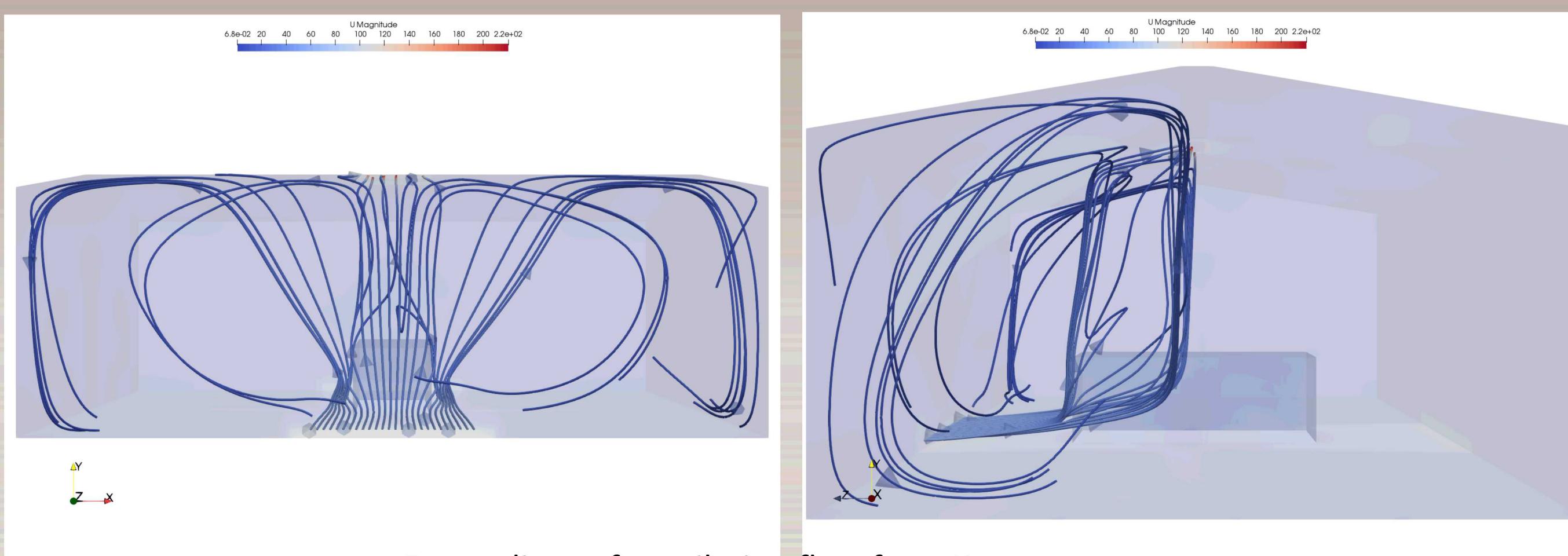


H_2 Fuel Cell Vehicle Repair Garage

By: Harris, Shaun and Blaylock, Myra



Given: Hydrogen fuel cell vehicles undergoing repairs must be defueled to a safe level prior to repair.

Goal: Inform codes and standards of the conditions (fuel amount and ventilation) for the workers to have a safe environment.

