National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594

DCA24FM018

VOYAGE DATA RECORDER GROUP

Specialist's Factual Report

November 26, 2024

WARNING

The reader of this report is cautioned that the transcript of a voyage data recorder audio recording is not a precise science but is the best product possible from a National Transportation Safety Board group investigative effort. The transcript or parts thereof, if taken out of context, could be misleading. The transcript should be viewed as an accident investigation tool to be used in conjunction with other evidence gathered during the investigation. Conclusions or interpretations should not be made using the transcript as the sole source of information.

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A. ACCIDENT

Location: Goose Creek, South Carolina
Date: January 14, 2024
Time: 1019 eastern standard time (EST)
Cargo, Liquid Bulk: Hafnia Amessi, IMO 9719745

B. VOYAGE DATA RECORDER GROUP

Group Chairman   Matthew Yandrick
                        Electrical Engineer – Recorder Specialist
                        National Transportation Safety Board (NTSB)

Group Member   Andrew Ehlers
                        Investigator In Charge (IIC)

C.   NTSBFEDERAL 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 a simplified voyage data recorder (S-VDR). Either system requires a minimum of the most-recent 12 hours to be stored. 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]

Hafnia Amessi was built in 2015, and therefore was required to be fitted with a VDR. *Hafnia Amessi* was equipped with a Furuno VR-7000 VDR.

For additional details related to VDR carriage requirements, refer to table 1 below.

Table 1. Comparison of VDR and S-VDR requirements.

Parameters to be Recorded	VDR after June 2014[a]	VDR before July 2014[b]	S-VDR[c]
Date and time	X	X	X
Ship's position	X	X	X
Speed	X	X	X
Heading	X	X	X

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

Parameters to be Recorded	VDR after June 2014[a]	VDR before July 2014[b]	S-VDR[c]
Bridge audio	X	X	X
VHF communications audio	X	X	X
Radar	X	X	X [d]
AIS	X		X [d]
ECDIS	if fitted		
Depth (echo sounder)	X	X	X [d]
Main alarms	X	X	X [e]
Rudder order and response	X	X	X [e]
Engine and thruster order and response	X	X	X [e]
Hull openings status	X	X	X [e]
Watertight and fire door status	X	X	X [e]
Accelerations and hull stresses	if fitted	X	X [e]
Wind speed and direction	if fitted	if fitted	X [e]
Rolling motion (inclinometer)	if fitted		
Configuration data	X		
Electronic logbook	if fitted		

[a] Refer to IMO resolution MSC.333(90) for required VDR parameters for installations after June 2014.

[b] Refer to IMO resolution A.861(20) for required VDR parameters for installations before July 2014.

[c] Refer to IMO resolution MSC.163(78) for required S-VDR parameters.

[d] S-VDR installations require radar, unless no commercial off the shelf (COTS) interface is available. If COTS interface for radar is not available, AIS data must be recorded.

[e] Certain parameters are only required for S-VDR installations if an IEC 61162 digital interface is available.

SOLAS Chapter V, regulation 18, requires an annual performance test (APT) for VDRs by an approved testing or servicing facility to verify the accuracy, duration, and recoverability of recorded data. Included in an APT is an inspection of devices fitted to aid location of the recorder.

D.   DETAILS OF THE INVESTIGATION

The NTSB Vehicle Recorder Division received an electronic file containing the VDR data from the *Hafnia Amessi*. This data came from the Furuno VR-7000:

Recorder Manufacturer/Model: Furuno VR-7000
Recorder Serial Number: 100019-100406

1.0   Furuno VR-7000 Recorder Description

The Furuno VR-7000 is a full VDR system capable of recording navigation, propulsion, alarms, weather, and radar data. Additionally, bridge audio and communications audio channels are recorded. A minimum of 48 hours of data is recorded by the crash protected VDR capsule and 30 days on the long term storage medium inside the ship.

1.1   Recording Description

An approximate 6-hour download of the *Hafnia Amessi* VDR was provided to the Vehicle Recorder Division. Software from the VDR manufacturer was used to extract bridge audio, parametric data, and radar/Electronic Chart Display and Information System (ECDIS) images. Data were converted into the National Marine Electronics Association (NMEA) 0183 format, from there, lab software was used to convert the data into engineering units.

Timing of the VDR data was synchronized to GPS time and recorded as coordinated universal time (UTC). Time was converted to local time or eastern standard time (EST) by subtracting 5-hours from UTC. Data from the time surrounding the event were recorded by the VDR. The time of the selected parameters ranged from 07:49:52.3 EST on January 14, 2024, to 13:49:51.7 EST on January 14, 2024.

The parameters evaluated for this report appeared to be in accordance with VDR carriage requirements.

The system was also designed to record a screenshot of the ship's ECDIS and radar system every 15 seconds. The VDR playback software allowed the screenshots to be replayed. The system also exported screenshots PNG images.

1.2   Audio Recording Description

Each channel's audio quality is indicated in table 2. Table 2 lists the eight monaural audio tracks from the microphones on and around the bridge that were recorded; each channel's audio quality is indicated in the table.[2]

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[2] Monaural audio – a single channel of audio perceived from a single position or speaker.

Table 2. Audio Quality and Channel Description.

Source Microphone	Channel Number	Quality[3]	Duration
VHF1	V1	Good	05:59:59.4[4]
VHF2	V2	Good	05:59:59.4
B.C.C.[5] Starboard	M1	Good	05:59:59.4
B.C.C. Port	M2	Best	05:59:59.4
B.C.C. Center	M3	Best	05:59:59.4
Chart Table	M4	Good	05:59:59.4
Radio Table	M5	Good	05:59:59.4
Unknown	M6	Not Active	05:59:59.4
B.W.C.[6] Port	M7	Good	05:59:59.4
B.W.C. Starboard	M8	Not Active	05:59:59.4

[3] Audio Quality Rating Scale provided in attachment 1.
[4] Format given is HH:MM:SS.0, where HH is equal to the number of elapsed hours, MM is equal to the number of elapsed minutes and SS.0 is equal to the number of seconds to 1 decimal place.
[5] Bridge Center Control console.
[6] Bridge Wing Control console.

E.   AUDIO AND DATA SUMMARY

Voices in English appear in English. Voices in non-English were not transcribed by the audio group. Attachment 1 contains an approximate 13-minute transcript of the events recorded on the VDR. The bridge audio transcript began at 10:09:00 EST and ended at 10:22:00 EST on January 14, 2024.

Parametric data for 45 minutes prior to the accident is provided in this report. Figure 1 is a plot of parameters recorded by the VDR from 09:45:00 EST to 10:30:00 EST on January 14, 2024. Figure 2 is plot of parameters around the time of the accident from 10:14:00 EST to 10:21:00 EST on January 14, 2024. The data is also provided in comma-separated value (CSV) format as attachment 2 to this report.

Both rudder sensor angle channels are provided and plotted. The difference between each channel was approximately 1 to 2 degrees from each other.

The ships ECDIS images for approximately 5 minutes prior to the accident is provided in this report. Figures 3-23 contain ECDIS images displayed to the crew from 10:14:06 EST to 10:19:06 EST on January 14, 2024.
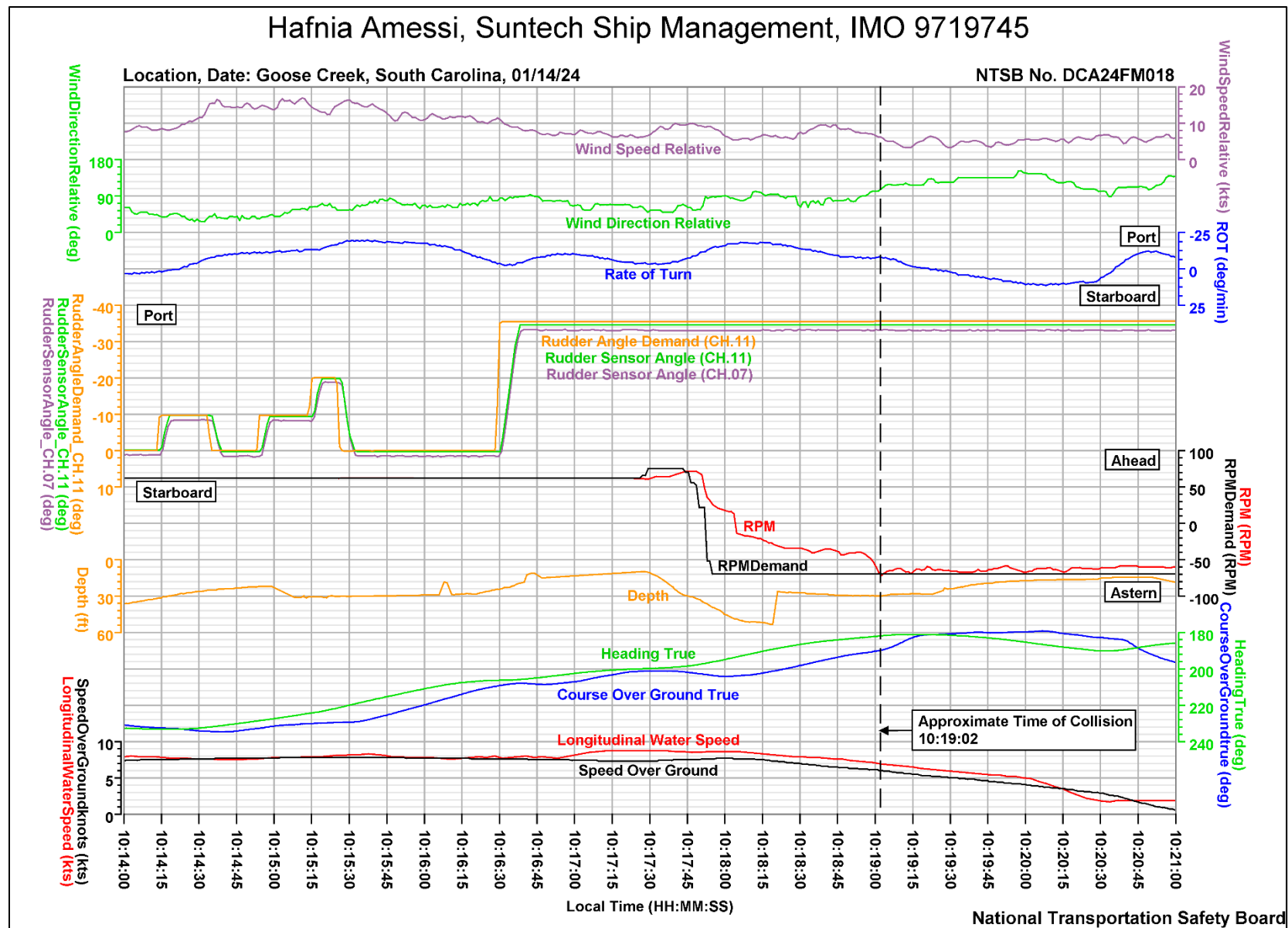
Submitted by:

