A DYNAMIC LOOK AT DESIGN OF UPSTREAM STORAGE TANK VAPOR CONTROL SYSTEMS

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global **environmental** and **advisory** solutions

SLR


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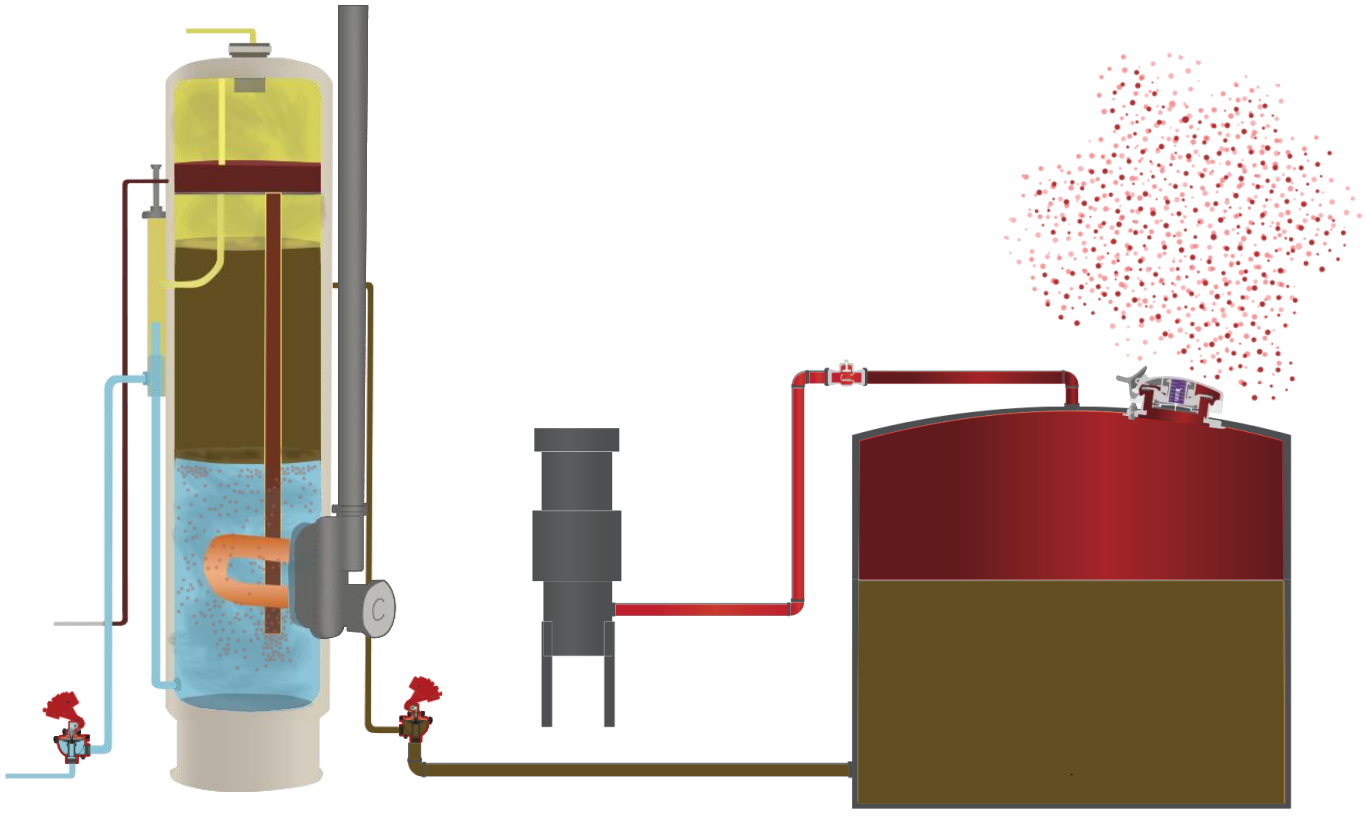
