NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

July 22, 2021

Specialist's Factual Report

METEOROLOGY

DCA21FM031

Table Of Contents

A. ACCIDENT 3
B. METEOROLOGY SPECIALIST 3
C. SUMMARY 3
D. DETAILS OF THE INVESTIGATION 3
E. WEATHER INFORMATION 4
1.0 Synoptic Conditions 4
1.1 Surface Analysis Chart 4
1.2 National Composite Radar Mosaic 6
1.3 Wind and Wave Analysis 6
2.0 Observations 7
2.1 Ship Shoal Oil Platform 8
2.2 Green Canyon 338 Oil Platform 8
2.3 Garden Banks 172 Oil Platform 9
2.4 Green Canyon 33 Oil Platform 9
2.5 North of Eugene Island Buoy 9
3.0 Sounding 9
4.0 Satellite Imagery 11
5.0 Weather Surveillance Radar Imagery 12
6.0 NWS Forecasts and Advisories 13
6.1 Area Forecast Discussion 13
6.2 Coastal Waters Forecast 15
6.3 Marine Weather Messages 16
7.0 Astronomical Conditions 16

A. ACCIDENT

Location:	Eugene Island Block 259, about 100 miles southwest of Grand Island, Louisiana
Date:	June 25, 2021
Time:	0245 central daylight time
	0745 coordinated universal time (UTC)
Vessel:	OSV Elliot Cheramie collision with platform

B. METEOROLOGY SPECIALIST

Don Eick
Senior Meteorologist
Operational Factors Division (AS-30)
National Transportation Safety Board

C. SUMMARY

About 0245 central daylight time on June 25, 2021, the 150 ft. long offshore supply vessel (OSV) *Elliot Cheramie* (US flag) struck the platform EI 259A in Eugene Island Block 259, about 100 miles south west of Grand Isle, LA. The OSV sustained damage to the bow forward of the collision bulkhead. Minor damage to the platform was reported including damage to the natural gas line valve and the crude oil line. No pollution reported. Minor injuries were reported to four passengers on the OSV. Damage estimates exceed $500K.

D. DETAILS OF THE INVESTIGATION

The National Transportation Safety Board's Senior Meteorologist was not on scene for this investigation and conducted the meteorology phase of the investigation from the Washington D.C. office, collecting data from official National Weather Service (NWS) sources including the Weather Prediction Center (WPC) and the National Center for Environmental Information (NCEI). All times are central daylight time (CDT) based upon the 24-hour clock, local time is -5 hours from UTC, and UTC=Z. NWS station identifiers use the standard International Civil Aviation Organization (ICAO) identifiers. Directions are referenced to true north and distances in nautical miles. Heights are in feet (ft) above mean sea level (msl) unless otherwise noted. Visibility is in statute miles and fractions of statute miles.

This report provides a meteorological review on the weather conditions and NWS weather products applicable to the offshore conditions near Eugene Island Block area around the time of the accident. The accident occurred about 100 miles southwest of Grand Island, Louisiana, in the Gulf of Mexico at position 28° 27.205' N latitude and 091° 27.338' W longitude.

E. WEATHER INFORMATION

1.0 Synoptic Conditions

The synoptic or large-scale migratory weather systems influencing the area were documented using standard NWS charts issued by the National Center for Environmental Prediction (NCEP) and the Weather Prediction Center (WPC) located in College Park, Maryland. These are the base products used in describing weather features and in the creation of forecasts and warnings. Reference to these charts and other weather products documented in this report can be found in the NWS Ocean Prediction Center's (OPC) Radiofacsimile Chart User's Guide[1].

1.1 Surface Analysis Chart

The southcentral section of the NWS WPC Surface Analysis Chart for 0100 CDT on June 25, 2021 is included as figure 1 with the approximate accident site marked by the red star. The chart depicted a stationary front extending from southern Georgia, westward across Alabama, and then turning northward across Mississippi. The accident site was located south of the frontal boundary in an area of a weak pressure gradient[2].

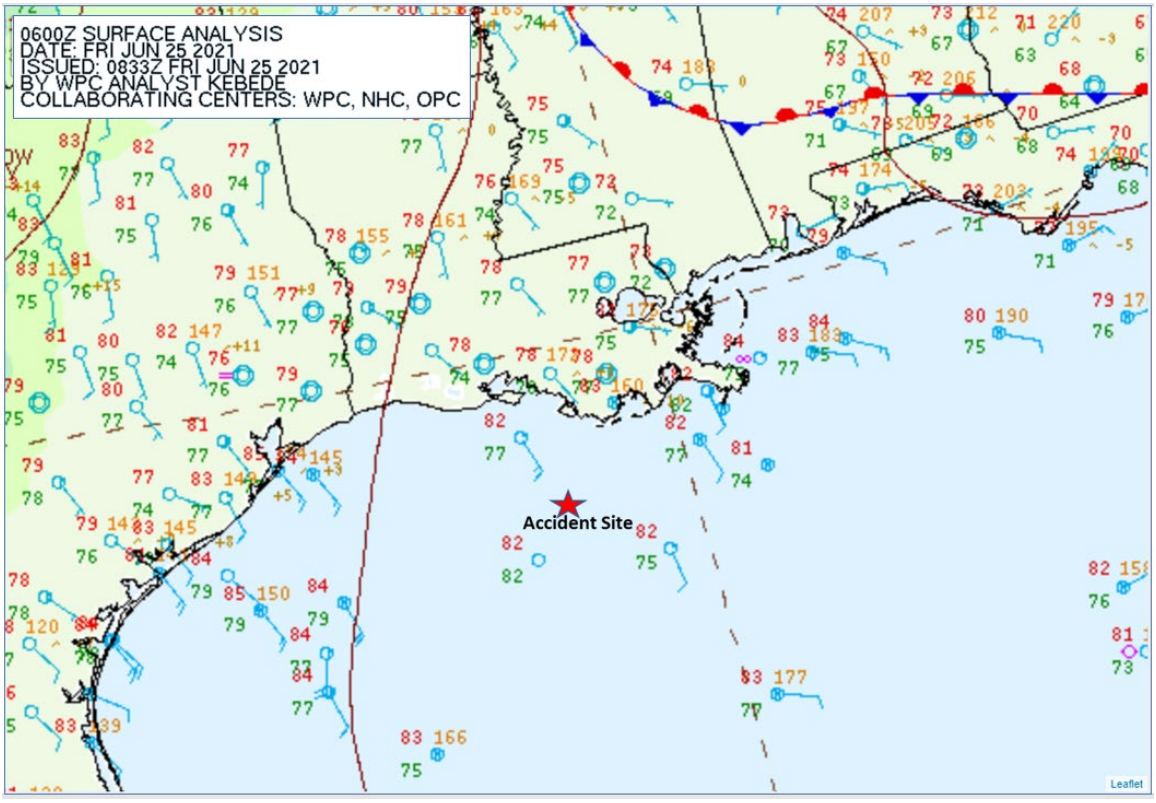

Figure 1 - NWS Surface Analysis Chart for 0100 CDT with the accident site marked by the red star

[1] https://ocean.weather.gov/UsersGuide/UGprint.php

[2] Pressure gradient is just the difference in pressure between high- and low-pressure areas. The speed of the wind is directly proportional to the pressure gradient meaning that as the change in pressure increases (i.e. pressure gradient increases) the speed of the wind also increases at that location.

