[4] of the ship's VDR. With support from JRC headquarters, the marine electronics technician was unable to perform a successful retrieval of all VDR data from the ship's VDR cabinet. As such, on March 29, 2024, the NTSB elected to remove the electronic memory components of the *Dali*'s VDR cabinet. In consultation with JRC, a plan was constructed to download the contents at JRC Americas office in League City, Texas.

On April 15, 2024, two specialists from the NTSB's Vehicle Recorder Laboratory traveled with the VDR cabinet memory components to JRC's Americas in League City. At this facility, JRC provided an exemplar VDR system for the VDR memory components that were removed from *Dali* to be installed and downloaded. The download was accomplished using the ethernet transfer method and JRC proprietary software.

The VDR's memory component metadata indicated that approximately 37 days of VDR data was available from the cabinet's memory component. The full dataset were extracted using the ethernet method. This took approximately 36 hours to complete and resulted in only proprietary files being output that could only be played back by JRC's playback software. After this process had completed, the audio still needed to be converted to a commercial format.

The NTSB elected to not convert the entirety of the VDR audio extraction to a commercial format, and instead, based on interviews and other parametric data, selected areas of interest to convert to .WAV files. Primarily, the NTSB elected to convert 24 hours previous to the contact with the Francis Scott Key Bridge, the contents of which are discussed in this report. Additionally, select areas were identified, converted and reviewed. None of those areas were determined to be pertinent to the investigation and were not utilized in the generation of this report. Had the NTSB elected to convert the 37 days of audio data, if the operation were to be continuous, the estimated time to perform that task would have been 370 hours, just over 15 continuous days.

TIME CORRELATION (AUDIO)

VDR AUDIO AND DATA

The time recorded by the *Dali*'s VDR was determined to be the most accurate source of timing information and was determined to be the authoritative time source for this investigation. For details of time correlation to other devices, see the Voyage

[4] IMO Resolution MSC.333(90) stipulates 30 days of data must be available from the cabinet. In this case, the VDR indicated that 37 days of data was available. Further details are discussed in the Voyage Data Recorder and Electronic Data Factual Report which can be found in the docket for this investigation.

Data Recorder (VDR) and Other Electronic Data Group Chairman's Factual report, which will be released in the public docket for this investigation.

MDTA COMMAND CENTER AUDIO

A portion of this transcript covers a set of recorded calls from the Maryland Transit Authority Command Center (MDTA). A time correlation for these recordings was constructed by comparing a comment that the Pilot of the *Dali* made on the telephone at 1:26:38.0 EDT which was captured by both recordings. These recordings were provided with a timestamp that was determined to be one second ahead of that *Dali*'s VDR. The audio from the MDTA Command Center was offset by subtracting one second to bring the two recordings into alignment.

MDTA command center audio appears in the transcript as BLUE.

TRANSLATION

Three languages were primarily spoken on *Dali*. During operations with the pilots onboard, the primary language spoke on the bridge was English. In the absence of the pilots, the crew primarily communicated with each other in Hindi. The Master also spoke Tamil. Only a few conversational components were spoken in Tamil.

In the transcript portion, English generally appears as unaltered font (black).

Hindi appears as ORANGE font.

Tamil appears as PURPLE font.

Independent translation services for Hindi were obtained by the NTSB and the independent translator was a part of the transcription group. Additionally, two other members of the transcription group were native Hindi speakers. For the portions spoken in Tamil, the Indian Directorate of Shipping, via the Indian Embassy in Washington, D.C., provided a native speaker of Tamil.

ELECTRONIC CONVERSATIONS

The bridge audio recording contained ambient VHF and cellular call audio. Any conversation external to the ship will appear in the third column of the transcript. Furthermore, to differentiate between simultaneous electronic external conversations occurring on the bridge (in the same column of the transcript), the entries have been color coded in the following manner:

Pilot to Tugs is in unaltered font (BLACK).

The Pilot to the USCG appears in GREEN.

AMP Pilot Command Center to MDTA Command Center appears in BLUE.

Training Pilot to the USCG appears in RED.

Note that some of these conversations were conducted via telephone and thus only one side of the conversation was recorded by the VDR.

AUDIO RECORDING DESCRIPTION

Table 1, in the above section, displays the source of each audio channel recorded in monoaural format, as well as the quality of the recorded audio. Appendix A to this report is the audio quality rating scale.

The quality of the audio was primarily impacted by two factors: the independent microphone sources being mixed into monoaural audio channels, and the recording of audible alarms on the bridge during the blackout events that persisted through the accident sequence and after the *Dali* made contact with the bridge.

SURVIVING CREW AUDITION

As part of the Safety Board's accident investigation process, the crew, in this case, the two pilots and the *Dali*'s bridge officers who were on watch at the time of contact with the Francis Scott Key Bridge, were separately invited to review the audio recording and the transcript that was made by the audio group.

PILOT AND TRANING PILOT AUDITION

On July 31, 2024, both the Pilot and the Training Pilot, along with the party representative from the Association of Maryland Pilots who partook in the initial transcription exercise, visited the NTSB lab to review the VDR audio recording.

The Pilot and Training Pilot had the following comments:

From the summary portion on the accident day, the Pilot clarified that the term "box", which was spoken around 00:34:26, referred to the Portable Pilot Unit (PPU).

During the transcribed portion on the accident day, the Pilot and the Training Pilot had the following comments:

All times are given in EDT.

- At 01:02:40, the Pilot clarified that his comment was "port twenty."
- At 01:05:01, the Pilot clarified that his comment was "ease to twenty."
- Around 01:10:49, the Pilot stated he responded "oh great" to the Master's offer of coffee or black tea.
- Between 01:16:44.3 and 01:16:52.8, the Pilot and Training Pilot stated the discussion they were having was related to the connectivity of the PPU's independent antenna.

- At 01:17:22.7, the Pilot stated the light music came from a Bluetooth speaker.
- Between 01:18:30.9 and 01:18:33.1, both the Pilot and the Training Pilot stated the discussion they were having was again related to the connectivity of the PPU's independent antenna.

DALI BRIDGE OFFICERS AUDITION

On August 22, 2024, the Master of the *Dali* and the Second Officer of the *Dali*, who were the officers on watch at the time of the contact with the Francis Scott Key Bridge, visited the NTSB lab to review the VDR audio recording. The Master and the Second Officer visited without the party representative who partook in the initial transcription exercise from the Synergy Marine Group.

On the summary portion that covered the prior day to the accident, the Master and Second Officer had the following comments:

All times are given in EDT.

- Around 15:30, the Master stated the position "electronics technician" should be referenced as Training Electrical Officer (TEO).
- Around 15:33, the Second Officer clarified that he was speaking to the TEO, not the third engineer.

During the transcribed portion on the accident day, the Master and the Second Officer had the following comments:

- At 01:10:48.6, the Master clarified that the phrase "uh tea" should be corrected to "black tea."
- At 01:25:45.0, the Master stated that he was inquiring about the Second Officer's telephone call to the engine room. The Second stated that he had called the engine room using the bridge telephone and there was no response from the engine room at this time.
- At 01:26:01.6, the Master clarified that his statement in Hindi was related to a conversation he was having on the bridge telephone to the engine room. The Master believed he had asked, "what's the status?"
- At 01:27:10.4, the Master and the Second Officer stated the UHF radio call from the forward position should read, "Sir I cannot lower alone here sir."
- Around 01:27:19.2, the Master clarified that he stated, "forward, everybody go forward."
- Around 01:28:01.0, the Master explained that he also stated in Hindi, "why didn't you tell me this before?"

