

School Bus Crash Investigation
Dynamic Science, Inc.
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The crash investigation process is an inexact science which requires that physical evidence such as skid marks, vehicular damage measurements, and occupant contact points be coupled with the investigator's expert knowledge and experience of vehicle dynamics and occupant kinematics in order to determine the pre-crash, crash, and post-crash movements of involved vehicles and occupants.

Because each crash is a unique sequence of events, generalized conclusions cannot be made concerning the crashworthiness performance of the involved vehicle(s) or their safety systems.

TABLE OF CONTENTS

Background	1
Summary	1
Interior School Bus Diagram	3
Appendices:	
A. Traffic Collision Report	
B. VIN - Decoded	

Background

This two vehicle crash involved a 1984 International School Bus which was struck on the left side by a 1988 Kenworth flat bed tractor-trailer combination. The bus was struck by the vehicle and its shifting load from the trailer. The bus was forced backward and off the road, overturning in a ditch. The crash was selected for additional follow up due to fatal and severe injuries suffered by occupants of the bus. A remote-style investigation was conducted during which information was sought from the investigating police jurisdiction, and the bus owners (the school district). This crash is still being litigated, and copies of official documents could not be obtained from the Board of Education. A detailed interview was obtained from a representative of the Board of Education.

Summary

The crash involved a 1984 International/Thomas 36 passenger bus (Vehicle 1). It had a gross vehicle weight of 19,200 pounds. The bus was reported to have been in good condition prior to the crash, with approximately 50,000 miles on the odometer. The bus was traveling westbound on a 2 lane, undivided roadway in a rural area. Vehicle 1 was entering a left turning curve. The driver was a 49 year old male. The driver was fatally injured. There were 10 occupants on the bus including the driver and one coach.

Vehicle 2 was a 1988 Kenworth tractor/flat bed trailer combination. It was traveling eastbound on a 2 lane rural roadway, entering a right turning curve. The vehicle was driven by a 33 year old male. There were no other passengers in Vehicle 2. Vehicle 2 crossed the center line of the roadway while negotiating the curve, and then steered sharply to the right in an attempt to move back into the eastbound travel lanes. The left side of the trailer portion of the combination vehicle struck the left front of Vehicle 1. During this impact, the cement tanks being carried on the trailer shifted position to the left, and came off the trailer, striking the left front corner and left side of Vehicle 1.

As a result of the impact, Vehicle 1 was pushed rearward and off the north side of the road. The bus overturned and came to final rest in a ditch. Vehicle 2 continued in a northeasterly direction, past the area of impact. Vehicle 2 also went off the road on the north side and overturned, coming to final rest in the ditch.

The crash occurred during a fall weekday, in the late evening. There were no adverse weather conditions reported. The speed limit for Vehicle 1 was 55 mph, and for Vehicle 2 was 35 mph. The precrash speeds were estimated by police to be 35 mph for Vehicle 1, and 60 mph for the tractor trailer. The driver of Vehicle 2 was cited for alcohol use and exceeding a safe speed.

The eight child occupants of the bus were all female with average weights of approximately 115 pounds. None of the passengers were restrained. The approximate seating positions are shown on figure 1 and are listed below:

- Occupant 1 (seat 4) was a 16 year old female. She received fatal injuries.
- Occupant 2 (seat 7) was a 16 year old female who received injuries to her knees.
- Occupant 3 (seat 9) was a 25 year old coach who received nonincapacitating injuries.
- Occupant 4 (seat 10) was a 16 year old female who received nonincapacitating injuries.
- Occupant 5 (seat 16) was a 16 year old female who received nonincapacitating injuries.
- Occupant 6 (seat 34) was a 16 year old female who reported pain.
- Occupant 7 (seat 37) was a 16 year old female who received nonincapacitating injuries.
- Occupant 8 (seat 40) was a 16 year old female who received incapacitating injuries.
- Occupant 9 (seat 46) was a 16 year old female who received nonincapacitating injuries.

Fatal injuries reportedly were received by the child sitting just behind the bus driver (Occupant 1). It is believed that she had her back to the window prior to the crash. She is shown incorrectly on the police report as being in the first row on the right side of the bus. The Board of Education believes that she was in the first row on the left side of the bus.