The station models surrounding the accident site depicted southerly winds of 10 to 15 knots, scattered to broken cloud cover, with temperatures of 82° Fahrenheit (F), and dew point temperatures between 75° and 82° F.

The NWS OPC Atlantic Surface Analysis for 0100 CDT is included as figure 2 for marine interests and transmitted thru radiofax. The chart depicted similar conditions to those in figure 1, with a low-pressure system at 1020-hectopascals (hPa)[3] off the South Carolina coast with the stationary front extending southwestward into Georgia and westward across Mississippi to the northeast of the accident site.

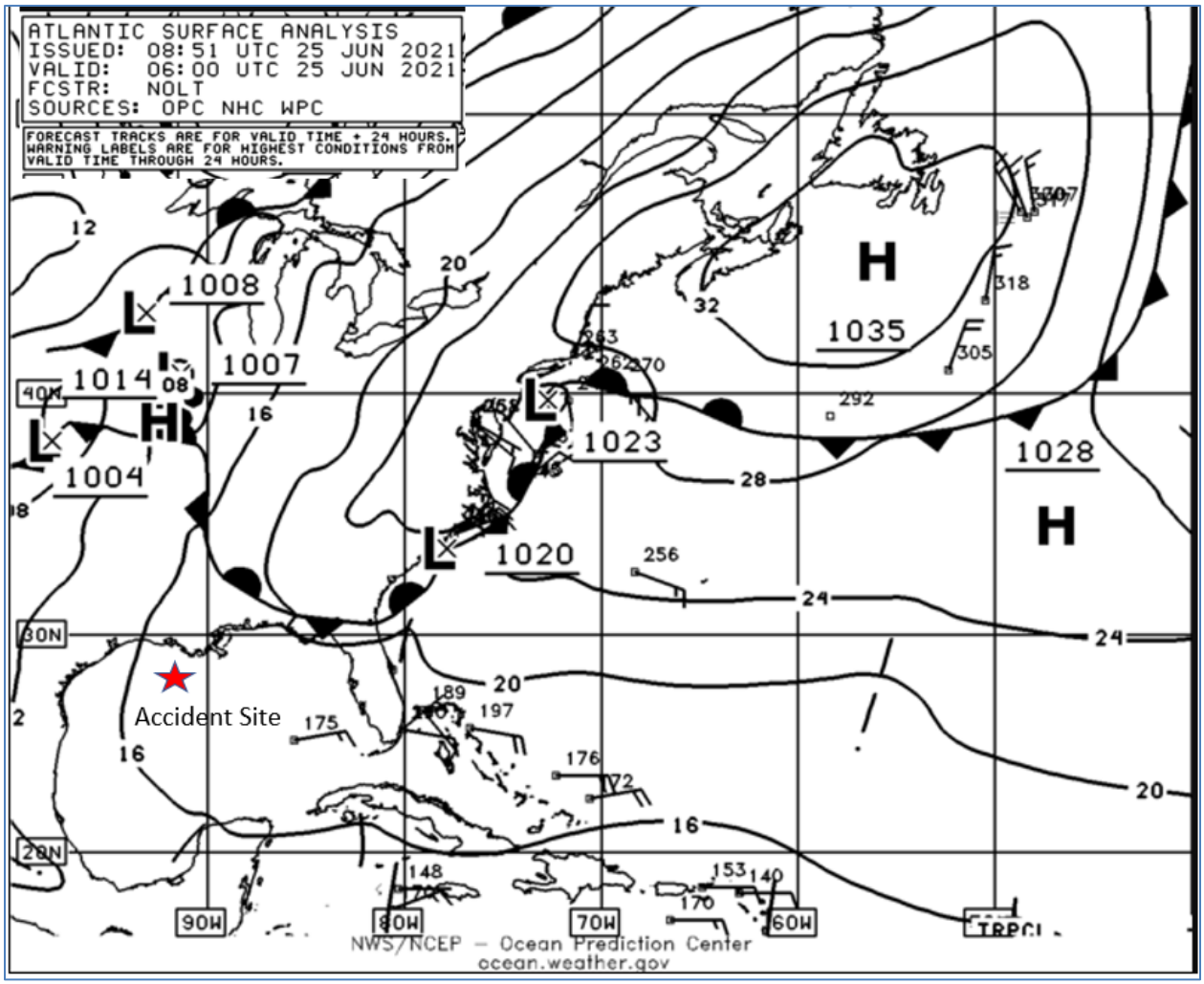

Figure 2 - NWS OPC Atlantic Surface Analysis Chart for 0100 CDT

[3] Hectopascals (hPa) is the new standard term for reporting sea-level pressure and is interchangeable with the former term millibar (mb). Standard sea-level pressure is 1013.25-hPa with a temperature of 59° Fahrenheit (F) or 15° Celsius (C).

1.2 National Composite Radar Mosaic

A review of the NWS National Composite Radar Mosaic for the hour surrounding the time of the accident depicted no significant meteorological echoes over the accident site during the period. Figure 3 is the composite radar mosaic for 0145 EDT with the approximate accident site marked by the red star, which depicted scattered "moderate" to "heavy" intensity echoes near 45 dBZ in the coastal waters east through south of New Orleans, or approximately 60 miles east of the accident site.