Matthew Yandrick
Electrical Engineer – Recorder Specialist
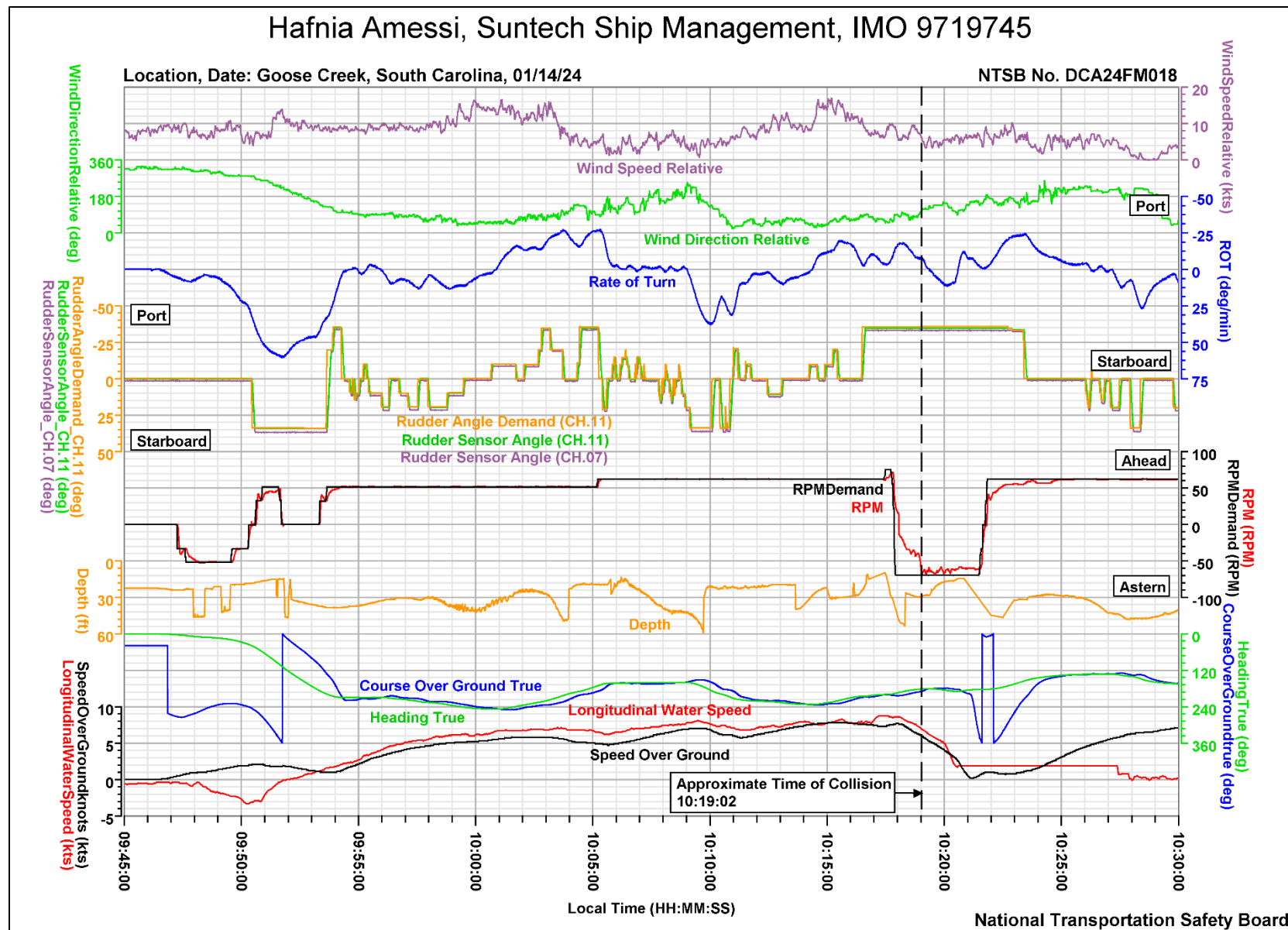
Figure 1. Plot of voyage data recorder parameters from 09:45:00 EST to 10:30:00 EST.

Figure 2. Plot of voyage data recorder parameters from 10:14:00 EST to 10:21:00 EST.

APPENDIX A. VERIFIED AND PROVIDED PARAMETERS FROM FURUNO VR-7000.

This appendix describes the parameters provided and verified in this report. Table 1 lists the Furuno VR-7000 parameters and unit abbreviations.

Table 2. Verified and provided parameters.

Parameter Name (units)	Parameter Description (unit description)
CourseOverGroundtrue (deg)	Course over ground true (degrees)
Depth (ft)	Depth (feet)
HeadingTrue (deg)	Heading true (degrees)
LongitudinalWaterSpeed (kts)	Longitudinal water speed (knots)
ROT (deg/min)	Rate of turn (degrees per minute)
RPM (RPM)	Engine revolutions per minute (RPM)
RPMDemand (RPM)	Engine revolutions per minute demand (RPM)
RudderAngleDemand_CH.11 (deg)	Rudder angle demand (Ch.11) (degrees)
RudderSensorAngle_CH.07 (deg)	Rudder sensor angle (Ch.07) (degrees)
RudderSensorAngle_CH.11 (deg)	Rudder sensor angle (Ch.11) (degrees)
SpeedOverGroundknots (kts)	Speed over ground (knots)
WindDirectionRelative (deg)	Relative wind direction (degrees)
WindSpeedRelative (kts)	Relative wind speed (knots)
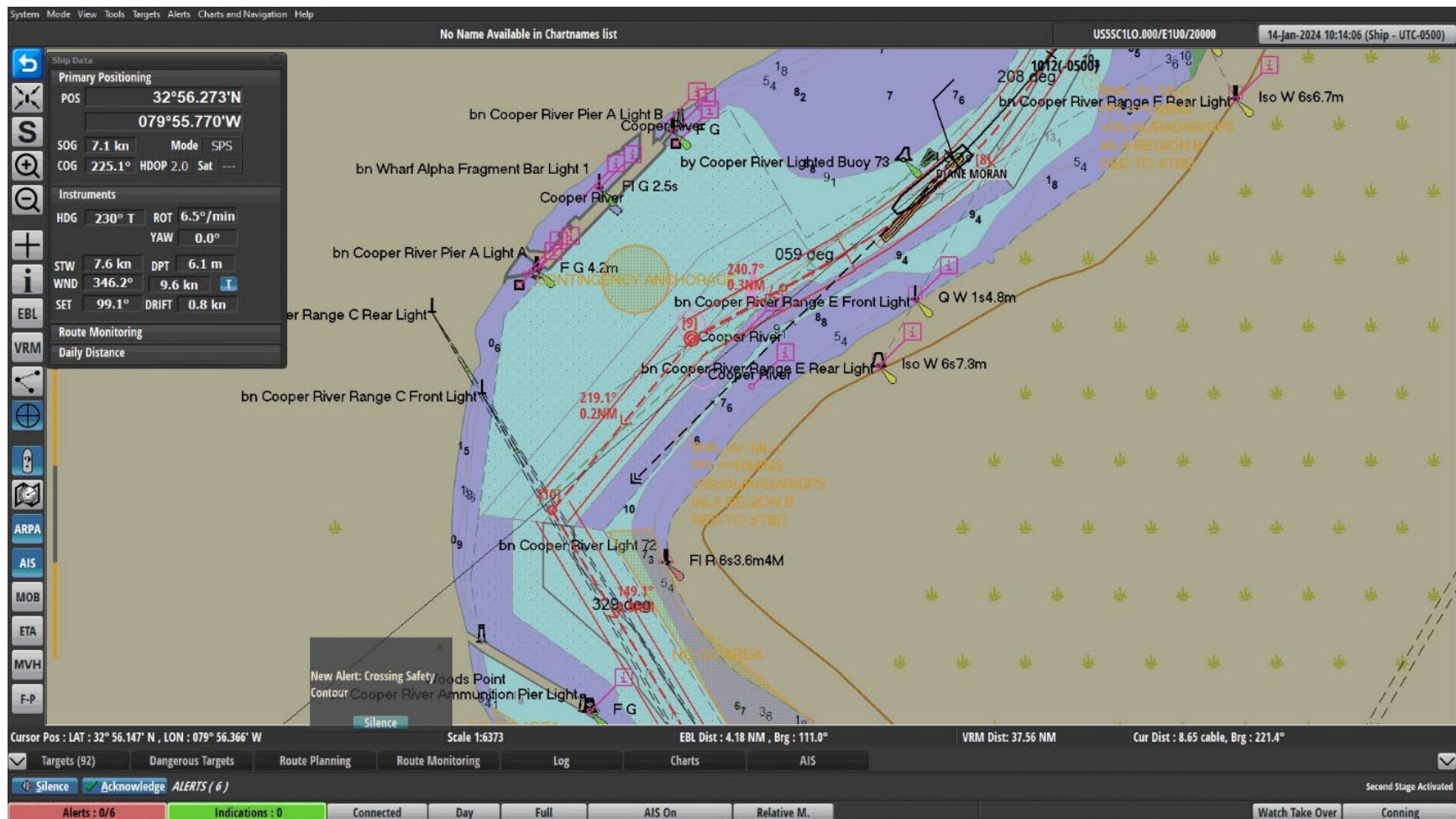
Figure 3. ECDIS display at 10:14:06 EST.

