Hazardous Substances Emergency Events Surveillance (HSEES): What Can We Learn from Tropical Storm Allison and Other Adverse Weather Conditions in Texas?

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Abstract

High winds, flooding, lightning, and other phenomenon associated with adverse weather events such as tropical storms and tornados can cause power failures, equipment damage, and process upsets resulting in chemical releases. Of the 15,732 qualifying events entered into the Texas Hazardous Substances Emergency Events Surveillance system (TxHSEES) from 1996-2001, adverse weather conditions defined as rain, snow/ice, fog, high winds, weather disasters, extreme temperatures, and lightning, were present in 803 events (5%) events, 701 of which occurred at fixed facilities. Most events identified with adverse weather conditions occurred during April through September corresponding with the high temperature and hurricane season in Texas. Sixty-five percent of the events reporting adverse weather conditions occurred in coastal counties with large numbers of industrial facilities (Harris, Brazoria, Jefferson, Galveston, and Nueces counties). Harris County exhibited a disproportionately higher percentage of events during adverse weather conditions as compared to events that occurred during clear weather. Three industries reported the majority of events under both clear and adverse weather conditions: the industrial and miscellaneous chemical manufacturing industry; the petroleum refining industry; and the plastics, synthetics, and resin manufacturing industry. Equipment failure was the single most common contributing factor for the majority of the releases both for clear and adverse weather condition events; however, factors beyond human control including bad weather, and power failure were associated with adverse weather condition events to a greater extent than with clear weather events. Ancillary process equipment and process vessels were identified as the area where releases occurred during adverse weather events. Flooding resulted in secondary containment overflows and the sinking of floating roofs on storage tanks. Adverse weather conditions were present in 17 fixed-facility events that
involved 101 victims; this included 12 employees, 2 firefighters, and 48 members of the general public. Rain was the adverse weather condition most frequently identified in events involving victims. Industries, e.g. the “Industrial and Miscellaneous Chemical” industry and areas, e.g. Harris County, where there are more weather-related events, could benefit from targeted design modifications. System and process design improvements such as improved back up power generation, redesigned secondary containment systems, and modifications of floating storage tank roofs to withstand heavy rains could be explored to reduce the potential negative effects of severe weather.