



National Transportation Safety Board

Washington, D. C. 20594

Safety Recommendation

Date: October 9, 1991

In Reply Refer To: I-91-1

Mr. William H. Smock
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About 11:20 a.m. central daylight time on July 22, 1989, CSX Transportation, Inc., freight train R-331-22 derailed near Freeland, Michigan. The train consisted of 2 locomotive units, 17 loaded freight cars, 15 empty freight cars, and an unoccupied caboose. Of the 14 freight cars that derailed, 6 were tank cars that sustained damage resulting in either partial or total loss of load. A flatcar (ATSF 90005) carrying a heat recovery steam generator, which was being transported as an excess-dimension load, overturned, and the module was destroyed. One nearby residence was destroyed by the fire that ignited following the release of hazardous materials. About 1,000 residents were evacuated for 7 days after the accident. No one was killed; 11 people were treated for injuries. Estimated damage exceeded \$4 million.¹

CSX and the hazardous materials shippers promptly responded to the accident. Nonetheless, response teams encountered problems with UTLX 83841, the tank car containing trimethylchlorosilane, which burned for 6 days before the fire could be extinguished. The incident commander and hazardous materials experts tried several methods to minimize the danger from the burning trimethylchlorosilane. They initially allowed the fire to burn. After 3 days, they tried to put it out by applying sodium bicarbonate, which failed to extinguish the fire and created a potentially more hazardous situation by generating and igniting hydrogen gas. Discussions over the next 2 days about accelerating the burn rate, moving and burying the tank car, and injecting nitrogen into the car suggest that the response teams and product experts did not have a reliable method for responding to the burning trimethylchlorosilane and were unsure of what could or should be done.

¹For more detailed information, read Railroad Accident Report--"Derailment of CSX Transportation Inc. Freight Train and Hazardous Materials Release Near Freeland, Michigan on July 22, 1989" (NTSB/RAR-91/04).

Firefighters extinguished the blaze on July 28 after pumping 2,000 gallons of trimethylchlorosilane from the burning tank car, effectively removing the "fuel" for the fire. Although Dow Corning's MSDS identified water fog and foam as fire extinguishing media, it also warned that the trimethylchlorosilane mixture reacts with water to generate hydrochloric acid vapors. Thus, the application of certain recommended extinguishing media appeared to contradict the warning about the mixture's reactivity with water. Water fog and foam were not used, presumably to avoid generating hydrochloric acid vapors.

At the time of the accident, chlorosilane manufacturers had not conducted large-scale spill tests to determine effective fire extinguishing or spill containment techniques. The lack of information about such techniques for a large release of a chlorosilane product quite likely contributed to the difficulty in extinguishing the fire.

Dow Corning reported that on May 7-14, 1990, chlorosilane manufacturers and users tested the effectiveness of foams on spills and fires involving two chlorosilanes, trichlorosilane and silicon tetrachloride. A principal conclusion, according to Dow Corning, "was that medium expansion type foams are in general the most effective in suppressing fires and vapors involving these chlorosilanes. It should be borne in mind, however, that all of these tests involved rectangular, flat pools of liquid and were conducted under relatively favorable conditions. Other configurations could present unique and/or additional challenges."

Although chlorosilane manufacturers have tested the effectiveness of extinguishing agents under "favorable conditions," the Safety Board remains concerned that effective response procedures for emergencies have not yet been proven and that recommendations in the MSDS for fire extinguishing media conflict with warnings about the material's reactivity with water. The Board believes that the Silicon Health Council, because of its role within the chemical industry, can best coordinate the efforts of chlorosilane manufacturers to develop effective emergency response procedures.

The Safety Board, therefore, urges the Council, with the assistance of Dow Corning and other chlorosilane manufacturers, to develop such procedures, including firefighting procedures, for handling releases of chlorosilanes in transportation accidents and to provide this information to the National Fire Protection Association and the DOT.

Therefore, the National Transportation Safety Board recommends that the Silicon Health Council:

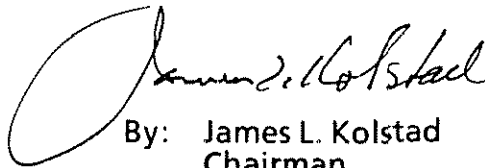
Determine, with the assistance of Dow Corning and other chlorosilane manufacturers, the most effective emergency response procedures for handling transportation accidents involving the release of chlorosilanes, including accidents involving fires, and provide this information to the National Fire Protection Association and the U.S. Department of Transportation. (Class II, Priority Action) (I-91-1)

Also, the Safety Board issued Safety Recommendations R-91-51 through -54 to the Federal Railroad Administration; R-91-55 and -56 to the Association of American Railroads; R-91-57 and -58 to Dow Corning Corporation; R-91-59 through -62 to CSX Transportation, Inc.; and R-91-63 and -64 to the Atchison, Topeka and

Santa Fe Railway Corporation. Also, the Safety Board reiterates R-89-50 to the Federal Railroad Administration.

The National Transportation Safety Board is an independent Federal agency with the statutory responsibility "to promote transportation safety by conducting independent accident investigations and by formulating safety improvement recommendations" (Public Law 93-633). The Safety Board is vitally interested in any action taken as a result of its safety recommendations. Therefore, it would appreciate a response from you regarding action taken or contemplated with respect to the recommendation in this letter. Please refer to Safety Recommendation I-91-1 in your reply

KOLSTAD, Chairman, COUGHLIN, Vice Chairman, and LAUBER, HART and HAMMERSCHMIDT, Members, concurred in this recommendation.



By: James L. Kolstad
Chairman