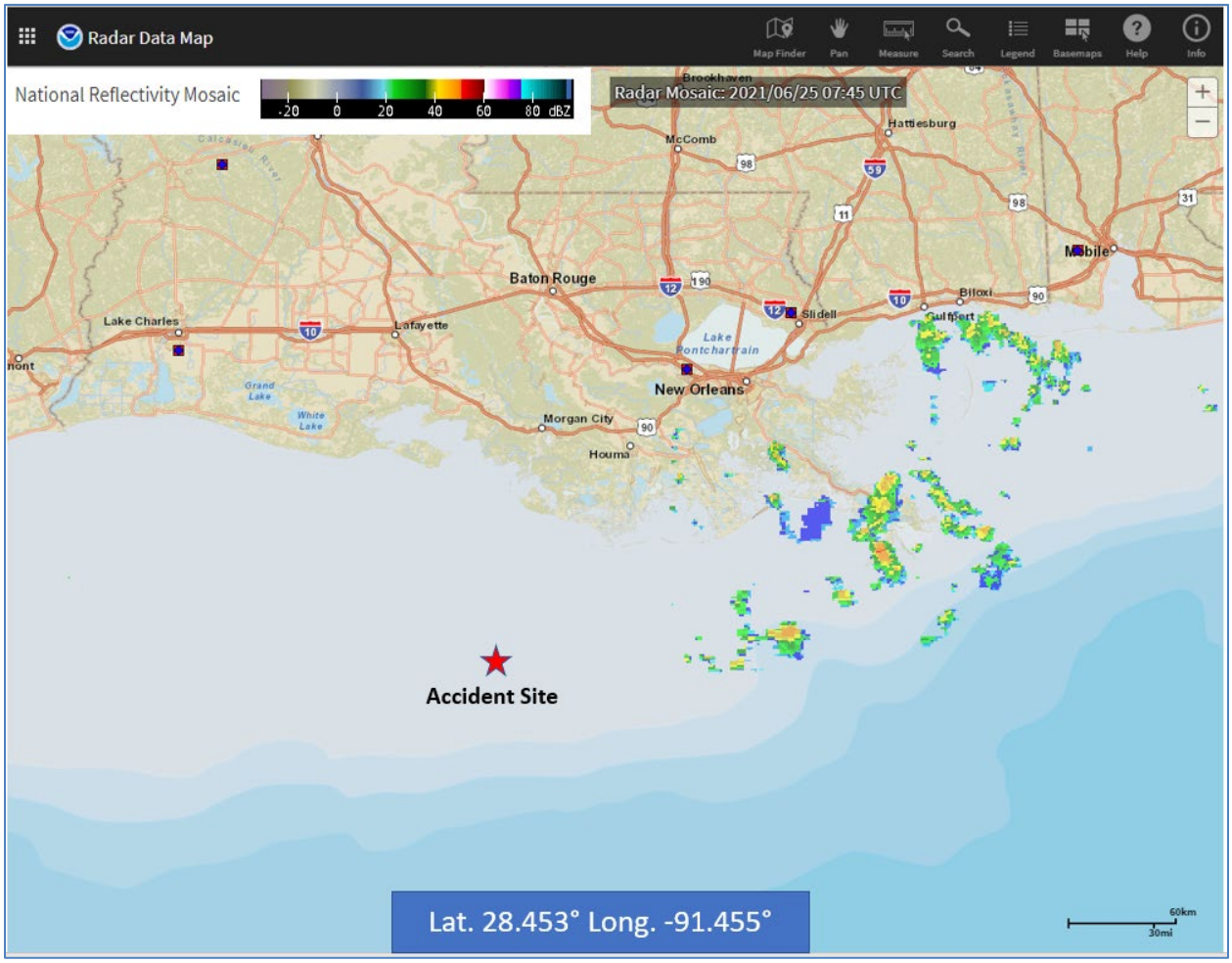

Figure 3 - National Composite Radar Mosaic for 0145 CDT with accident site marked

Based on the potential for some precipitation echoes in the vicinity of the accident site the closest NWS weather surveillance radar will be further documented in section 5.0 of this report.

1.3 Wind and Wave Analysis

The NWS OPC Wind and Wave Analysis Chart is included as figure 4 and was valid for 0100 CDT on June 25, 2021. The chart depicted winds of 5 to 15 knots from the east-southeast with a

significant wave height[4] of 2 to 3 feet over the waters off Louisiana with a maximum of 4 feet off the northwest gulf coast or south of the Florida Panhandle in the Gulf of Mexico.

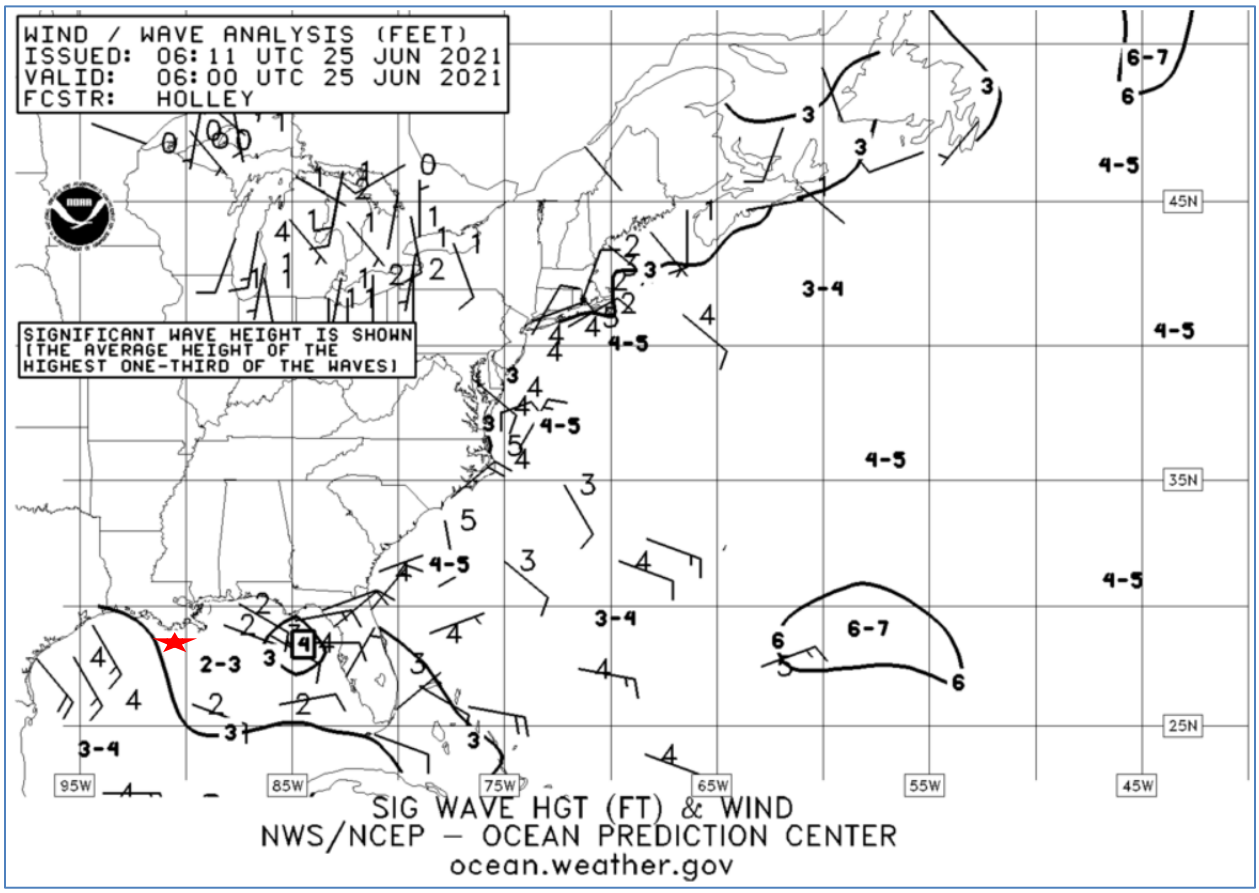

Figure 4 - NWS OPC Wind and Wave Analysis for 0100 CDT on June 25, 2021

2.0 Observations

The official observations issued surrounding the accident site were documented using Aviation Routine Weather Reports (METARs), and buoy reports across the area. Cloud heights are reported above ground level (agl) in the following section, and the magnetic variation was estimated at 1° west based on the latest chart for the area. Figure 5 is a depiction of the closest weather reporting locations and buoys (yellow triangle) identified in the immediate vicinity of the accident site, which is marked by the red star for reference.