- At 01:28:16.4, the Second Officer clarified that the unintelligible statement should read “we do not have bow thruster.”

AUDIO SUMMARY AND AUDIO TRANSCRIPT

The summary covers from 1400 EDT on March 25, 2024, to 0000 EDT on March 26, 2024. The *Dali* was alongside the Seagirt Marine Terminal.

All language detected in this summary portion was in Hindi, unless otherwise specified.

The summary began at 14:00, little activity was detected on the bridge. The *Dali* was alongside the Seagirt Marine Terminal. All times are in EDT and given in the format HH:MM.

At 14:20:18, a sound similar to the automatic power change over circuit was detected and multiple loud electronic alarms began activating on the bridge. At 14:20:54, a sound similar to the automatic power change over circuit operating was again detected. Moments later at 14:21:51, a sound similar to the automatic power change over circuit operating was detected for a third time. At 14:22:20, the sound of a siren was detected while the other alarms continued to activate. Around 14:24:18, the sound of the primary alarm ceased but other alarm sounds continued.

At 14:25:09, a conversation over UHF was detected, but it was not intelligible due to the number of alarms still activated.

By 14:26:15, no alarms were detected on the recording.

Between 14:26:23 and 14:26:51, there was a resurgence of multiple loud electronic alarms. A sound similar to the automatic power change over circuit was detected at the start of this interval (14:26:23).

At 14:27:14, there was a brief exchange over UHF which was partially in English. The phrase “something is missing” was detected. A voice in English then responded, “one zero zero six charlie.”

Between 14:27:28 and 14:28:05, a sound similar to the automatic power change over circuit was audible and there was a resurgence of multiple loud electronic alarms. At 14:27:54, a sound similar to the automatic power change over circuit was again detected.

At 14:28:56, a sound similar the automatic power change over circuit was detected. Alarms again ceased by 14:29:50.

Between 14:28:59 and 14:29:04, a pulsing alarm was detected.

Between 14:29:27 and 14:30:21, there was a conversation over UHF. “One zero zero six charlie” and the phrase “something is missing” was again detected. A voice then repeated “zero zero six charlie.” Another voice then stated, “look there -

close to that" and a different voice responded, "nothing brother." Later at 14:31:46, a voice then stated, "go ahead" and another voice stated, "look there." A voice later was detected in Tamil stating, "it should be there - look over there." There were no alarms activated at this time and a sound similar to a utensil stirring coffee in a ceramic cup was detected.

Between approximately 14:35:56 and 14:57:14, multiple loud electronic alarms were continuously activating on the bridge again. At the start of this interval, a sound similar to the automatic power change over circuit was audible. The audio did not appear to reveal that any crew members were present on the bridge during the time of the alarm's activation.

Around 14:59, there was a UHF radio conversation. Someone was asking over UHF if the person receiving the UHF transmission was on the bridge. A person repeatedly answered "yes" over UHF from the bridge. There was then a brief conversation in Tamil related to resetting an alarm, but the conversation was not specific.

Around 15:00, the Second Officer told the Chief Officer over UHF that he will go to the bridge.

Around 15:30, the Chief Officer reported that he was on the bridge. The Chief Officer and the electronics technician reported that the alarms were nominal for a unspecified condition, but did not give any specifics.

Around 15:33, the Second Officer was talking to the third engineer about resetting the BWTS alarm (Ballast Water Treatment System).

Around 15:57, the Chief Officer and Second Officer stated that all alarms were reset. There was an additional conversation with the deck crew and later, a UHF call to the ETO. The exact context of the ETO conversation could not be determined but seemed to be related to the ship's reefers.

Around 17:06, the Second Officer discussed with the engine room the estimated time of arrival of the pilots as around midnight.

Around 17:40, the Second Officer asked a crew member to go forward and check if the winch power was in operation and to identify the breaker for the winch power system.

Around 17:49, the bridge telephone rang, and the Master answered. The conversation was in Tamil. The Master instructed the Chief Engineer to prepare an incident report for the ship's office. The Master instructed the Chief Engineer to update the form and complete the form now. The Master referenced this as the "incident report." The Master said that all the required fields in the form cannot be left blank. The Master continued to report, "for now put the data reporting date as the

twenty eighth." The Master instructed the chief to fill out the form, to not leave anything blank and stressed to not leave out any information. The Master stressed that he wanted that information as soon as possible but the report itself could be submitted at a later date. The Master stressed that if the form is not filled out correctly, he would have to fill the out the form himself, and that he wanted the engine room to fill it correctly because the incident was related to the engine room. The phone call ended and there were no further references detected that referred to this incident. There was nothing specifically discussed as to the nature of the incident.

Between roughly 18:00 and 23:22 on March 25, there was little activity recorded on the VDR microphones on the bridge. Any activity detected was related to nominal ship operations.

Around 23:22, a crewmember reported that steering and gryo checks were completed.

A summary of the accident voyage follows.

Summary of 0000 to 01:02:41.2 EDT (Beginning of the Accident Voyage)

The summary begins at 00:00 EDT. The ship was still alongside Seagirt Marine Terminal. Only the ship's crew was detected on the bridge. The ship's crew was having casual conversation in Hindi.

Around 00:05, the crew was discussing over UHF that the Pilots were on the gangway. Around 00:06, a crewmember on UHF radio reported the Pilots had boarded.

At 00:08, the Master asked the Second Officer if the engine blow through had been completed and the Second Officer reported that it was completed. The crew discussed the draft and reported it as 12.15 meters.

At 00:08:43, the Pilot's voices were detected on the bridge. The draft was repeated. The Master greeted the Pilots. The Pilot introduced the Training Pilot and reported to the Master that they would be taking another Pilot "halfway through." The Master and Pilots confirmed they would be using two tugs. The Pilots discussed with the Master tug placement and it was mentioned one tug would be on the port shoulder. The Pilot discussed with the Master the rating of the ship's bits.

Around 00:10, the Master discussed picking up the gangway with the crew.

Around the same time, the Pilot discussed with the Master and Second Officer the *Dali*'s sister ship, the Cezanne [IMO 9697416]. The Training Pilot stated that he had been "on that one."

Around 00:10:50, the Master discussed the tug position with the forward crewmember position over UHF. Around this time, the Master's voice was also detected on the bridge wing.

Around 00:12:15, the aft position reported on UHF that the aft propeller area was clear. The Second Officer reported to the engine room, "trying out engines." The Master asked the Second Officer to give the telegraph a longer "kick" so that an engine response could be made. The bridge was coordinating with the Chief Engineer on performing the engine telegraph test and discussed a longer duration "kick." They indicated satisfaction.

Around 00:13:15, the tug, Eric McAllister [IMO 9707493], reported it was ready to work over VHF radio.

Around 00:14, the Master discussed with the crew tug placement and that one tug would be forward at the port shoulder and another tug be aft at the port quarter. The Pilots were audible in the background reciting numbers.

Around 00:14:30, the Second Officer reported to the Master that the engine try out was completed at 00:12. The Master acknowledged.

At 00:16:02, the Pilot asked the Master, "captain everything's working?" The Master replied, "yeah everything is in order."

Around 00:18, the Bridget McAllister [IMO 9369215] reported on the *Dali*'s port quarter. There was some UHF conversation in Hindi with the aft personnel at this time. Seconds later, the Master reported to the Pilot that the aft tug was made fast. The crew discussed asking the bridge personnel to ask the Pilot if they could remove slack from other lines. The Pilot reported to the Master that they could "get rid of any extras." Around 00:20, the Master ordered over UHF to begin slacking lines.

