NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

July 7, 2022

Specialist's Factual Report

METEOROLOGY

DCA22FM013

A. CASUALTY

Location: Pascagoula, Mississippi
Date: March 12, 2022
Time: 0043 central standard time
0643 Coordinated Universal Time (UTC)
Vessel: *Valaris DS-16*

B. METEOROLOGY SPECIALIST

Specialist Paul Suffern
National Transportation Safety Board
Washington, DC

C. DETAILS OF THE INVESTIGATION

The National Transportation Safety Board's (NTSB) Meteorologist did not travel for this investigation and gathered the weather data for this investigation from official National Oceanic and Atmospheric Administration (NOAA) National Weather Service (NWS) sources and also from the National Centers for Environmental Information (NCEI). This Specialist's Factual Report contains the meteorological factors pertinent to the weather surrounding the casualty time. All times are central standard time (CST) and are based upon the 24-hour clock, where local time is -6 hours from UTC. Directions are referenced to true north and distances are in nautical miles. Heights are above mean sea level (msl) unless otherwise noted. Visibility is in statute miles and fractions of statute miles. NWS station identifiers use the standard International Civil Aviation Organization 4-letter station identifiers versus the International Air Transport Association 3-letter identifiers, which deletes the initial country code designator "K" for U.S. airports.

The casualty site was located at latitude 30.3349° N, Longitude 88.5095° W at msl.

D. FACTUAL INFORMATION

1.0 Synoptic Situation

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 synoptic weather features and in the creation of forecasts and warnings for the NWS. Reference to these charts can be found in the joint NWS and Federal Aviation Administration (FAA) Advisory Circular "Aviation Weather Services", AC 00-45H.[1]

1.1 Surface Analysis Chart

The NWS Surface Analysis Charts centered over the southern United States for 0000 and 0300 CST are provided as figures 1 and 2, respectively, with the location of the casualty site within the black circle. The charts depicted a cold frontal boundary moving eastward across the southern United States with a low-pressure system of 1002-hectopascals (hPa) over eastern Alabama at 0000 CST along the frontal boundary. The low-pressure system deepened to 987-hPa by 0300 CST and moved northeast to the Georgia and South Carolina border. The casualty site was located west of the frontal boundary at both 0000 and 0300 CST on the cold side of the front.

The station models around the casualty site depicted air temperatures dropping from the low 60's degrees Fahrenheit (°F) at 0000 CST to the low 40's °F by 0300 CST near the casualty site. Station models depicted overcast skies with the wind increasing from the northwest to 20 knots at 0000 CST to a northwest wind at 30 knots by 0300 CST. Light rain was depicted in the station models in southern Mississippi at 0000 CST.

[1] https://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.information/documentID/1030235

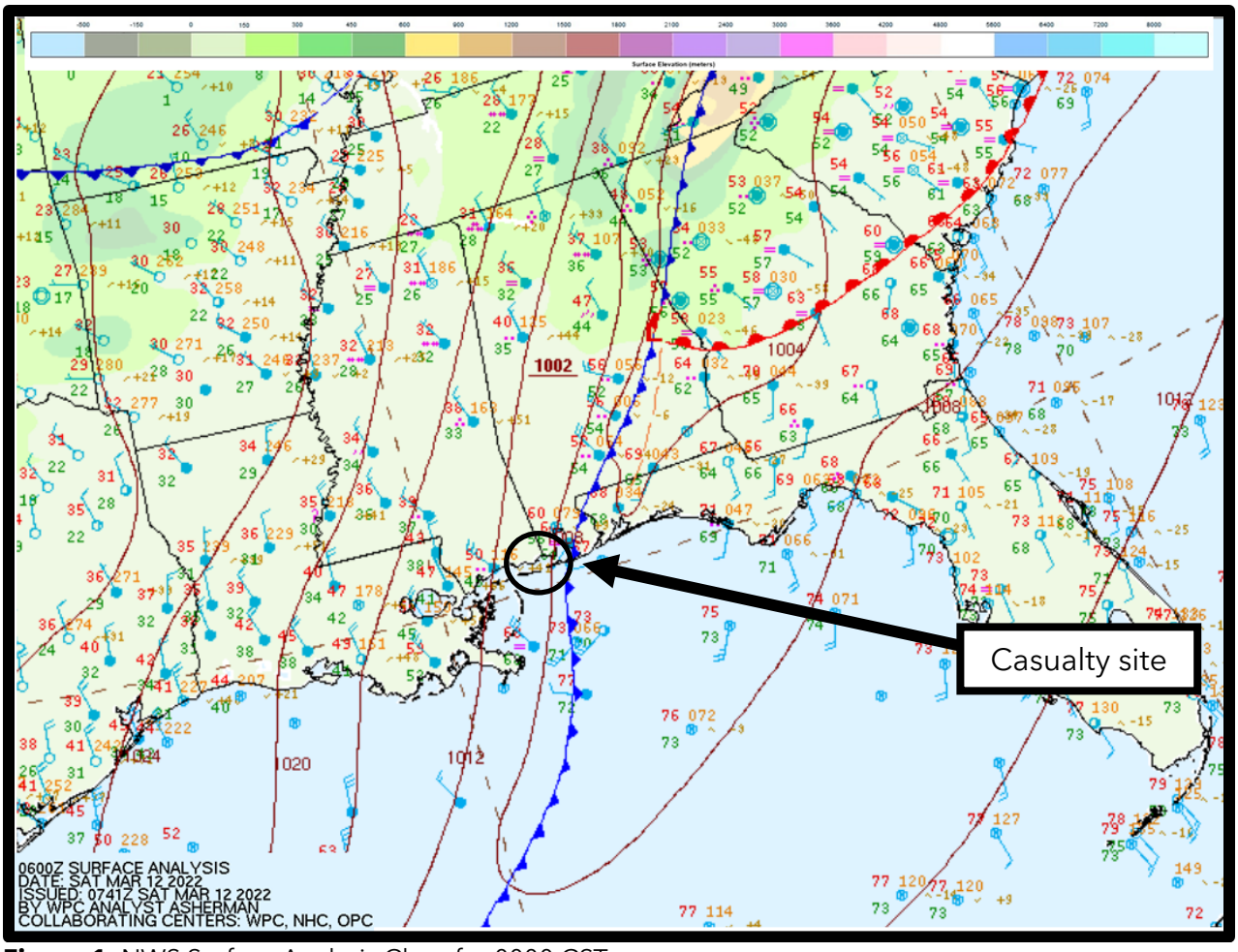

Figure 1. NWS Surface Analysis Chart for 0000 CST.

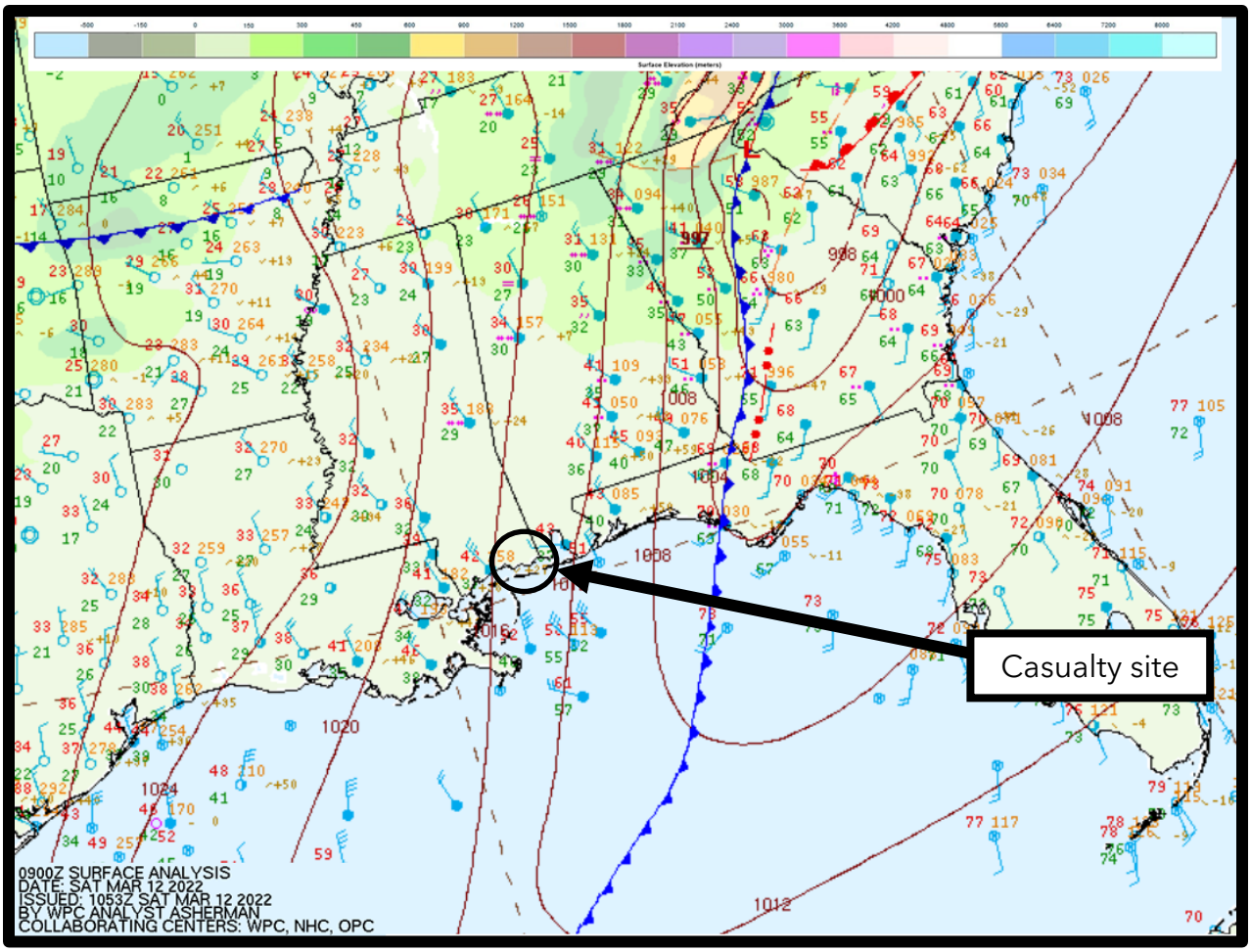

Figure 2. NWS Surface Analysis Chart for 0300 CST.