[4] Significant wave height - The mean or average height of the highest one third of all waves in a swell train or in a wave generating region. It approximates the value an experienced observer would report if visually estimating sea height. Generally, it is assumed that individual wave heights can be described using a Rayleigh distribution.

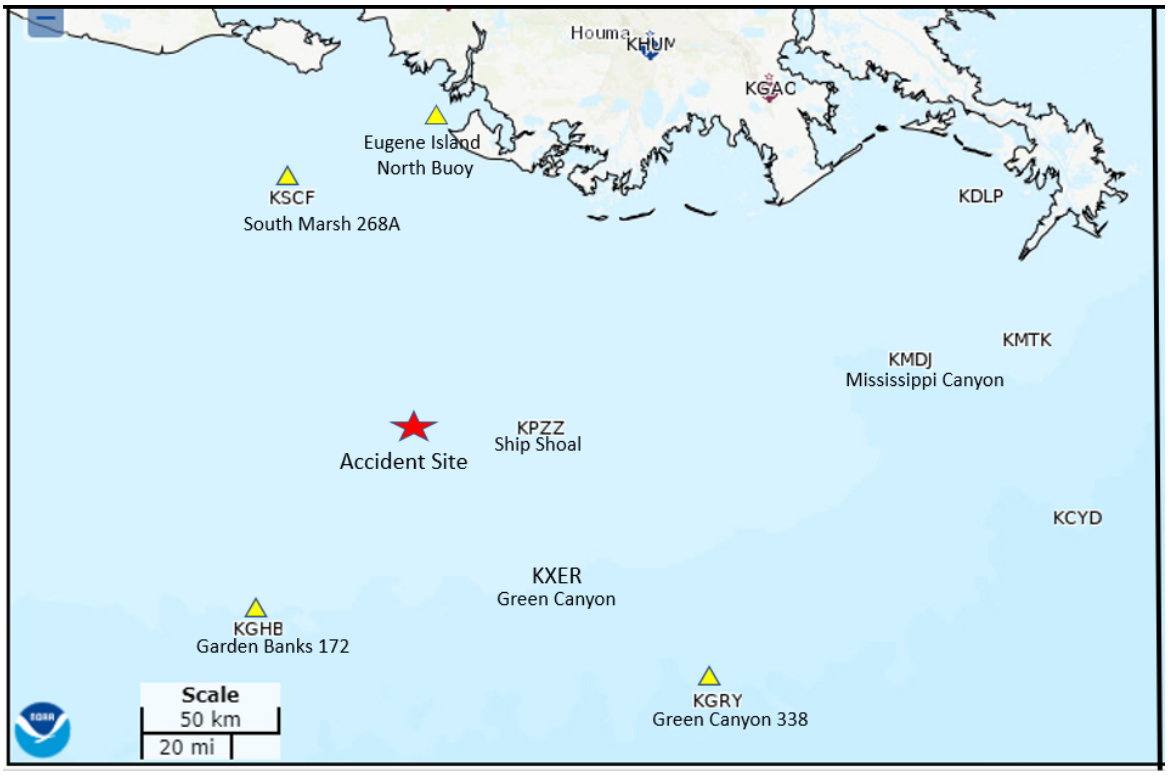

Figure 5 - Weather reporting and buoy locations relative to the accident site

2.1 Ship Shoal Oil Platform

The closest weather reporting location to the accident site was from Ship Shoal Oil Platform (KPZZ) located at coordinates 28.435° N, 91.033° W, or approximately 21.5 miles east of the accident site. The observation at the approximate time of the collision was as follows.

Weather observation for KPZZ at 0235 CDT, automated, wind from 170° at 12 knots, visibility 9 miles, a few clouds at 1,600 ft agl, scattered clouds at 2,300 ft, and scattered at 3,800 ft, temperature 28° C (82° F), dew point temperature 25° C (77° F), altimeter 30.03 inches of mercury (inHg). Remarks: automated station without a precipitation discriminator.

2.2 Green Canyon 338 Oil Platform

Green Canyon 338 Oil Platform (KXER) was the next closest weather reporting station located at coordinates 27.956° N, 90.993° W, or approximately 38.5 miles southeast of the accident site. The following conditions were reported at the time of the accident.

Weather observation for KXER at 0255 CDT, automated, wind from 200° at 12 knots, visibility 10 miles or more, scattered clouds at 1,600 ft agl, scattered at 3,000 ft, and broken clouds at 3,600 ft, temperature and dew point missing, altimeter 30.03 inHg. Remarks: automated station without a precipitation discriminator.

2.3 Garden Banks 172 Oil Platform

Garden Banks 172 Oil Platform (KGHB) was located at coordinates 27.840° N, 91.988° W or approximately 46 miles southwest of the accident site and reported the following conditions at the time. The anemometer height was listed at 360 ft above the site elevation.

> *Weather observation for KGHB at 0235 CDT, automated, wind from 170° at 7 knots gusting to 14 knots, wind variable from 080° to 210°, visibility 7 miles, a few clouds at 1,800 ft agl, and a few clouds at 3,300 ft, temperature 28° C (82° F), dew point temperature 28° C (82° F), altimeter missing. Remarks: automated station without a precipitation discriminator.*

The station also reported a wave height of 3 ft, with a wave period of 10 seconds, a swell height of 1.6 ft.

2.4 Green Canyon 33 Oil Platform

Green Canyon 33 Oil Platform (KGRY) located at coordinates 27.63° N, 90.44 W or approximately 73 miles southeast of the accident site and reported the following conditions.