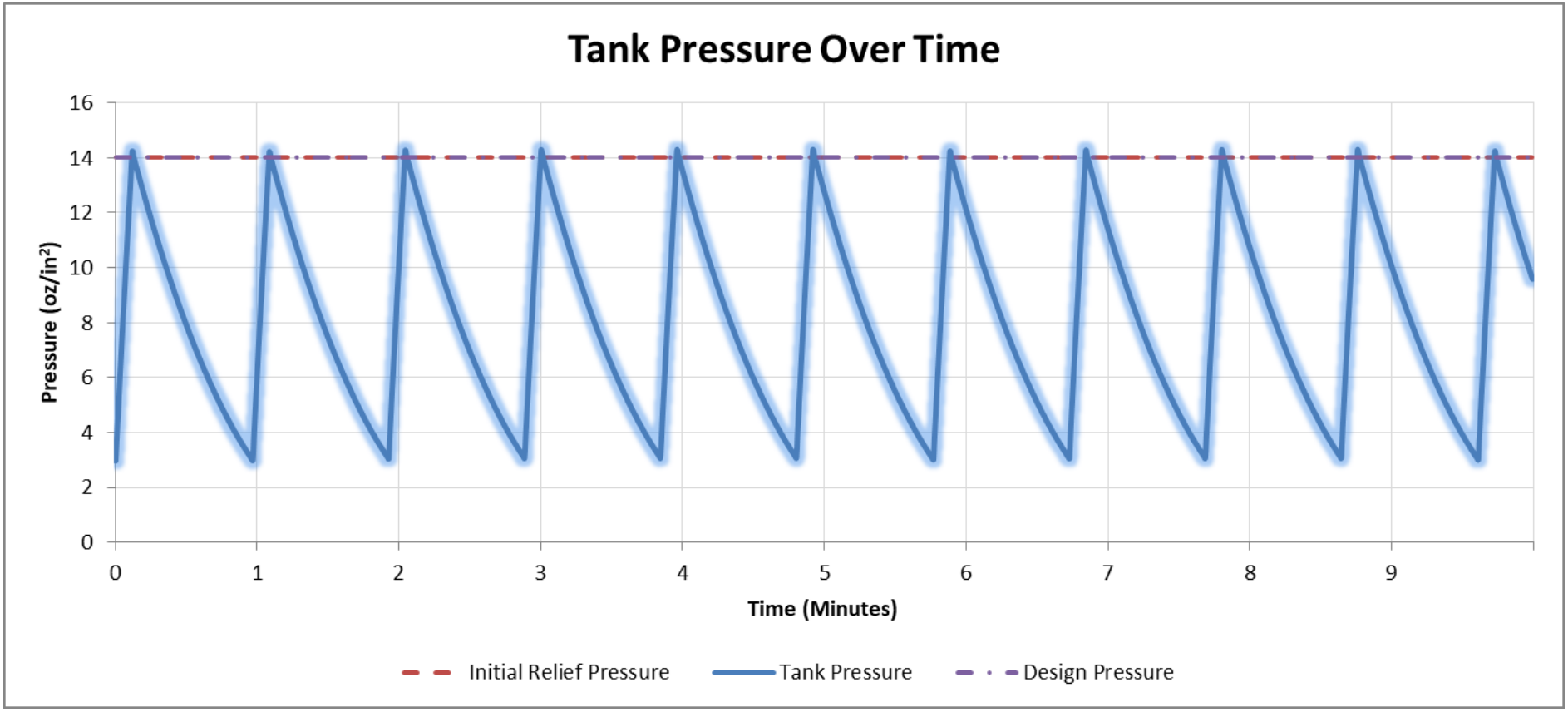
2015	2016	2017	2018	2019	2020?
• Colorado CD • Compliance Alert	• North Dakota CD • OOOOa Promulgated	• Colorado CD	• North Dakota CD • Storage Tank Guidelines	• Colorado CD • EPA Audit Program	