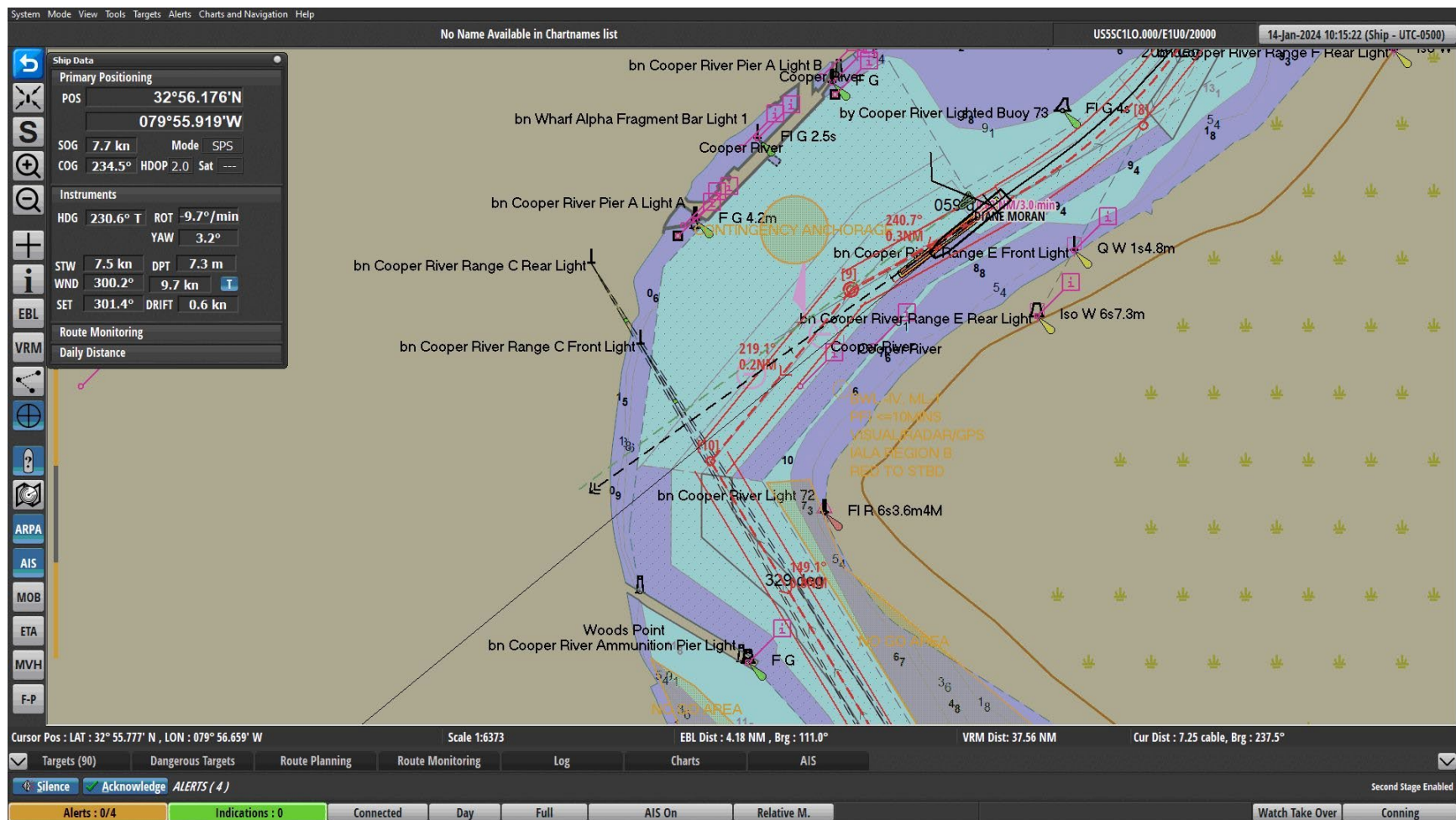**Figure 4.** ECDIS display at 10:14:21 EST.
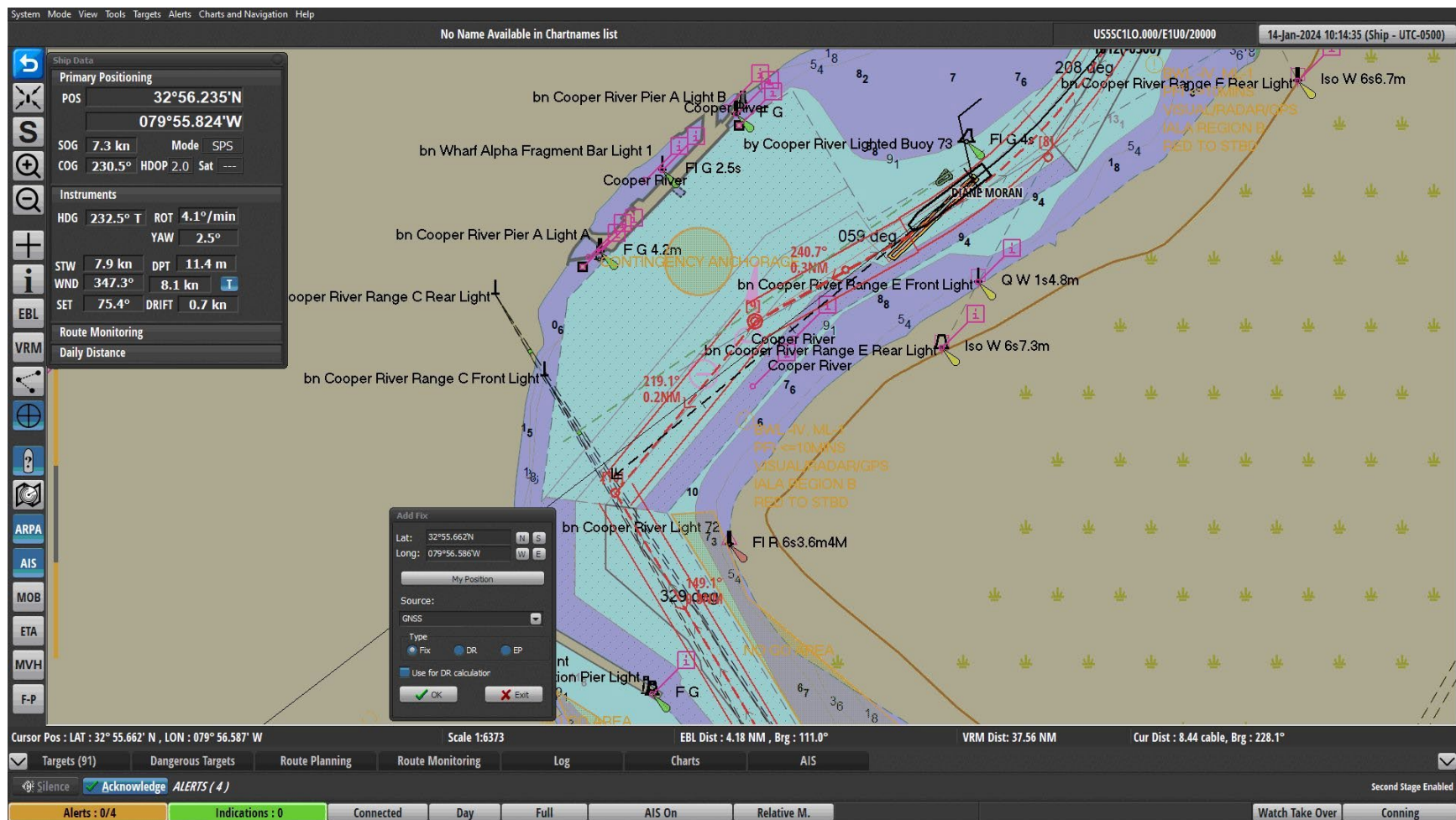
Figure 5. ECDIS display at 10:14:35 EST.