2.0 Storm Prediction Center Convective Outlook

The NWS Storm Prediction Center (SPC) issued the following Day 1 Convective Outlook at 1836 CST on March 11 (figure 3) with a slight risk of severe thunderstorms depicted for the casualty site northeastward into central North Carolina through 0600 CST on March 12. In addition, the casualty site was located where SPC forecast the 5% risk of a tornado within 25 miles of a point, a 15% risk of damaging thunderstorm winds or wind gusts of 50 knots or higher within 25 miles of a point, and a 5% risk of one inch diameter hail or larger within 25 miles of a point (figure 4 through 6). The SPC text bulletin that was associated with the Convective Outlook text follows figure 6.

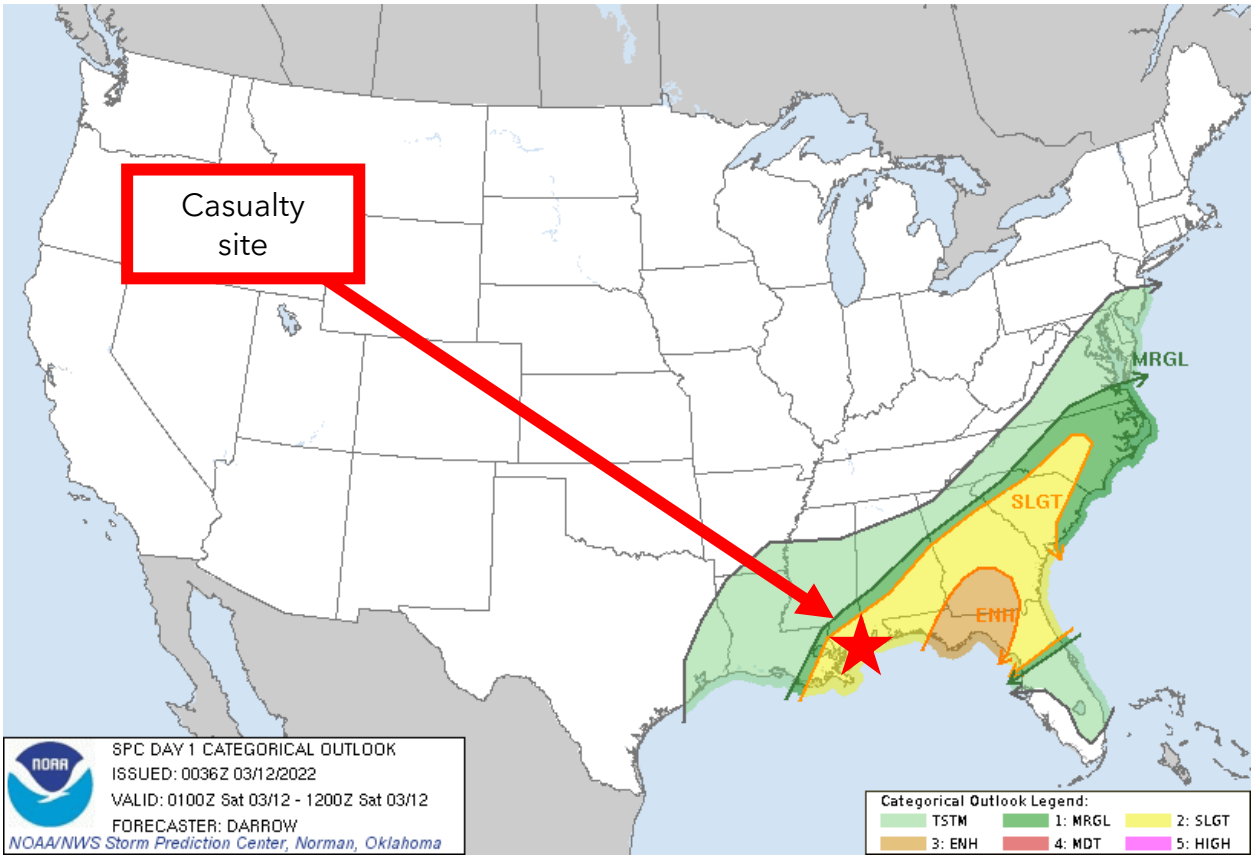

Figure 3. SPC Day 1 Convective Outlook valid at the time of the casualty.

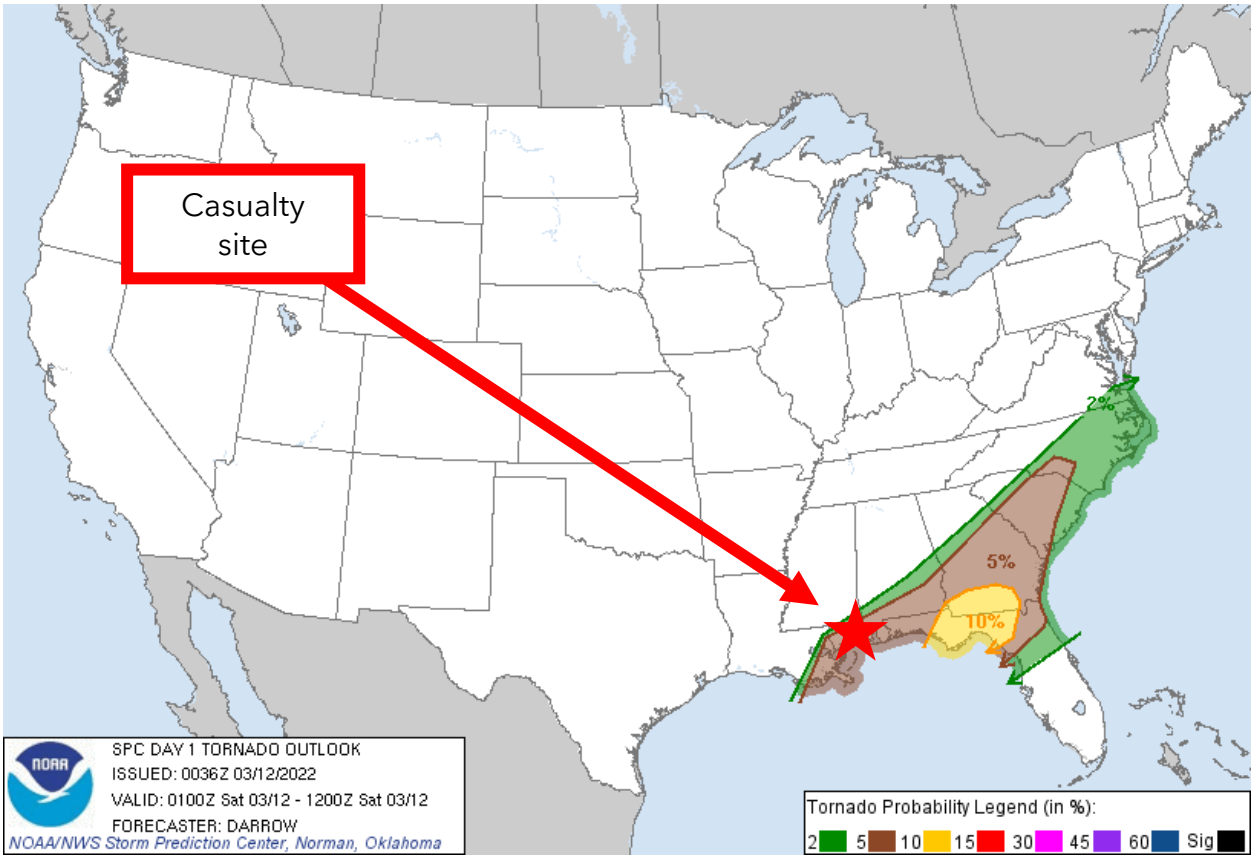

Figure 4. SPC Day 1 Tornado Outlook valid at the time of the casualty.

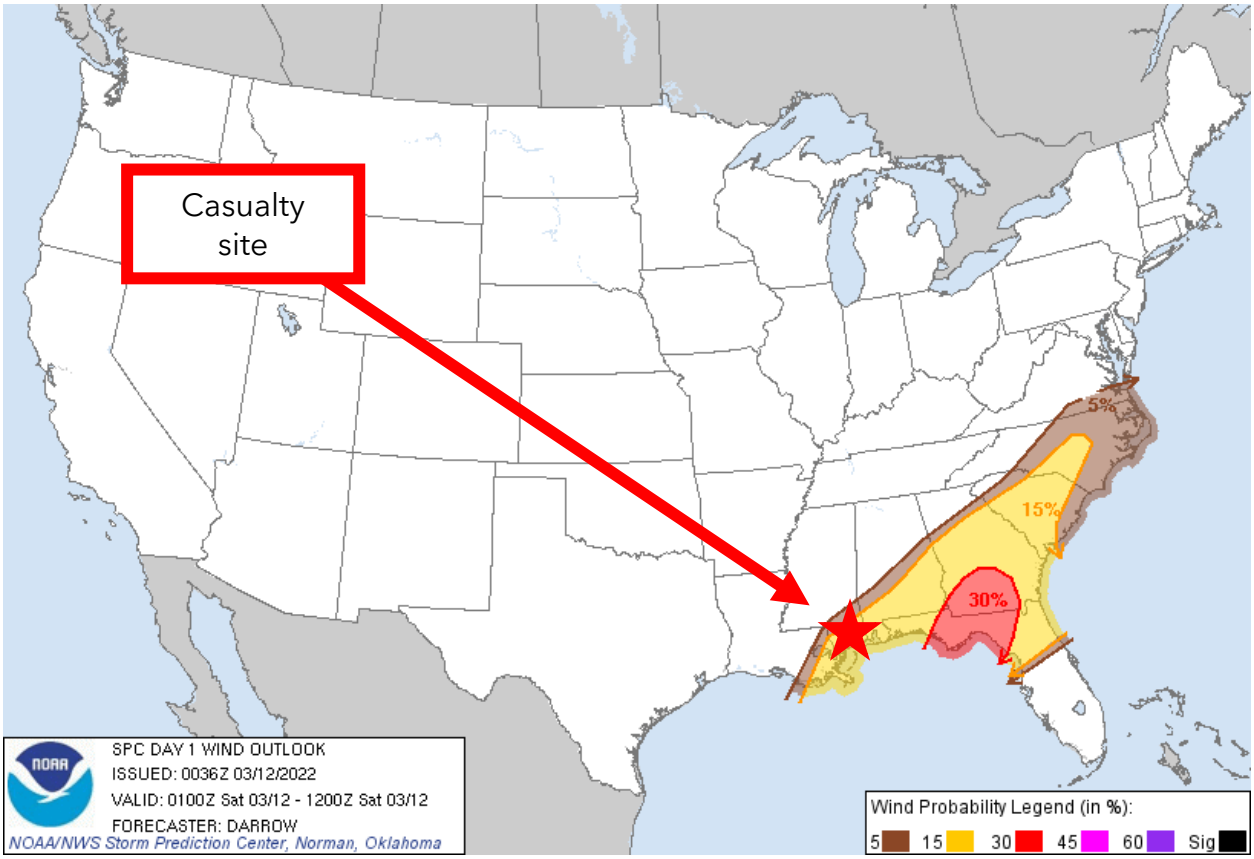

Figure 5. SPC Day 1 Wind Outlook valid at the time of the casualty.

