



## **National Transportation Safety Board**

Washington, D.C. 20594

January 31, 2020

Frank English  
Manager of Fleet Operations  
Ride The Ducks Branson  
Branson, Missouri

Re: Tech review of the Meteorology Group Factual Report

Frank:

The NTSB investigative team has reviewed all factual comments submitted by the parties as part of the technical review and has decided on a disposition for each one, as reflected below. All editorial suggestions have been considered and will be incorporated as appropriate.

The deadline for providing party submissions pursuant to 49 CFR 831.14 is February 14, 2020.

Thank you and best regards,

Brian Young  
Investigator in Charge  
National Transportation Safety Board  
490 L'Enfant Plaza, S.W.  
Washington, DC 20594

NATIONAL TRANSPORTATION SAFETY BOARD  
 OFFICE OF MARINE SAFETY  
 WASHINGTON, D.C. 20594



# ERRATA

## Group Chairman’s Factual Report Meteorology

### *Stretch Duck 7* DCA18MM028

Page/Line	Original	Correction	NTSB Disposition of Party Comments
5	Due to the approaching weather, before departing the shoreside boarding facility the crew of two was instructed to bypass the land-based portion of the tour and head directly to the lake.	<p>This language leaves out certain facts, is ambiguous, and needs clarification. The use of the word “bypass” incorrectly suggests that a decision was made not to perform part of the land-based portion of the tour. The record reflects that the captain and driver intended to take the entire tour, but a decision was made to take the water portion of the tour first. The language “the crew of two” is ambiguous, but instead the terms “captain and driver” are more accurate. Finally, the transcript of Captain McKee also makes clear that the captain had reviewed the weather just prior to the tour, and just prior to the issuance of the severe thunderstorm warning. The description of these events, as written, omits that fact, suggesting that Captain McKee was simply following the suggestions of the MOD.</p> <p>To be more accurate and complete, we request this language be revised to read as follows:</p>	<p>Update paragraph to read:</p> <p>“Prior to the accident, the National Weather Service had issued a severe thunderstorm warning for the area advising of wind gusts of 60 mph. The manager-on-duty advised the captain and driver before departing the shoreside boarding facility to complete the lake portion of the tour before the land tour (which normally occurred first) due to the approaching weather.</p>

		<p>“Just prior to the issuance of the severe thunderstorm warning issued at 6:32 PM, the Captain of the Stretch Duck 7 reviewed the weather on a weather monitor at the company’s Branson headquarters. Due to the approaching weather, before departing the shoreside boarding facility, the captain and driver were advised to complete the lake portion of the tour first before the land-based portion of the tour.”</p>	<p>Additional details about the sequence of events to be included in the accident narrative.</p>
5	<p>About 5 minutes after the vessel entered the water from the south ramp, a “derecho” passed through the area generating 2- to 4-foot waves, with the highest wind gust recorded at 73 mph.</p>	<p>A senior deckhand on the Showboat Branson Belle as well as the driver of the Stretch Duck 17 testified in their NTSB interview that they observed up to 5 foot waves. See Transcript Womack at page 6; Marotti at page 21. In his September 9, 2019 deposition, the senior deckhand on the Showboat Branson Belle testified that sustained waves were up to 6 feet, characterizing the waves as “huge” and “continuous.” We have attached to this errata sheet an excerpt of the deposition of the senior deckhand of the Showboat Branson Belle from the civil proceedings. See Attachment A, Deposition Transcript Womack at pages 73-74. To be more complete and factual, we request that this language be modified to more precisely reflect the record in regard wave height as follows:</p> <p>“About 5 minutes after the vessel entered the water from the south ramp, a “derecho” passed through the area generating waves estimated by witnesses to be 2- to 6- feet, with the highest wind gust recorded at 73 mph.”</p>	<p>Based on interviews NTSB conducted, waves were estimated to be 3-5 feet. NTSB did not participate in civil proceedings and does not have access to these transcripts. <i>Showboat Branson Belle</i> relief captain interview 7/21/18 pg. 13, line 24 – “guesstimate it about 3 feet” <i>Showboat Branson Belle</i> senior deckhand interview 7/21/19 pg. 6 “about a 5-foot wave went over the top of the rescue boat”</p> <p>Update sentence to read: “About five minutes after the vessel entered the water from the south ramp, a “derecho” passed through the area generating waves estimated by witnesses to be 3- to 5- feet, with the highest wind gust recorded at 73 mph.”</p>
59	<p>The entirety of the original text is not repeated here, but we request clarification be added after “... and users of StreamerRT will see the mosaic image with a 1230 timestamp.”</p>	<p>It is unclear from the language on page 59-60 of the draft report how much total time it takes for the real-time U.S. National Weather Service (NWS) radar data to be processed and sent to EarthNetworks, before it is then transmitted and received by its customers (such as RTD).</p> <p>It is our understanding there is a multistep process between when the NWS makes its radar images available, and when the radar images are ultimately published by EarthNetworks to its customers on the StreamerRT monitor.</p>	<p>Further factual information on weather radar may be found in Attachment 18. However, only the redacted version of Attachment 18 will be released.</p>