Figure 6. ECDIS display at 10:14:51 EST.
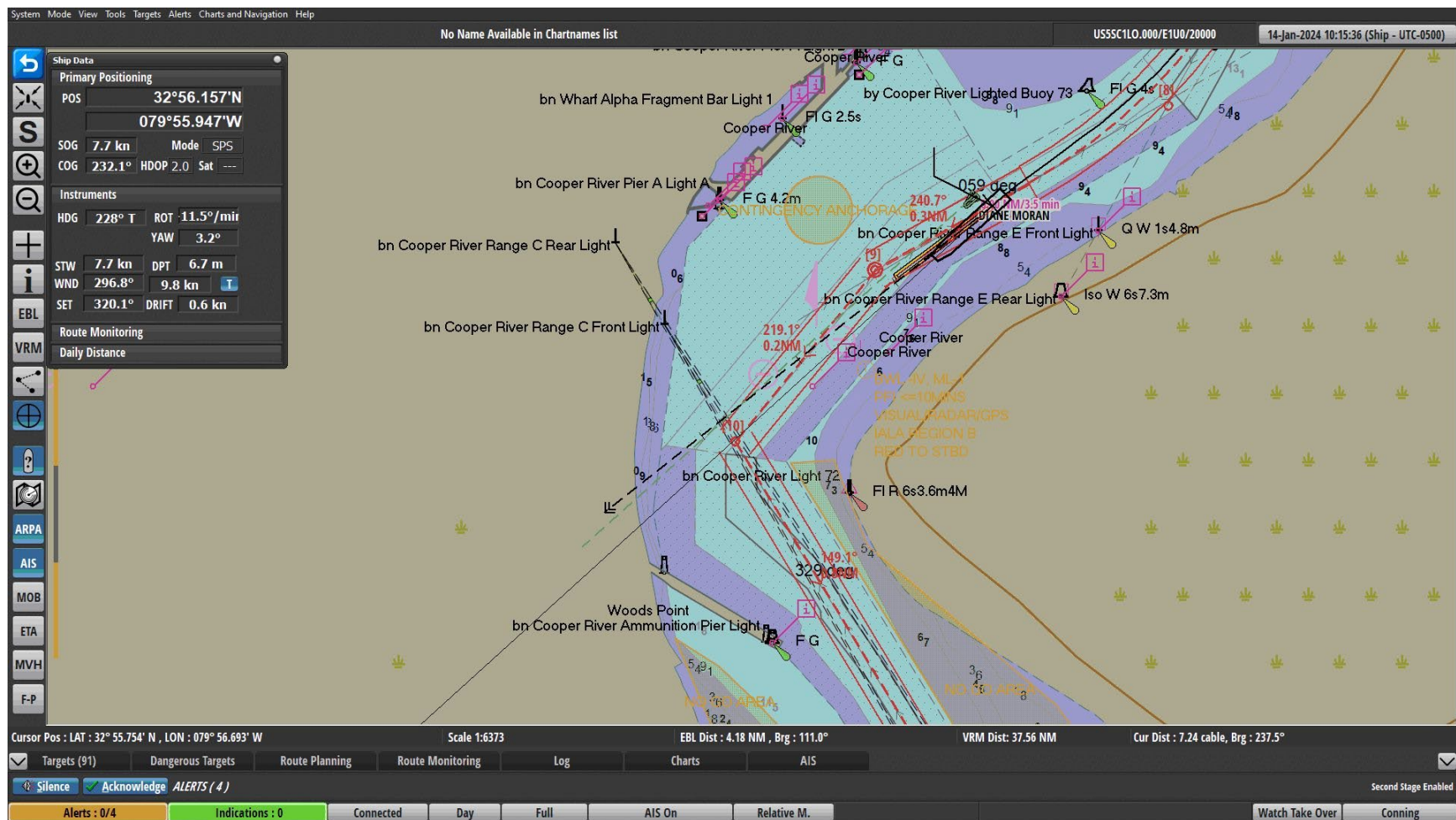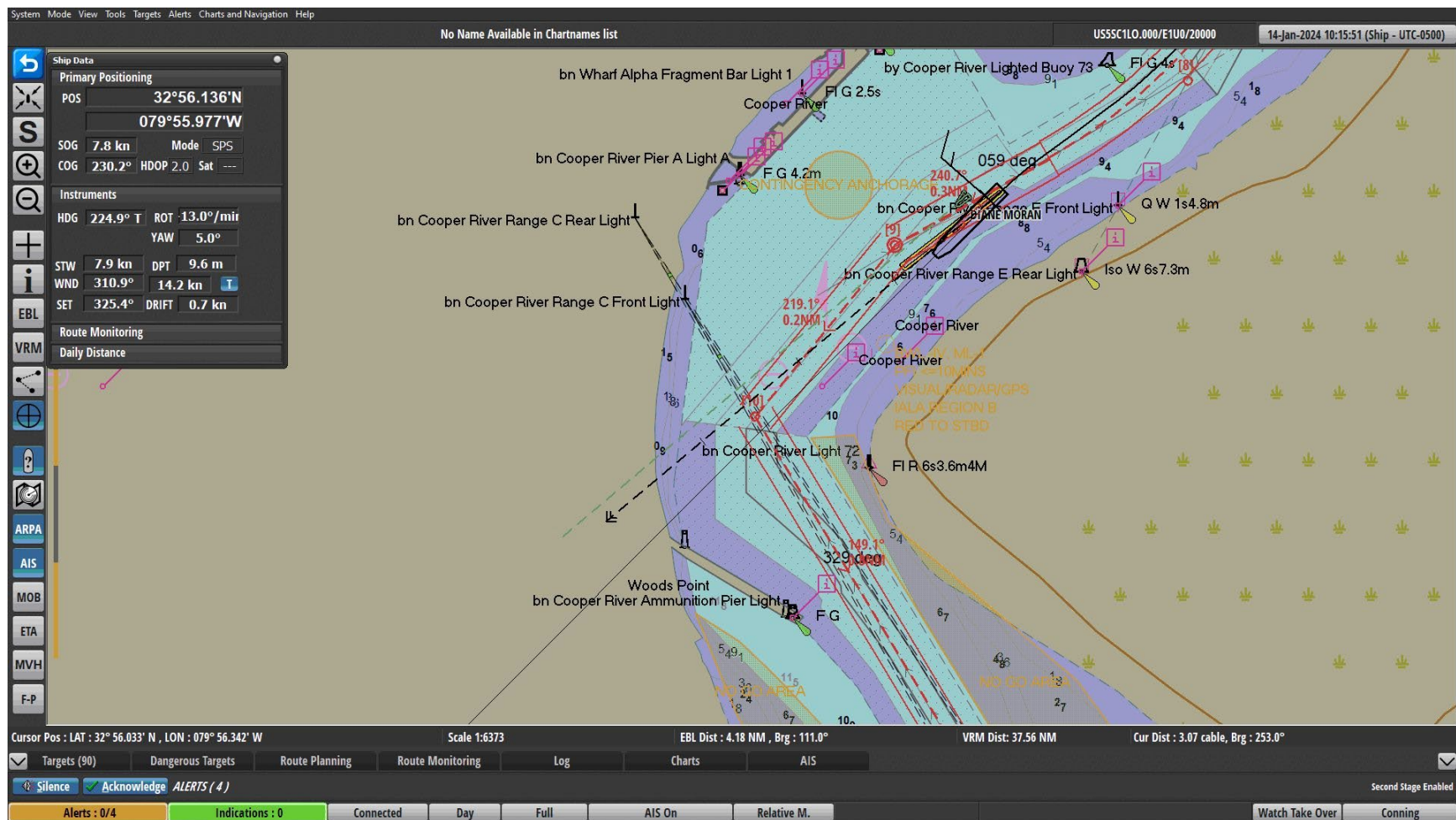
Figure 7. ECDIS display at 10:15:06 EST.