> *Weather observation for KGRY at 0230 CDT, automated, wind from 190° at 6 knots, visibility 10 miles or more, a few clouds at 1,700 ft agl, scattered at 2,300 ft, and scattered at 4,300 ft, temperature 27° C (81° F), dew point temperature 24° C (75° F), altimeter 30.03 inHg. Remarks: automated station without a precipitation discriminator.*

2.5 North of Eugene Island Buoy

The North of Eugene Island Buoy #8764314, located at coordinates 29.3733° N, 91.3833° W or approximately 52 miles north of the accident site reported at 0300 CDT a wind from 150° at 12 knots with maximum gust at 14 knots, a temperature of 83.5° F, a relative humidity of 89%, a sea-level pressure of 1015.8-hPa, and a water temperature of 83.3° F.

3.0 Sounding

A High-Resolution Rapid Refresh (HRRR) numerical model[5] was obtained from archive data from the NOAA Air Resource Laboratory's website for the accident site coordinates. The sounding was then plotted on a standard Skew T log P diagram[6] using the Universal RAwinsonde OBservation (RAOB) program software[7]. Figure 7 is the HRRR numerical model sounding over

[5] The HRRR is a National Oceanic and Atmospheric Administration (NOAA) real-time three-kilometer resolution, hourly-updated, cloud-resolving, convection-allowing atmospheric model, initialized by three-kilometer grids with three-kilometer radar assimilation. Radar data is assimilated in the HRRR every 15 minutes over a one-hour period.
[6] Skew T log P diagram – is a standard meteorological plot or thermodynamic diagram using temperature and the logarithmic of pressure as coordinates, used to display winds, temperature, dew point, and various indices used to define the vertical structure of the atmosphere.
[7] RAOB – (The Universal RAwinsonde OBservation program) is an interactive sounding analysis program developed by Eosonde Research Services (ERS) previously known as Environmental Research Services, The Villages, Florida.

the approximate accident site for 0300 CDT on June 25, 2021 from the surface to 500-hPa or approximately 18,000 ft.

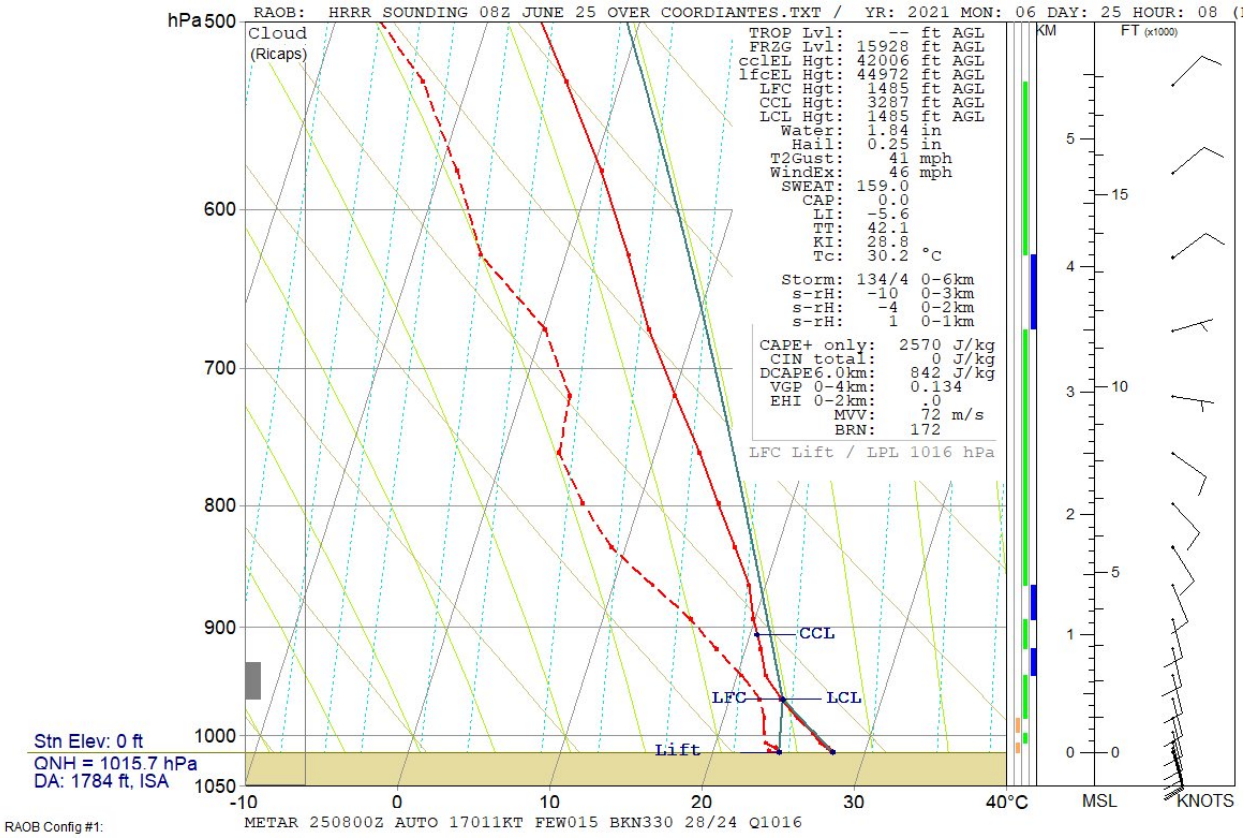

Figure 6 - HRRR numerical model over the accident site for 0300 CDT

The HRRR sounding depicted a near surface temperature of 28° C (82° F), a dew point temperature of 24° C (76° F), with a relative humidity of 81%, with wind from 170° at 11 knots. The sounding depicted a lifted condensation level (LCL)[8] and convective condensation level (CCL)[9] at 1,489 ft agl, and a level of free convection (LFC)[10] at 1,485 ft agl. The RAOB analysis program supported a scattered layer of stratiform type clouds (indicated in gray on left axis) from the LFC with tops near approximately 2,600 ft. The HRRR sounding was classified as conditional

[8] Lifted Condensation Level (LCL) - the level at which a lifted parcel becomes saturated. The LCL height corresponds to cloud base height for forced ascent.

[9] Convective Condensation Level (CCL) - The level in the atmosphere to which an air parcel, if heated from below, will rise dry adiabatically, without becoming colder than its environment just before the parcel becomes saturated.

[10] Level of Free Convection (LFC) - the last level where a parcel becomes buoyant, or "warmer" than the environmental temperature at the same level.

unstable with a Lifted Index[11] of -5.6, a K-index[12] of 28.8, a Convective Available Potential Energy (CAPE)[13] of 2,570 J/kg, and a precipitable water value of 1.84 inches.

4.0 Satellite Imagery

Geostationary Operational Environmental Satellite number 16 (GOES-16) imagery were obtained from an archive at the Space Science Engineering Center at the University of Wisconsin-Madison in Madison, Wisconsin, and processed using the Man-computer Interactive Data Access System (McIDAS) software. The infrared long wave imagery was obtained for times surrounding the time of the accident, with the images closest to the time of the accident documented below. The infrared long wave imagery (band 13) at a wavelength of 10.3 microns (μm) provided radiative cloud top temperatures with a nominal spatial resolution of 2 km.