While the difference between the WDT designated “valid time” and the EarthNetworks “timestamp” is noted in the report to be 5 minutes, we believe the report needs to be made clear that EarthNetworks publishes its radar images on the StreamerRT up to 11 minutes after those images are made available from the NWS.

Our understanding from the draft factual report is that EarthNetworks did not obtain its weather radar data (that it processes and ultimately broadcasts to its customer) directly from the National NWS. Instead, EarthNetworks obtained this radar data from a third party provider called Weather Decision Technologies, Inc. (“WDT”). As we understand the process from the draft report, WDT constantly received Level II radar data from NWS radars stations. Once WDT received this data, we understand that WDT processed this data through its “quality control process” -- or as referred to in the draft report, its “QC process” -- in order to “smooth” out the images, removing radar images it deemed “non precipitation.”

Thus, based on the language in the draft report, the total time needed or WDT to receive the data from the NWS, process it, and then transmit composite mosaic radar images to Earth Networks could be up to 6 minutes. For example, if a NWS radar image is transmitted to WDT just after 6:54 PM, WDT’s QC process (which takes 1 minute) will not be completed until just after 6:55 PM. WDT’s further processing (mosaic creation process) will not begin until 7:00 PM because the mosaic creation process that WDT has in place begins once every 5 minutes, starting at the top of the hour, according to the draft report. Because the average time for WDT to complete the mosaic creation process is stated to be 1 additional minute, the mosaic would be transmitted to EarthNetworks at 7:01 PM. (In this example given, we understand from the draft report that this mosaic radar image would be designated by WDT with a “valid time” of 7:00PM, even though it is based on radar data/images transmitted from the NWS at 6:54 PM).

Once Earth Networks received a composite mosaic radar image from WDT, EarthNetworks then applied additional “smoothing on the

boundaries of the radar images,” and after this process is completed, this final mosaic would be “stored” at Earth Networks, until publication.

We understand from the draft report that EarthNetworks then publishes this stored mosaic radar image to their customers every 5 minutes, similarly starting at the top of the hour. Therefore, in the example discussed above, the WDT mosaic radar data transmitted to Earth Newtorks at 7:01PM (which is based on radar data received from NWS at 6:54 PM), would not be published by EarthNetworks to its customers until 7:05 PM.

In the example discussed above, we understand that when EarthNetworks publishes this radar data to its customers on StreamerRT, it would be marked with a “timestamp” of 7:05 PM, even though the “valid time” marked by WDT is 7:00 PM, and even though the radar data was transmitted by NWS to WDT at 6:54 PM.

While the difference between the WDT designated “valid time” and the EarthNetworks “timestamp” is noted in the report to be 5 minutes, we believe the report needs to be made clear that EarthNetworks publishes its radar images on the StreamerRT up to 11 minutes after those images are made available from the NWS. In other words, the visual radar images being viewed on StreamerRT at 7:05 PM is based on actual weather observation data that could have been transmitted by NWS at 6:54 PM (and that is potentially based on actual observations from before 6:54 PM). This time delay is not mentioned in the EarthNewtorks StreamerRT User Guide (Attachment 17).

Accordingly, we request the following clarification language be added:

“Thus, a StreamerRT mosaic image with a 1230 timestamp would be from Level II radar images that are made available by the NWS at 1219. This delay, between real time weather observation data from the NWS radar and the EarthNetworks broadcasts, is not discussed in the StreamerRT User Guide.”