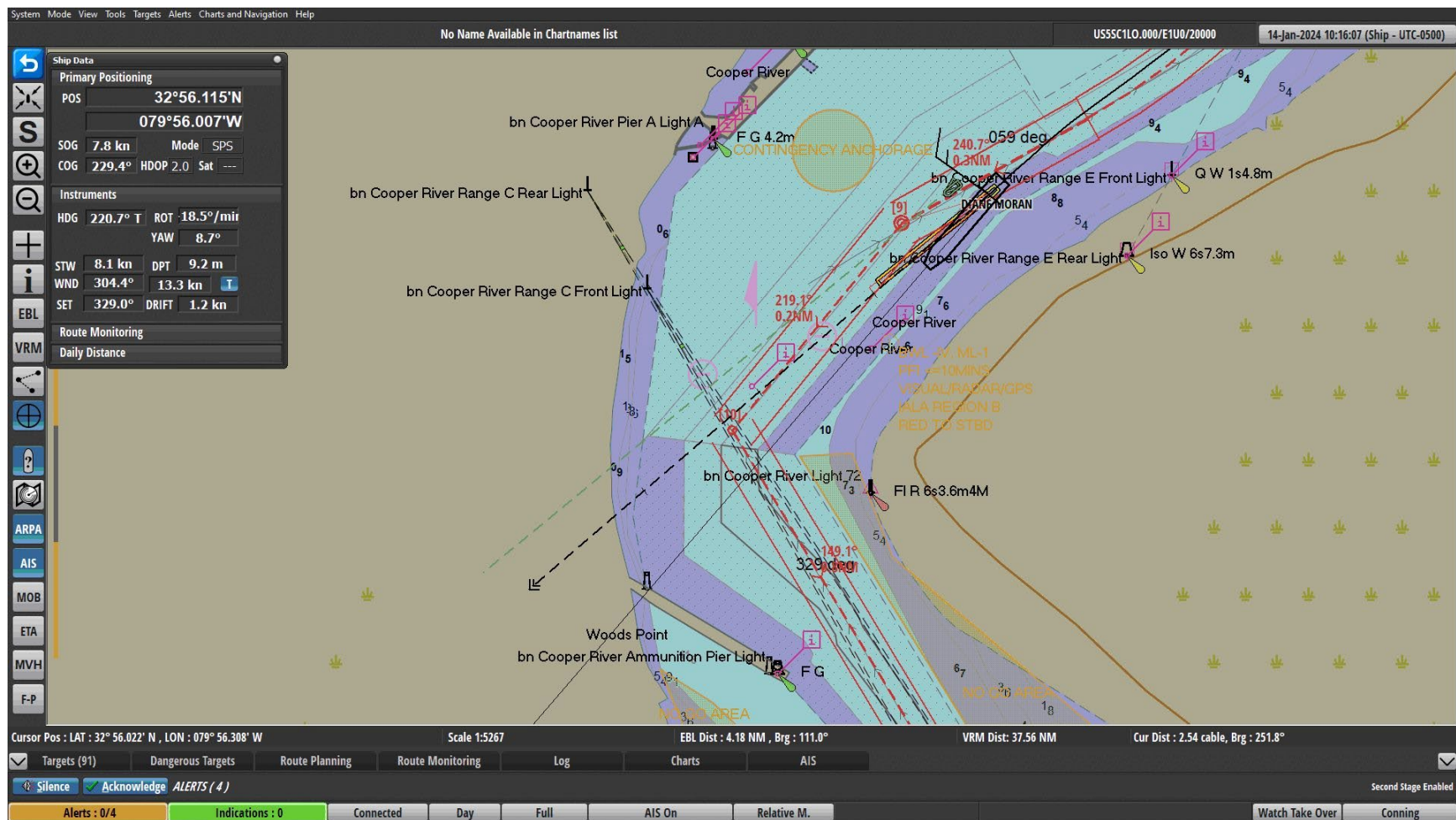**Figure 8.** ECDIS display at 10:15:22 EST.
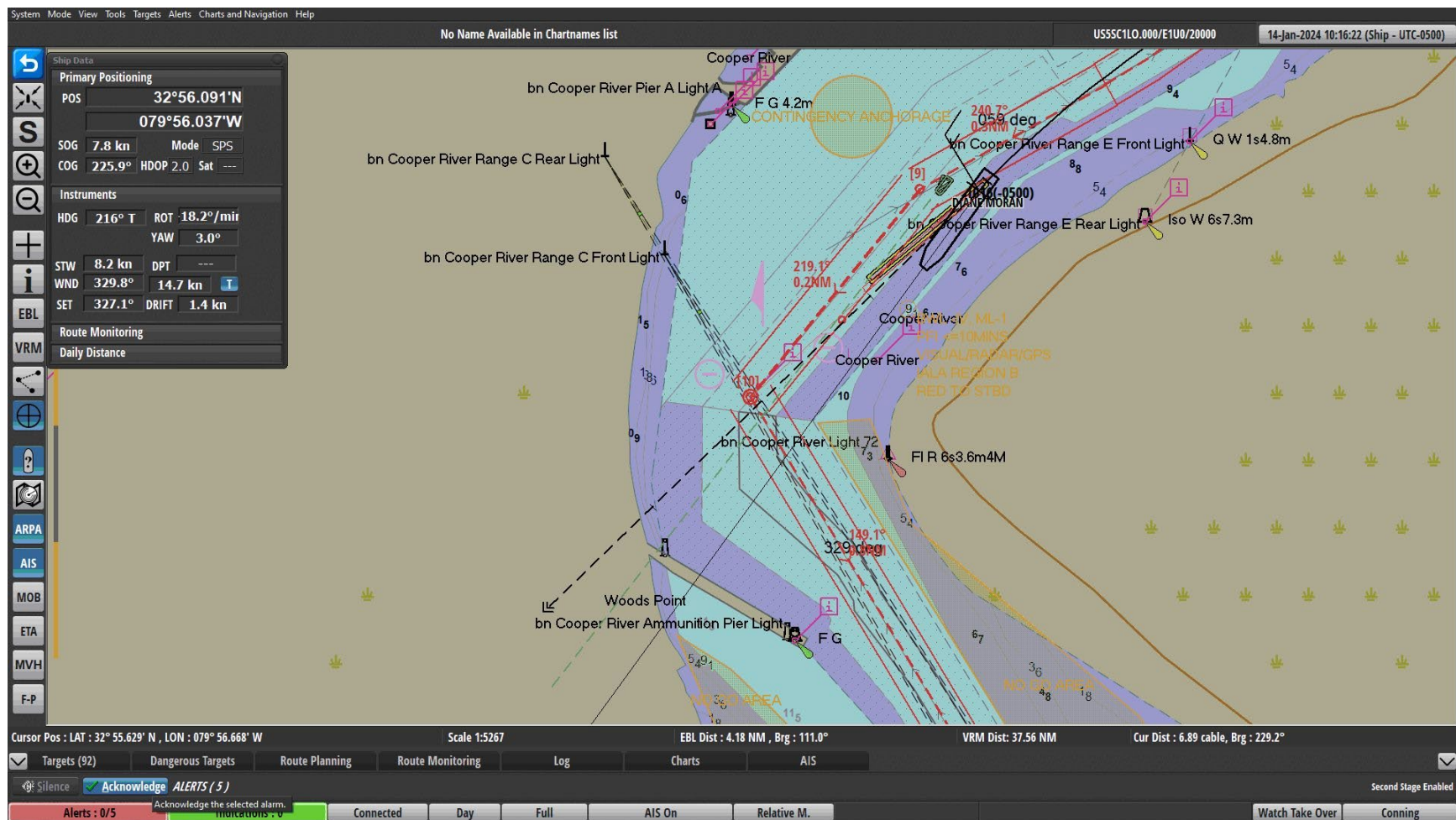
Figure 9. ECDIS display at 10:15:36 EST.

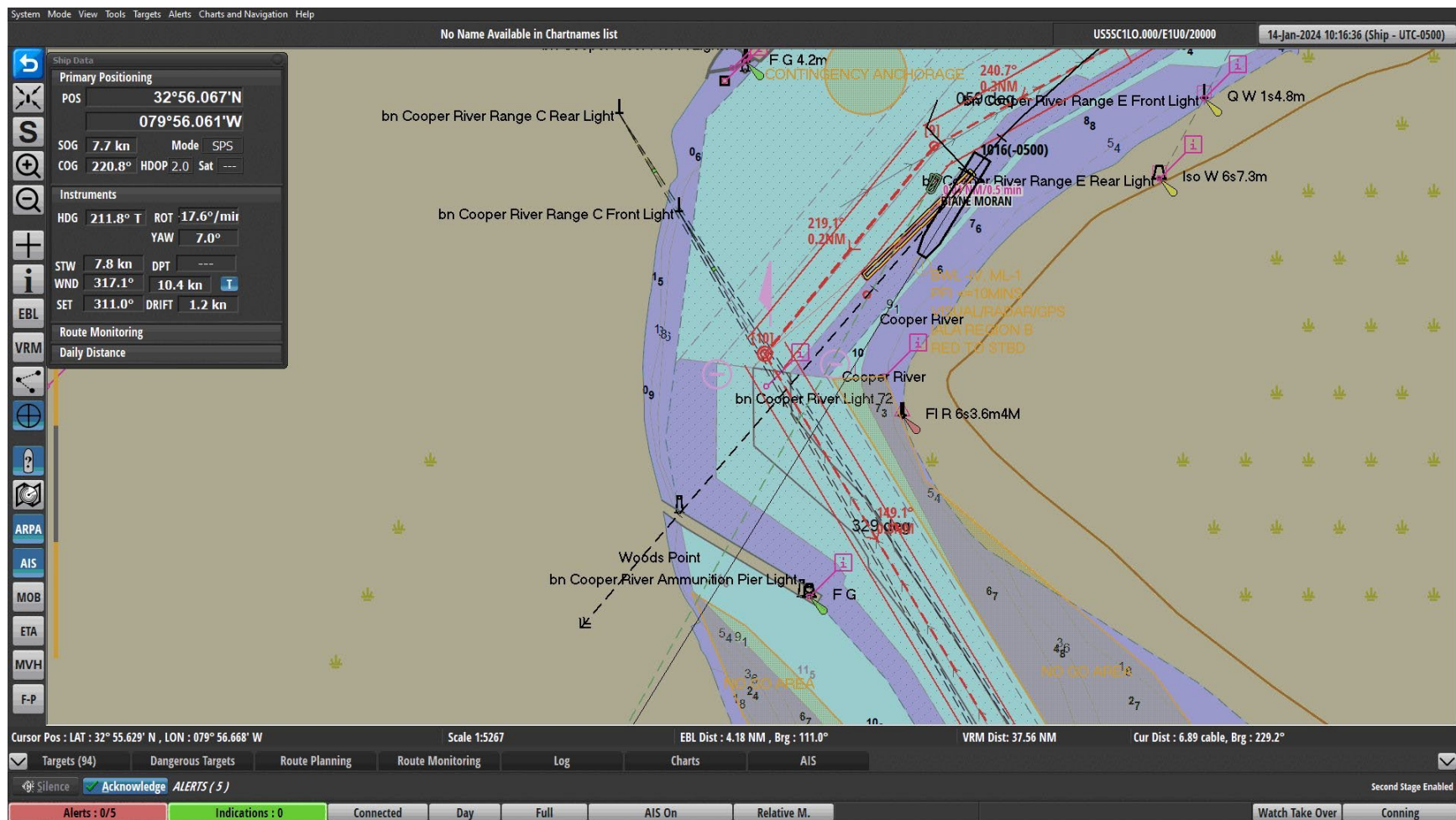**Figure 10.** ECDIS display at 10:15:51 EST.

