Partnership Between the Greater New Orleans Expressway Commission and the Weather Forecast Office (WFO) in Slidell, LA

Alan Johnson, Paul Trotter and Fred Zeigler
WFO New Orleans/Baton Rouge
Slidell, Louisiana

1. Introduction

The 24-mile long Lake Pontchartrain Causeway is the longest bridge over water in the world (24 miles). Over 30,000 commuter vehicles make a round-trip crossing of the lake daily. The bridge (Fig. 1) connects the two Louisiana parishes of St. Tammany and Jefferson. The WFO in Slidell, Louisiana, developed a partnership with the Greater New Orleans Expressway Commission with the goal of providing the Causeway Commission more precise forecasts and advisories which would assist them in preparing for such significant weather events as strong winds across the lake, which impedes vehicles such as recreation vehicles, glass transporters and motorcycles as they try to make their way across the bridge. Other high impact weather factors are dense fog, severe thunderstorms, heavy rain, hailstorms, hurricane conditions, waterspouts and winter freezes.

In conjunction with this partnership the WFO has used local research to develop forecast techniques for the formation of dense fog over the tidal lakes. Safety of motorists across the Causeway is extremely important. The Causeway Police Department is greatly concerned with sudden and rapid weather changes which affect visibility, as well as the ability of drivers to control high profile vehicles. Since the bridge initially opened in 1956 with two lanes across the lake (it was later expanded to four lanes), the span has been rammed by marine traffic sixteen times. Also, there have been incidents where vehicles have been knocked into the lake.

Applying local forecast techniques using the latest numerical guidance, enhanced technology, and automated surface observations, WFO Slidell has significantly improved the lead time of forecasts for the development of dense fog over the tidal lakes. Figure 2 illustrates the typical synoptic pattern conducive to dense sea/lake fog development. Motorists can be notified by using the internet Web site www.thecauseway.com, or the NWS Web site at www.srh.noaa.gov/lix. The latest dense fog advisories are given in the Hazardous Weather Outlook (HWO) which is issued twice daily and updated as needed. This product, issued routinely at 630 am and 11 am daily, lists weather hazards which may cause visibility problems for motorists during the following 24-hour period. The HWO is also issued on the NOAA Weather Radio (NWR) as well as to the news media. Current weather information is also communicated to motorists by means of message signs at the approaches to the bridge, as well as on the causeway's Information Advisory Radio Station, 1700 AM.

The NWS-Causeway Commission collaboration included a public awareness campaign, part of which resulted in development of a jointly developed fog brochure. The brochure informs motorists of the safety procedures for crossing the world's longest bridge. In addition to the fog brochure which was made available for the first time at the beginning of the fog season in late 2001, several ads have been published in the *Times Picayune of New Orleans* newspaper and in the New Orleans city business magazine. These ads advise motorists of helpful guidelines to follow during fog conditions.

2. Partnership between WFO Slidell and the Greater New Orleans Expressway Commission

Dense fog over the tidal lakes is the most important weather parameter motorists have to deal with during the year. Seasonally, dense fog events may last for several days except for minor improvement in visibilities during the mid-afternoon into the evening hours. Aided by the research and development of a "fog decision tree" by several WFO Slidell forecasters in the early 1990s, the lead time for forecasting dense fog over the tidal lakes has been significantly improved. Using the latest enhanced technology, numerical guidance, observations, satellite imagery, and sea surface temperatures, accurate forecasts for surface visibility can be made several days in advance. The causeway police officials use these forecasts for staffing decisions, especially for the onset of the dense fog when convoying of motorists might become necessary.

The WFO maintains direct contact with the Causeway Police Department. In addition to issuing a Dense Fog Advisory to the public and news media, coordination calls are made to the dispatchers at the causeway advising them of developing weather conditions. During the winter, dense fog is likely not only over the cooler shallow tidal lake waters, but also over adjacent land areas, especially when the wind is light. There are usually about 10 to 15 episodes of significant fog which affects travel over the causeway during each winter season. Strong winds, hurricane conditions, severe thunderstorms, hailstorms, waterspouts, heavy rains, and freezes may also affect travel over the long causeway, but occurrences are much less frequent compared to dense fog during the winter months of November to March.