Figure 6 is the GOES-16 infrared image for 0246 CDT at 4X magnification with a standard MB temperature enhancement curve applied and the approximate accident site marked by the yellow square. The image depicted an area of low scattered clouds over the area with a radiative cloud top temperature of 288 Kelvin or 14.8° C, which corresponded to cloud tops near 3,000 ft. No enhanced clouds were identified within 50 miles of the accident site; however, some cumulus congestus to cumulonimbus clouds were identified approximately 58 miles east and 78 miles northeast over the southeast Louisiana over the Mississippi River Delta.

[11] Lifted Index (LI) - the difference between the lifted parcel temperature at 500 mb and the 500 mb temperature in the sounding. Negative values denote parcels that are warmer than the background 500 mb temperatures and are thus buoyant or "unstable".

[12] K-Index - This index attempts to identify steep mid-level lapse rates (850-700 mb temperature differences) in the presence of substantial moisture in the low-mid levels (850mb dewpoint minus the 700 mb dewpoint depression). Values greater than 30-40 tend to be associated with deep convection, while thunderstorms are much less common with lesser values.

[13] Convective Available Potential Energy (CAPE) – is a measure of the amount of energy available for convection. CAPE is directly related to the maximum potential vertical speed within an updraft; thus, higher values indicate greater potential for severe weather. Observed values in thunderstorm environments often may exceed 1000 joules per kilogram (J/kg), and in extreme cases may exceed 5000 J/kg.

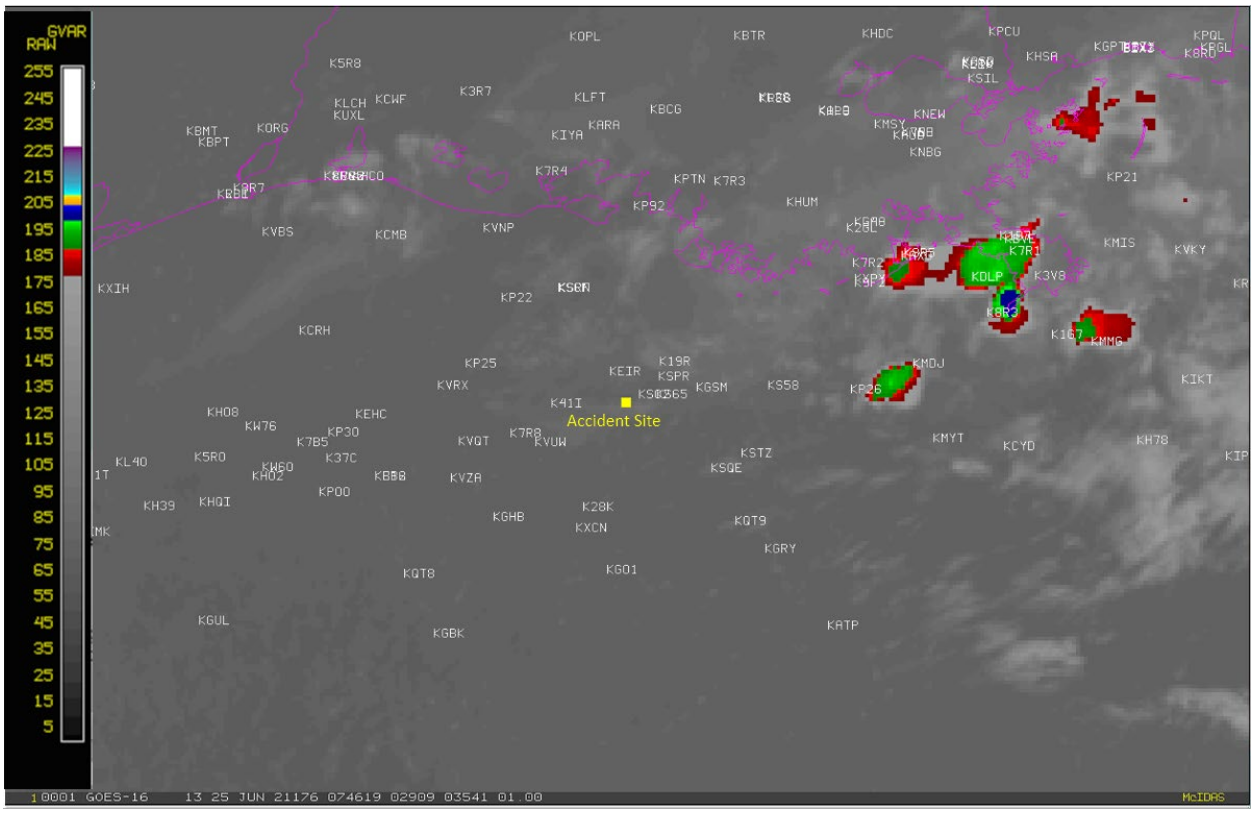

Figure 7 - GOES-16 infrared image for 0246 CDT at 4X magnification with accident site in yellow

5.0 Weather Surveillance Radar Imagery

The closest NWS Weather Surveillance Radar 1988 Doppler (WSR-88D)[14] was from New Orleans (KLIX) located approximately 140 miles northeast of the accident site. The level II data were obtained from the NCEI archive and displayed using the NWS NEXRAD Interactive Viewer and Data Exporter software. During the period surrounding the accident the computer-controlled radar was operating in the clear air mode, volume coverage pattern 215 (VCP-215), where the radar makes 9 overlapping elevation scans every 7-minutes.

Assuming a standard refraction[15] of the WSR-88D 0.48° radar beam with the KLIX antenna height of 179 ft and a distance of 140 miles from the accident site, the 0.48° elevation scan saw the altitudes from about 13,240 ft through 27,350 ft over the accident site.

Reflectivity is the measure of the efficiency of a target in intercepting and returning radio energy. With hydrometeors, it is a function of the drop size distribution, number of particles per unit volume, physical state (ice or water), shape, and aspect. Reflectivity is normally displayed in

[14] The WSR-88D is a S-band 10-centimeter wavelength radar with a power output of 750,000 watts, with a 28-foot parabolic antenna concentrating the energy into a 0.95° beam width. The radar produces three basic types of products reflectivity, radial velocity, and spectral width.

[15] Standard Refraction in the atmosphere is when the temperature and humidity distributions are approximately average, and values set at the standard atmosphere.

decibels (dBZ[16]) and is a general measure of echo intensity. Echoes typically greater than 18 dBZ imply precipitation reaching the surface, with echoes less than 30 dBZ described as "light" in intensity, echoes of 30 to 40 dBZ as "moderate", and echoes >40 to 50 dBZ as "heavy", and echoes >50 dBZ as "extreme" intensity.