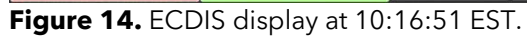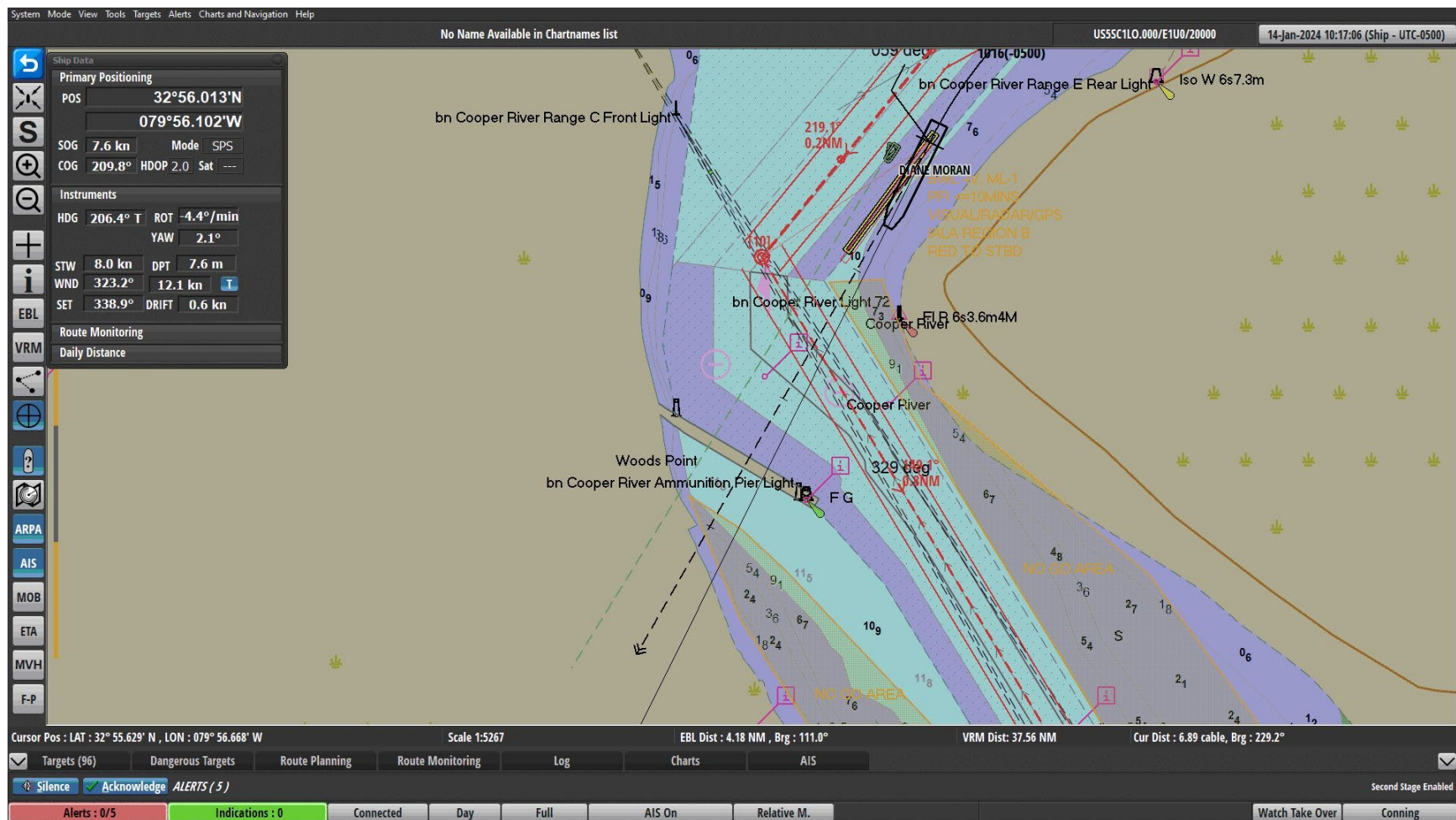**Figure 11.** ECDIS display at 10:16:07 EST.
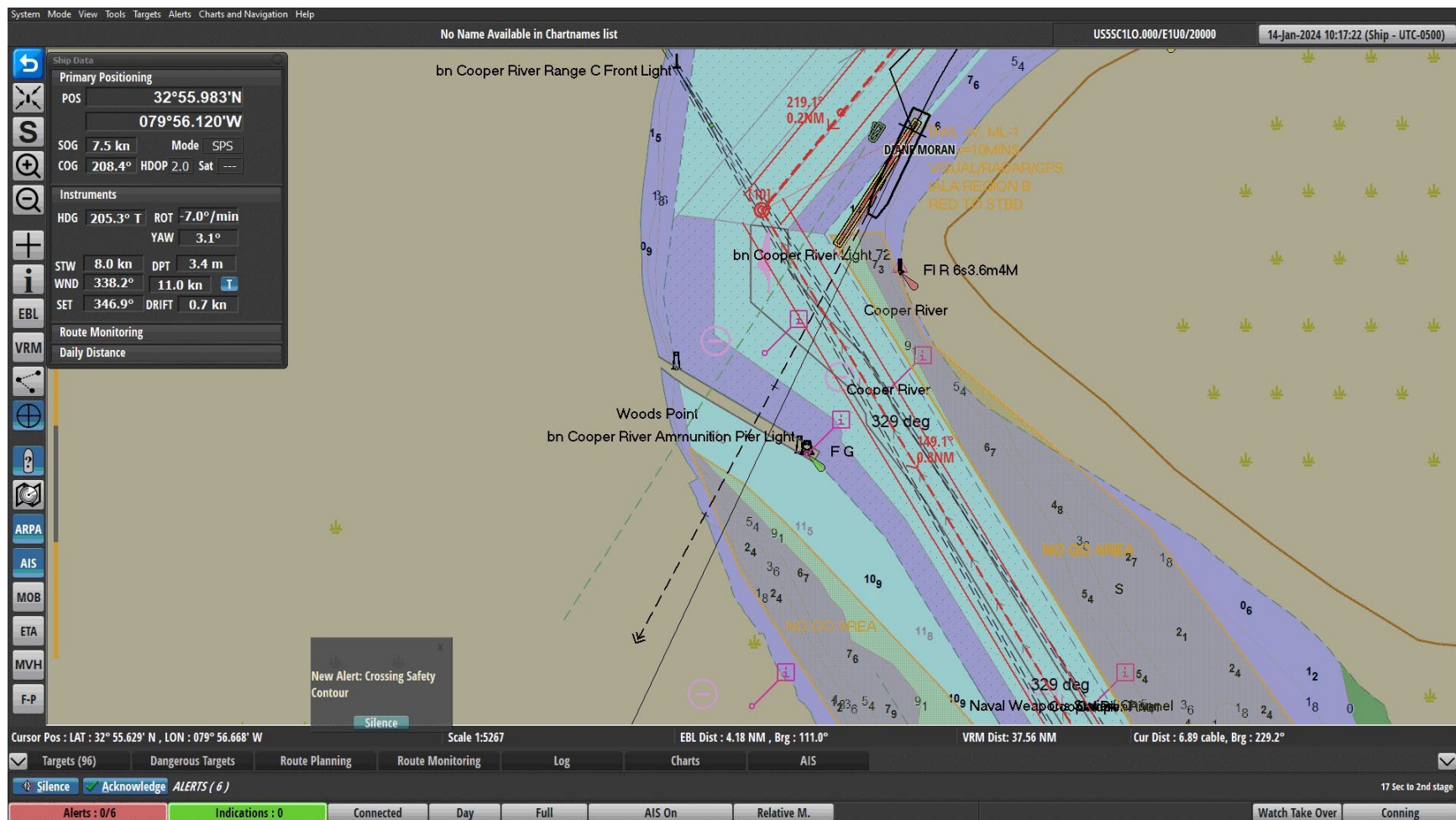
Figure 12. ECDIS display at 10:16:22 EST.