At 00:20:25, the Master informed the forward crewmember position that the *Dali*'s whistle would be blown. The whistle was blown at 00:20:30.

At 00:20:40, the Master stated, "B-T," and a beep sound was detected shortly thereafter. The Master's voice was detected on the bridge wing at this time using a UHF radio.

Around 00:21:25, the Pilots' voices were detected on the bridge wing along with the Master.

Around 00:24, the Second Officer discussed with the engine room as having time as 00:06 as "standby engine."

At 00:25:15, the Pilot discussed with the Master that they were ready to depart and instructed the master to finish slacking any remaining lines. UHF transmissions discussed slacking remaining lines around this time.

At 00:26:30, the Training Pilot made a security call that the *Dali* would be slacking lines at the Elevator Channel and that the working tugs would be on VHF Channel 14 and the Pilot would be standing by on VHF channel 13.

Around 00:26:45, the Pilot and Master were on the wing having a casual conversation. The Master and Pilot then discussed the rating of the ship's bits. The Master stated the lines were on the 70-ton bits. The Pilot confirmed to the tugs that the bits were rated for 70 tons. The Pilot and Training Pilot then discussed the rating of the tug bits. The Pilot said, "think the Eric's 54 and the Bridget's is 65 tons."

The Pilot and Training Pilot had a basic conversation about the Training Pilot's start date and where the Training Pilot lived. The Training Pilot stated that he had worked with the Pilot previously.

Around 00:31:50, the Master reported the crew was still holding the spring lines on the stern and bow (headlines). They discussed casting off the remaining lines.

Around 00:33, the Pilot had a casual conversation with the Training Pilot and Master that he had stepped on a staple at home.

Around 00:34:26, the Pilot stated to the Training Pilot, "so I'll get it out on the mainstream and then you can drive. I'll (have/run) the speeds down the channel." Then Training Pilot replied, "sounds good." The Pilot asked, somewhat in a sarcastic tone, "unless you want to sail it?" The Training Pilot declined saying, "I'll watch you a couple more times." The Pilot then stated, "this one's pretty straight forward," and then stated, "the box [PPU] really makes it a lot easier. especially with these wider ships." The Master reported to the Pilot they were standing by with springs and the Pilot stated, "let it all go."

Around 00:37:20, the Master reported, "forward all clear."

Around 00:37:47, a UHF radio transmission in Hindi reported aft lines were all clear.

Around 00:42:45, the Master asked the Pilot about Easter celebrations in the United States. The Pilot asked the Master what his next port was. The Master replied Sri Lanka. The Pilot asked, "around the bottom?" The Master reported that was the route due to piracy in the Red Sea and that it would add an extra seven days. All agreed that was a good plan.

At 00:44:54, the Pilot gave the tug Eric McAllister an all stop order and shortly thereafter, gave the Master a dead slow ahead order. Shortly thereafter, the Pilot gave the tug Bridget McAllister an all stop command.

Around 00:45:50, the first steering command was issued by the Pilot.

Steering commands continued to be issued by the Pilot. Nothing abnormal was noted on the recording at this time.

Around 00:48, the Pilot stated the to the Master, "have your men standby watch the quarter as we go around the turns. everything should be fine. And then we'll need one man standing by forward until we get to the bridge. after the bridge they can come back. and then I'll need a starboard side ladder in like four hours. but if you have people available maybe it's easier to rig it now." The Master acknowledged throughout and the Pilot stated the starboard ladder should be rigged at 1.5 meters. The Master then relayed these instructions over UHF to the crew.

At 00:49:30, the Pilot asked the Master to go inside (move off the wing) and stated, "if you don't have any controls out here…we can go inside." The voices then ceased from being recorded near the wing microphone channel.

Steering commands were now detected from the bridge's VDR internal microphones.

At 00:51:20, the Master instructed the aft crew member to let go of the aft tug line.

Steering commands continued to be issued. There was no extraneous conversation on the bridge.

Transcript of a JRC JCY-1900 VDR, serial number MB39751, installed on the *Dali* [IMO 9697428] which contacted the Francis Scott Key Bridge on March 26, 2024.

LEGEND

2ND	Voice identified as the Second Officer *Dali*
AFT	Voice identified as the aft (stern) crewmember position *Dali*
AMPDISP	Voice identified as the Pilot Dispatcher (Association of Maryland Pilots)
AUDIO	General sound captured from any of the *Dali* VDR microphones
BRDGT	Transmission from the *Bridget McAllister* (IMO 9369215)
CM	Voice identified as the Chief Mate *Dali*
CMD	MDTA Command Center
ERIC	Transmission from the *Eric McAllister* (IMO 9707493)
FWD	Voice identified as the forward (bow) crewmember position *Dali*
HELM	Voice identified as the Helmsman *Dali*
MAST	Voice identified as the Master *Dali*
MSCT	Transmission from the *MSC Toronto* (IMO 9299525)
PILOT	Voice identified as the Pilot *Dali* (Association of Maryland Pilots)
TRNPLT	Voice identified as the Training Pilot *Dali* (Association of Maryland Pilots)
-PA	Transmission over the *Dali* Public Address System
-T	Transmission over Telephone or Mobile Phone
-UHF	Transmission over Ultra High Frequency Radio (typically used intra-ship)
USCG	Voice identified as a representative of the United States Coast Guard (USCG)
-VHF	Transmission over Very High Frequency Radio (typically used extra-ship)
-?	Voice unidentified
*****	Unintelligible word
#	Expletive
@	Non-pertinent word
( )	Questionable insertion
[ ]	Editorial insertion

Note 1: Times are expressed in Eastern Daylight Time.

Note 2: Generally, only radio transmissions to and from the incident ship were transcribed.

Note 3: Words shown with excess vowels, letters, or drawn out syllables are a phonetic representation of the words as spoken.

Note 4: A non-pertinent word, where noted, refers to a word not directly related to the operation, control, or condition of the aircraft.

Note the following color code:

- Intra-Ship comms or the *Dali* crew to Tugs in English in unaltered font (BLACK).
- **The pilot to the USCG appears in GREEN.**
- **AMP Pilot Command Center to MDTA Command Center appears in BLUE.**
- **Training Pilot to the USCG appears in RED.**
- **Translated Hindi appears as ORANGE font.**
- **Translated Tamil appears as PURPLE font.**

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
0102:40.0 **START OF TRANSCRIPT**					
0102:40.0 **PILOT**	(port twenty.)				
0102:41.2 **MAST**	port twenty.				
0102:42.2 **2ND**	port twenty.				
0102:43.1 **HELM**	port twenty.				
0102:49.2 **HELM**	wheel on port twenty.				
0103:01.5 **?**	[sound of sigh.]				
		0103:25.5 **FWD-UHF**	@[Ordinary Seaman] come in.		
		0103:28.1 **?-UHF**	go ahead bosun.		
		0103:31.7 **FWD-UHF**	*where are you? * *.*		
0133:33.0 **PILOT**	captain there's gunna be a little green buoy starboard quarter till the stern's clear.				

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
		0103:36.5 **FWD-UHF**	* * *.		
		0103:41.2 **MAST-UHF**	aft you have to keep watching for the green buoy coming on starboard quarter.		
		0103:46.8 **AFT-UHF**	copy that standing by.		
0104:05.0 **PILOT**	hard port.				
0104:07.1 **MAST**	hard port.				
0104:08.1 **HELM**	hard port.				
0104:08.6 **2ND**	hard to port.				
0104:17.4 **HELM**	wheel on hard port.				
		0104:36.4 **AFT-UHF**	bridge aft– athwartship clearance with green buoy five zero.		