Figure 8 is the NWS KLIX WSR-88D 0.48° base reflectivity image for 0246 CDT with the accident site marked. The image depicted scattered "heavy" echoes located beyond 50 miles east of the accident site, with no echoes over the accident site.

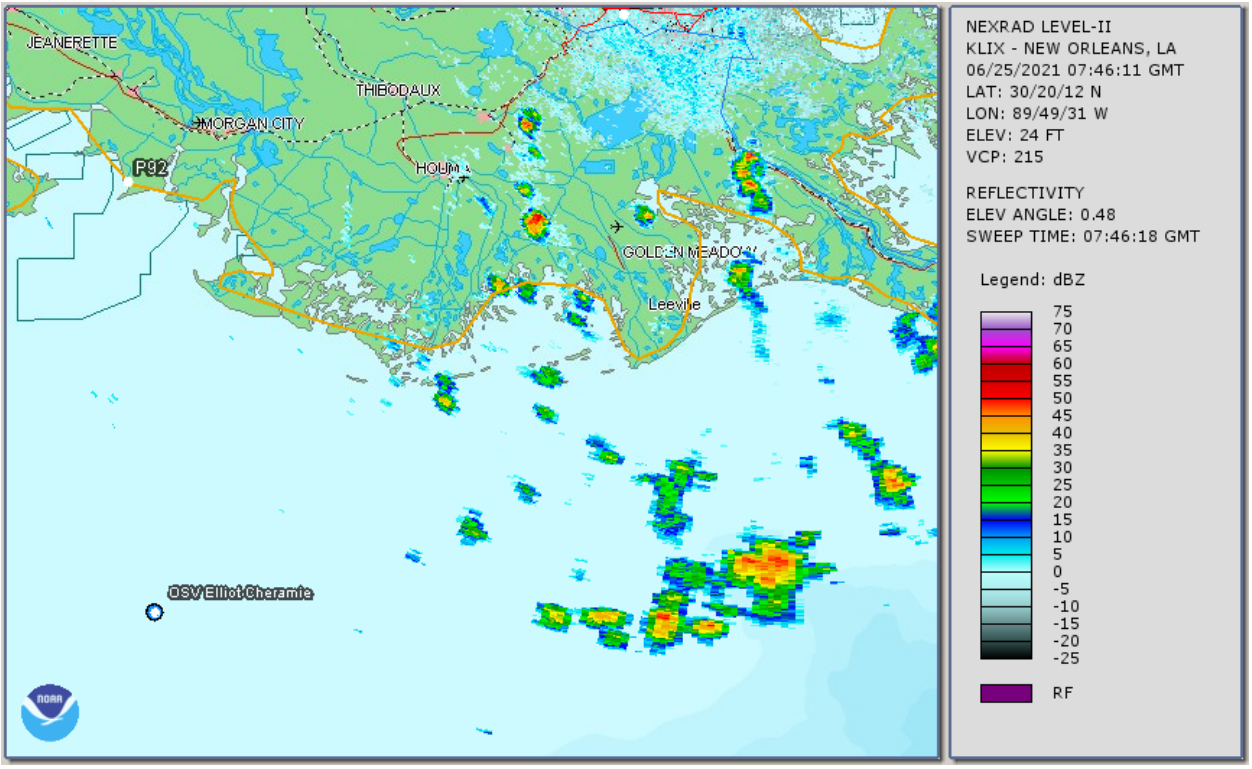

Figure 8 - KLIX WSR-1988D 0.48 base reflectivity image for 0246 CDT

6.0 NWS Forecasts and Advisories

The NWS New Orleans/Baton Rouge (KLIX), Louisiana, Weather Forecast Office (WFO) was responsible for the offshore weather and warning for the area. The following weather forecasts and advisories were issued surrounding the period.

6.1 Area Forecast Discussion

The NWS Area Forecast Discussions (AFD) are issued by each WFO to describe the short term weather conditions within their region with a marine section that includes the general conditions as it relates to the creation of the local forecast. These are generated roughly every 6 hours. The area forecast discussion issued at 0002 CDT on June 25, 2021 was as follows.

[16] dBZ - 10 log Ze

FXUS64 KLIX 250502
AFDLIX

Area Forecast Discussion
National Weather Service New Orleans LA
1202 AM CDT Fri Jun 25 2021

.PREV DISCUSSION... /issued 822 PM CDT Thu Jun 24 2021/

EVENING UPDATE...A multi-cellular area of convection over portions of coastal Mississippi will continue to drift to the south over the next few hours before dissipating. This southward movement is being mostly driven by density differences between the warm and unstable airmass along the coast and the rain cooled airmass beneath the multi-cellular convection. Given the extensive coverage of precipitation expected to move into coastal Mississippi, have increased POP for this evening to between 50 and 70 percent. The POP should fall back to below 20 percent after midnight. More isolated and short-lived convection in the Baton Rouge area is accounted for with 20 to 30 percent POP for the next couple of hours with expected dissipation before midnight. Outside of the POP, weather, and QPF adjustments, the remainder of the forecast package is on track this evening. PG

SHORT TERM (Tonight through Sunday)...

Scattered to numerous showers and thunderstorms occurred today in a fashion very typical of a summer day on the Gulf Coast. A few locations saw some heavier rainfall amounts of 1-2 inches in a short period of time, but no substantial flooding was reported thus far.

***High pressure was the dominant weather feature at various levels and locations relative to the central Gulf coast, however the surface ridge to the east has provided enough of a weak seabreeze/lake breeze regime to assist with the development of diurnal convection over land and nocturnal convection over the Gulf waters and coastal areas**. A moist airmass will remain in place through Saturday with afternoon precipitable water values expected to range from 1.70 to near 2 inches, although some drier pockets of 1.4 to 1.7 inches may rotate through from the east late Friday through early Saturday. This is expected to continue to support the status quo of scattered to numerous, mostly late morning/afternoon showers and thunderstorms both days with locally heavy rainfall expected.*

An amplification of a mid/upper level trough will occur over the northern/central Plains/upper Mississippi Valley area over the weekend while a mid to low level inverted moves northwest across the central to western Gulf of Mexico. This will reload or bring a surge of tropical moisture into at least southern/western portions of the forecast area on Sunday and have likely to categorical PoPs of showers and thunderstorms which also means greater locally heavy rainfall potential. Have followed very close to the NBM for both PoP and temperatures.

MARINE...