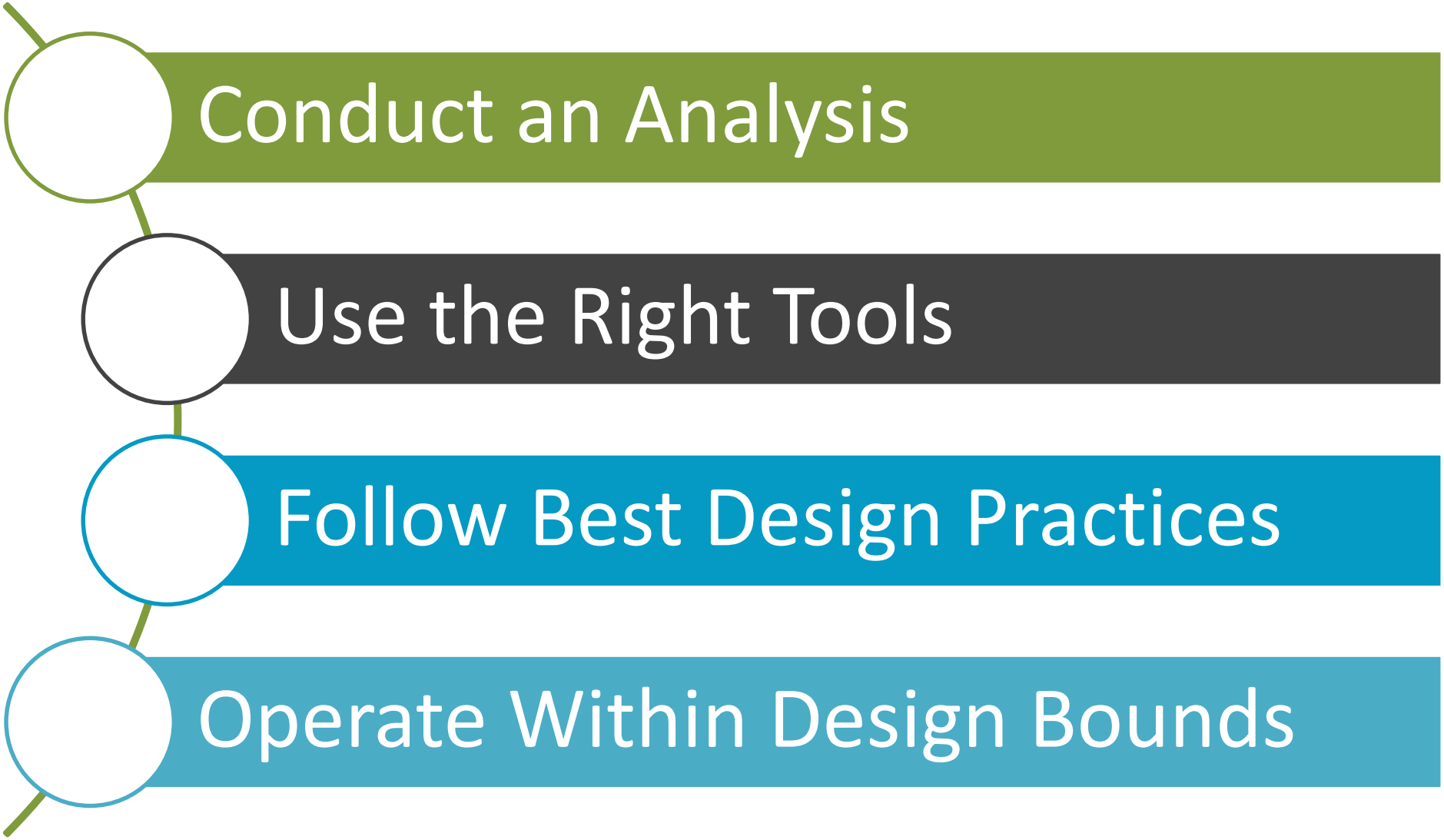
"Dump events can overwhelm an inadequately designed or sized vapor control system and create back pressure that causes emissions to escape from PRDs."