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
		0104:40.8 **MAST-UHF**	five-zero. if it comes in closer… let us know.		
		0104:45.0 **AFT-UHF**	copy that sir.		
0104:44.5 **MAST**	green buoy five zero.				
0104:45.9 **PILOT**	perfect.				
0104:50.0 **AUDIO**	[sound of bridge phone ringing.]				
		0104:53.4 **2ND**	hello. *one minute.*		
0105:01.0 **PILOT**	(ease to twenty.)				
0105:03.3 **MAST**	ease to twenty.				
0105:05.0 **2ND**	ease to twenty.				
0105:13.2 **HELM**	wheel on port twenty.				

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
0105:14.6 **PILOT**	great.				
		0105:18.3 **AFT-UHF**	bridge aft– distance to the green buoy four-zero.		
		0105:22.4 **MAST-UHF**	four-zero.		
0105:36.6 **PILOT?**	very close.				
				0105:38.6 **TUG?-VHF**	(all stop).
		0105:40.0 **AFT-UHF**	bridge aft clearance three-zero.		
		0105:42.5 **MAST-UHF**	three-zero.		
		0105:45.8 **?-UHF**	* * *.		
		0105:51.6 **MAST-UHF**	she will be passing clear at		

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
			our present rate of turn?		
		0105:55.1 **AFT-UHF**	yes sir. stern in line with the green buoy. clearance two-five.		
		0106:00.2 **MAST-UHF**	roger stern in line. now we are passing clear right?		
		0106:04.4 **AFT-UHF**	yes. passing clear now.		
		0106:07.0 **MAST-UHF**	thank you.		
0106:24.5 **MAST**	we're clear at stern *.				
0106:27.4 **PILOT**	cool.				

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
				0106:57.1 **PILOT-VHF**	Bridget [Bridget McAllister IMO 9369215]. I like my chances if you want to take off.
				0107:01.2 **BRDGT-VHF**	alright– all done here. (have) safe trip.
				0107:03.4 **PILOT-VHF**	(alright).
				0107:05.6 **PILOT-VHF**	hey Eric [Eric McAllister IMO 9707493]. uh…if wanna (make sure) (get) under the line…I'm good with that.
				0107:10.0 **ERIC-VHF**	okay (that's fine).
0107:13.8 **PILOT**	captain. we can let go of the forward tug boat.				
0107:15.8 **MAST**	okay.				
		0107:16.8 **MAST-UHF**	forward– bosun. let go tug.		
		0107:22.2 **FWD-UHF**	okay. copy that. let go tug.		

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
				0108:47.8 **ERIC-VHF**	okay. we got our line.
				0108:50.2 **PILOT-VHF**	alright. takeoff. I appreciate your help this evening. have a nice one.
				0108:53.7 **ERIC-VHF**	you too.
		0108:55.5 **?-UHF**	*.		
0108:57.9 **PILOT**	slow ahead.				
		0108:58.8 **MAST-UHF**	forward tug cast off.		
0108:59.3 **2ND**	slow ahead.				
		0109:02.0 **MAST-UHF**	*any one person needs to remain forward.*		
		0109:07.7 **FWD-UHF**	*yes sir (copy that).*		
0109:10.6 **PILOT**	ease to ten.				

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
0109:11.7 **HELM**	ease to ten.				
		0109:15.6 **MAST-UHF**	we are finished with aft also.		
0109:17.6 **PILOT**	* *.				
0109:20.3 **HELM**	wheel on port ten.				
0109:25.8 **MAST**	*what was last line?*				
0109:28.2 **2ND**	yeah yeah zero-zero-three-six.				
0109:32.3 **PILOT**	one-four-zero.				
0109:33.7 **HELM**	one-four-zero sir.				
		0109:50.6 **MAST-UHF**	bosun starboard ladder one point five meter.		
		0109:55.5 **FWD-UHF**	(starboard ladder).		

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
0109:57.5 **AUDIO**	[sound similar to bridge wing door movement.]				
		0110:02.7 **MAST-UHF**	*we need one person forward now.*		
		0110:06.3 **FWD-UHF**	*yes sir I'm here.*		
0110:18.4 **PILOT**	* * *.				
0110:23.8 **TRNPLT?**	* * *.				
0110:33.2 **PILOT**	It's a long way to go.				
0110:34.8 **TRNPLT**	it is long.				
0110:48.6 **MAST**	we have mineral water and uh tea– coffee if you like?				
0110:57.0 **TRNPLT**	captain. which radar should we use? does it matter which one?				
0110:59.6 **MAST**	whichever you like– yes. whichever comfortable for you.				

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
0111:02.9 **MAST**	that one.				
0111:03.6 **TRNPLT**	yea that's okay.				
0111:04.3 **MAST**	yea.				
0111:04.6 **PILOT**	yea.				
0111:05.9 **TRNPLT**	whatever's less out of your way.				
0111:07.6 **MAST**	yea.				
				0111:08.5 **MSCT-PLT?-VHF**	security. security. M-S-C Toronto [IMO 9299525] off Baltimore Light. southbound approaching Bay Bridge passing under Bay Bridge twenty minutes checking for all concerned traffic standing by channel one three M-S-C Toronto.
0111:19.4 **HELM**	heading one-four-zero.				
0111:28.3 **MAST**	would you like to have some tea. black coffee. let us know.				

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
0111:32.2 **TRNPLT**	I'll take a black coffee.				
0111:33.0 **MAST**	black coffee. no milk no sugar?				
0111:35.0 **TRNPLT**	a little bit of sugar.				
0111:36.0 **MAST**	a little bit of sugar.				
				0111:38.5 **MSCT-PLT?-VHF**	alright port to port right around Sandy Point Light.
0111:42.2 **TRNPLT**	* * *.				
0111:44.0 **PILOT**	yeah that's true.				
				0111:49.5 **MSCT-PLT?-VHF**	port to port agreed * *.
0111:50.9 **TRNPLT**	* * the whole time?				
0111:54.1 **PILOT**	well..it's about half way so kinda-ish so…				

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
0111:59.2 **PILOT**	so Point No Point is half way.				
0112:00.7 **TRNPLT**	gotchya.				
0112:02.8 **PILOT**	* * so ill say–				
0112:05.3 **TRNPLT**	sixty miles?				
0112:05.6 **PILOT**	sixty miles.				
0112:06.4 **TRNPLT**	I can do sixty miles– (I can do that).				
0112:09.2 **PILOT**	so seventeen miles between bridges. which means how much else (is that)?				
0112:19.5 **TRNPLT**	sixty uh–				
0112:20.1 **TRNPLT**	said what bridges is how many miles?				
0112:23.8 **PILOT**	seventeen.				
0112:24.4 **TRNPLT**	seventeen.				

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
0112:26.6 **PILOT**	from bridge to bridge.				
0112:28.2 **TRNPLT**	yeah let's see. so you've got forty-three–				
0112:33.0 **TRNPLT**	open.				
0112:36.5 **PILOT**	forty-three at eighteen knots.				
0112:39.5 **PILOT**	a little over two hours.				
0112:41.6 **TRNPLT**	(let's see) two– less than two and half.				
0112:45.8 **PILOT**	yea (that's about right).				
0112:47.2 **TRNPLT**	about two-fifteen.				
0112:50.7 **PILOT**	and * now– so eight. we'll be down at this first one in twenty. twenty. tweeennnnttty. plus an hour and ten so its gunna beee. (two) thirty * thirty. I think thirty minutes.				