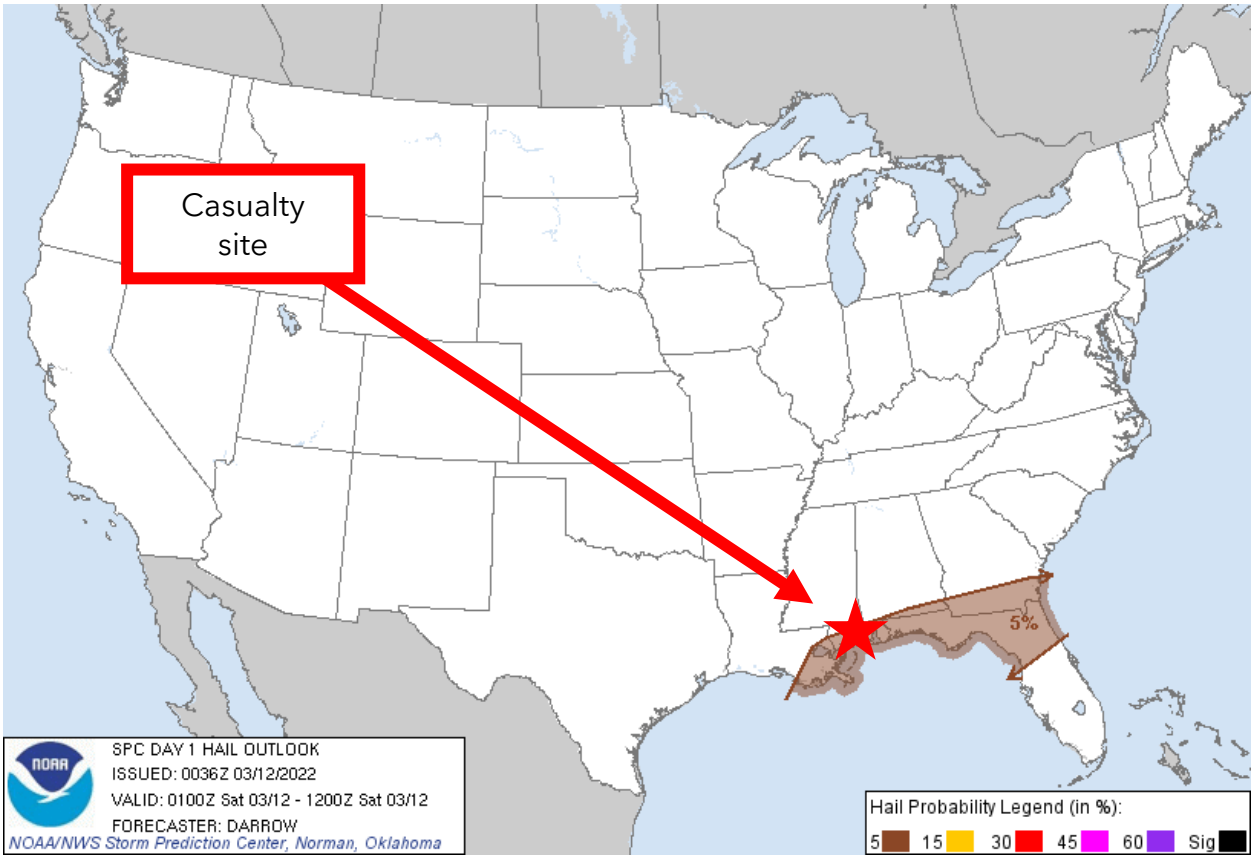

Figure 6. SPC Day 1 Hail Outlook valid at the time of the casualty.

SPC AC 120036

Day 1 Convective Outlook
NWS Storm Prediction Center Norman OK
0636 PM CST Fri Mar 11 2022

Valid 120100Z - 121200Z

...THERE IS AN ENHANCED RISK OF SEVERE THUNDERSTORMS ACROSS PORTIONS OF NORTHERN FLORIDA INTO SOUTHERN GEORGIA...

...SUMMARY...
Damaging wind and a few tornadoes are possible across the central and northeastern Gulf Coast to the Carolinas and northern Florida. The period of greatest concern appears to be late tonight into Saturday morning.

...01z Update...

Long-lived, elongated corridor of convection persists across the northeastern Gulf of Mexico extending into portion of northern FL.

This activity will stubbornly begin to advance north in response to approaching short-wave trough later this evening. Higher instability air mass is expected to gradually return to the central Gulf Coast as an associated offshore boundary lifts north. Over the last few hours, scattered thunderstorms have gradually increased in coverage/intensity over southeast LA ahead of the main cold front. Other strong storms are just off the southeast LA Coast where greater buoyancy resides. This upstream convection is expected to spread east-northeast this evening, along/near the Gulf Coast. Strengthening wind fields over the ENH Risk will remain conducive for supercells and potential tornadoes. Other than adjusting the western edge of thunder/severe probabilities to account for ongoing activity, earlier thoughts regarding the potential for severe remain.

..Darrow.. 03/12/2022

CLICK TO GET WUUS01 PTSDY1 PRODUCT

NOTE: THE NEXT DAY 1 OUTLOOK IS SCHEDULED BY 0600Z

3.0 Surface Observations

The area surrounding the casualty site was documented using official Aviation Routine Weather Reports (METARs) and Specials Reports (SPECIs). The following observations were taken from standard code and are provided in plain language. Figure 7 is a local map with the casualty site and the closest weather reporting location to the casualty site marked. A sectional chart depicted the magnetic variation[2] of 2° west over the area.

[2] Magnetic variation – The angle (at a particular location) between magnetic north and true north. Latest measurement taken from https://skyvector.com/

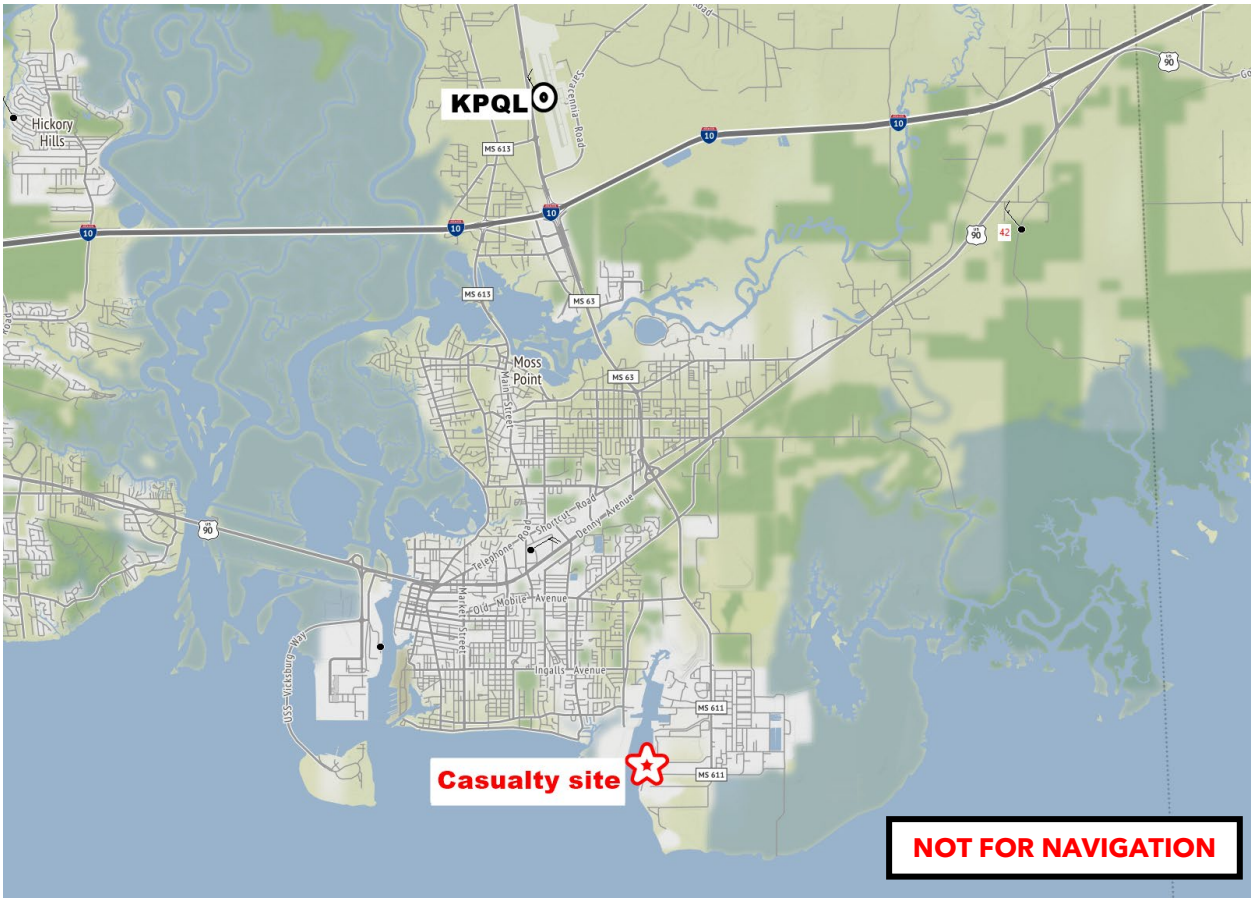

Figure 7. Local map of the casualty area with the location of the casualty site and surface observation site.