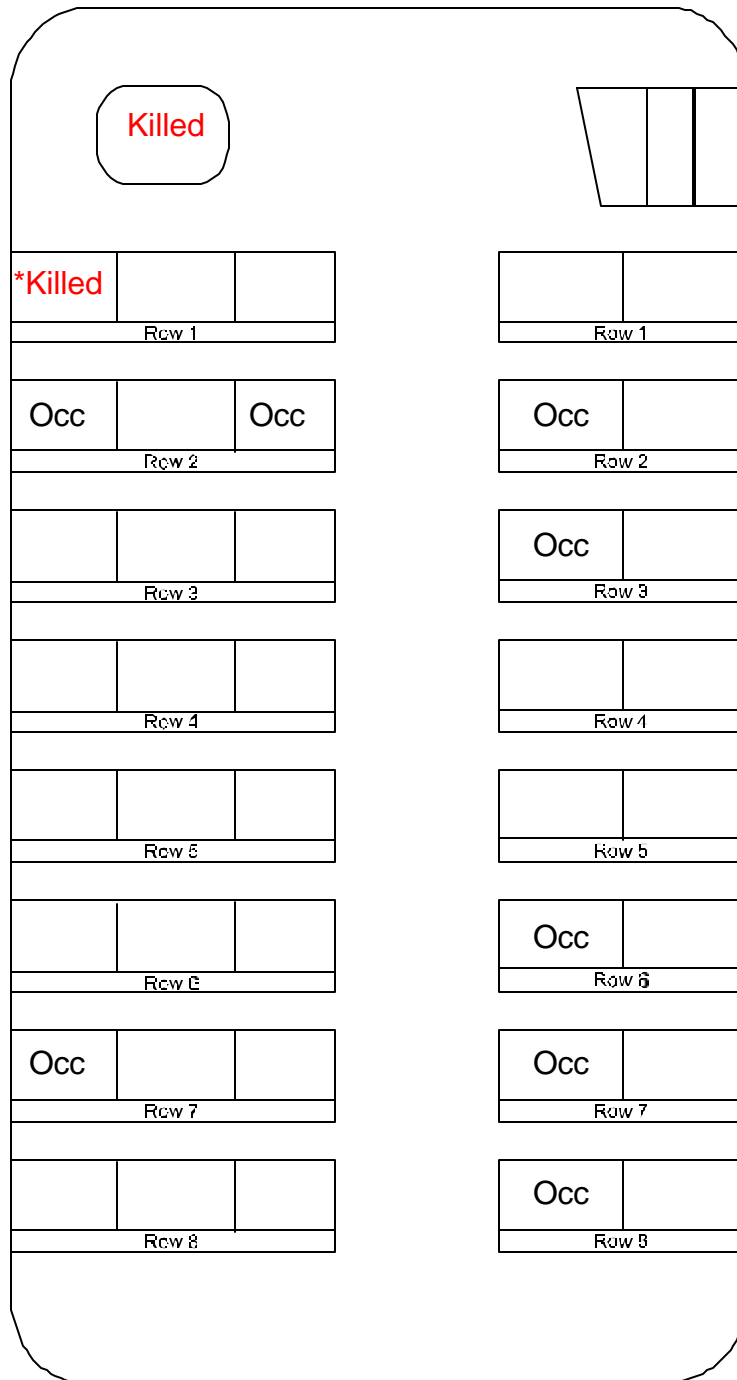
Knee injuries were sustained by the child in the second seat, left side (Occupant 2), who was sitting with the coach. Serious back injuries were sustained by the child in the next to last seat on the right side of the bus (Occupant 8), who is still receiving treatment for her injuries.

According to an interview with a representative from the Board of Education, The most severe damage to the bus was at the level of the windows on the left side of the bus. The roof supports from the front windshield all the way to the rear of the bus were cut through by the impact. The front axle was torn from the vehicle.

A letter was faxed to Thomas Bus Company requesting a photograph of an exemplar 1984, 36 passenger bus, but no response was received.

The police estimated the damage to the bus as \$20,000. The bus had a pre-crash value of \$12,000 and is assumed to be a total loss. Damage to the tractor trailer was estimated by the police as \$40,000. Both vehicles were towed from the crash scene.

Injured occupants were transported to a local hospital via ambulance.



* Shown on police report as first row, right side

Precise positions on seats are unknown