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
0113:07.2 **TRNPLT?**	* * *.				
0113:10.6 **PILOT**	yea four forty-five– five oh clock.				
0113:12.9 **TRNPLT**	okay.				
0113:15.5 **TRNPLT**	so zero-five for the H-I.				
0113:18.1 **PILOT**	yup.				
0113:18.9 **TRNPLT**	and I think I– I calculated ten thirty just off the bat for down at the uh…Capes.				
0113:24.2 **PILOT**	I think that's reasonable.				
0113:25.3 **TRNPLT**	yeah.				
0113:39.0 **PILOT**	think you ready?				
0113:40.4 **TRNPLT**	yea. if you don't mind.				

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
0113:41.3 **PILOT**	yea yea. go for it.				
0113:42.1 **TRNPLT**	yea.				
0113:42.6 **PILOT**	naw naw.				
0113:45.5 **PILOT**	you got one-four-zero.				
0113:46.8 **HELM**	one-four-zero.				
0113:48.2 **TRNPLT**	very well.				
		0113:52.1 **?-UHF**	* * *.		
		0113:56.7 **2ND-UHF**	(go ahead).		
0113:59.7 **AUDIO**	[sound similar to bridge wing door movement.]				
		0114:00.7 **?-UHF**	* * *.		
		0114:07.7 **?-UHF**	(okay) * * *.		

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
0114:17.6 **MAST**	[unintelligible comments between the Second Officer and the Master.]				
0114:53.0 **TRNPLT**	one-four-one.				
0114:54.6 **HELM**	one-four-one sir.				
0115:32.6 **HELM**	heading one-four-one sir.				
0115:33.9 **TRNPLT**	very well.				
0116:44.3 **AUDIO**	[sound of electronic beep.]				
0116:48.9 **TRNPLT?**	still nothing?				
0116:50.6 **PILOT?**	is it still not working?				
0116:52.8 **TRNPLT?**	(ehhhh nawww) I ain't gunna mess with that.				
		0117:10.4 **?-UHF**	* * *.		

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
0117:12.6 **AUDIO**	[sound similar to bridge wing door movement.]				
0117:22.7 **AUDIO**	[sound of music begins. light music is detected on the recording throughout the accident sequence.]				
0117:27.2 **TRNPLT**	*.				
0117:27.8 **PILOT**	[sound of chuckling.]				
0117:34.7 **AUDIO**	[sound similar to bridge wing door movement.]				
0117:42.8 **TRNPLT**	yeah it's funny. I came up here and said I haven't been on this ship before. but it looks familiar– its the sister ship to the Cezanne [IMO 9697416]. they're nice ships.				
0118:07.4 **AUDIO**	[sound similar to bridge wing door movement.]				
0118:10.1 **AUDIO**	[sound of two beeps.]				

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
		0118:18.3 **AFT-UHF**	bridge aft station secure.		
		0118:21.6 **MAST-UHF**	say okay.		
0118:22.3 **AUDIO**	[sound similar to bridge wing door movement.]				
		0118:24.4 **2ND-UHF**	okay copy.		
0118:29.9 **TRNPLT**	what's that?				
0118:30.9 **PILOT**	see if that works.				
0118:31.8 **TRNPLT**	yea.				
0118:33.4 **PILOT**	if not I give up.				
0119:00.7 **AUDIO**	[sound of two beeps.]				
0119:30.8 **AUDIO**	[sound of two beeps.]				

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
0120:00.0 **AUDIO**	[sound of steady electronic tone, about a five seconds in duration.]				
0120:59.7 **TRNPLT**	would you like me to put it up on half?				
0121:02.6 **PILOT**	(naw).				
0121:06.4 **PILOT**	at least till we get to North Point.				
0121:10.3 **TRNPLT**	* * *.				
0121:13.2 **TRNPLT**	I don't know what's uhhh...is there a ship docked there? is uh?				
0121:18.5 **PILOT**	eeeh you can just say ten knots or less.				
0121:21.4 **TRNPLT**	uh for uhhh Sparrows Point.				
0121:23.1 **PILOT**	yea.				

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
0121:25.7 **PILOT**	but like…ten point nine is still ten knots.				
0121:27.6 **TRNPLT**	right.				
0121:28.8 **TRNPLT?**	yea. [chuckles.]				
0121:29.6 **PILOT?**	eleven's too fast.				
0122:57.1 **PILOT**	so I remembered what happened in uh–				
0123:02.5 **PILOT**	whatever it was.				
0123:03.6 **PILOT**	uh…September. when I was on this. I was southbound. I think it was the day I was going on E-T-O.(I was seeing * * *.)				
0123:14.2 **TRNPLT**	yup.				
0123:15.5 **PILOT**	I took a relief– @[Other Pilot 1] was my relief and the office told me that they couldn't– they didn't have anybody to get me back– so they were like when you get there you'll just				

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
	gunna have to hang– for a while– till mid morning till we get someone down there– and I was like how bout this– I'll just stay on board go to Cape Henry and fly back– like you're flying three other people back anyway.				
0123:43.6 **TRNPLT**	yea.				
0123:44.2 **PILOT**	transportation's already organized– me and @[Other Pilot 2] through it was great idea– apparently the powers that be were not a fan.				
0123:53.8 **TRNPLT**	were not happy?				
0123:53.9 **PILOT**	they were not happy.				
0124:02.0 **PILOT**	to which I said its my E-T-O.				
0124:04.6 **TRNPLT**	yea. [sound of chuckle.]				
0124:11.6 **PILOT**	I can stay on board– go to bed– get home rested.				

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
0124:14.8 **TRNPLT**	yep.				
0124:16.2 **PILOT**	or get woken up three hours after I get in to get into a van and drive back to Baltimore.				
0124:22.4 **TRNPLT**	yea.				
0124:24.6 **PILOT**	(mine) * better.				
0124:34.6 **PILOT**	take the one oh clock flight back.				
0124:40.0 **TRNPLT**	works out well.				
0124:41.3 **PILOT**	yes.				
0124:42.1 **PILOT**	the powers were not happy.				
0124:43.9 **PILOT**	nawww– I got a phone call– "why would you do that?" I'm				

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
	still learning– I've been here (fifteen) years.				
0124:53.4 **TRNPLT**	[sound of chuckle.]				
0124:59.2 **AUDIO**	[sound similar to Automatic Power Change Over Circuit. sound of multiple alarms activating at once. the sound of these alarms continued through the contact with and subsequent collapse of the Key Bridge. the alarms were filtered heavily in attempt to remove them for the creation of this transcript. only changes in tones of the alarms are noted in the transcript, or when they were canceled.]				
0125:00.3 **PILOT?**	oh #.				
0125:01.0 **TRNPLT?**	uht oh.				
0125:01.5 **MAST**	Second Officer.	0125:05.3 **MAST-UHF**	forward. forward. forward.		

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
		0125:07.8 **2ND-UHF**	hello.		
		0125:11.6 **MAST-UHF**	bosun bosun *go fast forward.*		
0125:14.4 **PILOT**	do we have steering?				
0125:16.1 **2ND**	we have steering.				
0125:16.4 **PILOT**	do you have steering?				
0125:17.1 **HELM**	yes sir. yes sir.				
0125:17.6 **?**	okay.				
0125:18.6 **PILOT**	one-four-one.				
		0125:19.9 **MAST-UHF**	bosun come in *.		
0125:20.6 **HELM**	one-four-one sir.				
0125:21.9 **?**	yep.				