Trent Lott International Airport (KPQL), Pascagoula, Mississippi, had the closest official weather station to the casualty site. KPQL had an Automated Surface Observing System (ASOS[3]) whose longline reports were augmented by air traffic control (ATC) when the air traffic control (ATC) tower was in operation[4]. The KPQL ASOS was located 8 miles north of the casualty site, at an elevation of 17 feet (ft), and issued the following observations surrounding the period of the casualty:[5]

[3] ASOS – Automated Surface Observing System is equipped with meteorological instruments to observe and report wind, visibility, weather phenomena, ceiling, temperature, dewpoint, altimeter, and barometric pressure. ASOS are maintained by the NWS.
[4] ATC operational hours 0800 to 1800 local time on weekends. Operational hours 0600 to 2000 local time on the weekdays.
[5] The bold sections in this NWS product and the rest of the products in this report are intended to highlight the text that directly reference the weather conditions that affected the casualty location around the casualty time. The local times in this section next to the METARs are provided for quick reference between UTC and local times around the casualty time.

[2335 CST[6]] SPECI KPQL 120535Z AUTO 32011G23KT 5SM +RA BR FEW008 BKN013 OVC021 17/16 A2978 RMK AO2 P0012 T01720156 TSNO=

[2353 CST[7]] METAR KPQL 120553Z AUTO 31011G27KT 10SM -RA BKN008 OVC013 14/13 A2980 RMK AO2 PK WND 33029/0539 CIG 006V011 SLP093 P0013 60018 T01390128 10217 20139 402440106 53024 TSNO=

[0011 CST] SPECI KPQL 120611Z AUTO 32012G27KT 10SM OVC010 12/10 A2984 RMK AO2 PK WND 34027/0605 RAE05 CIG 006V014 PRESRR P0000 T01170100 TSNO=

[0020 CST] SPECI KPQL 120620Z AUTO 32012G24KT 10SM OVC008 11/09 A2985 RMK AO2 PK WND 34027/0605 RAE05 CIG 006V012 PRESRR P0000 T01060094 TSNO=

[0030 CST] SPECI KPQL 120630Z AUTO 34014G27KT 10SM OVC010 10/08 A2987 RMK AO2 PK WND 34027/0627 RAE05 P0000 T01000083 TSNO=

CASUALTY TIME 0043 CST

[0053 CST] METAR KPQL 120653Z AUTO 33013G25KT 10SM -RA OVC012 09/07 A2991 RMK AO2 PK WND 34027/0627 RAE05B44 PRESRR SLP128 P0000 T00890072 TSNO=

[0126 CST] SPECI KPQL 120726Z AUTO 35014G25KT 10SM BKN015 OVC040 08/06 A2990 RMK AO2 PK WND 33032/0700 RAE19 P0000 T00780056 TSNO=

The bold type observations decoded in plain language were as follows:

[6] March 11
[7] March 11

KPQL weather at 0030 CST, automated, wind from 340° at 14 knots with gusts to 27 knots, visibility 10 miles or greater, overcast ceiling[8] at 1,000 ft above ground level (agl), temperature of 10°Celsius (C), dew point temperature 8°C, and an altimeter setting of 29.87 inches of mercury (inHg). Remarks, automated station with a precipitation discriminator, peak wind at 0027 CST from 340° at 27 knots, rain ended at 0005 CST, a trace of precipitation since 2353 CST[9], temperature 10.0°C, dew point temperature 8.3°C, thunderstorm information not available.

KPQL weather at 0053 CST, automated, wind from 330° at 13 knots with gusts to 25 knots, visibility 10 miles or greater, light rain, overcast ceiling at 1,200 ft agl, temperature of 9°C, dew point temperature 7°C, and an altimeter setting of 29.91 inHg. Remarks, automated station with a precipitation discriminator, peak wind at 0027 CST from 340° at 27 knots, rain ended at 0005 CST, rain began at 0044 CST, pressure rising rapidly, sea level pressure 1012.8 hPa, a trace of precipitation since 2353 CST[10], temperature 8.9°C, dew point temperature 7.2°C, thunderstorm information not available.

The observations from KPQL surrounding the casualty time indicated gusting wind conditions to 27 knots from the northwest and light rain. Heavy rain was reported at KPQL between 2335 and 2353 CST on March 11. The casualty vessel also captured wind information. Please see section 9.0 for additional wind information.

4.0 Satellite Data

Geostationary Operational Environmental Satellite number 16 (GOES-16) visible and infrared data 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 software. Visible and infrared imagery (GOES-16 bands 2 and 13) at wavelengths of 0.64 microns (μm) and 10.3 μm, respectively, were retrieved for the period from 1800 CST on March 11 through 0400 CST on March 12 and reviewed, and the closest images to the time of the casualty were documented. Given the sun angle, the visible imagery (band 2) did not provide useful information.

[8] Ceiling is defined as the lowest layer of clouds reported as broken or overcast, or the vertical visibility into a surface-based observation.
[9] March 11
[10] March 11

Figures 8 and 9 present the GOES-16 infrared imagery from 0020 and 0040 CST at 4X magnification with the casualty site highlighted with a red square. There was cloud cover above the casualty site at the casualty time with the cloud cover moving from west to east. The lower brightness temperatures (green and blue colors; higher cloud tops) were located to the east of the casualty site. It should be noted these figures have not been corrected for any parallax error.

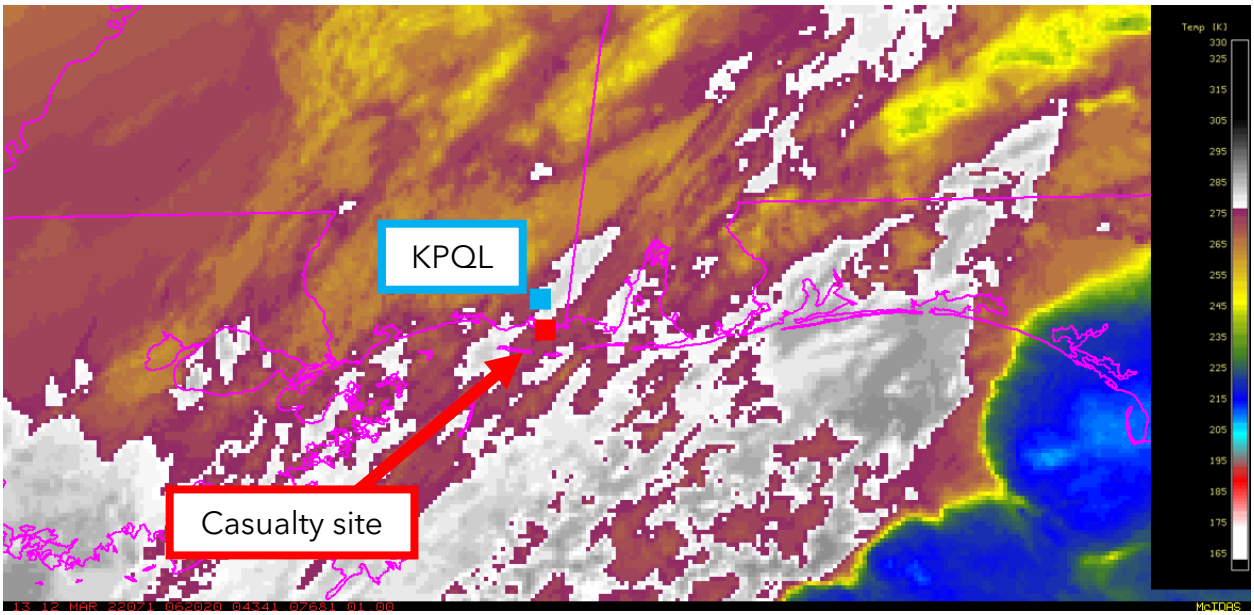

Figure 8. GOES-16 infrared image at 0020 CST.

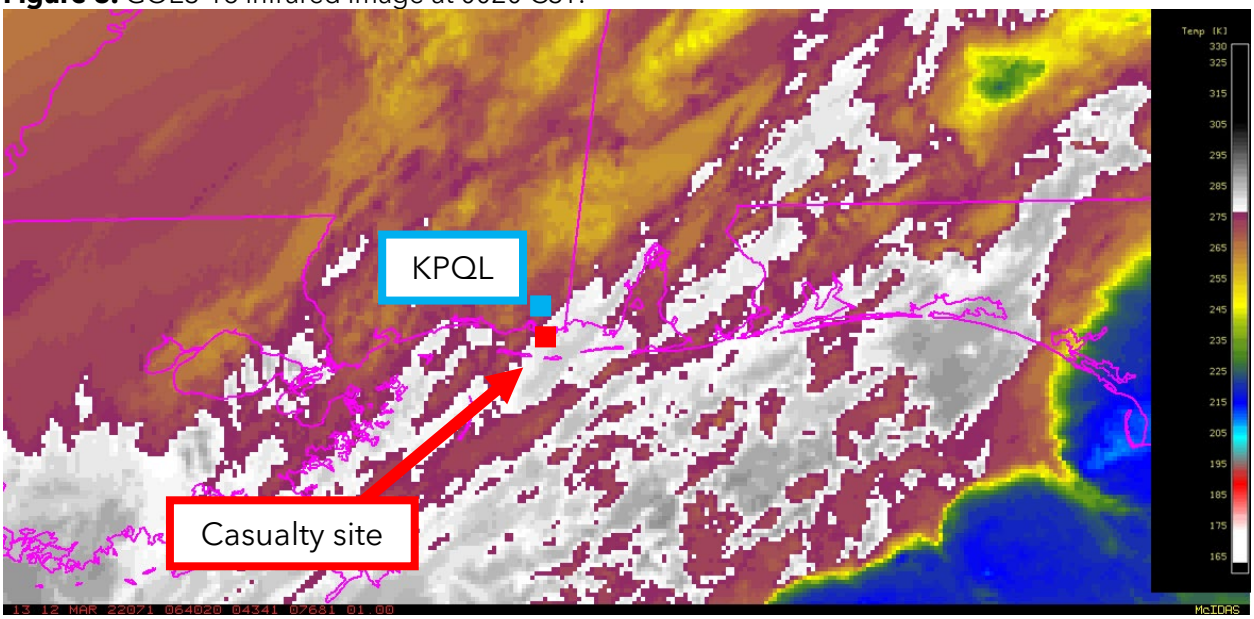

Figure 9. GOES-16 infrared image at 0040 CST.

