



Intersecting Engineering, Operations and Safety



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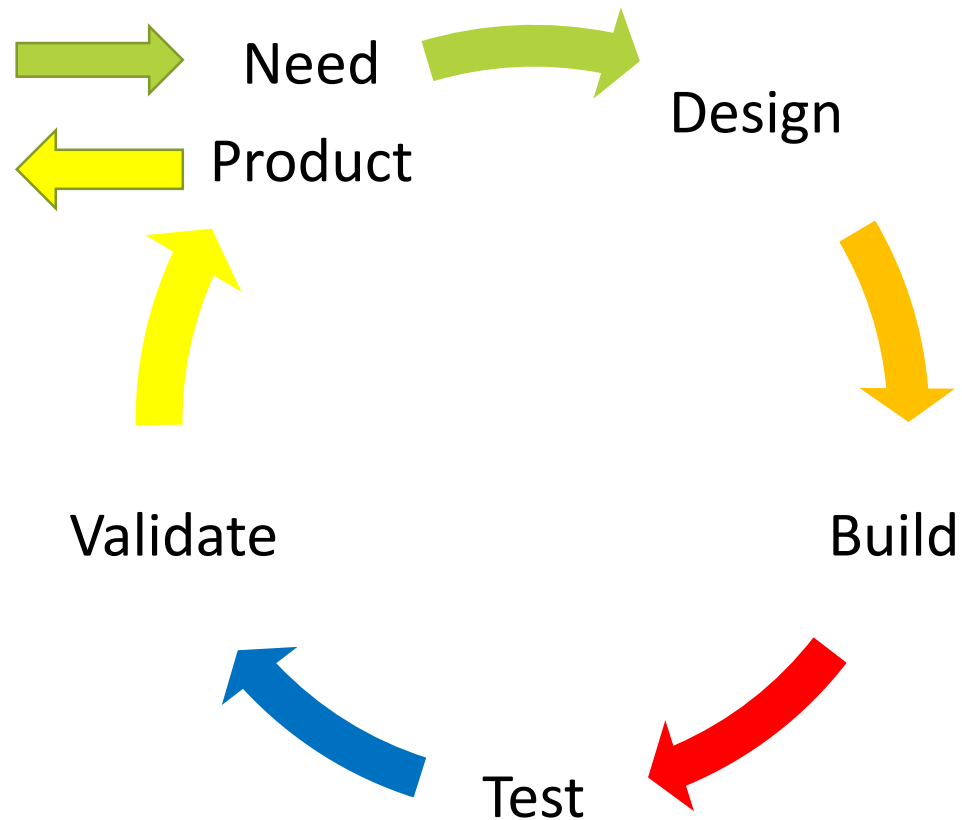
American Biogas Council

Goals of Presentation

- Tie Process Safety Management (PSM) to existing processes. It's really not entirely new!
- Give examples of failures that PSM could have prevented
- Discuss the criticality of having a multi-discipline approach to PSM
- Focus on the need for PHA and how it impacts most every part of process safety
- Self-identify with your own opportunities.



Industrial Projects are a Team Effort



Team Approach Examples

- Has operations, safety and maintenance been involved in:
 - Design standard development
 - Design reviews (PHA)
 - Quality control and Quality Assurance
 - Managing change (MOC)
 - Managing readiness for start up (PSSR)
 - Operating per design (SOP)



Failure is Guaranteed if.....

- Risk are not evaluated as a team
- Engineering and Operations do not communicate
- Systems are not in-place to ensure communication
- Recommendations are not implemented
- Start-Up is not defined and managed
- Change is not managed
- People are not qualified to operate
- You don't solid have a start-up plan
- You lack systems to drive all the above (PSM and design standards as examples)



Management of Change (MOC)

- Incompatible materials.
 - Incompatible materials introduced (ferric chloride through stainless)
 - Positive Material Identification (PMI)
 - Design change not managed
 - No process for managing change



Risk not Identified (CSE & Maintenance Needs)

- Risk to people not evaluated
 - People were entering confined space with IDLH atmospheres possible
 - No permitting conducted
 - Inadequate or no PPE available
 - Gas detection inadequate to evaluate space
 - No training provided



Engineering & Operational Fails

- Inadequate mixing and off-balance feeding of a digester.
 - Absent PHA or Risk Assessment
 - Mixer blades/shafts failed due to improper installation/design
 - Inadequate mixing of digestate
 - Biogas trapped below foam layer
 - Inadequate spill containment
 - Facility siting added risk to environment



Facility Siting

- Facility Siting
 - Gas vent lines were located within a few feet of a flare. The only thing holding back gas pressure is a water seal. There are no engineering controls to isolate the gas in the event of any number of scenarios and the vent is too close to the ignition source.



Story Telling

- What similar incidents can you think of?



How do we improve process performance?

- PHA is the foundation, take the time to do it right
- Define what processes make sense for your organization and risk tolerances
- Make sure management is involved in defining risk tolerances
- Incorporate processes (such as PSM) into your business strategy
- Don't ignore the benefits of PSM, regardless of regulatory obligations
- Understand the relationships between safety, maintenance, operations and engineering
- Capture and report key performance indicators (KPIs)



Benefits of PSM

- Improved risk identification and control
- Improved decision making for design team
- Improved reliability of a process
- Improved institutional knowledge of process
- Safe and efficient start-up
- Improved change management
- Improved design standards
- Improved efficiency for estimating future projects and lower design cost over time



How could PSM have helped your incidents?



Hopeful Take Away

- PSM is a consistent way to manage process safety
- PSM is really just formalizing and expanding what you may do now
- A process does not have to be a covered process for PSM to work
- Evaluate your procedures and systems to determine if PSM will help make your process safer and more reliable
- A safe design is a collective effort between engineering, operations, maintenance, contractors, and safety.



Discussion

