



North West Redwater Partnership

Sturgeon Refinery

- ▶ Safe Operating Limits:
- ▶ Common (Broad) Definitions:
- ▶ The envelope beyond which a process cannot be intentionally operated
- ▶ The point beyond which normal troubleshooting ends and pre-determined action occurs to return the process to a known safe state



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- ▶ NWR – Identification of Safe Operating Limits (SOL):

- ▶ Design HAZOPs/LOPAs used as starting point
 - Limit associated with a primary safeguard/action to prevent high severity H&S consequence loss of containment scenarios

- ▶ Other Considerations:
 - Process Licensor recommendations
 - Operating experience
 - Industry best practices



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- ▶ SOL Process Development:
- ▶ Unit process engineers developed the base case SOL's based on the criteria above
- ▶ SOL registers maintained in Unit Safeguarding Manuals
- ▶ Integrity Operating Windows – managed by pressure equipment integrity engineering
- ▶ Unit SOLs and IOWs reviewed jointly to address gaps or overlaps
- ▶ Changes to SOL require MOC



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- ▶ SOL Monitoring:
- ▶ Owned by Unit Process Engineer
- ▶ Limits are monitored in PI
- ▶ Control Room Operators also check (shift rounds)
- ▶ PI SOL status summaries are checked daily, and exceedances verified
- ▶ Verified SOL exceedances are entered as incidents (may be coincidental with another event – PSV lift, emergency trip, etc.)
- ▶ SOLE events reported to leadership weekly, monthly



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- ▶ Other Implementation Notes:
 - ▶ SOL mainly correspond to:
 - PSV set pressures
 - SIS thresholds
 - Other Trips, Emergency Shutdowns or Depressuring
 - High-high or low-low alarms with operator action
 - Lab results outside specified limits
 - ▶ Some SOL did not have DCS pre-alarms configured
 - ▶ A revalidation/reconciliation exercise is needed based on 2 years operation



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- ▶ **General Remarks:**
- ▶ Using the original criteria, with discretion of unit engineers, the SOL registers are generally larger than was anticipated:

Unit	SOL's
Crude	142
Resid. Hydrocracker	181
Gas Oil Hydrocracker	84
Light Ends	74
Utilities	164