5.0 National Radar Imagery

A regional view of the NWS National Reflectivity Mosaic is included as figure 10 for 0045 CST with the approximate location of the casualty site marked by a red circle. The image depicted echoes to the west through north of the casualty site, but no echoes were present above the casualty site at the casualty time.

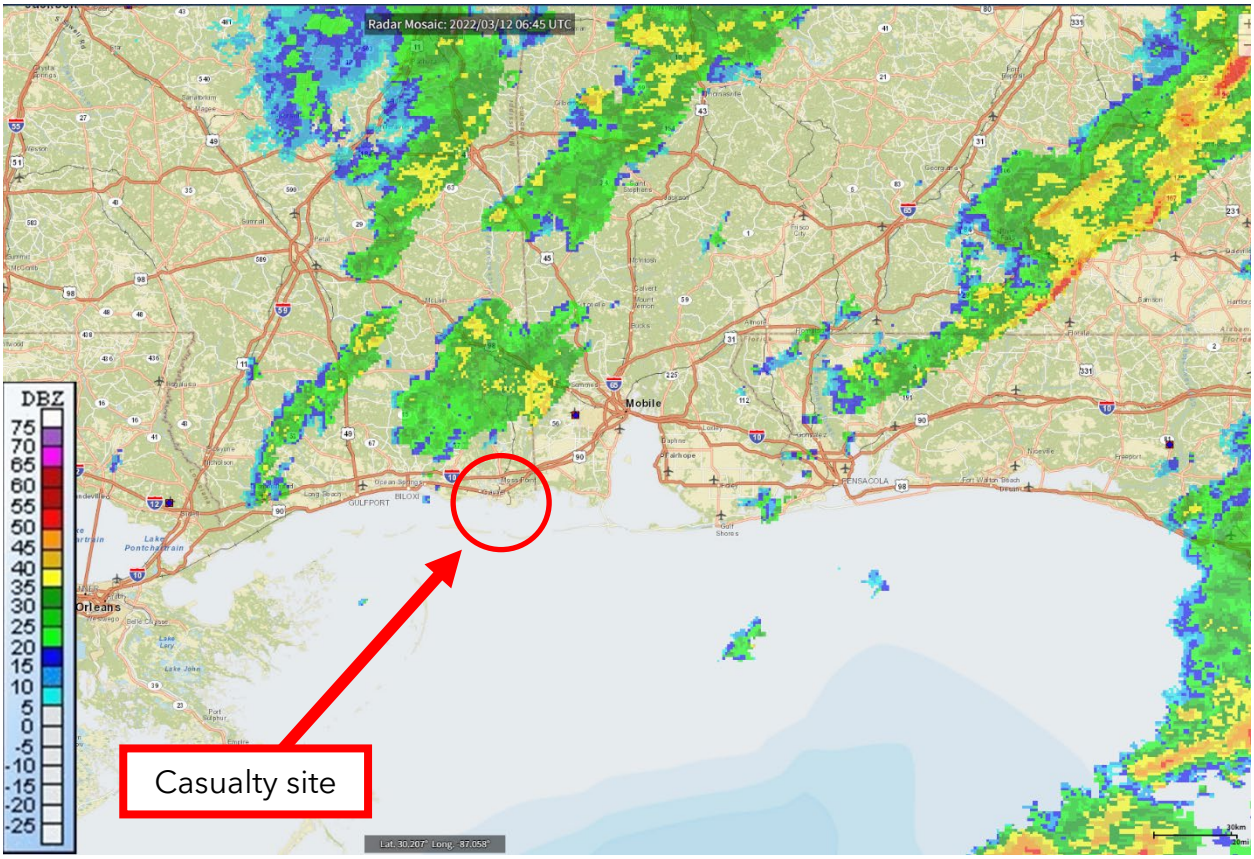

Figure 10. National Reflectivity Mosaic for 0045 CST.

6.0 Weather Surveillance Radar Imagery

The closest NWS Weather Surveillance Radar-1988, Doppler (WSR-88D)[11] to the casualty site was Mobile, Alabama (KMOB) located 25 miles northeast of the casualty site. Level II archive radar data were obtained from the NCEI utilizing the NEXRAD Data Inventory Search and displayed using the NOAA's Weather and Climate Toolkit software.

[11] The WSR-88D is an S-band 10-centimeter wavelength radar with a power output of 750,000 watts, and with a 28-foot parabolic antenna that concentrates the energy between a 0.87° and 0.96° beam width. The radar produces three basic types of products: base reflectivity, base radial velocity, and base spectral width.

6.1 Volume Scan Strategy

The WSR-88D is a computer-controlled radar system, which automatically creates a complete series of specific scans in a specific sequence known as a volume scan. Individual elevation scans are immediately available. Products that require data from multiple elevation scans are not available until the end of the five-to-ten-minute volume scan.

The WSR-88D operates in two main scanning modes, identified as Mode A and Mode B. Mode A is the precipitation scan where the radar makes 14 elevation scans from 0.5° to 19.5° every four and a half minutes. This particular scanning strategy is documented as volume coverage pattern 212 (VCP-212, figure 11). Mode B is the clear-air mode, where the radar makes 5 elevation scans during a ten-minute period. During the period surrounding the casualty, the KMOB WSR-88D radar was operating in the precipitation mode VCP-212. The following figure provides an indication of the different elevation angles in this VCP, and the approximate height and width of the radar beam with distance from the radar site.

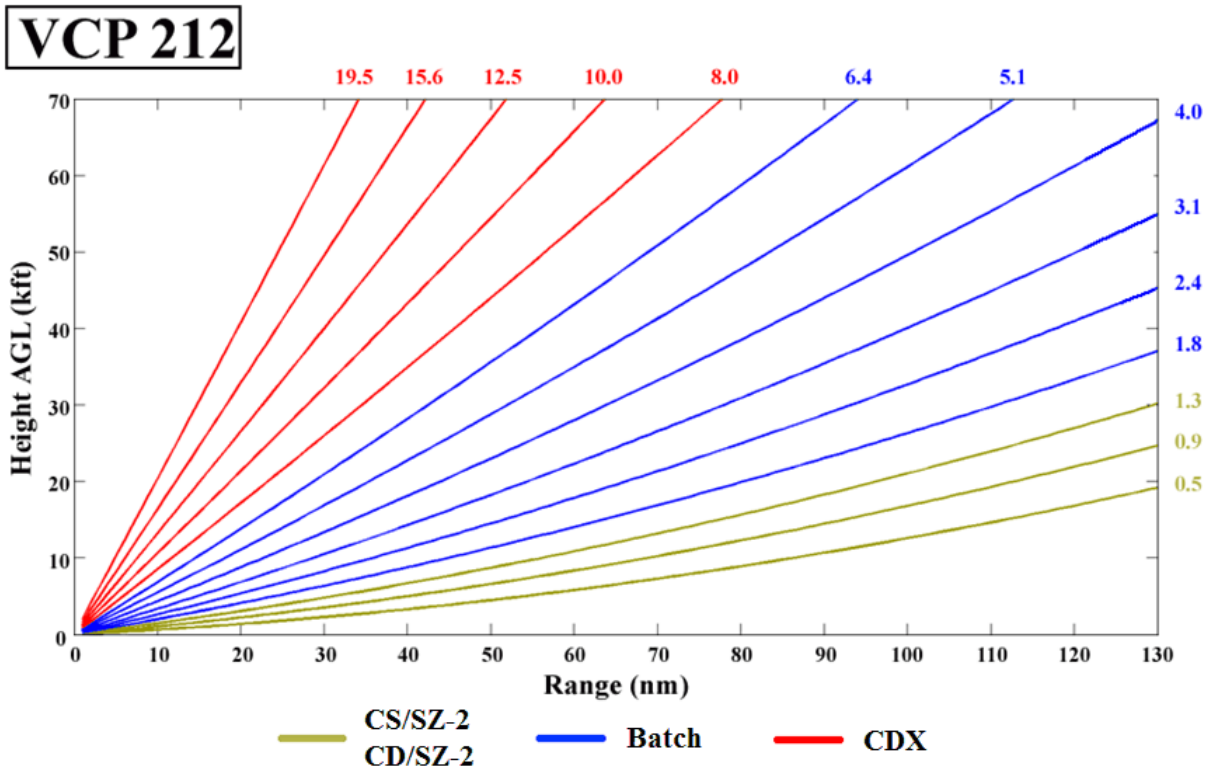

Figure 11. VCP-212 Precipitation Mode Scan Strategy[12].

[12] Contiguous Surveillance (CS)--The low Pulse Repetition Frequency (PRF) scan of the split cut. Gives a high R_{max} value to determine proper target location and intensity, but a low V_{max} value limits the velocities that can be measured.

6.2 Beam Height Calculation

Assuming standard refraction[13] of the KMOB WSR-88D radar beam with the antenna elevation at 289 ft, and considering a beamwidth[14] of 0.95°, the following table shows the approximate heights for the radar beam center, top and base for antenna elevations over the casualty site. These heights have been rounded to the nearest 10 ft.

ANTENNA ELEVATION	BEAM CENTER	BEAM BASE	BEAM TOP
KMOB 0.5°	2,070 ft	840 ft	3,300 ft

Based on the radar height calculations, the elevation scans from KMOB listed in the above table depicted the conditions between 840 ft and 3,300 ft over the casualty site and these scans "saw" the closest altitudes to the ground.

Contiguous Doppler (CD)--The high PRF scan of the split cut. Gives a low R_{max} value causing more range folded (multiple trip) echoes, but a high V_{max} value to get higher, more accurate velocity values.
Batch Mode – Uses alternating low and high PRFs on each radial for one full rotation at each elevation angle. The two resulting data sets (low PRF and high PRF) are combined to resolve range ambiguity. Used in the middle elevation angles.
W – With range unfolding (W)
WO – Without range unfolding (WO)

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

[14] Beamwidth - the angular separation between the half power points on the antenna radiation pattern, where the gain is one half the maximum value.