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
		0125:22.9 **MAST-UHF**	bosun bosun come in.		
0125:24.6 **PILOT**	(just) let me know if you can't steer.				
		0125:25.3 **FWD-UHF**	bosun– forward.		
		0125:27.0 **MAST-UHF**	* standby. *keep the bowstopper up*		
0125:30.0 **AUDIO**	[change in alarm tone.]				
		0125:35.2 **MAST-UHF**	bosun. copy pick up bow stopper.		
		0125:38.7 **FWD-UHF**	sir copy sir.		
0125:45.0 **MAST**	*what they say? nothing?*				
0125:47.0 **HELM**	swinging to starboard wheel on hard port sir?				
0125:51.4 **AUDIO**	[change in alarm tone.]				

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
0125:57.9 **AUDIO**	[sound similar to Automatic Power Change Over Circuit. change in alarm tone.]				
				01:25:59.9 **AMPDISP-T**	pilot's. @[AMP Pilot Dispatcher] speaking
		0126:00.2 **MAST-T?**	*yes tell me now.*		
				0126:01.6 **PILOT-T**	@[AMP Pilot Dispatcher] have them shut down the Bay Bridge. I just lost steering– not the Bay Bridge– the uh... Key Bridge–
				01:26:04.7 **AMPDISP-T**	okay. Key Bridge?
				01:26:06.9 **PILOT-T**	yep.
				01:26:07.8 **AMPDISP-T**	alright. bye.
				01:26:08.2 **PILOT-T**	bye.
0126:10.3 **HELM**	we are swinging to starboard sir.				
0126:10.3 **AUDIO**	[sound similar to Automatic Power Change Over Circuit.]				

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
0126:11.9 **PILOT**	port twenty.				
0126:13.1 **MAST**	port twenty.				
0126:13.4 **HELM**	port twenty sir.				
0126:15.0 **PILOT**	port. [shouted.]				
0126:15.8 **HELM**	yes sir. port twenty sir.				
0126:17.2 **PILOT**	(yea/whats that?)				
0126:20.4 **PILOT**	uh grab my radio get channel fourteen.				
0126:22.4 **TRNPLT**	yep.				
0126:22.8 **PILOT**	grab a Mac boat.				
0126:24.1 **MAST**	*how it makes a sound? alarm?*				
		0126:28.4 **2ND-T?**	hello.		

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
0126:29.8 **PILOT**	is the bosun standing by forward?				
0126:31.4 **MAST**	ya he is– yes.				
		0126:33.0 **2ND-T?**	me Second Officer.		
0126:33.8 **AUDIO**	[sound of electronic beep.]				
0126:34.4 **PILOT**	are you on fourteen?				
0126:34.9 **HELM**	wheel on port twenty sir.				
0126:37.2 **AUDIO**	[change in alarm tone.]				
				0126:38.0 **PILOT-VHF**	calling the Mac boats– anybody out there?
				01:26:44.7 **CMD-T**	central command (corporate) harbor can I help you?

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
				0126:45.7 **ERIC-VHF**	yeah. this is the Eric. [Eric McCallister IMO 9707493]
				01:26:46.4 **AMPDISP-T**	hey. I am trying to get a hold of someone to shut down the Key Bridge. I have a ship that just lost steering heading towards it. I know that we gotta call the Coast Guard as well.
				0126:47.4 **PILOT-VHF**	hey Eric [IMO 9707413] it's the Dali– I need ya over here quick I've uh just lost power (heading to the Key Bridge).
				01:26:53.6 **CMD-T**	ok uhhh...where? where you at? you - you're on the water right now?
				0126:55.0 **ERIC-VHF**	copy that. we'll be right there.
				0126:57.2 **PILOT-VHF**	that's it. hammer down.
				01:26:57.3 **AMPDISP-T**	no there's a vessel - I'm calling for the pilot. there's a ship heading toward the Key Bridge. he lost steering. we need to stop all traffic on the Key Bridge.
0126:58.4 **AUDIO**	[sound of public address chime.]				

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
		0126:59.3 **MAST-UHF**	forward *are you stand by now.*		
		0127:00.7 **2ND-PA**	chief officer chief officer * *.		
0127:02.7 **PILOT**	port anchor. [shouted.]				
0127:03.5 **?**	*what happened to us?* [exclaimed.]				
0127:04.0 **AUDIO**	[sound similar to Automatic Power Change Over Circuit. change in alarm tone.]				
0127:04.7 **HELM**	port twenty sir.				
				01:27:04.8 **CMD-T**	okay. got it.
		0127:05.6 **MAST-UHF**	forward let go port anchor. forward let go port anchor. [shouted]		
				01:27:05.8 **AMPDISP-T**	alright bye.

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
				01:27:06.2 **CMD-T**	thanks bye. [sound similar to phone handset slamming.]
		0127:10.4 **FWD-UHF**	sir I cannot * * *. [end of transmission obscured by other shouts on the bridge.]		
0127:11.4 **PILOT**	make a security call.				
0127:12.6 **TRNPLT**	yep.				
		0127:14.1 **MAST-UHF**	*fast fast let go port anchor* [shouted]		
		0127:16.7 **2ND-T?**	chief officer.		
		0127:19.2 **MAST-UHF**	forward let go port anchor. let go port anchor.		
		0127:20.2 **2ND-PA**	chief officer. chief officer. let go port		

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
			anchor. let go port anchor go forward		
0127:23.0 **PILOT**	hard port [shouted.]				
0127:23.9 **HELM**	hard port sir. [shouted.]				
				0127:25.2 **TRNPLT-VHF**	security call. security call. container ship Dali has lost power. approaching the Key Bridge– I repeat– the container ship Dali has lost all power approaching the Key Bridge– Dali.
		0127:25.7 **?-UHF**	* * *.		
		0127:28.1 **MAST-UHF**	forward let go *fast*		
0127:36.1 **AUDIO**	[sound similar to Automatic Power Change Over Circuit. change in alarm tone.]				
0127:36.0 **HELM**	wheel on hard port sir.				
		0127:40.4 **MAST-UHF**	forward *.		

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
0127:42.2 **PILOT**	captain do we have a bow thruster? [shouted.]				
0127:44.0 **MAST**	eh yes.				
0127:44.8 **2ND**	we have. we have. we have. [shouted.]				
0127:45.5 **MAST**	we have.				
0127:46.3 **PILOT**	full to port. [shouted.]				
0127:46.9 **MAST**	full to port full to port. [exclaimed.]				
0127:47.2 **2ND**	full to port. [exclaimed.]				
		0127:51.3 **MAST-UHF**	forward let go.		
				0127:54.8 **ERIC?-VHF**	Dali you lost uh you lost engines?

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
		0127:55.0 **FWD-UHF**	I tried to open the break *break is not able to open up.*		
		0128:01.0 **MAST-UHF**	*open open open fast open it and* let go.		
0128:09.2 **MAST**	#.				
0128:10.8 **PILOT?**	* (look).				
0128:11.5 **?**	[sound of yelling frustrated groan.]				
0128:16.4 **?**	** * (what happens).*				
		0128:21.5 **MAST-UHF**	*has anyone come forward?*		
		0128:24.9 **FWD-UHF**	*it's done*		
		0128:26.4 **MAST-UHF**	let go. let go. let go port anchor. [shouted]		

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
0128:33.9 **PILOT?**	it's not good.				
		0128:37.5 **MAST-UHF**	*have you let go?*		
		0128:42.2 **FWD-UHF**	*opened it.*		
		0128:45.1 **MAST-UHF**	let go. let go.		
0128:51.0 **HELM**	hard port sir.				
0128:53.1 **PILOT**	great.				
0128:56.5 **PILOT**	full bow thruster to port. [shouted.]				
0128:57.8 **2ND**	no. it's not working.				
0128:58.5 **MAST**	not working.				
0128:59.3 **PILOT**	not working #.				
0128:59.9 **AUDIO**	[sound similar to the anchor chain running.]				