60	Figures 38-49 present the composite mosaic data sent from WDT to Earth Networks for the times surrounding the accident, prior to any processing by Earth Networks, as provided to the NTSB Meteorology Group by WDT.	For clarity, because the data has already been processed and smoothed by WDT to some extent before being sent to EarthNetworks, we believe the word “further” should be added so the language reads “...any further processing...”	Change made as suggested.
Figures 38-49	<b>Figure 38 (as an example)</b> – Graphic representation of the composite mosaic data with a valid time of 1815 CDT on July 19, 2018, provided to Earth Networks by WDT. The earliest this mosaic could have been displayed for customers on StreamerRT was 1820 CDT (with a timestamp within StreamerRT of 1820 CDT).	For Figures 38-49: This language could be interpreted to mean that mosaic data visually displayed in the graphic, on figures 38-49, would also be displayed on the StreamerRT monitor. Because EarthNetworks performs additional processing and “smoothing,” that is not the case. For clarity, we request that the caption language on Figures 38-49 be modified as follows:  “ <b>Figure 38 (through 49)</b> – Graphic representation of the composite mosaic data with a valid time of 1815 CDT on July 19, 2018, provided to Earth Networks by WDT. The earliest this mosaic could have been further processed by Earth Networks, and then displayed for customers on StreamerRT, was 1820 CDT (with a timestamp within StreamerRT of 1820 CDT).”	Concur, but the offered edit suggests that 1820 CDT (in this example) was the earliest the mosaic could have been further processed by Earth Networks, which may not be the case. So, second sentence in each caption (Figures 38-49) will be edited to:  “The earliest these mosaic data could have been displayed for customers on StreamerRT following further processing by Earth Networks was...”
Figures 50-61	“These radar data have been geolocated to a different background than what would have been presented on the Streamer RT map.”	For Figures 50-61: We believe this caption needs to be clarified with the following additional sentence.  “The images shown in the figure are not a depiction of what RTD personnel would have seen on the StreamerRT monitor.”	This can be reworded to establish that it’s a different complete presentation than what was seen in StreamerRT, however calling the image “not a depiction” the user would see isn’t totally accurate since the weather radar portion of this presentation is as a user would see it. Final sentence in each caption (Figures 50-61) edited to:  “These radar data have been geolocated to a background that does not represent

			what a user of StreamerRT would have seen.”
<p>59, Attachment 18, pp 87-106</p>	<p>We have requested access to the redacted portions of Attachment 18 regarding EarthNetworks’ processing of radar data, but our request was denied.</p>	<p>Other than the limited information provided on page 59 of the draft report, there is little or no detail in the draft report regarding the “processing” and further “smoothing” on the “boundaries of the of the radar images” that is performed by EarthNetworks, once they receive the mosaic from WDT. The interview summary of EarthNetworks personnel, at page 108 of Attachment 21 to the draft report, does not address radar data at all, but it instead describes information obtained from Earth Networks regarding ground weather observation data.</p> <p>In that regard, Attachment 18 contains a heading “Information provided to the NTSB from Earth Networks” on page 86, but pages 87 to 106 are redacted and completely blacked out, including the page that has an unredacted heading “NTSB Questions, September 2018.” It is unclear why this information is not provided to us with the draft report, so we can better understand the “smoothing” process and other processing that EarthNetworks applies to the radar images.</p> <p>However, we have attempted to better understand how EarthNetworks modifies the NWS images, before publication on StreamerRT. In this regard, we have examined a number of thunderstorm systems that have outflow boundaries/dry gust fronts, as occurred on the day of the accident. While these systems are not considered derechos, they do contain outflow boundaries or dry gust fronts ahead of the systems, which has allowed our consulting expert to analyze the net effects of the EarthNetworks smoothing and other processing. It appears that EarthNetworks StreamerRT, as a result of the smoothing process, does not show these outflow boundaries in its mosaic that it publishes to its customers. To illustrate what our consulting expert has found, we have included a screen shot of a weather system in Kansas on July 10, 2019 at approximately 1400 UTC, as Attachment B to this Errata. Due to EarthNewtorks smoothing process, those customers reviewing the StreamerRT mosaic would not be alerted to the dry gust front well ahead of the main part of the storm.</p>	<p>Only the redacted version of Attachment 18 will be released.</p>

		<p>We requested unredacted versions of attachment 18 so that we can assess and comment upon the information provided by EarthNetworks regarding its processing of the radar images, but that request was denied. We also ask that the draft factual report contain further details and a summary of these facts, as the report does in other areas. Because most of the information regarding EarthNetworks has not been provided to us, we cannot comment further at this time.</p>	
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