Integrity Management is more than just an inspection

Codes and Regulations

- USEPA – 40 CFR 112 - Spill Prevention Control and Countermeasures (SPCC) Rules
- NFPA 30 and IFC Flammable and Combustible Liquids Codes
- PHMSA/DOT – 49 CFR 195 Hazardous Liquid Pipeline Regulations
- ***All*** require periodic inspection and testing to confirm integrity

Codes and Regulations

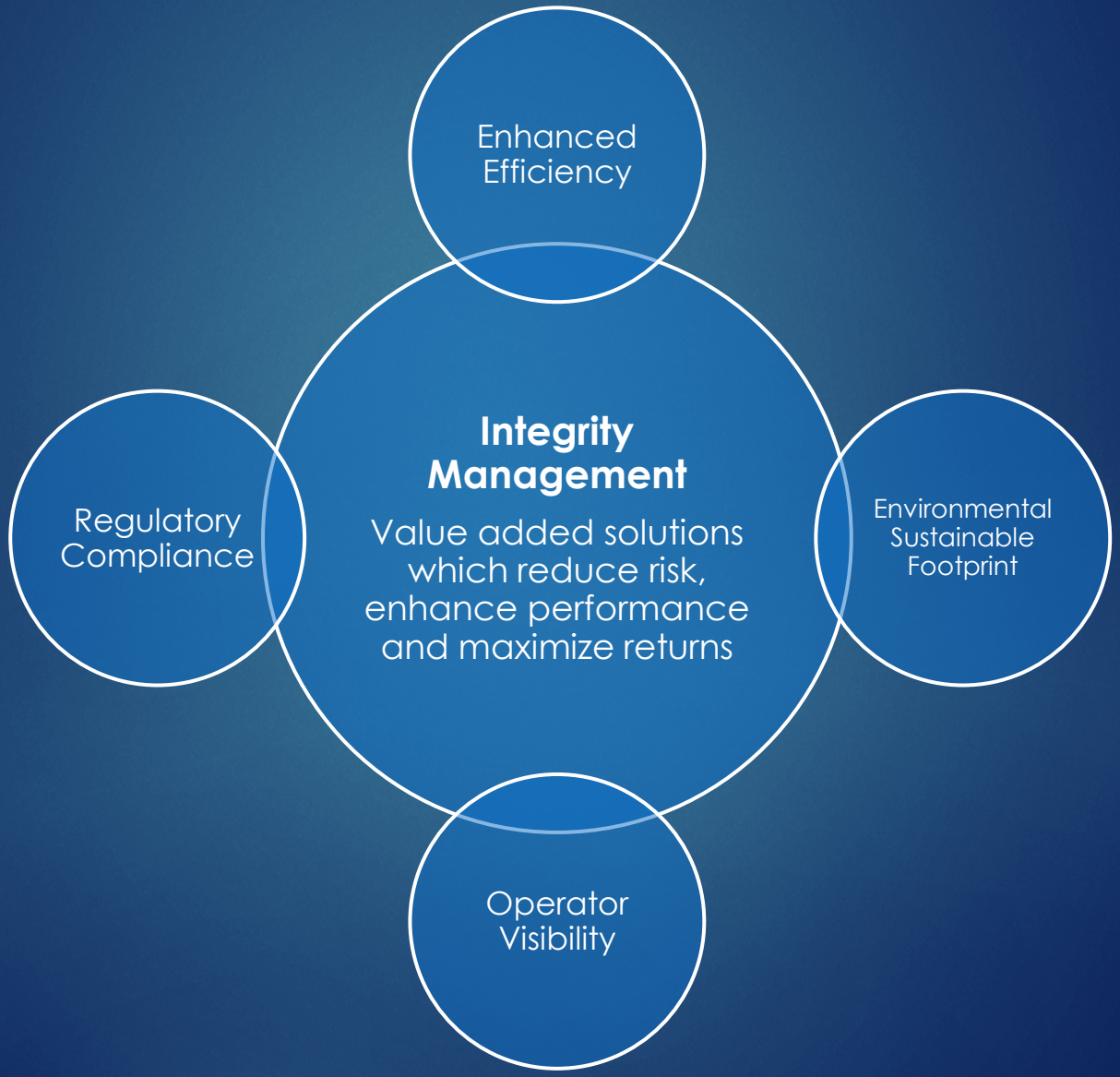
- Federal regulations require the tank owner/operator to develop a site-specific plan to manage the integrity of their tank systems.
  - UST: Periodic tank and line testing, SIR, ATG systems, containment sumps, leak detection equipment functionality, etc.
  - AST: SPCC Plans – Integrity Testing and Inspection
  - Pipelines: IMP – O&M Plans

- **Once you have written your plan, it becomes enforceable as the law for your location**

Inspection Standards

- **API 653** – Field Erected Aboveground Storage Tanks
- **STI SP001** – Shop Fabricated Aboveground Storage Tanks
- **API 570** – Process Piping Inspection
- **AMPP (NACE)** – Cathodic Protection Recommended Practices

Integrity Management



Integrity Management

- Integrity Management is more than just a formal inspection…
  - All the inspection standards referenced in the regulations include guidance that goes beyond the "formal" inspection.
  - Integrity Management includes:
    - Periodic inspection by operations personnel
    - Monitoring of key component operations
    - Preventative maintenance
    - Programmed upgrades

Integrity Management

- Beyond the inspection, most standards call for…
  - Monthly visual inspections
  - Monthly monitoring
    - Cathodic protection rectifiers
  - Annual inspection
  - Annual testing and calibration
    - Gauges, thermal and pressure relief systems