3. Methodology Used by Causeway Police In Reducing Loss of Life and Property during Adverse Weather

Several causeway safety improvements have been made since the first span of two lanes was built and opened in 1956 (Lambart 1991). In the late 1960s another span of two lanes was opened giving two lanes in each direction. The causeway police have established an excellent rapport with commuters by exchanging roadway information over citizen band radios and cellular phones and, of course, the causeway AM broadcast. Safety enhancements were made in 1984 with the installation of the Motorist Information System (MIS). The system included twelve variable message signs (Fig. 3) used to warn motorists of potential upcoming roadway conditions.

As a toll facility, it is essential to avoid if possible a disruption in service to the commuting public. In the 1970s a convoy system (Fig. 4) was developed to provide safe travel across the causeway should dense fog conditions exist. Since there were not enough police units to escort the vehicles, another system had to be developed. Figure 5 shows how the police units were used in the 1980s with a lead car and another unit in the rear of commuters in one lane, and other police units in the adjacent lane. Figure 6 illustrates how vehicles are controlled today when the police are not actually convoying. They "ride herd," to prevent motorists from passing, while they are looking for breakdowns.

If visibility is very poor in one area, signs will tell motorists the speed in that zone. While in another area if the visibility is better, another sign may increase the speed allowed. With this system the bridge is never closed to traffic. Crossovers between the twin spans of roadway come in very handy. When fog is developing over the lake, the police units have a roll call and give the visibility in their respective location. One of the things the police do is watch how fast the traffic is moving in and whether the visibility is lowering. The criterion used by the police for the "riding herd" approach is when visibility is reduced to below 500 feet.

Figure 7 shows a fog abatement sign configuration which illustrates the view from ground level that a motorist would encounter when controls have been put in place on the bridge. Variable message signs are controlled by dispatchers through a computer system from the operations building at the south end of the causeway. This system for controlling traffic on the bridge will work with any type of inclement weather that may reduce visibility for an extended period of time.

4. Sea/Lake Fog Decision Tree

Johnson and Graschel (1992) describe an operational decision tree for forecasting sea/lake fog in southeast Louisiana and the adjacent coastal waters which was developed by several meteorologists at WFO Slidell. The technique utilizes the current sea/lake surface temperature (SST) as well as the forecast surface temperatures, dew points, and wind direction and speed. The study indicated the critical water temperature for dense fog to be 68 F (20 C). Under appropriate temperature conditions, with southeast to southwest winds and speeds less than 10 m/sec, dense fog develops over water and may extend inland some 50 to 75 miles. If the wind is too strong over land (greater than 8 kt) then the fog becomes more advected. Visibilities over large bodies of water such as the tidal lakes can be frequently reduced to less than one-fourth of a mile. Figure 8 shows the graphs used by the WFO Slidell meteorologists for forecasting dense fog over the tidal lakes.

Research has indicated that dense fog, especially over the water, may take 6 to 9 hours to form once the air and water temperatures, and the dew point, approach critical values (within one degree). The public and especially the news media need to be made more aware of the hazards of dense fog, especially when it is patchy. This is because it may suddenly appear over the bridges and highways adjacent to large bodies of water, and visibilities may suddenly drop to less than

1/4 mile. Too often the result is a multi-car pileup such as the many which have occurred in recent years on the Pontchartrain Causeway or the I-10 twin span (another bridge which crosses Lake Pontchartrain) listed in Table 1.

The WFO "call to action" statements should be supplemented by emergency management officials and media information. Since the "sea/lake fog" decision tree was implemented, much longer lead times for impending dense fog development have been given in the zone forecasts. Through the use of the Internet, the causeway police can be kept informed of potential dense fog development and make plans accordingly.

5. Conclusions

The NWS Forecast Office in Slidell has developed an excellent partnership with the Greater New Orleans Expressway Commission in order to strive to give the Causeway Commission more accurate forecasts and advisories. These products can then be used to assist in preparation for significant weather events such as dense fog and very heavy rainfall which reduce visibilities to below one-half mile, as well as other hazardous conditions. This summary has shown how local research helped develop techniques for forecasting the formation of dense fog over the tidal lakes, and how that has led in turn to an enhanced public awareness campaign including distribution of fog brochures, critical weather messages displayed on the variable message signs located on the causeway, and broadcasts on a local radio station. All contribute directly to the saving of life and property.

When surface visibilities decrease to less than 500 feet during the early morning hours on regular work days, convoying of vehicles on the causeway across Lake Pontchartrain goes into effect. Since this procedure was instituted there have been no major accidents on the bridge. The next goal in our partnership for improving our service to the motorists who cross the tidal lakes regularly is to work toward securing cameras at several locations with fast access by satellite interrogation.

