



SAFE OPERATING LIMITS / INTEGRITY OPERATING WINDOWS

TSX | **IPL**

CCPS Calgary Regional
Meeting

AGENDA

- **Background**
- **What is a Safe Operating Limit**
- **Why do we need to document Safe Operating Limits**
- **What is an Integrity Operating Window**
- **Current Challenge(s)**
- **Summary**

BACKGROUND

- **Inter Pipeline operates in four business segments**
 - ✓ Oil Sands Transportation - > 3,300 km of operating pipelines and 3.8 million barrels of storage
 - ✓ NGL Processing –Three straddle plants on TransCanada Alberta system and off-gas processing facilities in Fort McMurray
 - ✓ Conventional Oil Pipelines - >3,900 km of pipelines
 - ✓ Bulk Liquid Storage – 23 terminals in Europe and the UK
- **Inter Pipeline is also in the process of constructing and eventually operation of an integrated petrochemical facility that will be producing 525 kT of Polypropylene annually.**
- **Process Safety program in relative infancy**
 - ✓ Several elements have higher priority driven by internal gap assessments and external feedback

WHAT IS A SAFE OPERATING LIMIT?

- **CCPS Definition:** Limits established for critical process parameters, such as temperature, pressure, level, flow, or concentration, based on a combination of equipment design limits and the dynamics of the process.
- **OSHA 1910.119:** The Process Safety Information Section [(d)(2)(i)(D)] highlights the expectation that employers shall provide “Safe upper and lower limits for such items as temperatures, pressures, flows or compositions”.
- **CSA Z767:** The Process knowledge and documentation section [6.1.4(m)] states that “information shall be obtained and kept current...such as... safe operating limits (e.g., levels, temperatures, pressures, flows, time, cycles, and compositions) and an evaluation of the process safety consequences of deviations
- **Our (current) definition:** The maximum and/or minimum allowable operating parameter(s) for a piece of equipment. In most cases the maximum and/or minimum parameter(s) are based on the equipment’s mechanical design or the equipment’s current state as determined by a fitness for service assessment

WHY DO WE NEED TO DOCUMENT SOLS

- **Informs the operator of the Safe Operating Limits of their equipment and the consequences of deviating from the limits.**
- **Assists in determining potential causes of the excursion and corrective actions**
- **A potential data source for alarm rationalization activities to set alarms at appropriate values**

WHAT IS AN INTEGRITY OPERATING WINDOW (IOW)

- **API RP 584 Integrity Operating Windows 1st edition (2014) definition:**
Established limits for process variables (parameters) that can affect the integrity of the equipment if the process operation deviates from the established limits for a predetermined length of time (includes critical, standard and informational IOW's).
- **API RP 584 defines an IOW critical limit as** “An established IOW level which, if exceeded, rapid deterioration could occur such that the operator must take immediate predetermined actions to return the process variable back within the IOW to prevent significant defined risks of potential equipment damage or hazardous fluid release could occur in a fairly short timeframe”

As per API 584

IOW critical limit = Safe Operating Limit

OUR INTERPRETATION

Safe Operating Limit (SOL) Diagram



CURRENT CHALLENGES

- **Agreement on terminology/scope of application (SOLs vs IOWs etc)**
- **Identification/documentation of**
 - ✓ Damage/Corrosion mechanisms
 - ✓ Consequences of Deviation from SOLs/IOWs
 - ✓ Actions required to stop an SOL/IOW deviation
- **Cultural challenges in ensuring that Operations shuts down the process or moves it to a safer state until formal approval received to start-up, or move to full rates**

CURRENT CHALLENGES

- **Challenges with documentation of Consequences of Deviation from SOLs/IOWs**
 - ✓ Consequences associated with exceeding SOLs should align with the H&S consequences from the facility's Process Hazard Analysis (PHA) – not all PHAs have been completed for all facilities
 - ✓ Consequences associated with formal QRAs

- **Challenges with documenting actions required to stop an SOL/IOW deviation**
 - ✓ Require a robust way to interface with Operations personnel to provide timely info

CURRENT CHALLENGES

- **Ensuring SOLs/IOWs remain evergreen (revalidation)**
- **Training of personnel on timely response to SOL/IOW alarms/alerts**

SUMMARY

- **Safe Operating Limits/Integrity Operating Windows program to be formally developed and rolled out**
 - ✓ Meaningful alignment being developed between Asset Integrity and Process Safety
- **Challenges ahead around identification, documentation and sustainment**

Questions?