6.3 Reflectivity

Reflectivity is the measure of the efficiency of a target in intercepting and returning radio energy. With hydrometeors[15] 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 dBZ[16] and is a general measure of echo intensity. FAA Advisory Circular AC 00-24C[17], "Thunderstorms," dated February 19, 2013, also defines the echo intensity levels and weather radar echo intensity terminology associated with those levels. For dBZ values less than 30 the weather radar echo intensity terminology should be "light." For dBZ values between 30 and 40, the terminology should be "moderate." "Heavy" terminology is used for dBZ values greater than 40 dBZ but less than 50 dBZ, inclusive. Finally, any dBZ values above 50 dBZ shall be described as "extreme."

6.4 Base Reflectivity and Lightning Data

Figures 12 and 13 present the KMOB WSR-88D base reflectivity images for the 0.5° elevation scans initiated at 0021:35 and 0042:42 CST, respectively, with a resolution of 0.5° X 250 m. There were no reflectivity values above the casualty site at 0021 or 0042 CST, however, there was a band of reflectivity values between 10 and 20 dBZ that was located above the casualty site after 0043 CST (attachment 1). The band of precipitation was moving from southwest to northeast with time (attachment 1).

There were no lightning flashes[18] reported within 50 miles of the casualty site within 30 minutes prior to or following the casualty time.[19]

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[15] Hydrometeors are any product of condensation or sublimation of atmospheric water vapor, whether formed in the free atmosphere or at the earth's surface; also, any water particles blown by the wind from the earth's surface. Hydrometeors are classified as; (a) Liquid or solid water particles suspended in the air: cloud, water droplets, mist, or fog. (b) Liquid precipitation: drizzle and rain. (c) Freezing precipitation: freezing drizzle and freezing rain. (d) Solid (frozen) precipitation: ice pellets, hail, snow, snow pellets, and ice crystals. (e) Falling particles that evaporate before reaching the ground: virga. (f) Liquid or solid water particles lifted by the wind from the earth's surface: drifting snow, blowing snow, blowing spray. (g) Liquid or solid deposits on exposed objects: dew, frost, rime, and glazed ice.

[16] dBZ – A non-dimensional "unit" of radar reflectivity which represents a logarithmic power ratio (in decibels or dB) with respect to radar reflectivity factor, Z.

[17] https://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.information/documentID/1020774

[18] Lightning Flash – This is one contiguous conducting channel and all the current strokes/pulses that flow through it. There are two types of flashes: ground flashes and cloud flashes.

[19] A review of Earth Networks Total Lightning network and GOES-16 Geostationary Lightning Mapper was done.

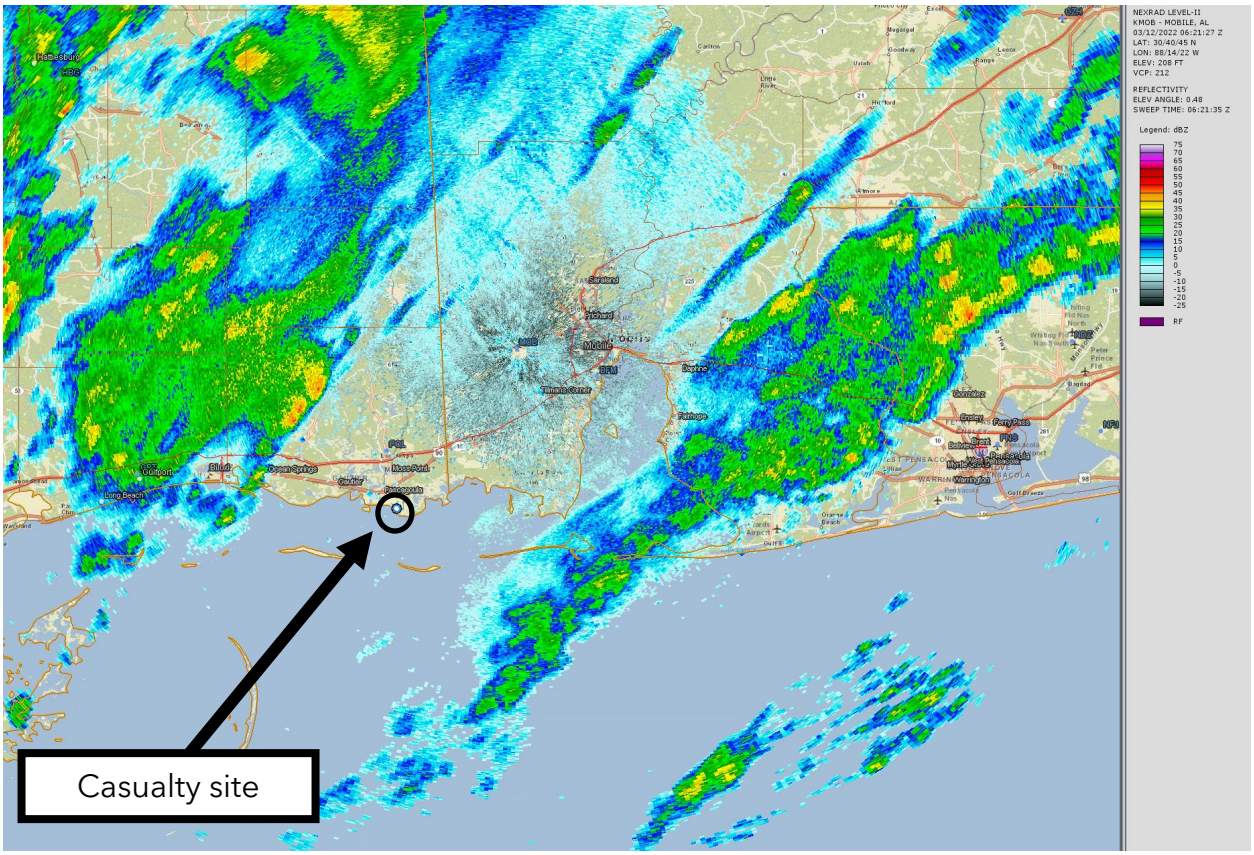

Figure 12. KMOB WSR-88D reflectivity for the 0.5° elevation scan initiated at 0021:35 CST with the casualty site marked with black circle.

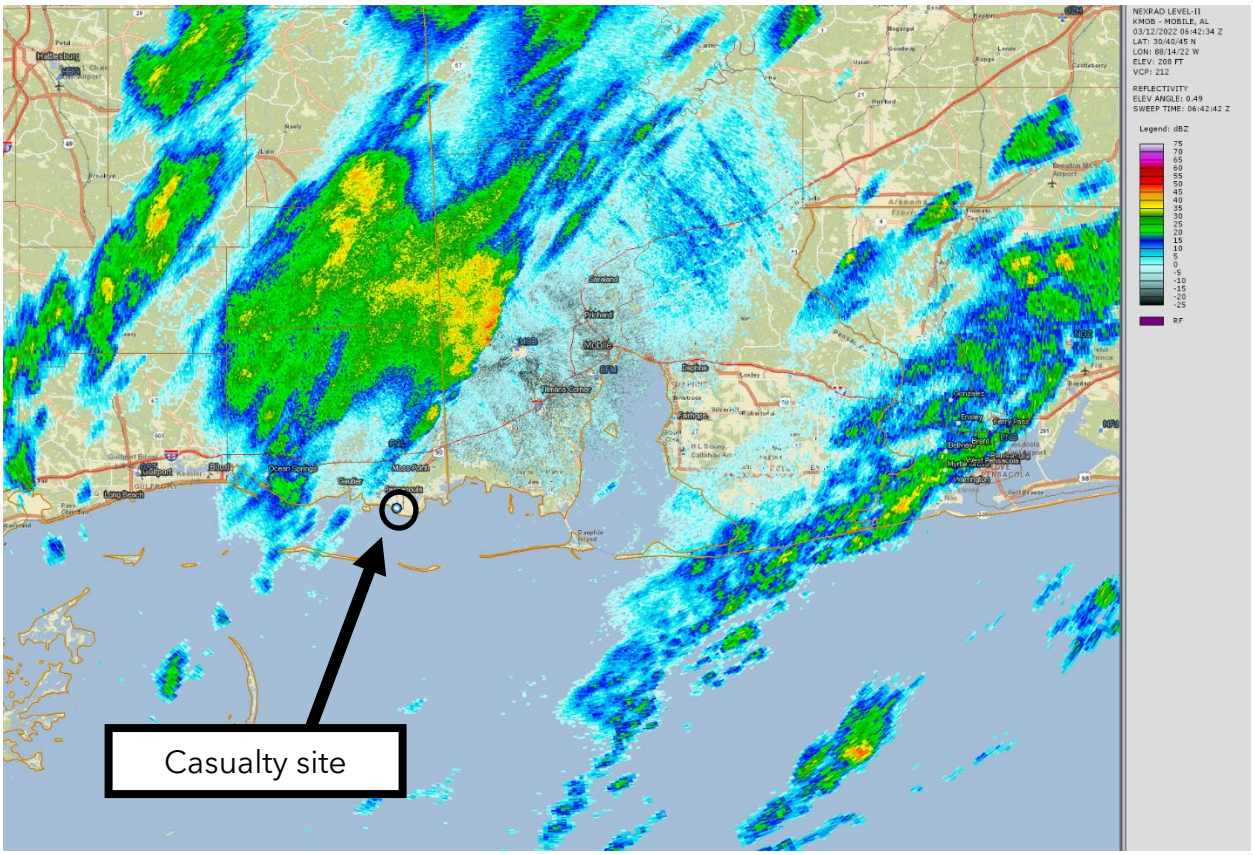

Figure 13. KMOB WSR-88D reflectivity for the 0.5° elevation scan initiated at 0042:42 CST with the casualty site marked with black circle.