Acknowledgments

The authors would like to thank Mr. Robert Lambert, manager of the New Orleans Expressway Commission, and his staff for suggestions and assistance in developing this partnership with the NWS Forecast Office in Slidell.

References

Lambart, R. J.,1991: Traffic management in fog on the world's longest bridge. Greater New Orleans Expressway Commission.

Johnson, G. A., and J. Graschel, 1992: Sea fog and stratus: A major aviation hazard in the northern Gulf of Mexico. Unpublished.

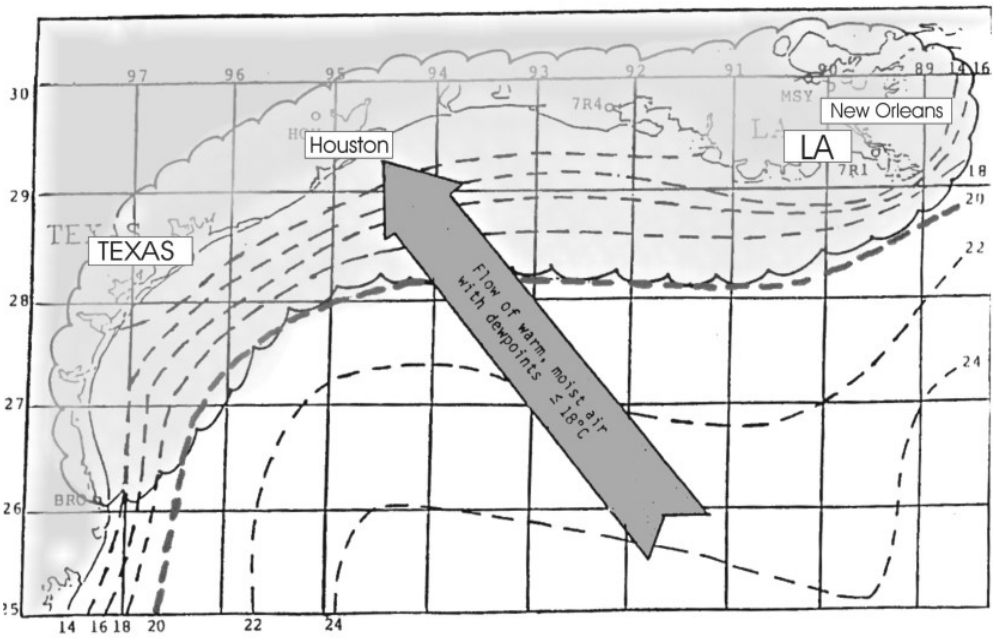

Figure 1. Typical synoptic pattern during return flow in the Northern Gulf in the winter.

Figure 2. Southern terminus of the Lake Pontchartrain Causeway.

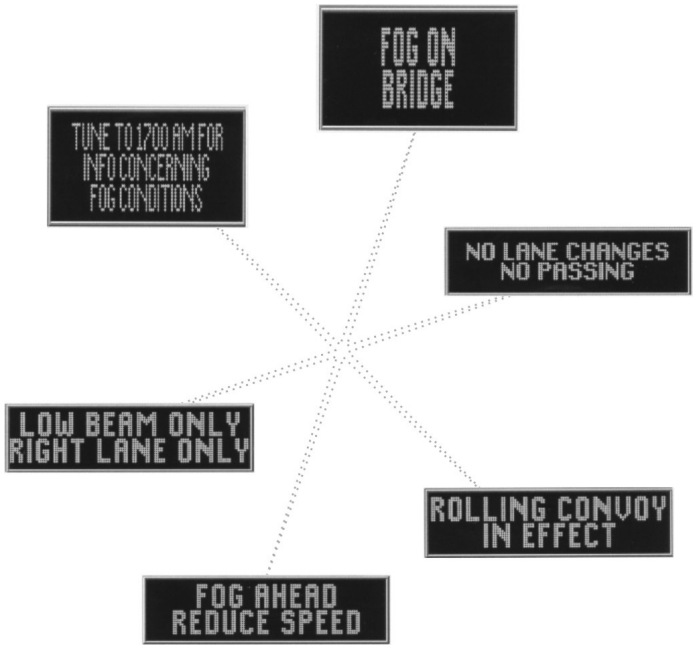

Figure 3. Message signs used to warn motorists of upcoming roadway conditions.