-EPA Compliance Alert

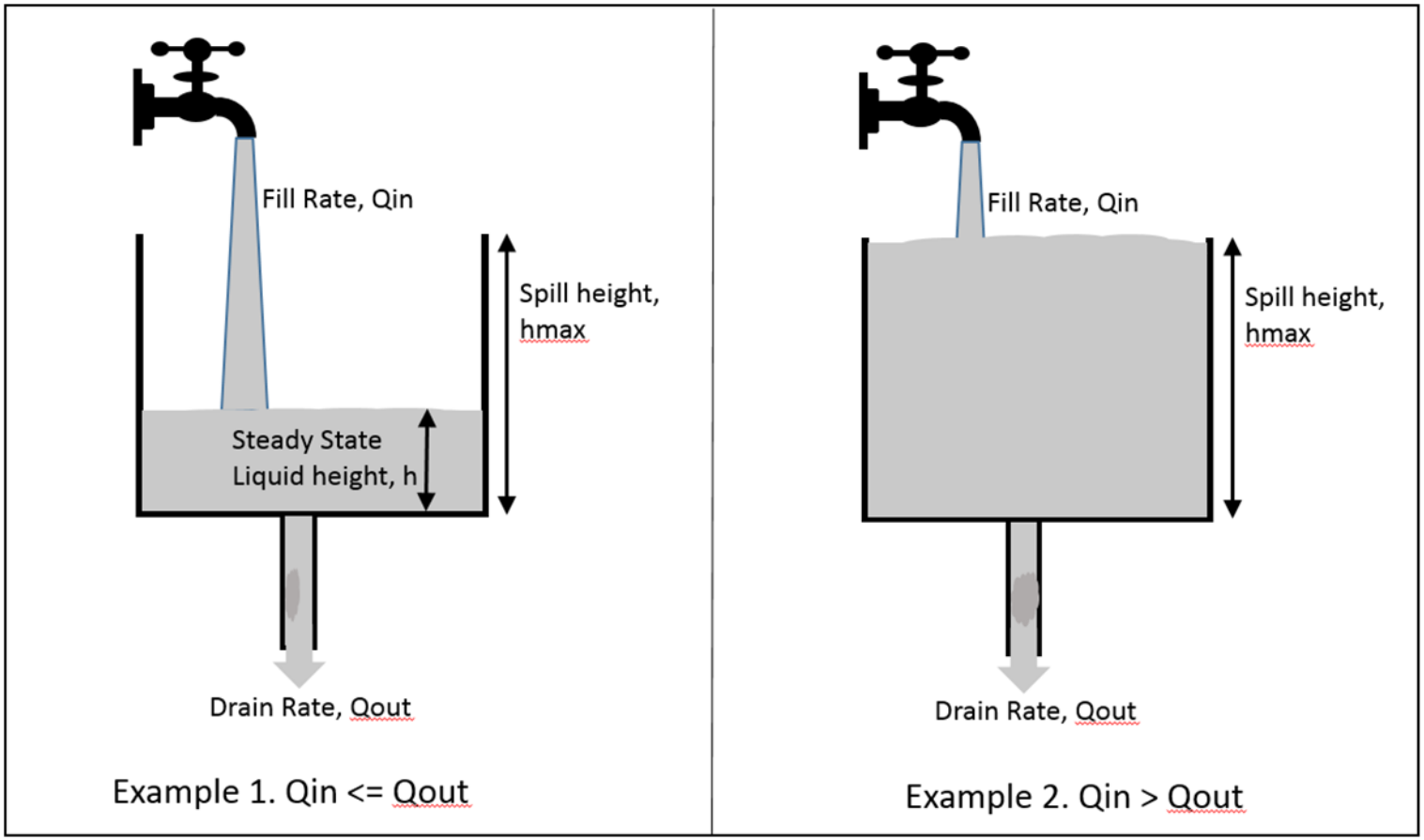



Tank Pressure Over Time
Pressure (oz/in²)
16
14
12
10
8
6
4
2
0
0
1
2
3
4
5
6
7
8
9
Time (Minutes)
Initial Relief Pressure
Tank Pressure
Design Pressure

