MECHANICAL INTEGRITY VS PSM REQUIREMENTS

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Safety Minute

Don’t tease the tiger!

Pressure vessel

You!
OSHA 29 CFR Part 1910.119 (Process safety management of highly hazardous chemicals) and the new CSA Z767 (Process Safety Management) states that Mechanical Integrity (MI) is one of the official process safety elements.
OSHA requires that every manager/inspector responsible for stationary equipment: «Establish maintenance systems for critical process-related equipment, including written procedures, employee training, appropriate inspections, and testing of such equipment to ensure ongoing mechanical integrity». 
By measuring this...
Integrity program shall be implemented for stationary equipment by following:

a) A complete inspection/maintenance plan
b) Integrity Operating Windows (IOW’s) adapted for each equipment and piping system
Inspection plan?

Inspection plan & inspection frequencies based on:

a) **NBIC NB-23 Part 2**, Inspection;
b) **API 510**, Pressure Vessel Inspection Code: In-Service Inspection, Rating, Repair, and Alteration;
c) **API 570**, Piping Inspection Code: In-service Inspection, Repair, and Alteration of Piping Systems;
d) **API RP 576**, Inspection of Pressure-relieving Devices;
e) **CSA B51**, Boiler, pressure vessel, and pressure piping code;
Inspection plan & inspection frequencies based on:

f) **API 653**, Tank Inspection, Repair, Alteration, and Reconstruction;
g) **CSA Z662**, Oil and gas pipeline systems;
h) **ABSA’s AB-506**, Inspection & Servicing Requirements for In-Service Pressure Equipment;

f) etc.
IOW’s?

• The new API RP 584, Integrity Operating Windows (IOW’s) can guide you to find out their specific IOW’s.
• First edition: May 2014
IOW, what is it exactly?

The new API RP 584, Integrity Operating Windows (IOW’s) can guide owners to find out their specific IOW’s.

- **150 PSIG** (hydro test)
- **133 PSIG** (max ASME B31.3 upset authorization)
- **100 PSIG** (set pressure relief valve)
- **0 PSIG** (not designed for vacuum)
- **-10 PSIG** (partial vacuum)
## Level of IOW?

<table>
<thead>
<tr>
<th>Risk</th>
<th>Type of IOW</th>
<th>IOW Guidance/Action</th>
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</thead>
<tbody>
<tr>
<td>High</td>
<td>Critical</td>
<td>IOW’s Required - Limits and durations established on all IOW process parameters for monitoring; IOW’s are alarmed/alerted and SME’s are notified of exceedances; Operations take urgent predetermined action to return process to normal operation.</td>
</tr>
<tr>
<td>Medium High</td>
<td>Critical or Standard</td>
<td>IOW’s Required - Limits and durations established on all IOW process parameters for monitoring; IOW’s are alarmed/alerted and SME’s are notified of exceedances; Operations take predetermined action to return process to normal operation.</td>
</tr>
<tr>
<td>Medium</td>
<td>Standard or Informational</td>
<td>IIL’s Identified - IOW’s identified suggested limits specified for each IOW; Operations and SME’s are alerted/notified of exceedances; Troubleshooting initiated with planned adjustments to operations, inspection/maintenance developed.</td>
</tr>
<tr>
<td>Low</td>
<td>Informational</td>
<td>IIL’s Suggested - Normal operating parameters identified for analysis; Parameters tracked and trended by SME to determine long-term effects on equipment reliability.</td>
</tr>
</tbody>
</table>

### Legend
- SME: Subject Matter Expert
- IIL: IOW Information Limit
If Something Went Wrong?

Every deficiency found during inspection or IOW, should be:

• **Managed** with a MOC
• **Evaluated** by **API 579-1/ASME FFS-1** (Fitness For Service) or
• **Repaired** according to recognized Codes such as **NBIC NB-23 part 3** (Repairs & Alteration), **ASME PCC-2** (Repair of Pressure Equipment and Piping), **API 510** (Pressure Vessel Inspection Code: In-Service Inspection, Rating, Repair, and Alteration) or else.
Why?

https://www.youtube.com/watch?v=6Tb5Butd940

Figure 1 – Aerial view of the entrance to the Westray mine taken May 11th, 1992 [1]

Figure 2 – Heavy fuel oil spill at Cliffs Natural Resources, Sept-Iles, Quebec, August 31st 2013 [2]
The End

Thanks for your attention!