***A typical summer pattern with a ridge of high pressure centered from the Mid Atlantic region and adjacent Atlantic Ocean to the southeast U.S. and northeast Gulf of Mexico will maintain light to moderate southeast winds through the weekend and early next week with wind speeds mostly alternating between 5-10 knots and 10-15 knots. The main marine concern over the next several days will continue to be the threat of thunderstorms**. Am not really anticipating any wind related headlines over the coastal waters through the weekend, although it might be borderline above 15 knots on Saturday night.*

.PRELIMINARY POINT TEMPS/POPS...
MCB 91 72 90 71 / 50 30 50 20
BTR 92 74 90 73 / 70 20 50 20
ASD 91 74 89 73 / 60 20 50 10

MSY 91 77 90 77 / 70 10 60 10
GPT 89 75 87 74 / 60 60 50 10
PQL 88 73 86 73 / 60 60 40 10

.LIX WATCHES/WARNINGS/ADVISORIES...
LA...None.
GM...None.
MS...None.
GM...None.

The evening forecast indicated that light to moderate southeasterly winds between 5 and 15 knots were expected over the area under the influence of a high pressure ridge. The main marine weather concern was the threat of thunderstorms during the period.

6.2 Coastal Waters Forecast

The NWS Coastal Waters Forecasts (CWF) are issued every six hours and provide a synopsis of the conditions influencing the area, any advisories in effect, and a general week forecast of winds, significant wave heights, and any adverse weather expected during the period. The forecast areas are identified in figure 9 for the area, with region "GMZ570" covered the accident site and covered the coastal waters from Port Fourchon to the Lower Atchafalaya River, Louisiana, from 20 to 60 miles.

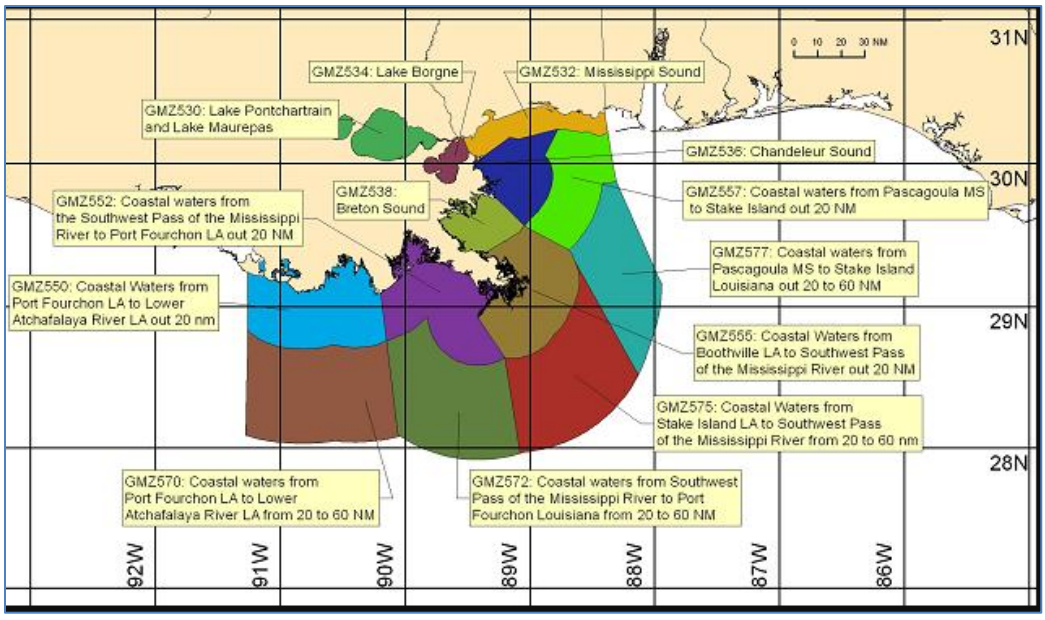

Figure 9 - Louisiana Coastal Water Forecast Regions

The Coastal Waters Forecast issued at 2140 CDT June 24, 2021 and current at the time of the accident was as follows:

FZUS54 KLIX 250240
CWFLIX

Coastal Waters Forecast
National Weather Service New Orleans LA
940 PM CDT Thu Jun 24 2021

Pascagoula to Atchafalaya River Out to 60 mile

Seas are provided as a range of the average height of the highest 1/3 of the waves...along with the occasional height of the average highest ten percent of the waves.

GMZ570-572-251515-
Coastal waters from Port Fourchon Louisiana to Lower Atchafalaya River LA from 20 to 60 mile- Coastal waters from Southwest Pass of the Mississippi River to Port Fourchon Louisiana from 20 to 60 mile-
940 PM CDT Thu Jun 24 2021

.REST OF TONIGHT...Southeast winds 10 to 15 knots. Seas 2 to4 feet. Dominant period 5 seconds.

.FRIDAY...East winds 10 to 15 knots. Seas 1 to 3 feet. Dominant period 5 seconds. Slight chance of showers and thunderstorms in the late morning and afternoon.

.FRIDAY NIGHT...Southeast winds 10 to 15 knots. Seas 2 to 4 feet. Dominant period 4 seconds. Slight chance of showers and thunderstorms.

The forecast expected southeasterly winds near 10 to 15 knots, with seas 2 to 4 ft, with the dominant period of 5 seconds.

6.3 Marine Weather Messages

The NWS issued Marine Weather Messages (MWW) to inform mariners of adverse weather hazards and serves as a long term marine watch, warning, and advisory product. They are issued as required or an event-driven product and may include Small Craft Advisories. The intent of the product is to provide information to those who need considerable lead time typically 12 to 48 hours to prepare for the event. During the period surrounding the accident there were no Marine Weather Messages issued on June 24 through the time of the accident on June 25, 2021. Marine weather advisories were issued later on June 25th for thunderstorms well after the accident and not pertinent to the case.

7.0 Astronomical Conditions

The astronomical conditions over the accident site coordinates provided the following astronomical conditions from the United States Naval Observatory's (USNO) Multiyear Interactive Computer Almanac (MICA) software for the period. The time of the accident has been included as bold italic type for reference, with time rounded to the nearest minute.

Sun	Local
Sunset	2007 CDT June 24, 2021
End civil twilight	2034 CDT
End nautical twilight	2106 CDT
Accident	***0245 CDT June 25, 2021***

Begin of nautical twilight	0511 CDT
Begin of civil twilight	0543 CDT
Sunrise	0610 CDT
Sun transition	1308 CDT
Sunset	2007 CDT

Moon	Local Time
Moonrise	2128 CDT June 24, 2021
Moon culmination	0139 CDT June 25, 2021
Accident	***0245 CDT***
Moonset	0652 CDT

At the time of the accident the Moon was 33° above the horizon at an azimuth of 197° with 99.5% of the disk illuminated at the time of the accident with the phase being a full moon.

Submitted by:

_____

Donald Eick
Senior Meteorologist

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