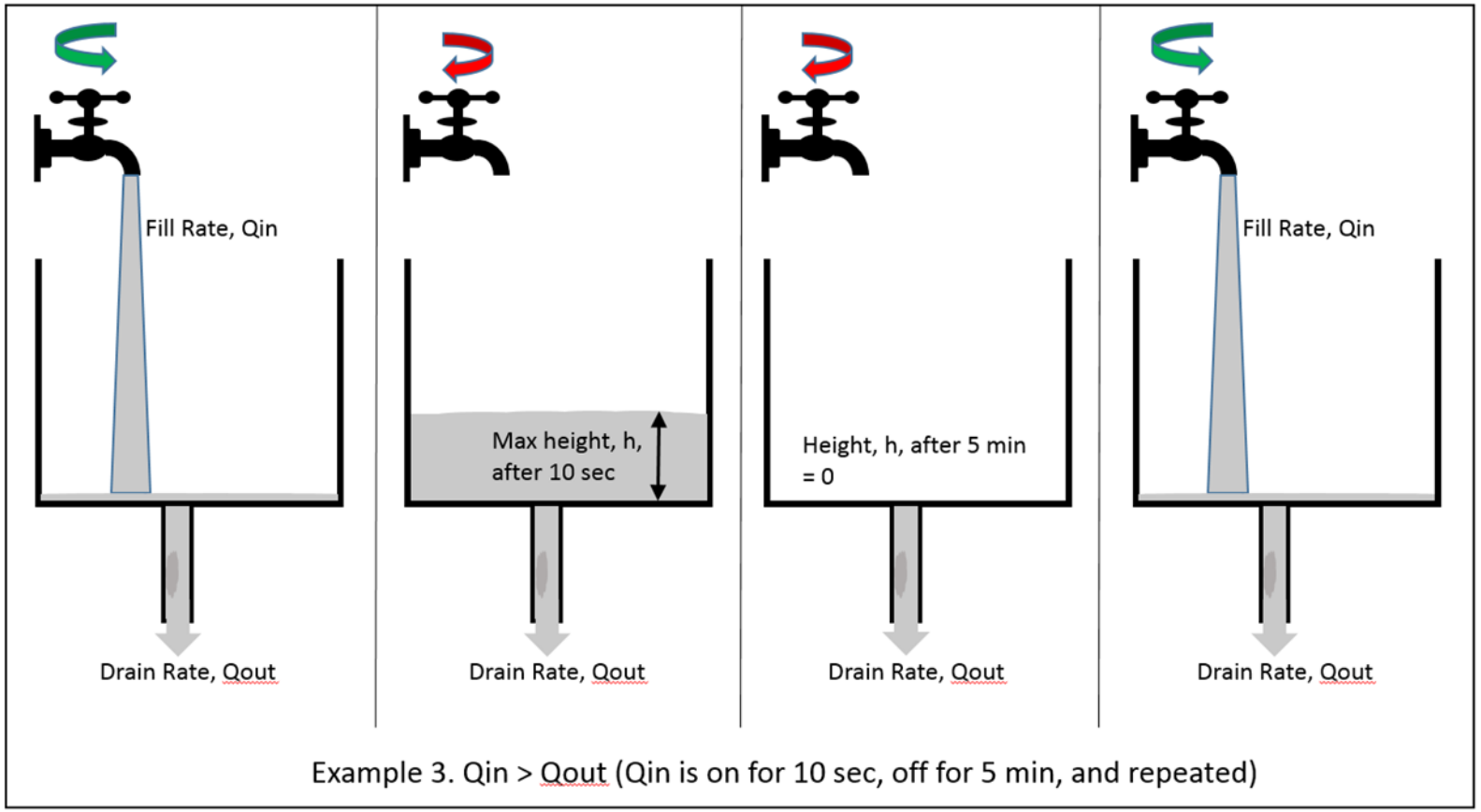
How Can Vapor Control Systems be Designed Better?


Conduct an Analysis
Use the Right Tools
Follow Best Design Practices
Operate Within Design Bounds

Steady-State Modeling



Dynamic Modeling



Example 3. Qin > Qout (Qin is on for 10 sec, off for 5 min, and repeated)

Best Design Practices

- Avoid low points and underground vapor lines
- Use large diameter vapor lines (3+ inches)
- High performance sealing thief hatches
- PRDs set at or near tank design pressure
- Multi-stage separation
- Multi-stage combustors

