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NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

Appendix 3: Debris Migration
(3 pages)

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MIGRATION OF TWA 800 DEBRIS ON THE OCEAN FLOOR

April 19, 1997

TO: DAVID MAYER
NTSB

FROM: RICK HORGAN
OCEANEERING INTERNATIONAL, INC.

From July 21, 1996 to Dec. 13, 1997, I was responsible for data collection and distribution for U.S. NAVY SUPERVISOR OF SALVAGE. Working at the temporary Navy facility at the U.S. COAST GUARD Station at East Moriches, I was in daily meetings with the recovery divers and collected and recorded their written dive descriptions. The R.O.V. (Remotely Operated Vehicle) operators on the GRASP, PIROUETTE, GRAPPLE AND MARION C. and the Laser Line Scan operators on DIANE G. sent reports to me daily. I analyzed all the sonar data from PIROUETTE, MARION C., ABLE J. and some from the N.O.A.A. ship RUDE. David Mayer of the NATIONAL TRANSPORTATION SAFETY BOARD has asked me to relate observations concerning migration of debris.

During the first month after the July 17 event the divers reported seeing small, light weight pieces of aircraft and personal effects moving along the bottom with the currents. On the last week of August all the R.O.V.'s were forced to curtail operations because a hurricane, more than 1000 miles away, was producing long period swells resulting in surges on the bottom. These surges caused the R.O.V. and large pieces of aircraft debris to be lifted off the bottom and moved in a circular motion to such a degree that the R.O.V. was at risk of being damaged if operations continued. The surges also stirred up the sediment reducing visibility to zero. At this time all of the large pieces and most of the small pieces had been recovered from area two and three.

After the hurricane passed within a few hundred miles, the swells continued for several days delaying the resumption of diver and R.O.V. operations due to poor visibility and hazardous currents. During this time a new side-scan sonar survey was conducted to map the "new" location and condition of debris. Some pieces remained in their original location but many had moved or were partially covered by sediment. The vast majority of the remaining debris was still within area one.

Long period swells interrupted the effort several more times as additional hurricanes and tropical storms passed through the Atlantic Ocean during September and October causing similar conditions. As winter approached with ever more debris being recovered, the storms grew in frequency and ferocity making the sonar / diving / R.O.V. operation less efficient. As the unrecovered pieces were smaller and fewer, the adverse conditions compounded the difficulty.

This combination inevitably led to the decision to trawl for pieces with scallop trawlers. The trawlers' ability to gouge into the sediment has allowed them to work through the winter and continue to provide parts. The size and quantity of aircraft parts have diminished noticeably since the first weeks of trawling.

While pieces have moved in various directions at different times of the tide or different storm swell directions, the overwhelming trend of movement has been to the west. This is consistent with the normal trend in this area, as reported by oceanographers and local fishermen.

Pieces affected most by currents are those with a high surface area to weight ratio. A high surface area collects more force from the moving water. An object's light weight is further reduced by its buoyancy in sea water (i.e., the weight of the water displaced by the volume of the object is subtracted from the objects weight). The position of debris that remained afloat after impact and eventually sank would vary in proportion to how long it floated and at which stage of the tidal cycle it sank.

In summary it is extremely likely that light weight parts which originally landed in area one could have moved west into area three and beyond.