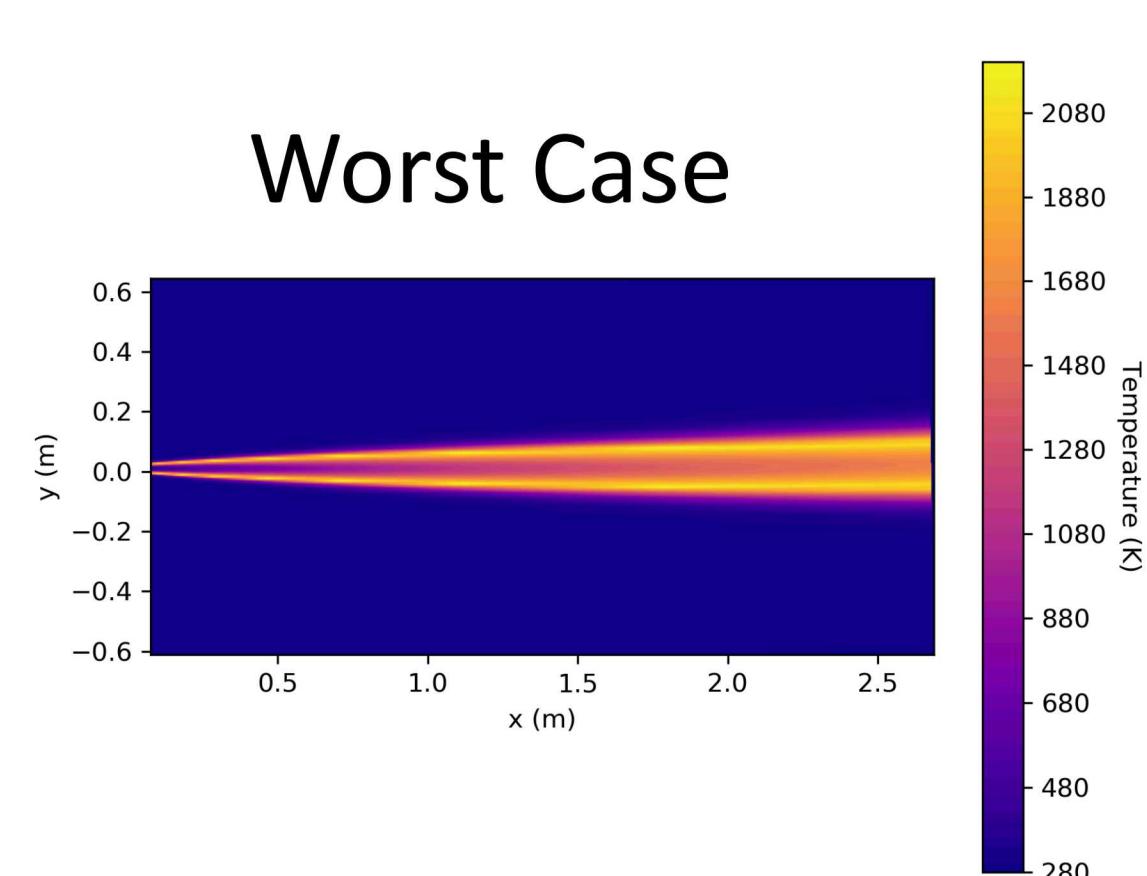
Process:

1. Identify the top hazards (based on frequency and consequence)
2. Model top hazards using simulations
3. Postprocess and suggest codes and standards necessary to have a safe environment based on the top hazards and related models

