

**AIR**  
**PRODUCTS**



# Liquid Hydrogen Diking

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# Background on Diking

- Prior to NFPA 52 no diking requirement
- Pooling not considered an issue
  - Low boiling point (-423F)
  - Low heat of vaporization
  - Flash losses when released

# Air Products Modeled Spill

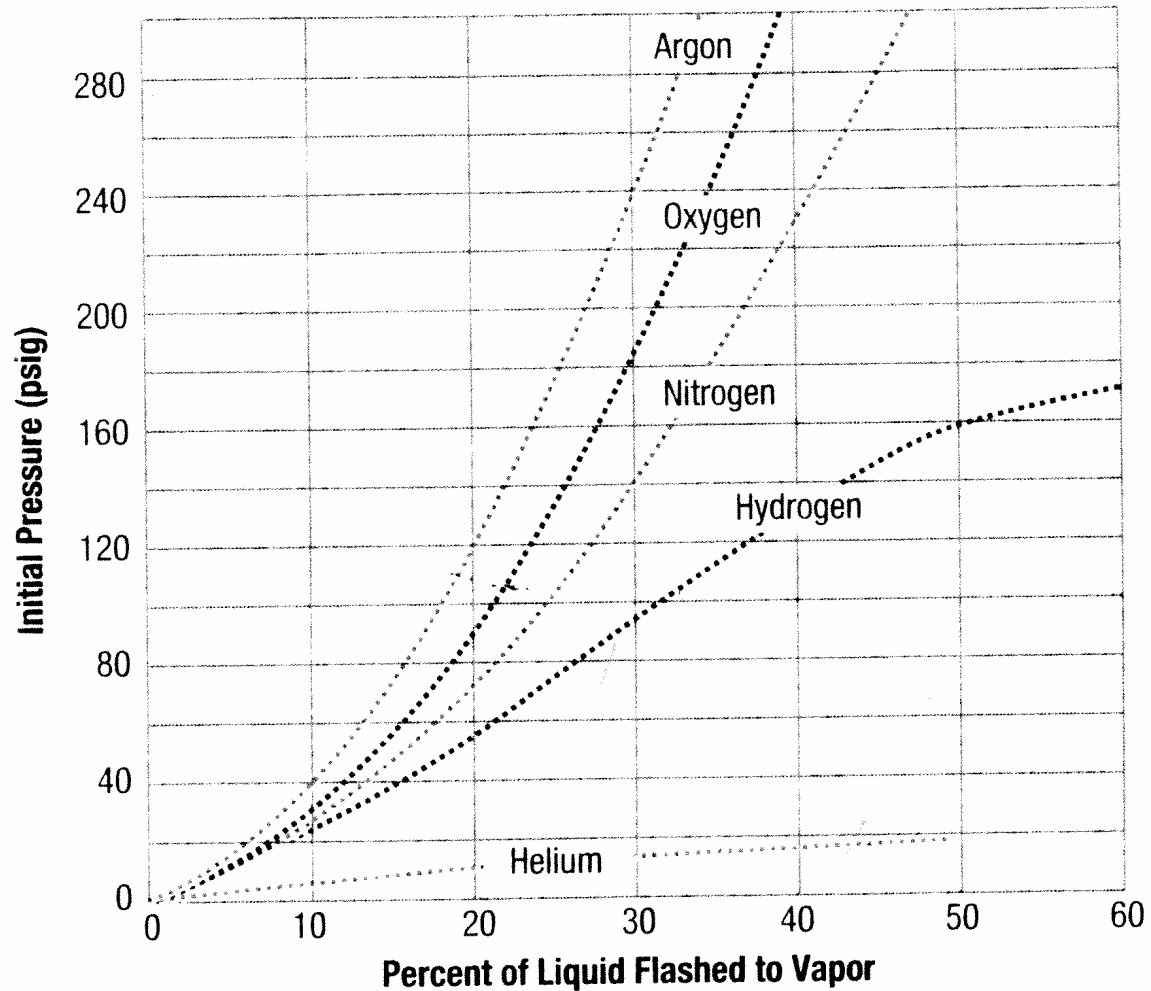
- Confirm that dike necessary
- Establish criteria for dike size
- Phast model used in analysis
  - Available to public
  - Model could analyze liquids & pooling
  - Model validated with field experiments

# Assumptions for Modeling

- 10,000 gallon spill
- Release from 2 inch line
- Release 2 feet above grade
- Horizontal release from trailer pump discharge hose
  - Tank did not contribute to release
  - Check valve on tank fill line

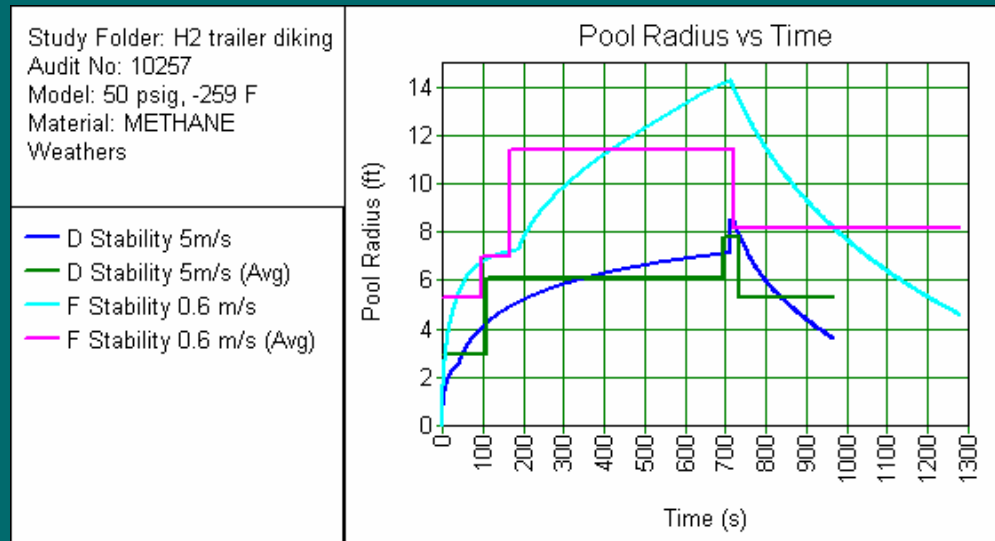
# Flash Losses

Fig. 12 Flash Loss (Isenthalpic Throttling)



# Hydrogen @ 50 psig, -423F (saturated at 0 psig) vs. methane @ 50 psig, -259F (saturated at 0 psig)

- Hydrogen –  
no pool formed



# Conclusions Based on Modeling

- Hydrogen does not pool under conditions analyzed
  - Extremely cold product (-423F vs. -259F for methane)
  - Heat required to vaporize hydrogen lower than methane
    - 388 BTU/ lb-mol (101 BTU/gallon)
    - 3530 BTU/ lb-mol (778 BTU/gallon)
  - Hydrogen has higher flash losses
    - 22% to 52% for hydrogen
    - 15% to 29% for methane

# Questions?

Thank you

tell me more  
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