Figure 13. ECDIS display at 10:16:36 EST.
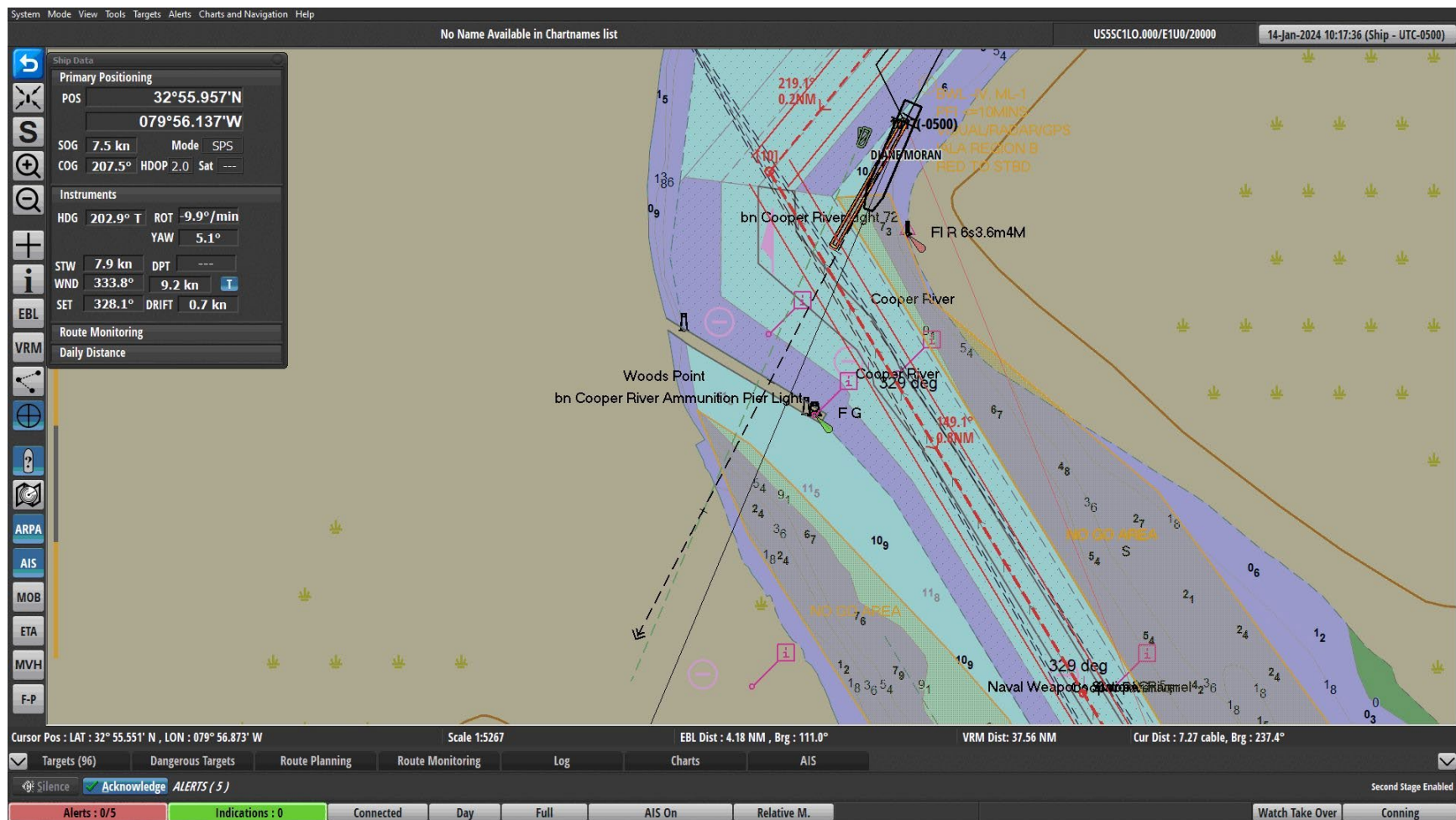
Figure 14. ECDIS display at 10:16:51 EST.
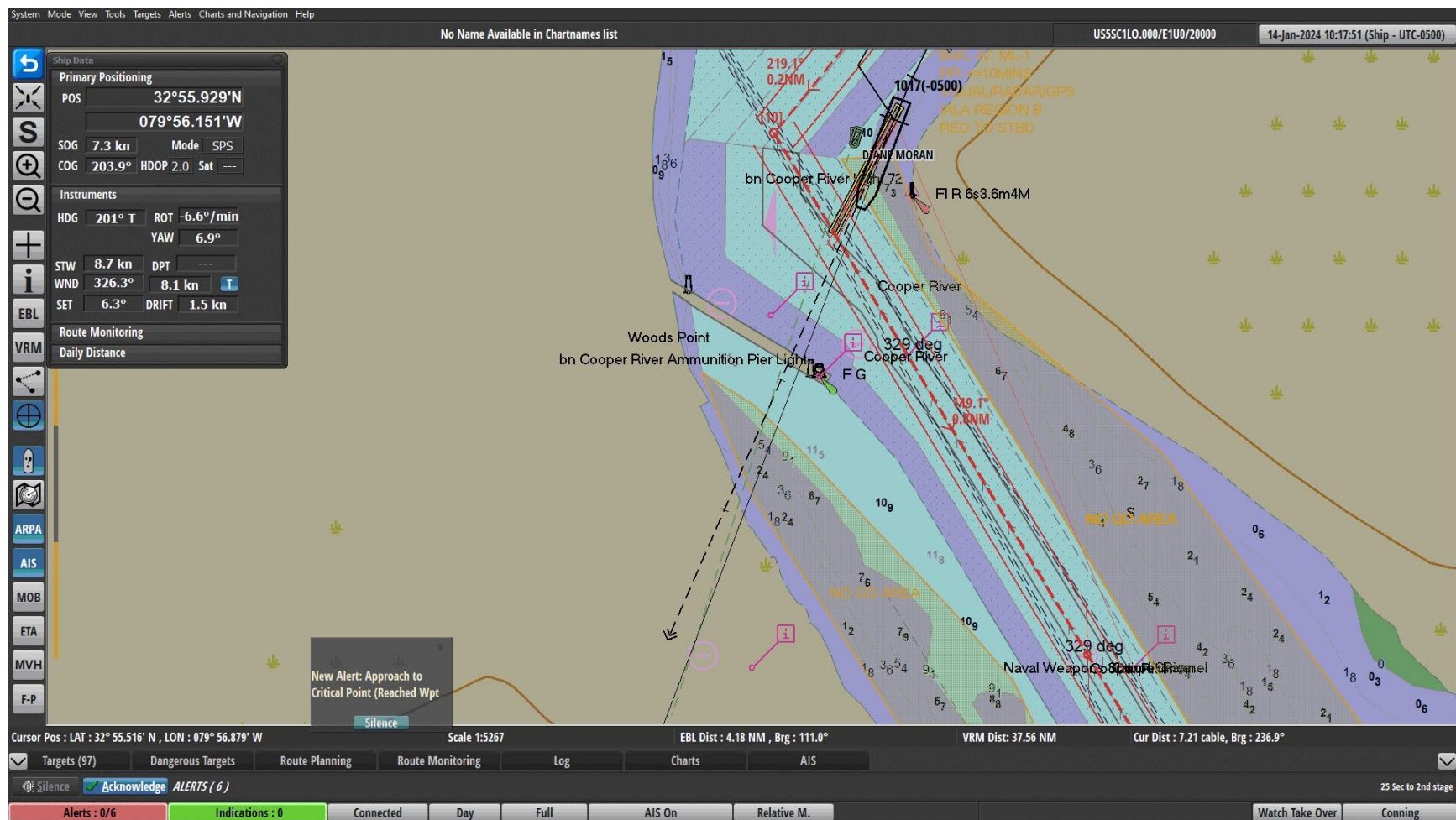
Figure 15. ECDIS display at 10:17:06 EST.

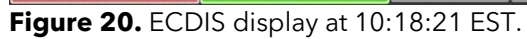**Figure 16.** ECDIS display at 10:17:22 EST.

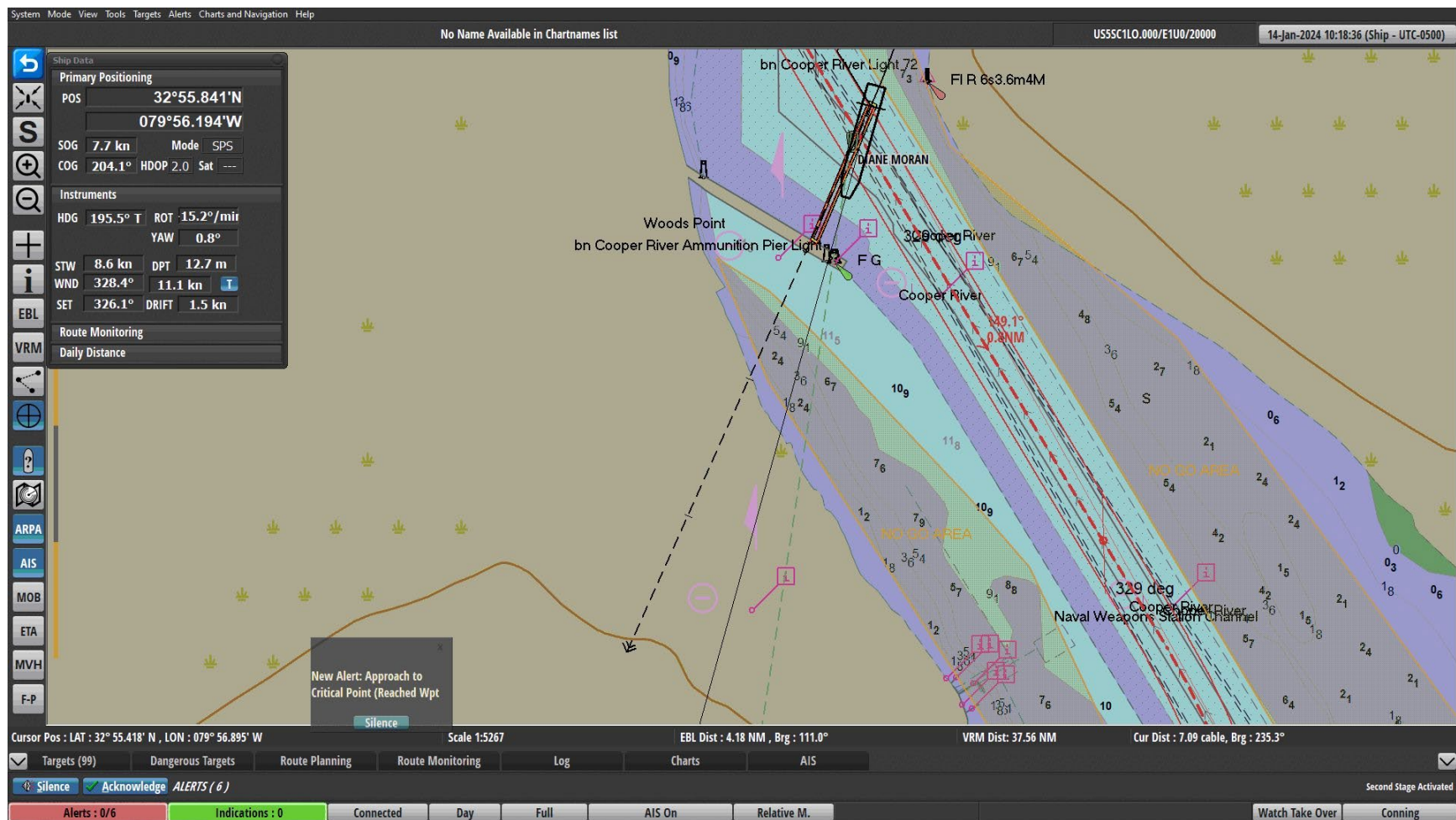**Figure 17.** ECDIS display at 10:17:36 EST.