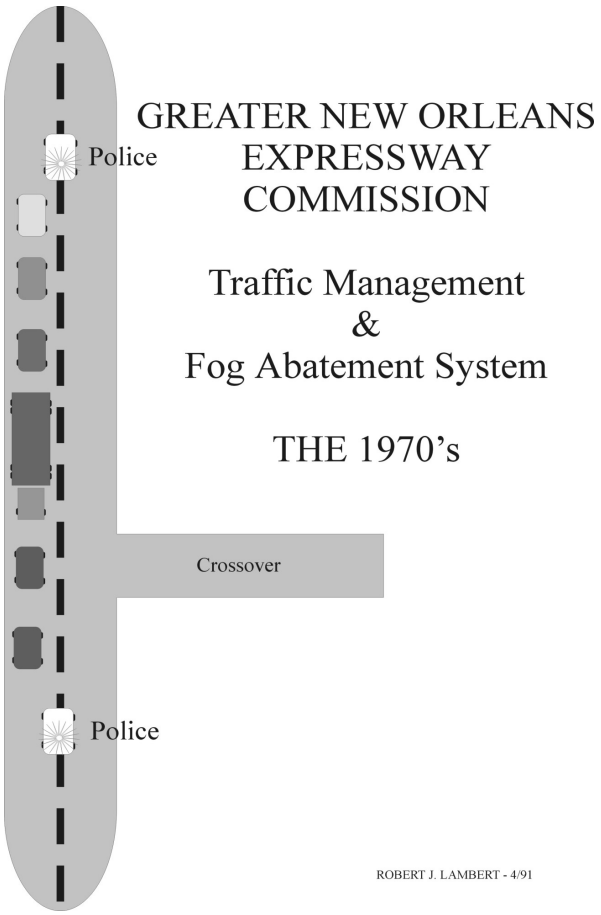

Figure 4. Convoy system used by the causeway police in the 1970s.

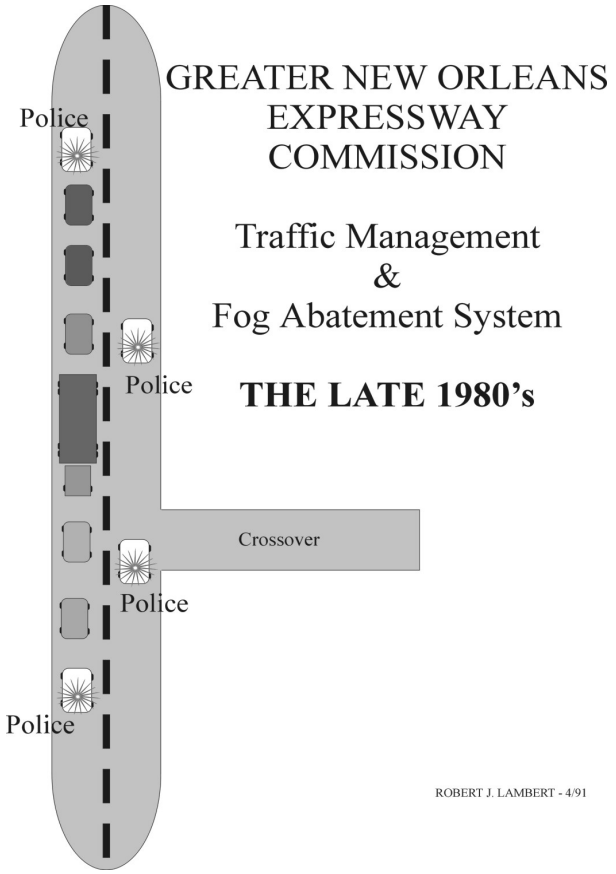

Figure 5. Convoy system used in the 1980s utilizing a lead car in the front and one in the back.

