

Climate Impacts on Hazardous Material Handling Industries

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Background/Objectives. Extreme weather has an outsized impact on petrochemical industries, in part because many are located along coastal and inland waterways. One aspect of this impact is an increased frequency of damage and resulting spills due to natural hazards in recent decades. Patterns in these events reveal industry vulnerabilities not otherwise represented in publicly available data. Additionally, facilities handling hazmat in areas of high population density and natural hazard risk together present the potential for natural hazard triggered releases with significant public health as well as environmental impacts.

Approach/Activities. In the absence of other comprehensive public information, the author has comprehensively mined the National Response Center (NRC) database to identify releases associated with climate related natural hazard events between 1990 and 2019. Occurrence, trends and interannual variability in the frequency of these events are evaluated in relation to underlying climate trends. Expansion of this data set and evaluation through 2021 is anticipated by 2023.

Results/Lessons Learned. Natural hazards are the underlying cause of between 1 and 7 percent of spills each year. Releases caused by natural hazards have increased sharply, in large part due to increased damage from hurricanes as well as floods and wind. Inter annual variability and trends over time for these spills generally match reported variation in extreme weather and associated climate indexes. For example, releases caused by floods in the 2014-2019 were approximately 50 percent greater than in the early 1990s and this increase is correlated with similar increases in extreme precipitation both nationally and for select US regions.

Although many releases caused by natural hazards are minor, some are large and expensive. Centralized records on the impacts of these events is imperfect, but federal records identify at least 180 evacuation events, 84 injuries and two deaths along with release of 11 million gallons of petroleum, 1.5 million gallons and 16 million pounds of chemicals and \$32 million in damages. These values vastly underestimate actual impacts but serve to document that impacts have increased over time.

Predicted increases in the incidence of extreme weather in the future suggest that these types of impacts to hazardous material handling industries will continue to multiply resulting in an increased potential for serious human and environmental impacts. Greater attention to management of natural hazard risk to industry, and in particularly to bulk storage facilities, is required to manage the frequency and severity of these events.