Figure 18. ECDIS display at 10:17:51 EST.

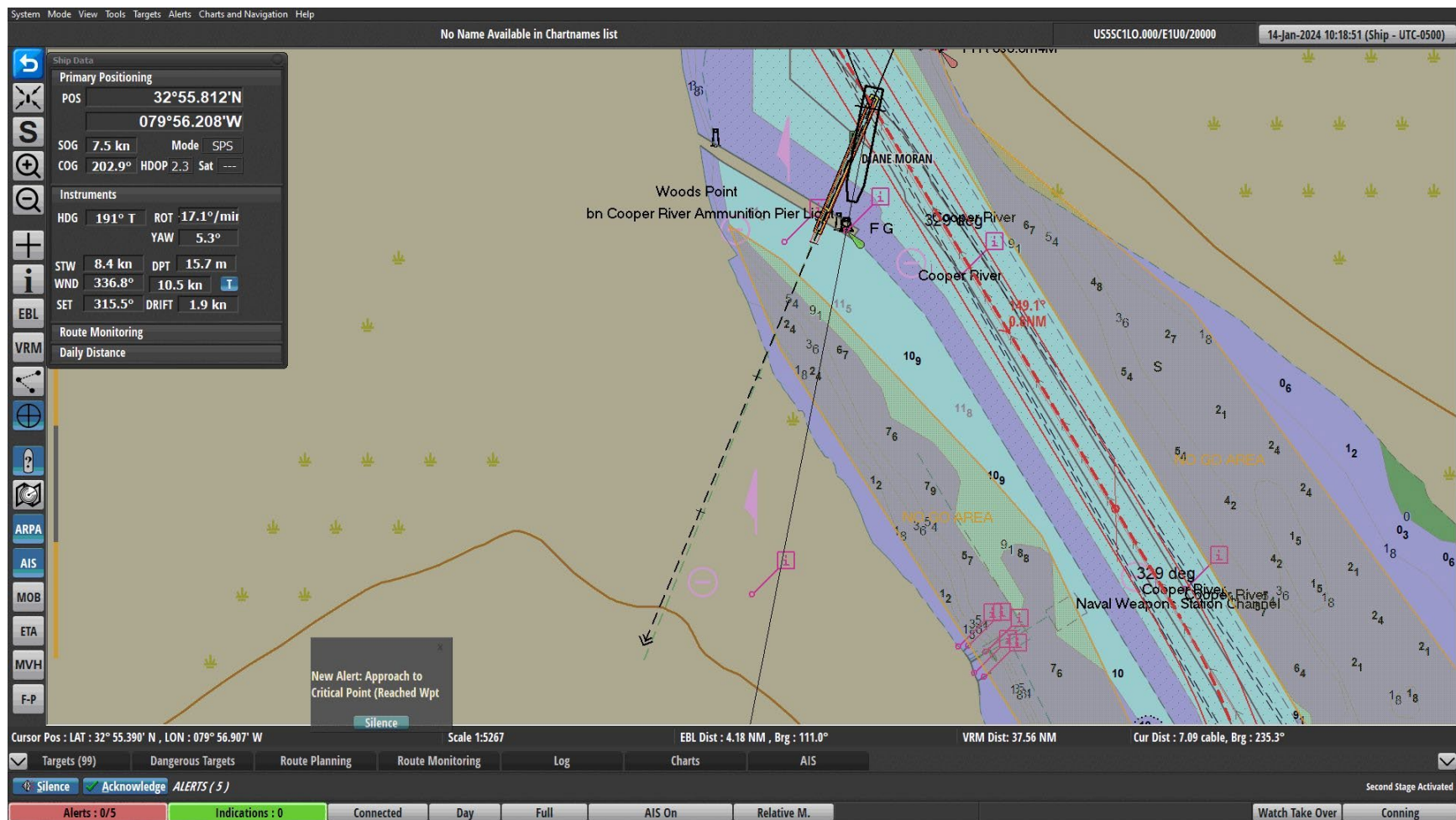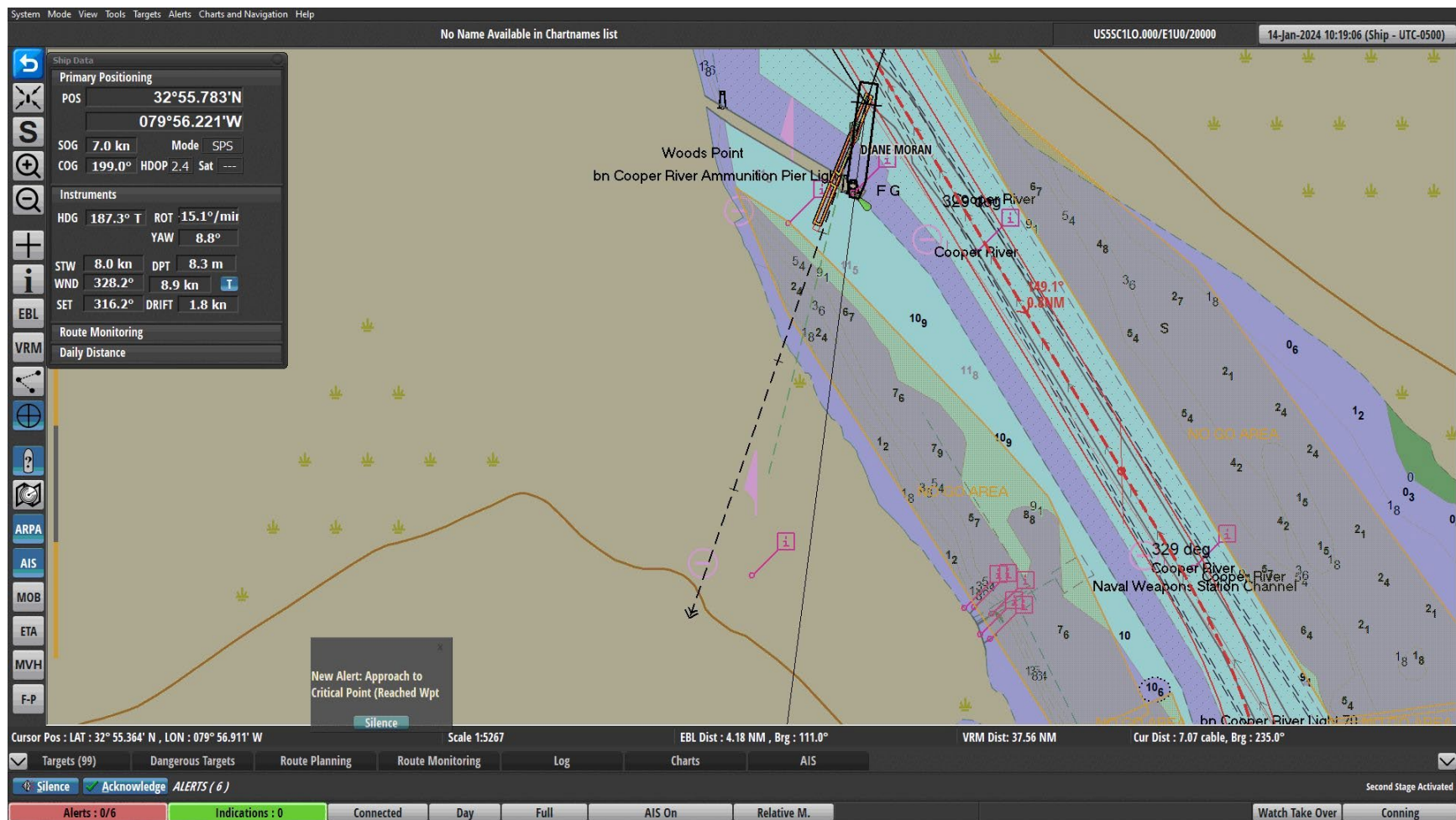**Figure 19.** ECDIS display at 10:18:06 EST.

Figure 20. ECDIS display at 10:18:21 EST.

Figure 21. ECDIS display at 10:18:36 EST.

System Mode View Tools Targets Alerts Charts and Navigation Help

Ship Data

Primary Positioning

POS 32°55.812'N
079°56.208'W

SOG 7.5 kn Mode SPS
COG 202.9° HDOP 2.3 Sat ---

Instruments

HDG 191° T ROT 17.1°/min
YAW 5.3°

STW 8.4 kn DPT 15.7 m
WND 336.8° 10.5 kn T
SET 315.5° DRIFT 1.9 kn

Route Monitoring

Daily Distance

Woods Point
bn Cooper River Ammunition Pier Light

DIANE MORAN

F G

Cooper River

Cooper River

149.1°
0.8NM

S

Cooper River
Naval Weapons Station Channel

329 deg
Cooper River

NO GO AREA

New Alert: Approach to
Critical Point (Reached Wpt

Silence

Cursor Pos : LAT : 32° 55.390' N , LON : 079° 56.907' W Scale 1:5267 EBL Dist : 4.18 NM , Brg : 111.0° VRM Dist: 37.56 NM Cur Dist : 7.09 cable, Brg : 235.3°

Targets (99) Dangerous Targets Route Planning Route Monitoring Log Charts AIS

Silence Acknowledge *ALERTS (5)* Second Stage Activated

Alerts : 0/5 Indications : 0 Connected Day Full AIS On Relative M. Watch Take Over Conning

Figure 22. ECDIS display at 10:18:51 EST.

Figure 23. ECDIS display at 10:19:06 EST.