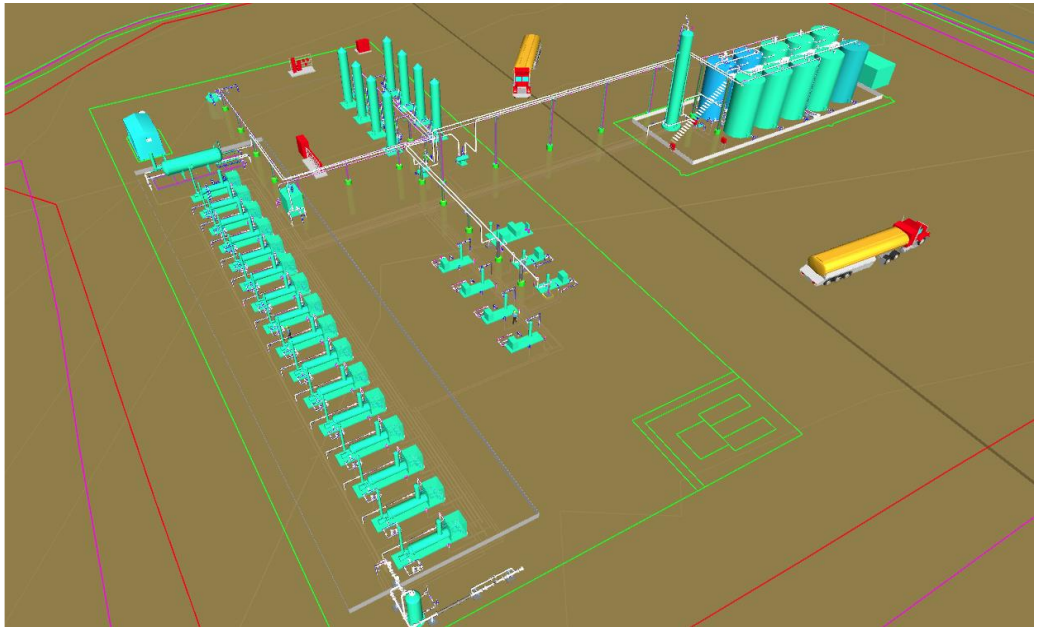
Design Bounds

Critical parameters that must be maintained for the design to be valid

Case Study 1

Voluntary Analysis of 288 multi-well batteries in Denver-Julesburg Basin

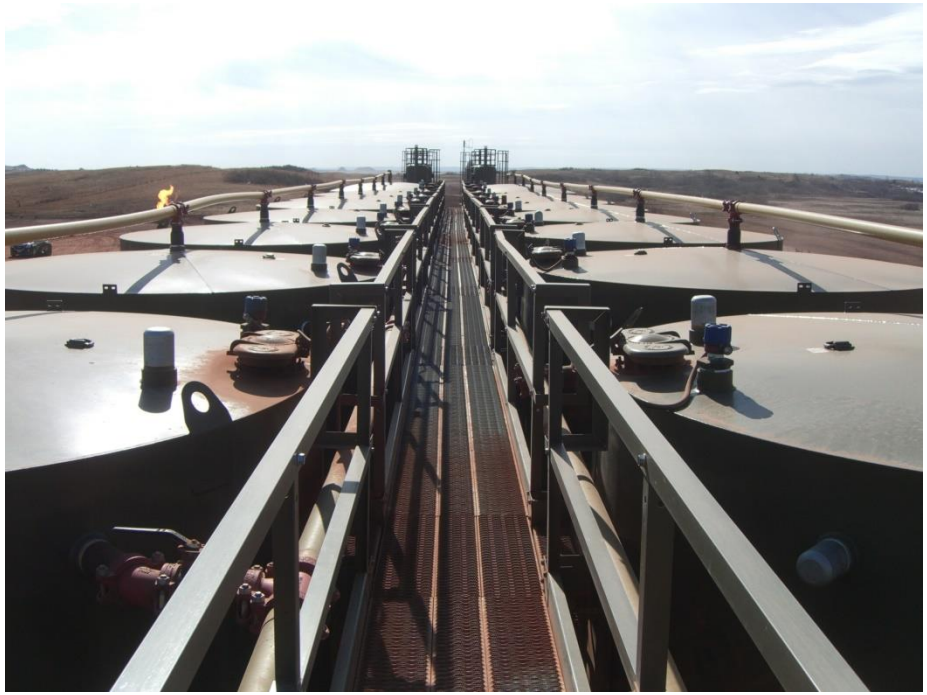
- Optimized batteries to transfer unneeded equipment to future development projects
- Reduced pad footprint for optimized sites
- Improved regulator and public stakeholder relations
- Asset-wide cost savings of $6.5 Million from repurposed equipment



Case Study 2

US EPA Settlement, 170 single and multi-well batteries in Williston Basin

- Grouped similar tank systems reducing the number of models needed and saving client money
- No findings related to design during 3rd party audit



Thank You!

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