Task 1: Risk Analysis

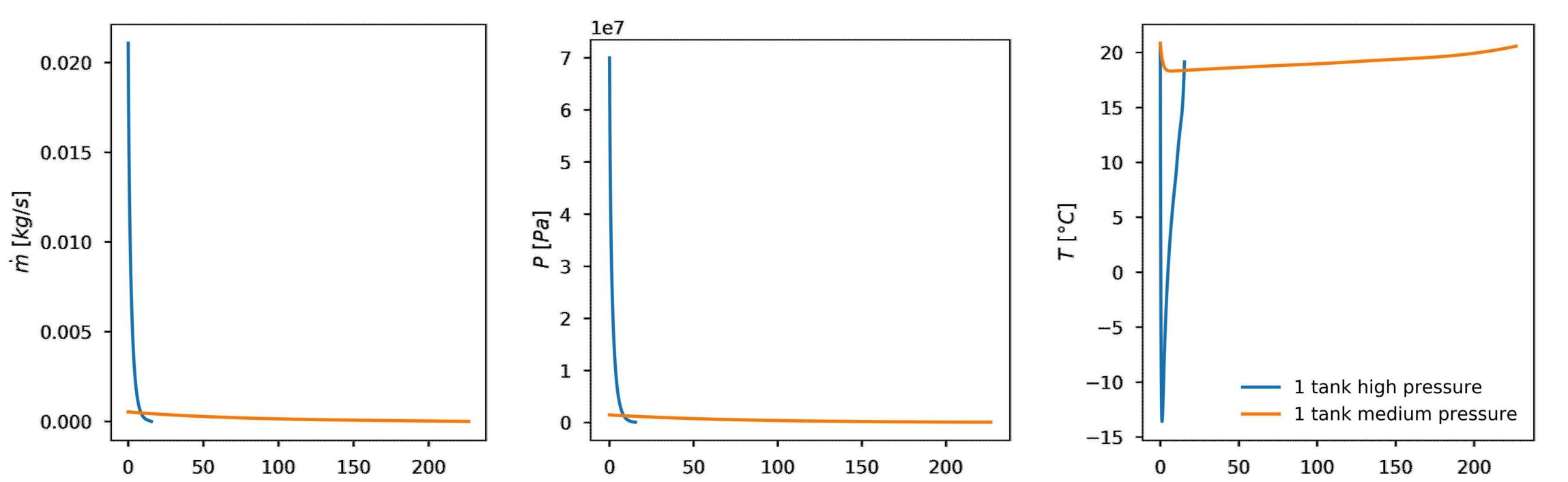
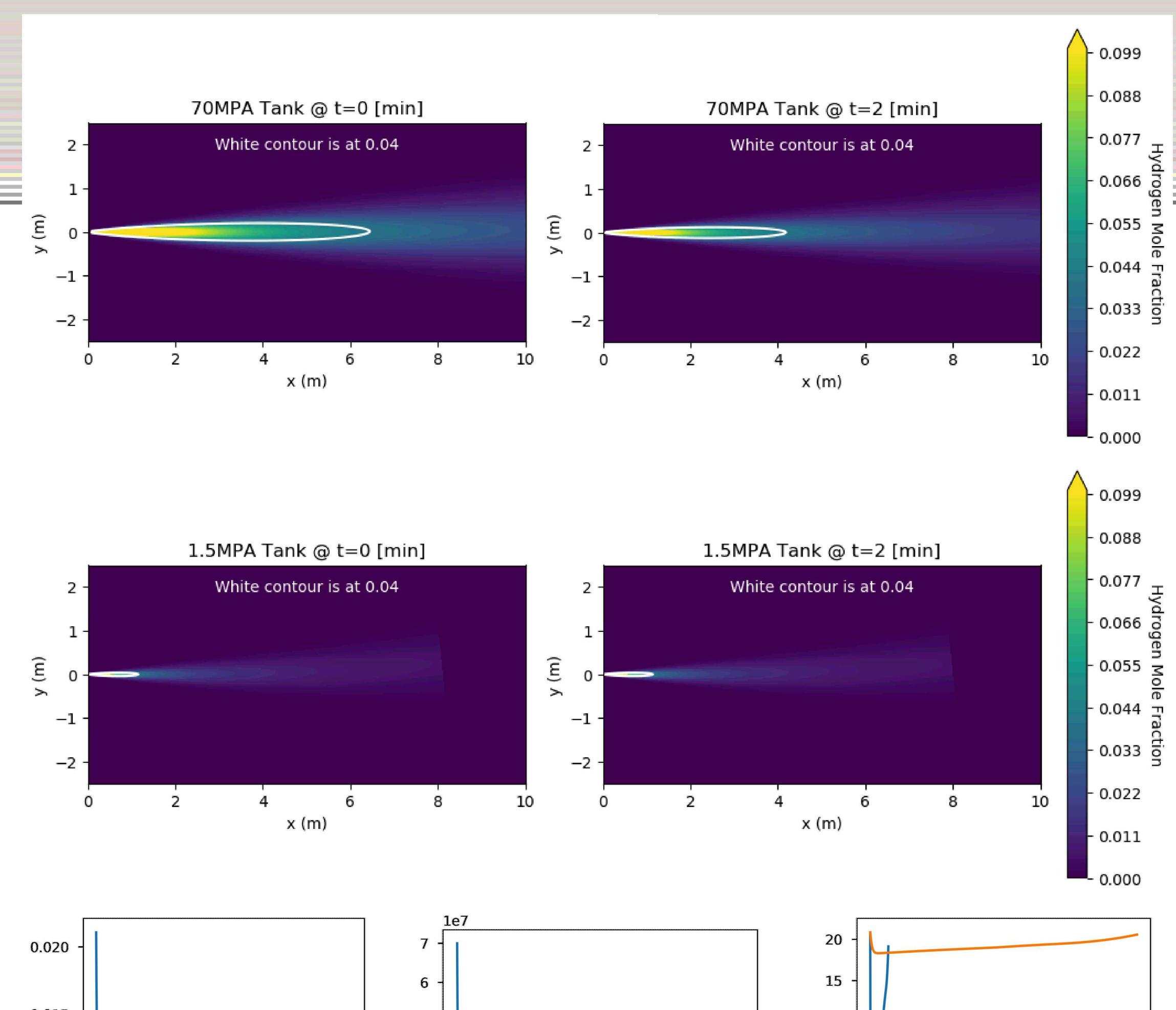
- Method:
 - Hazard and operability study (HAZOP)

Consequence	Frequency	Risk Metric	Modeling Scenario
1	2	2	
1	3	3	
2	3	6	1 tank, high pressure
1	2	2	worst case
3	2	6	2 tanks, high pressure, jet fire
1	3	3	
1	2	2	
2	3	6	worst case for one tank 1 tank, high pressure
1	3	3	
2	3	6	2 tanks, medium pressure
1	5	5	most likely
1	2	2	<1 tank, medium pressure
1	3	3	
1	2	2	
1	3	3	
2	3	6	2 tanks, medium pressure
1	4	4	
1	2	2	
1	3	3	
1	2	2	
1	3	3	
2	3	6	1 tank, high pressure
1	4	4	
1	2	2	



Task 2: Modeling and Postprocessing

- Tools:
 - **HYRAM** HYDROGEN RISK ASSESSMENT MODELS
 - Network flow modeling tool **MassTran**
 - The SIERRA Low Mach Module: **Fuego**



Conclusions:

- High pressure leak will have large plume for short time
- Medium pressure leak will have a smaller plume for a longer time

Next Steps: Fuego (CFD)

