Contribution ID: **51** Type: **Poster**

C2Po3D-03: A deployable barrier preventing liquid oxygen accumulation and safety risks during liquid hydrogen transfers

Tuesday 20 May 2025 14:00 (2 hours)

Uninsulated surfaces exposed to cryogenic temperatures can result in the formation of liquid air, an oxygen-rich mixture. The National Fire Protection Agency NFPA 2-2023 code specifies a non-combustible material must be underneath the transfer line to prevent liquid air from dripping onto combustible materials. Concrete is a non-combustible material commonly used in infrastructure that is heavy and generally immobile. Another common material used in infrastructure is asphalt which is considered a combustible material due to the tar content. Literature has discussed asphalt combustibility with pure liquid oxygen. This work describes experimental attempts to combust asphalt and other common ground surfaces in the presence of liquid air formation. A deployable barrier was designed to comply with the NFPA 2 standard while not requiring expensive materials like concrete. This barrier enables the safe transfer of liquid hydrogen in conditions where concrete pads are unavailable, particularly in off-road applications.

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Session Classification: C2Po3D - New Devices, Novel Concepts, and Miscellaneous II