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
		0129:00.7 **MAST-UHF**	forward?		
0129:03.1 **?**	* *.				
		0129:03.8 **MAST-UHF**	let go. yes.		
0129:06.9 **PILOT?**	[sound of groaning/cringing.]				
0129:15.2 **AUDIO**	[sound similar to collapse of Francis Scott Key Bridge. an enormous rumble.]				
0129:15.8 **TRNPLT**	oh # oh #. [shouted.]				
0129:17.3 **PILOT**	oh #. [shouted.]				
0129:18.4 **TRNPLT**	oh #. [shouted.]				
0129:20.7 **PILOT?**	oh #. [shouted.]				

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
0129:21.3 **TRNPLT?**	oh #. [shouted.]				
0129:22.7 **TRNPLT**	holy #. holy #. holy #.				
0129:29.3 **PILOT**	call the Coast Guard. [shouted.]				
0129:32.9 **TRNPLT?**	the Key Bridge is down. [shouted.]				
0129:35.8 **PILOT**	get 'em on sixteen. [exclaimed.]				
				0129:37.4 **TRNPLT-VHF**	Coast Guard. Coast Guard. this the Dali. we have a major problem. the Key Bridge is down. I repeat. the Key Bridge is down. ummm Coast Guard. Coast Guard. this is container ship Dali. you copy?
				0129:50.8 **USCG-VHF**	vessel calling Coast Guard. this is Coast Guard Sector Maryland. I have you reporting that the Key Bridge is down.
		0129:51.4 **2ND-T?**	hello.		

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
		0129:52.4 **2ND-T?**	*bridge collapsed forward forward bridge fell down - in the water.*		
		0129:57.8 **2ND-T?**	*the U-S bridge has fallen.*		
0130:09.2 **AUDIO**	[sound similar to bridge wing door movement.]				
0130:15.2 **PILOT**	is anybody injured up forward? (captain).				
0130:17.2 **?**	* * *.				
0130:17.8 **?**	*forward?*				
		0130:18.3 **MAST-UHF**	*forward did you let go anchor forward?*		
				0130:22.7 **PILOT?-T?**	hey.
		0130:23.3 **MAST-UHF**	forward?		

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
0130:24.8 **PILOT?**	the bridge is down.				
		0130:25.6 **FWD-UHF**	* * *.		
		0130:27.4 **MAST-UHF**	*was the anchor let go?*		
				0130:31.9 **PILOT?-T**	@[AMP Pilot Dispatcher] # crazy.
		0130:34.1 **MAST-UHF**	*was the anchor let go?*		
				0130:35.8 **PILOT?-T?**	(@[AMP Pilot Dispatcher]).
0130:36.9 **PILOT?**	hollllyyy #.				
0130:37.9 **TRNPLT?**	[sound of sigh.]				
		0130:44.5 **MAST-UHF**	*forward have you let go of the anchor?*		
0130:47.4 **AUDIO**	[sound of pulsing alarm.]				

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
		0130:47.7 **FWD-UHF**	*done done done.*		
0131:06.9 **AUDIO**	[cessation of pulsing alarm.]				
				0131:16.3 **PILOT-T**	hey good evening. this is the pilot of the Dali. we just hit the Key Bridge. the Key Bridge is down. I repeat. the Key Bridge is down.
				0131:25.9 **USCG-VHF**	vessel calling Coast Guard. this is Coast Guard sector Maryland channel sixteen. come in again.
				0131:30.0 **PILOT-T**	the Dali– yes the ship.
				0131:31.1 **TRNPLT-VHF**	yeah. this is the Dali go ahead.
				0131:34.4 **PILOT-T**	just now.
				0131:37.2 **USCG-VHF**	vessel Dali calling Coast Guard. can I get your name and a good on board

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
					cell phone number. we're trying to gather as much information as we can.
				0131:38.6 **PILOT-T**	no idea– need everything.
				0131:43.8 **PILOT-T**	I am the pilot.
				0131:47.5 **PILOT-T**	uhhh– thee– dude– I'm on a nine hundred foot container ship. yea.
				0131:52.2 **TRNPLT-VHF**	yes. um phone number is [redacted phone number].
				0131:54.4 **PILOT-T?**	we got some problems.
				0131:55.1 **MAST-T**	*yes sir yes sir * * *.*
				0131:57.0 **PILOT-T**	[redacted phone number].
				0132:01.1 **MAST-T**	we collided with the bridge.
				0132:03.4 **TRNPLT-VHF**	no [redacted phone number].

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
				0132:05.6 **USCG-VHF**	roger that captain– and can you give me a description of what you need and what's going on?
				0132:05.7 **MAST-T**	after uh we were heading toward the bridge…we had a black out and then we collided with the bridge. the bridge has fallen down. the Baltimore bridge. yea the bridge is collapsed. and uhhh–
				0132:10.3 **TRNPLT-VHF**	uh yeah were a thousand foot container ship. we lost power going through the Key Bridge– we hit the span and the Key Bridge is down. it's…it's down.
				0132:24.6 **MAST-T**	we were uhhh…just approaching the bridge. that time we had blackout.
				0132:30.3 **USCG-VHF**	roger that captain and are there any injuries on board?
				0132:30.9 **MAST-T**	and then we tried to umm–

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
				0132:33.6 **MAST-T**	none reported at this time– no injuries on board at this time.
				0132:36.9 **MAST-T**	and we tried to let go anchor– we kept shouting 'let go anchor. let go anchor' and then uhhh we let go anchor also. but then we went and collided with the pillar and then the bridge itself collapsed.
				0132:43.7 **USCG-VHF**	roger that captain standby.
0132:44.5 **PILOT**	can we silence some of this stuff?				
0132:46.7 **2ND**	sorry?				
0132:47.5 **PILOT**	can we silence some of this stuff?				
0132:48.5 **2ND**	silence?				
0132:49.9 **PILOT**	just turn some of the alarms off.				
0132:51.6 **2ND**	yes yes (there it is).				

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
0132:52.4 **PILOT**	yea thanks. [sound of some of the alarms activated previously now ceased. other alarms remained.]				
				0132:54.7 **MAST-T**	yeah. I think. I think when I saw on the left side…I could see vehicles but not sure it was on the bridge or not.
0132:55.2 **TRNPLT**	holy #.				
0132:56.1 **PILOT**	you okay?				
0132:58.0 **TRNPLT**	are you???				
0132:58.5 **PILOT**	I'm okay.				
0132:59.4 **TRNPLT?**	oh # [quick nervous laugh] ohhh dude hooollllyyy–				
0133:02.6 **PILOT**	now this is a problem.				

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
0133:03.7 **TRNPLT**	no #.				
0133:05.5 **PILOT**	okay who else do we need to call?				
0133:07.1 **TRNPLT**	so that's Coast Guard–				
0133:08.2 **PILOT**	call the Coast Guard.				
0133:08.8 **TRNPLT**	@[Vice President - AMP]				
				0133:09.0 **MAST-T**	no no the whole bridge down. the bridge that we passed through has collapsed. and we are anchored and touching the pillar and all.
0133:09.8 **PILOT**	(I'm going to call @[Vice President - AMP].)				
0133:11.9 **PILOT**	@[Vice President - AMP] will know @[President AMP] will know.				