STI SP001 Standard

- Focuses on shop fabricated tank systems, but extends beyond the tank
- Monthly Inspection
  - Tank Containment
    - Water? – Containment Valves – Clear Access
  - Leak Detection
    - Visible Leakage?
  - Tank Equipment
    - Venting – Spill & Overfill – Tank Gauging
  - Tank Attachments and Appurtenances

STI SP001 Standard

- Annual Inspection
  - Tank Containment
  - Tank Foundation and Supports
  - Cathodic Protection
  - Tank Shell, Heads, Roof
  - Tank Equipment
  - Insulated Tanks
  - Miscellaneous

PHSMA Pipeline Regulations

- "Transportation" related facilities as discussed within USEPA SPCC Rules
- Applies to both the pipelines and "breakout tanks" that are integral to the pipeline operation.
- Requires the owner to develop a written plan for their system.
  - Formal Inspections
  - Preventative and Mitigative Measures
  - Continuous Program Evaluation Process

DOD Pipe Integrity Management Plan

- Most developed under Centrally Managed Programs managed by Defense Logistics Agency Energy
- Part 1 – Installation Execution Requirements
- Part 2 – Site Assessment & Engineering Evaluation
- Part 3 – Follow On Assessment and DLA-Energy Supported Actions

Department of Defense (DOD) Pipe Integrity Management Plan

- Part 1 – Installation Execution Requirements
- Compliance Schedule
  - Visual Inspection Monthly and Annually
  - Thermal Relief Valve Testing Annually
  - Low Point Drain Maintenance Quarterly or…
  - Pressure Testing Annually (Deadhead test)
- Inspection Checklist Provided

So what are you looking for?

- Leakage or Stresses on Tanks and Piping
- Tank Containment
- Tank Marking
- Tank Venting
- Tank Grounding and Bonding

Piping Issues

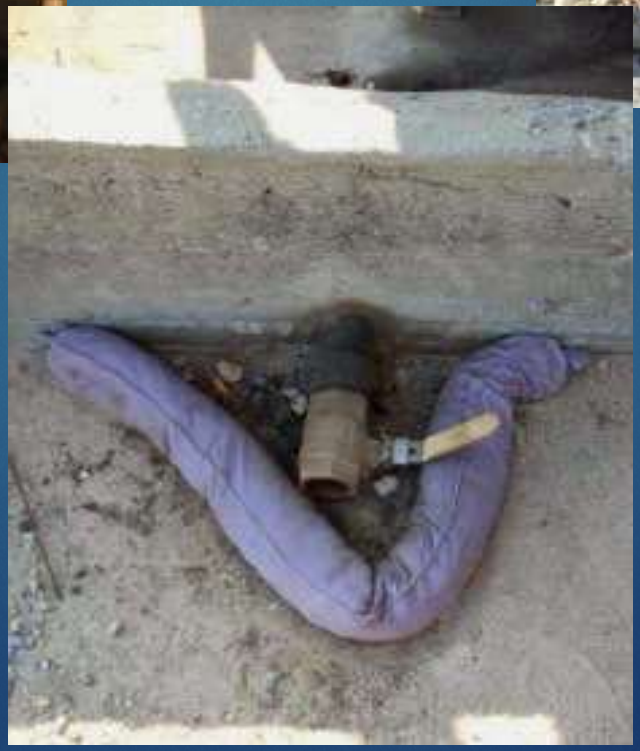
Piping Inspection

Piping Inspection

Piping can affect your tank

Will it contain a release?

Will it contain a release?



Inspect inside too

Tank Containment

Containment drains?

What does this tell you?

Tank marking

- NFPA and IFC all provide direction on marking ASTs.
  - Product stored
  - No Smoking
  - NFPA Hazard Diamond
  - Tank ID Number
  - Safe Fill Height
  - Last time cleaned and inspected
  - Interior coating information

Tank marking

Adequate venting

- Lack of emergency venting is the most dangerous of the concerns.
- All ASTs are to have two vents.
  - Normal vent is for operations associated with product movement. This may be during product filling, or product removal such as dispensing.
  - Emergency relief vent is to avoid overpressurizing the tank when there is a fire outside the tank.
- Without an emergency vent…

What happens…

What happens…

Emergency Relief Vent

- Most horizontal tanks inspected do not meet the requirements.
  - Long Bolt Manway
    - Not a preferred method, especially in the north. May not be allowed by local code.
    - No longer allowed under UL 142 for tanks shipped from fabricator.
  - Emergency Vent
    - May require a larger opening in the tank.

Venting issues

Grounding and Bonding

NFPA and UFC require all ASTs to be grounded. DOD Standards describe two grounds per tank.

Grounding is protection from static discharge, lightning, electrical shorts, etc.

This is not the same as power neutral grounding required by the electrical code.

Tank grounding

Grounding and Bonding

Bonding is different but is equally important.

Bonding is to prevent arcs generated by static build up due to product movement.

"Grounding" at a truck rack is really bonding the tank truck to the grounded tank system.

All piping should be bonded to the tank unless intentionally isolated for cathodic protection. Then a surge protector should be in place.

Grounding and Bonding

Integrity Management

- An Integrity Management Plan
  - Reduces risk
  - Enhances performance
  - Maintains compliance
  - Maximizes operational life
- Complete implementation of an Integrity Management Plan goes beyond the formal inspections and involves the Tank Owner/Operator