

# Ammonia Port Preparedness and Emergency Response



Science and Technology

## THE RISKS OF AN EXCITING CLIMATE CHANGE INNOVATION

The most prominent threat to human safety is climate change and its extreme effects. With the leading contributor to climate change being the burning of carbon-based fuels, it is essential to utilize alternative modes of energy production. Ammonia is emerging as an important carbon free energy source. Direct use of ammonia as a zero-carbon marine fuel has been embraced by the shipping industry. While this is an exciting development, the large-scale ammonia storage and handling by ports as well as the ammonia production plants' proximity to ports increases risk of large-scale toxic inhalation chemical release.

## THE PROJECT

Previous studies of ammonia release have occurred exclusively in dry conditions which are not relevant to the water proximate situation. This is where the Chemical Security Analysis Center (CSAC) comes in. CSAC was established by the Department of Homeland Security (DHS) to identify and assess chemical threats and vulnerabilities in the United States and develop the best responses to potential chemical hazards. It is the nation's only federal studies, analysis, and knowledge management center for assessing the threat and hazard associated with an accidental or intentional large-scale chemical event or chemical terrorism event in the United States. With the support of the U.S. Army Combat Capabilities Development Command - Chemical Biological Center (DEVCOM CBC), the DHS Science and Technology Directorate's (S&T) CSAC will provide this crucial information through the execution of the Ammonia Port Preparedness and Emergency Response (AmPPER) project. This project will provide an understanding of the current ammonia landscape in the U.S., assemble specific information regarding ammonia storage plans at major U.S. ports, and then assess the potential impact from a catastrophic ammonia release at a major U.S. port.

## THE APPROACH

The ammonia energy landscape will be analyzed to characterize the ammonia energy "risk environment" at major

U.S. ports and their surrounding communities. Laboratory experiment test plans will detail experiments examining expedient protective measures that might be employed by community members needing to shelter in place during an ammonia release. These tests include ranges for key variables to be tested, detection and data acquisition strategies, and identification of appropriate testing facilities. After a six-month period, chamber/field experimental test plans of mitigation strategies will be developed to enable the characterization of knock-down spray technology. Experimental testing will evaluate protective measures that would be easily utilized by community members sheltering in place during a large-scale ammonia release and the effectiveness of catastrophic ammonia release mitigation measures.



## THE IMPACT

AmPPER will enable DHS S&T to provide critical information on ammonia storage and its potential impact on ports and surrounding communities. Through data-driven mitigation and resilience recommendations, we empower the U.S. Coast Guard, FEMA, and emergency response communities to enhance preparedness. Ultimately, these efforts contribute to the safety, security, and resilience of ports and their surrounding communities, protecting both employees and impoverished residents. The transition to ammonia as a maritime fuel ensures a greener future, reducing the risk of catastrophic toxic chemical release and benefiting the operational, environmental, governmental, and social aspects of our society.