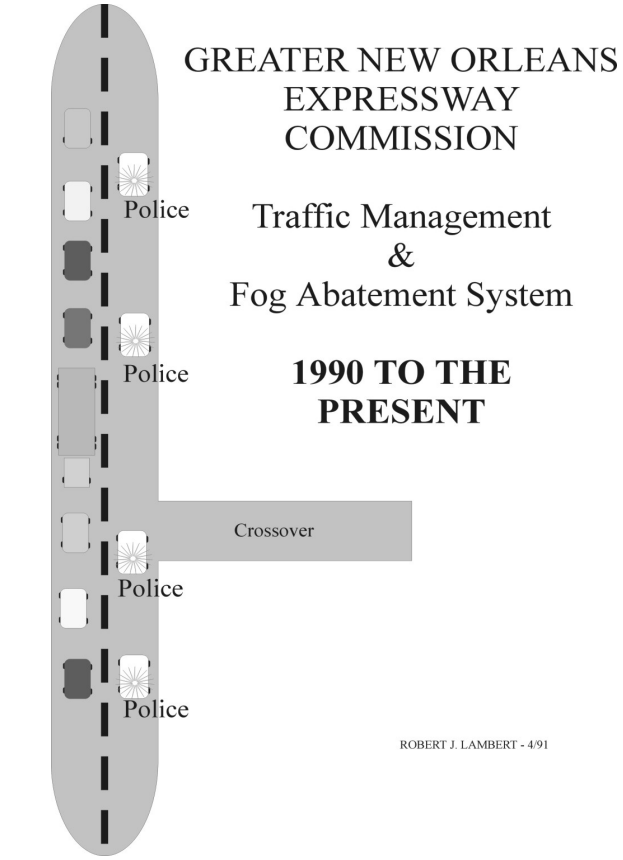

Figure 6. System used in the 1990s to present time by causeway police (riding herd) to prevent motorists from passing (used when visibility is below 500 feet).

Figure 7. Fog abatement sign configuration illustrates the view from ground level to what motorists would encounter when controls have been put in place on the bridge.

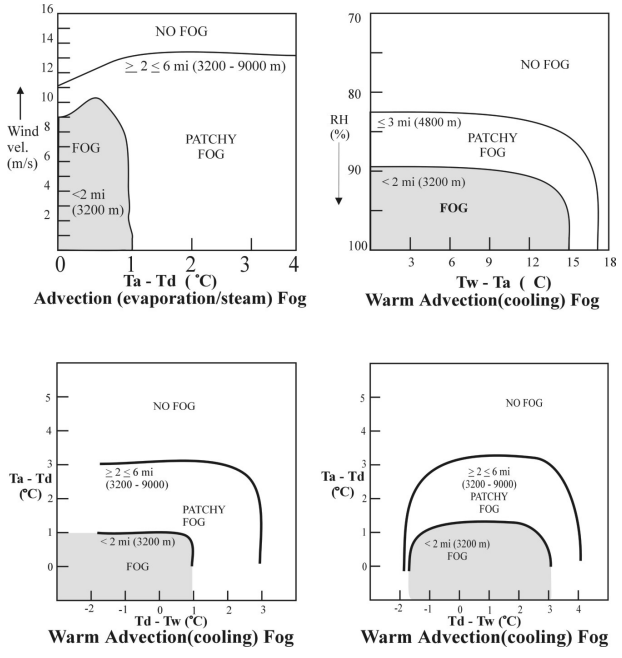

Figure 8. Fog forecasting graphs used by WFO Slidell.

Table 1. Fog related accidents over waterways.

FOG RELATED ACCIDENTS AS REPORTED BY THE TIMES-PICAYUNE NEWSPAPER IN NEW ORLEANS LOUISIANA		
Date	Description of Event	Damage...Injuries ...Deaths
Jan 14, 1999	Multi-car accident on I-10 between Kenner and La Place in the early morning hours	One Injury
Oct 3, 1999	Multi-car accident on I-10 Twin Spans between New Orleans and Slidell	One dead and 5 injuries; east bound span closed for 6 hours
Jan 14, 1999	Multi-vehicle accidents on I-10 bridge over the Bonnet Carre Spillway; 90 vehicles involved in a series of pileups (23 separate collisions)	Despite the 90 vehicles involved there were no serious injuries; bridge closed for 8 hours
Jan 13, 1998	Multi-car accident on I-10 Twin Spans	One dead; east bound lanes closed for 9 hours
Dec 31, 1996	Multi-vehicle accidents involving more than 100 vehicles on the I-10 Twin Spans between New Orleans and Slidell early New Years Eve	One dead; two-dozen injured
Dec 14, 1995	Multi-vehicle accidents on I-10 Twin Spans and also on the Causeway bridge between New Orleans and Northshore communities	6 persons injured; nearly 50 vehicles involved; bridges closed for 8 hours
Oct 31, 1992	Multi-vehicle accidents involving more than 20 cars on I-10 bridge over the Industrial Canal in New Orleans	25 persons injured; bridge closed for 3 hours
Nov 19, 1991	Multi-car accidents on Causeway Bridge	9 injuries mostly minor