7.0 National Weather Service Area Forecast Discussion

The NWS office in New Orleans/Baton Rouge, Louisiana, (WFO LIX) was responsible for the public forecast in the region of the casualty site. WFO LIX issued the following Area Forecast Discussion (AFD) at 2338 CST on March 11, the closest AFD to the casualty time. The WFO LIX AFD mentioned a cold front moving across the area with winds gusting to 40 to 45 miles per hour (mph) expected:

FXUS64 KLIX 120538
AFDLIX

Area Forecast Discussion
National Weather Service New Orleans LA
1138 PM CST Fri Mar 11 2022

.AVIATION...06Z TAF Package...Cold front is quickly moving through with very strong northwesterly to northerly winds behind it. The strongest winds will obviously be MSY and NEW as they come off the lake. All terminals are currently battling IFR and MVFR cigs, mostly MVFR. These will likely continue to be an issue through a majority of the morning but it looks like these clouds

scatter out around or shortly after sunrise. After that VFR conditions expected through Sunday./ CAB/

&&

.PREV DISCUSSION... /issued 710 PM CST Fri Mar 11 2022/

EVENING UPDATE...Still have a Slight Risk over extreme southeast LA and coastal MS. Currently SELA south of the Lake has the best chance for strong to severe storms. Instability is low but what is available is in that area. Helicity values are low but what is there is a stalled boundary which remains draped from near Houma to Yscckloskey to south of the MS Sound. The one storm we have been watching closely is trying to ride this boundary. It has had a deviant motion compared to the rest of the mean storm motion and continues to show characteristics of a cyclic supercell (albeit mini-supercell). The biggest question continues to be sfc based or elevated. That storm has appeared to be elevated much of the time but could quickly become sfc based with that boundary right there. There is still a good deal of support and deep shear with 0-6km bulk shear of 60-70kts, h5 winds of 60-70kts and what appears to be increasing divergence aloft per WV imagery.

Cold front is still on the way an at 01Z was just about to start entering the northwestern portions of the CWA. Southwest MS and the BTR metro should see frontal passage in the next few hours with temps quickly dropping into the upper 30s and lower 40s before midnight. Winds will be increasing as well. /CAB/

PREV DISCUSSION... /issued 328 PM CST Fri Mar 11 2022/

SHORT TERM...
Tonight through Sunday...
Tonight into tomorrow, a frontal system is expected to move through the area, enhancing rain chances for the area. Easterly surface winds will help to enhance some warm air and moisture into the environment. Weak upper level divergence will help to enhance some lifting in the environment. Looking at the models, numerous showers and storms will be possible tonight. There is not a ton of instability (CAPE values around 300-500 J/kg), but there is enough for stronger storms to develop. There is some helicity, but not a ton. An isolated tornado cannot be ruled out. Hail, gusty winds and lightning will be the main threat. Locally heavy rainfall will be possible inside any stronger storms. As this front moves through the CAA will be strong enough that if the timing works out, a flurry or two of snow could be possible in the SW MS areas as the CAA pulls in the remaining moisture from the lingering cloud deck. If the timing is off a bit (too slow or fast), then it will not be as likely. The strong cold air advection behind the front will allow low temperatures to be approaching or below freezing in the SW MS counties. As a result, a Freeze Warning has been issued for these areas for tomorrow morning.

Saturday, upper level ridging will dominate the pattern. Northerly surface winds will help to advect cold and dry air into the region. This strong Cold Air Advection, based on the models, will enhance the surface winds enough to where winds are forecast to be 25+ mph sustained winds gusting 40-45mph from overnight Friday through the afternoon hours Saturday. A Wind Advisory is in effect as a result for our area. Upper level convergence will help to bring sinking and stable air into the environment. Due to strong CAA, light winds, and clear skies forecast, radiational cooling will be likely. Low temperatures Sunday morning have been bumped down a few degrees below NBM to account for this radiational cooling and to be more in line with the general model consensus. Lows Sunday morning are expected to be in the mid 20s to low 30s across the area.

Sunday will be mainly a transitional day for the atmosphere. Zonal flow aloft will dominate the upper level pattern. Southerly surface winds will reintroduce moisture and warm air back into the environment. Some weak upper level divergence will help to enhance some lifting during the afternoon hours on Sunday. Looking at the models, Sunday will remain dry overall. MSW

LONG TERM...
Monday through Thursday...
Zonal flow will dominate the upper level pattern on Monday. Southerly surface winds will help to continue to enhance warm air advection and moisture advection in the environment. Weak upper level divergence during the afternoon hours will help to increase lifting in the environment. Looking at the models, some isolated showers may be possible in the coastal waters Monday afternoon, but overall Monday will remain fairly dry.

Monday Night into Tuesday, a low pressure system will influence the area. A shortwave trough/boundary will interact with a longwave low pressure system to enhance rainfall for the area. Models are still uncertain on the timing of the systems and whether/when they will phase/merge together. But looking at the current model trends, the shortwave boundary will help to generate storms along the coastal areas late Monday night ahead of the front. Then the front is expected to push through the area Tuesday morning around daybreak. Southerly winds are expected to enhance warm air advection and moisture ahead of the systems moving through. PW values are ranging in the 1.4-1.6 inches range Tuesday, which is above the 75th percentile for the SPC sounding climatology. This shows the abundant moisture in the environment and potential rainfall efficiency. There is not much instability, however, as the front moves through (and CAPE is only 500J/kg at times). And there is not a lot of upper level divergence based on the models' consensus placement of the low, which will hinder lifting. Locally heavy rainfall could be possible with this system, especially if it goes over the same areas. But storms, given the current model trends and timing (morning vs afternoon), are not as likely to be severe, but it

will be possible. Regardless, there could be some gusty winds from stronger storms inside the system and lightning will be possible. The systems start to merge after this point as they continue to propagate across the eastern US coast.

Wednesday, ridging will dominate the upper level pattern. Northerly surface winds will help to enhance cold air advection and dry air advection into the area. Upper level convergence will help to enhance sinking and stable air in the environment. Conditions, looking at the models, will be dry Wednesday.

Thursday, a small upper level disturbance will influence the area somewhat. Southerly surface winds will help to enhance warm air advection and moisture advection into the area. Weak upper level divergence will help enhance lifting in the atmosphere. Looking at models, Thursday will mainly be a transitional day and will be dry overall. MSW

AVIATION...
Today the issue will be CIGs and TS. A stationary boundary is sitting over our regions southern half and there has been some isolated thunderstorms. Most stations will have a few more hours of MVFR conditions, however some are expected to remain IFR. Overnight conditions are expected to degrade to IFR at all stations as a front moves into the region. VCTS has been placed in the TAFs as the front is expected to move through quickly and TSRA is not expected to remain on station very long. Once the front moves through winds will increase and gust, with potential gust up to 35 to 45 kts. With northerly winds this is expected to cause impacts to E-W oriented runways. -21/KWO

MARINE...
Tonight through Saturday evening, winds will be northerly and very strong (30-35kts). Winds Saturday evening through Sunday morning will be strong (20-30kts) and northerly. As a result, a Gale Warning is in effect tonight through tomorrow evening, and a Small Craft Advisory is in effect tomorrow night through Sunday morning. Sunday, winds will be moderate-strong (15-20 kts) and northerly to easterly. Monday, winds will be moderate (<15 knots) and southeasterly. Tuesday, winds will be westerly and strong (15-20 knots). Wednesday, winds will be northerly and strong (15-20 knots) turning southerly and moderate (<15 knots) by the afternoon hours. Thursday, winds will be southerly and moderate (<15 knots). Friday, winds will be southerly and strong (15-20 knots). Wave heights will correspond to the wind speeds. MSW

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.PRELIMINARY POINT TEMPS/POPS...
MCB 34 49 24 62 / 80 0 0 0
BTR 36 52 29 63 / 80 0 0 0
ASD 38 54 26 61 / 80 0 0 0
MSY 42 52 35 61 / 80 0 0 0

GPT 39 52 29 58 / 80 0 0 0
PQL 36 52 24 58 / 80 0 0 0

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.LIX WATCHES/WARNINGS/ADVISORIES...
LA...Wind Advisory until 3 PM CST Saturday for LAZ034>037-039-046>050-056>061-063>072-075>078.

Freeze Warning from 9 PM CST Saturday to 10 AM CDT Sunday for LAZ034>037-039-046>050-056>061-063>065-070>072-075>078.

GM...Small Craft Advisory from 3 PM CST Saturday to 7 AM CDT Sunday for GMZ536-538-550-552-555-557-570-572-575-577.

Gale Warning until 3 PM CST Saturday for GMZ530-532-534-536-538-550-552-555-557-570-572-575-577.

MS...Wind Advisory until 3 PM CST Saturday for MSZ068>071-077-080>082.

Freeze Warning from 9 PM CST Saturday to 10 AM CDT Sunday for MSZ068>071-077-080>082.

GM...Small Craft Advisory from 3 PM CST Saturday to 7 AM CDT Sunday for GMZ538-550-552-555-557-570-572-575-577.

Gale Warning until 3 PM CST Saturday for GMZ532-534-536-538-550-552-555-557-570-572-575-577.

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8.0 National Weather Service Forecast Information

WFO LIX issued the following Zone Forecast Product (ZFP) at 2100 CST on March 11 with the ZFP valid for the casualty time. The ZFP forecast a change of thunderstorms with west wind gusts up to 30 mph becoming a north wind 20 to 30 mph with gusts to 45 mph:

FPUS54 KLIX 120300
ZFPLIX

Zone Forecast Product for Louisiana
National Weather Service New Orleans LA
900 PM CST Fri Mar 11 2022

MSZ082-121015-
Jackson-
Including the cities of Pascagoula, Ocean Springs, Moss Point,
Gautier, and St. Martin

900 PM CST Fri Mar 11 2022

...WIND ADVISORY IN EFFECT UNTIL 3 PM CST SATURDAY...
...FREEZE WARNING IN EFFECT FROM 9 PM CST SATURDAY TO 10 AM CDT SUNDAY...

.REST OF TONIGHT...Patchy fog early this evening. A chance of thunderstorms. Showers, windy and much cooler with lows in the mid 30s. West winds 15 to 20 mph with gusts up to 30 mph, becoming north 20 to 30 mph with gusts up to 45 mph. Chance of rain 90 percent.
.SATURDAY...Sunny, breezy and much cooler with highs in the lower 50s. North winds 15 to 25 mph with gusts up to 45 mph.
.SATURDAY NIGHT...Clear, colder with lows in the mid 20s. North winds 10 to 15 mph.
.SUNDAY...Sunny. Highs in the upper 50s. East winds 5 to 10 mph, becoming southeast in the afternoon.
.SUNDAY NIGHT...Mostly clear in the evening, then becoming partly cloudy. Not as cool with lows in the upper 30s. East winds 5 to 10 mph.
.MONDAY...Mostly cloudy. Not as cool with highs in the upper 60s.
.MONDAY NIGHT...Mostly cloudy. A slight chance of showers in the evening, then showers likely after midnight. Not as cool. Near steady temperature in the upper 50s. Chance of rain 70 percent.
.TUESDAY...Mostly cloudy in the morning, then becoming mostly sunny. A slight chance of thunderstorms. Showers likely, mainly in the morning. Highs in the lower 70s. Chance of rain 70 percent.
.TUESDAY NIGHT...Partly cloudy with a slight chance of showers in the evening, then mostly cloudy after midnight. Lows in the lower 50s. Chance of rain 20 percent.
.WEDNESDAY...Mostly sunny. Highs in the lower 70s.
.WEDNESDAY NIGHT...Mostly clear. Lows in the lower 50s.
.THURSDAY...Mostly sunny. Highs in the mid 70s.
.THURSDAY NIGHT...Partly cloudy in the evening, then mostly cloudy with a chance of showers with a slight chance of thunderstorms after midnight. Lows in the mid 50s. Chance of rain 30 percent.
.FRIDAY...A chance of thunderstorms in the morning. Mostly sunny with a chance of showers. Highs in the upper 70s. Chance of rain 40 percent.