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
0133:15.3 **PILOT**	umm I'm going to have to take a drug test. which is fine.				
0133:17.8 **TRNPLT**	me too.				
0133:17.9 **TRNPLT**	yeah I don't care.				
0133:18.6 **PILOT**	yeah I don't care.				
0133:20.1 **PILOT**	uh what did we do wrong?				
0133:23.0 **TRNPLT**	we were steadied up. we were in the channel.				
				0133:23.3 **MAST-T**	yeah yeah. the two pilots are here– and we were trying to um…check with the engine room. but there was no response here and they kept saying 'wait wait wait' and uh–
0133:24.2 **PILOT**	yeah.				
0133:24.8 **TRNPLT**	we were coasting. everything was fine– usually when				

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
	everything's fine you just let it go–				
0133:29.0 **?**	yeah.				
0133:29.6 **PILOT**	I called @[Pilot Dispatcher] when we started to– drift.				
0133:32.2 **TRNPLT**	drift.				
0133:33.5 **PILOT**	but we had good speed.				
0133:34.4 **TRNPLT**	yeah.				
0133:35.2 **PILOT**	we weren't going crazy.				
0133:36.1 **TRNPLT**	yeah.				
0133:36.8 **PILOT**	everything was under control.				
0133:37.6 **TRNPLT**	yep.				
0133:38.4 **PILOT**	alright.				

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
0133:38.8 **TRNPLT**	we had a course to steer.				
0133:40.3 **PILOT**	had a course to steer.				
0133:41.0 **TRNPLT**	yeah.				
0133:41.4 **PILOT**	and then–				
				0133:43.5 **MAST-T**	yeah they've informed the U-S-C-G– the pilots.
0133:46.7 **PILOT**	mate. [exclaimed]				
0133:47.2 **2ND**	yes sir.				
0133:47.7 **PILOT**	is your crew up forward safe?				
0133:48.8 **2ND**	yes yes yes yes.				
0133:50.1 **PILOT**	are they safe?				
		0133:51.0 **2ND-UHF**	forward forward station.		

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
0133:52.8 **PILOT**	is anybody injured?				
		0133:53.7 **FWD-UHF**	bridge forward.		
		0133:54.7 **2ND-UHF**	everybody is safe. forward anybody– anybody injured?		
		0133:59.4 **FWD-UHF**	we are luckily safe sir. we have come aft.		
		0134:05.8 **2ND-UHF**	no no everybody's safe chief officer?		
		0134:08.9 **FWD-UHF**	sir yes sir. luckily we are safe. [exclaimed.]		
				0134:10.8 **MAST-T**	yea yea yea we are crew is safe. our bow hit the pillar of the bridge and the bridge fell down completely. and uh we'll have to check.

Time and Source	Bridge Audio	Time and Source	Intra-Ship Comms	Time and Source	External Ship Comms
0134:11.8 **PILOT**	they are safe?				
		0134:14.1 **2ND-UHF**	chief officer come in sir.		
0134:16.3 **CM**	* no problem forward.				
		0134:18.5 **2ND-UHF**	no problem forward.		
				0134:18.7 **USCG-VHF**	pan pan pan pan pan pan (hello) all stations (hello). all stations. this is United States Coast Guard sector Maryland N-C-R United States Coast Guard sector Maryland N-C-R Coast Guard. urgent marine information broadcast– time– zero five thirty four Greenwich Mean Time. zero one thirty four local time– the Coast Guard's received a report of a bridge allision with a container vessel at the Key Bridge with possible persons in the water. all mariners are requested to keep sharp lookout. assist if possible and report all sightings and information to the nearest Coast Guard unit. this is United States Coast Guard sector Maryland N-C-R– out–
00134:16 **END OF TRANSCRIPT**					

Post Accident Recording Summary

Start 01:34:16 End 02:00:00

The Second Officer was detected on a phone call.

The USCG inquired about the vessel's position and the Pilot reported it as "under the Francis Scott Key Bridge." The Training Pilot responded to the USCG's queries on VHF radio. At times, the Training Pilot stated that he could not hear due to the number of alarms that were activated. The USCG asked to confirm the meaning of the report of the "bridge down." The Training Pilot confirmed the bridge had collapsed. The USCG and Training Pilot agreed to be available on VHF channel16.

The Pilot made a phone call to the Pilot Dispatcher, much of the conversation was obscured by other sounds on the bridge. The Pilot inquired about injuries on the Francis Scott Key bridge.

The Master was also audible checking forward of the vessel. The contents of any one conversation could not be determined due to extraneous bridge noise and alarms.

Around 01:45, the pilots and crew discussed if there was traffic at the bridge at the time of the accident. Most voices detected determined that they had not seen any traffic on the bridge at the time of the collision.

The Master discussed with the Pilots that they were unable to access the forecastle. The Master and Pilots discussed the condition of the vessel near the bow.

Around 01:48, one of the Pilots asked if there was hazmat on the bow. The conversation was interrupted by a muster call made by the Second Officer on the ship's PA system.

Around 01:50, the USCG issued another Pan Pan call on VHF channel 16.

Around 01:51, the Master was detected on a phone call stating that he heard water running into the vessel. The Master stated that he could not see any oil sheen on the water. The Master also stated he could see some open containers and loose packages. The Master repeatedly stated to the person on the phone that the vessel had collided with the bridge and the vessel remained in contact with a pillar of the bridge. The Master continued to discuss damage to the vessel and stated that he did not know exactly which frame numbers of the vessel were damaged.

Around 01:53:25, one of the Pilots asked, "are we drifting?" Another voice stated that the Eric McAllister was present. The conversation was difficult to ascertain as multiple alarms and other conversations were present.

END 02:00:00 – No other spoken audio was transcribed or summarized.

2:25:15: The last electronic alarm ceased sounding at this time.

APPENDIX A. VDR QUALITY RATING SCALE

The levels of recording quality are characterized by the following traits of the voyage data recorder audio information:

Excellent Quality Virtually all of the crew conversations could be accurately and easily understood. The transcript that was developed may indicate only one or two words that were not intelligible. Any loss in the transcript is usually attributed to simultaneous bridge/radio transmissions that obscure each other.

Good Quality Most of the crew conversations could be accurately and easily understood. The transcript that was developed may indicate several words or phrases that were not intelligible. Any loss in the transcript can be attributed to minor technical deficiencies or momentary dropouts in the recording system or to a large number of simultaneous bridge/radio transmissions that obscure each other.

Fair Quality The majority of the crew conversations were intelligible. The transcript that was developed may indicate passages where conversations were unintelligible or fragmented. This type of recording is usually caused by bridge noise that obscures portions of the voice signals or by a minor electrical or mechanical failure of the VDR system that distorts or obscures the audio information.

Poor Quality Extraordinary means had to be used to make some of the crew conversations intelligible. The transcript that was developed may indicate fragmented phrases and conversations and may indicate extensive passages where conversations were missing or unintelligible. This type of recording is usually caused by a combination of a high bridge noise level with a low voice signal (poor signal-to-noise ratio) or by a mechanical or electrical failure of the VDR system that severely distorts or obscures the audio information.

Unusable Crew conversations may be discerned, but neither ordinary nor extraordinary means made it possible to develop a meaningful transcript of the conversations. This type of recording is usually caused by an almost total mechanical or electrical failure of the VDR system.