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In addition to the ZFP, WFO LIX issued the following wind advisory at 2103 CST on March 11 which warned of wind gusts up to 45 mph from the north from 2100 CST on March 11 through 1500 CST on March 12:

NPWLIX

URGENT - WEATHER MESSAGE
National Weather Service New Orleans LA

903 PM CST Fri Mar 11 2022

LAZ034>037-039-046>050-056>061-063>065-070>072-075>078-MSZ068>071-
077-080>082-121115-
/O.CON.KLIX.FZ.W.0008.220313T0300Z-220313T1500Z/
/O.CON.KLIX.WI.Y.0006.000000T0000Z-220312T2100Z/
Pointe Coupee-West Feliciana-East Feliciana-St. Helena-Washington-
Iberville-West Baton Rouge-East Baton Rouge-Ascension-Livingston-
Assumption-St. James-St. John The Baptist-Upper Lafourche-
St. Charles-Upper Jefferson-Upper Plaquemines-Upper St. Bernard-
Upper Terrebonne-Lower St. Bernard-Northern Tangipahoa-
Southern Tangipahoa-Northwest St. Tammany-Southeast St. Tammany-
Western Orleans-Eastern Orleans-Wilkinson-Amite-Pike-Walthall-
Pearl River-Hancock-Harrison-Jackson-
Including the cities of New Roads, Lettsworth, Livonia, Spillman,
St. Francisville, Wakefield, Jackson, Clinton, Felps, Darlington,
Easleyville, Greensburg, Montpelier, Bogalusa, Enon, Franklinton,
Bayou Sorrel, Plaquemine, White Castle, Port Allen, Addis,
Brusly, Baton Rouge, Gonzales, Donaldsonville, Prairieville,
Denham Springs, Watson, Walker, Pierre Part, Labadieville,
Paincourtville, Convent, Lutcher, Gramercy, Laplace, Reserve,
Thibodaux, Raceland, Larose, Destrehan, Norco, Metairie, Kenner,
Belle Chasse, Chalmette, Violet, Houma, Bayou Cane, Yscloskey,
Amite, Kentwood, Roseland, Wilmer, Hammond, Robert, Ponchatoula,
Mandeville, Covington, Lacombe, Slidell, New Orleans,
East New Orleans, Centreville, Dolorosa, Fort Adams, Woodville,
Gillsberg, Gloster, Smithdale, Liberty, McComb, Dexter, Salem,
Tylertown, Crossroads, McNeil, Poplarville, Picayune,
Bay St. Louis, Waveland, Diamondhead, Gulfport, Pascagoula,
Ocean Springs, Moss Point, Gautier, and St. Martin
903 PM CST Fri Mar 11 2022

...WIND ADVISORY REMAINS IN EFFECT UNTIL 3 PM CST SATURDAY...
...FREEZE WARNING REMAINS IN EFFECT FROM 9 PM CST SATURDAY TO
10 AM CDT SUNDAY...

*** WHAT...For the Freeze Warning, these locations forecast to see temperatures between 25 and 32 degrees. For the Wind Advisory, north winds 20 to 30 mph with gusts up to 45 mph expected.**

*** WHERE...Portions of southeast and southern Mississippi and southeast Louisiana.**

*** WHEN...For the Freeze Warning, from 9 PM CST Saturday to 10 AM CDT Sunday. For the Wind Advisory, from 8 PM this evening to 3 PM CST Saturday.**

*** IMPACTS...Gusty winds could blow around unsecured objects. Tree limbs could be blown down and a few power outages may result. Frost and freeze conditions will kill crops, other sensitive vegetation and possibly damage unprotected outdoor plumbing.**

PRECAUTIONARY/PREPAREDNESS ACTIONS...

Use extra caution when driving, especially if operating a high profile vehicle. Secure outdoor objects.

Take steps now to protect tender plants from the cold. To prevent freezing and possible bursting of outdoor water pipes they should be wrapped, drained, or allowed to drip slowly. Those that have in-ground sprinkler systems should drain them and cover above-ground pipes to protect them from freezing.

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The Coastal Waters Forecast (CWF) valid for the waters adjacent and south of the casualty site forecast gale[20] force winds with seas[21] building to 4 to 7 ft and occasional waves to 9 ft, the potential for showers and thunderstorms, and reduced visibility conditions:

CWFLIX

Coastal Waters Forecast
National Weather Service New Orleans LA
900 PM CST Fri Mar 11 2022

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.

GMZ500-GMZ501-121515-
Synopsis Pascagoula to SW Pass Mississippi-
Synopsis SW Pass Mississippi River to Atchafalaya River-
900 PM CST Fri Mar 11 2022

.SYNOPSIS...A very strong cold front will swing through the coastal waters tonight with high pressure settling in over the weekend. The next frontal system could impact the Northern Gulf by Tuesday.

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GMZ532-121515-
Mississippi Sound-
900 PM CST Fri Mar 11 2022

[20] Gale warning – Coastal Warning Display Program (weather.gov)
[21] Seas – NOAA's National Weather Service - Glossary

...GALE WARNING IN EFFECT THROUGH SATURDAY AFTERNOON...

.REST OF TONIGHT...South winds near 10 knots with gusts to near 35 knots becoming west 25 to 30 knots late in the evening, then becoming north 25 to 35 knots after midnight. Waves 3 to 5 feet. Dominant period 4 seconds. Seas building to 4 to 7 feet with occasional waves to 9 feet. Dominant period 4 seconds after midnight. Patchy fog early in the evening. Showers likely early in the evening. Chance of thunderstorms through the night. Chance of showers after midnight. Visibility 1 mile or less early in the evening.
.SATURDAY...North winds 30 to 35 knots easing to 20 to 25 knots in the afternoon. Waves 3 to 6 feet. Dominant period 4 seconds.
.SATURDAY NIGHT...North winds 15 to 20 knots. Waves 3 to 5 feet. Dominant period 4 seconds.
.SUNDAY...East winds 10 to 15 knots becoming southeast late in the afternoon. Waves 2 to 4 feet. Dominant period 4 seconds.
.SUNDAY NIGHT...Southeast winds 10 to 15 knots. Waves 2 to 4 feet. Dominant period 4 seconds.
.MONDAY...East winds 10 to 15 knots. Waves 2 to 4 feet. Dominant period 4 seconds.
.MONDAY NIGHT...Southeast winds 15 to 20 knots. Waves 3 to 5 feet. Dominant period 4 seconds. Slight chance of showers in the evening, then showers likely and slight chance of thunderstorms after midnight.
.TUESDAY...South winds 15 to 20 knots becoming southwest 10 to 15 knots in the afternoon. Waves 3 to 5 feet. Dominant period 4 seconds. Showers likely in the morning. Chance of thunderstorms through the day. Chance of showers in the afternoon.
.TUESDAY NIGHT...Northwest winds 10 to 15 knots. Waves 2 to 4 feet. Dominant period 4 seconds. Slight chance of showers in the evening.
.WEDNESDAY...Northwest winds 10 to 15 knots becoming west late in the afternoon. Waves 2 to 4 feet. Dominant period 4 seconds.
.WEDNESDAY NIGHT...Southwest winds 5 to 10 knots. Waves 1 to 2 feet. Dominant period 4 seconds.

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9.0 Casualty Captain Weather Information

The casualty vessel received and reviewed a "Daily Planner" weather information (attachment 2) at 1800 CST on March 11, 2022, with the "Daily Planner" weather information issued by the provider at 1800 CST on March 11, 2022. The casualty captain stated they were very aware the "wind is coming up" and that the wind vector makes the biggest difference of what tolerance threshold the casualty vessel has.[22] The casualty captain stated that the sustained winds in knots throughout the casualty timeframe remained in the 30s with a 51 knot gusts around the time of the breakaway at 0021 CST on March 12. For more about the weather forecast information contained therein, please see attachment 2.

10.0 Vessel Weather Information

The casualty vessel had four wind anemometers on board that recorded wind information surrounding the casualty time. The wind information from these anemometers can be found in attachment 3 and their location onboard the casualty vessel can be found in attachment 4. Wind sensor #1 was located on the forward mast at an approximate height of 52 meters above the water line. Wind sensor #2 was located at the derrick at an approximate height of 97 meters above the water line. Wind sensor #3 was located on the aft mast at an approximate height of 32 meters above the water line. Wind sensor #4 (next to wind sensor #1) was located on the forward mast at an approximate height of 52 meters above the water line.

[22] For more information please see casualty interviews contained in the docket for this casualty.

11.0 Astronomical Data

The astronomical data obtained for the casualty site on March 12, 2022, indicated the following:

SUN	
Casualty time	**0043 CST**[23]
Begin civil twilight	0543 CST
Sunrise	0607 CST
Sun transit	1204 CST
Sunset	1801 CST
End civil twilight	1824 CST

MOON	
Moonrise	1151 CST on March 11
Casualty time	**0043 CST**
Moonset	0238 CST

At the time of the casualty the Moon was located at an altitude of 20.93° and azimuth of 289.02° with 67.1% of the Moon's disk illuminated.

E. LIST OF ATTACHMENTS

Attachment 1 – KMOB WSR-88D reflectivity for the 0.5° elevation scans from 0003 to 0058 CST

Attachment 2 – Daily Planner weather information reviewed by the casualty captain

Attachment 3 – Casualty vessel wind anemometer information

Attachment 4 – Casualty vessel wind anemometer locations

Submitted by:

Paul Suffern
Senior Meteorologist

[23] Inserted casualty time for reference and context.