

InterAct

The Importance of Platform Process Safety Audits – Data Collection and Documentation Needs

Casey Elwell, PE
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an **ACTEON** company



Why are Audits Important?

InterAct

- Verify that process safety systems are working as intended to manage risk and to keep everyone safe!
- Operators have opportunity for refresher discussions on process and safety system operations due to interaction with third-party audit/verification personnel.
- Standards, approaches, and processes are ever evolving, which audit could identify items for improvement.
- Operators, Engineers, Scientists, Trades, Contractors, or Regulators working with out-of-date information will result in the following:
 - More time/money expended to perform tasks with potential rework
 - Overlooked/misidentified process optimizations opportunities



API = American Petroleum Institute

MAWP = Maximum Allowable Working Pressure

MOC = Management of Change

PFD = Process Flow Diagram

PHA = Process Hazard Analysis

P&ID = Piping & Instrumentation Diagram

PSSR = Pre-Startup Safety Review

SAFE = Safety Analysis Function Evaluation

Identify Process Safety Items to be Audited (P&IDs/SAFE charts in example)

- Gather current and historical documentation from Operator to be audited
 - PFD, P&IDs, SAFE Charts, control philosophy, test records, and operating procedures
- Receive training from Operator for field safe access check of documentation
- Review PHA/PSSR information
- Perform Third-Party Independent Audit

Break Process Safety Item into smaller tasks (SAFE chart – single process)

- Pressure relief system, fire water system, production well, injection well, etc.
- Assemble drawings by system for field verification
- Check whether system modifications are planned and review MOC documentation

Trace each process system line

- Wellhead to departing pipeline
- Locate safety devices
- Verify process control components
- Verify maximum allowable working pressures (MAWP)



Update equipment and safety device function matrix

- All sensing devices
- Shutdown Valves (SDVs)
- Shutdown Devices
- Emergency Support Systems

Refer to API RP 14C – Recommended Practice for Analysis, Design, Installation and Testing of Basic Surface Safety Systems for Offshore Production Systems

Process Component Checklist

- Flow Lines (segment - portion of flow line with different assigned operating pressures than other portions of the same flow line)
- Wellhead Injection Lines
- Headers
- Pressure Vessels
- Atmospheric Vessels
- Fired and Exhaust Heated Components
- Pumps
- Compressors
- Pipelines (Lines between Platforms or Platform to/from Shore)
- Heat Exchangers

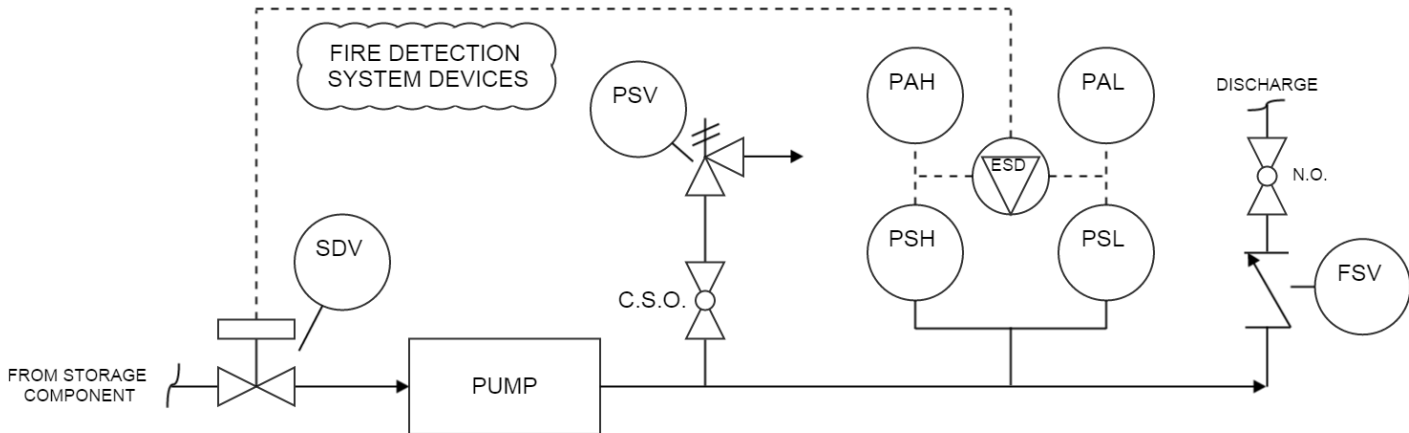
List of some undesirable events

- Overpressure or underpressure
- Leak (low flow) or Overflow
- Gas Blowby
- Excess Temperature
- Direct Ignition Source
- Excess fuel in Firing Chamber

Master Safety Analysis Table

- Undesirable Events
- Cause
- Effect
- Detectable Condition at Component
- Protection
 - Primary
 - Secondary

SAFE Chart Audit Example



Pipeline Pump Overpressure Example

➤ Cause

- Closed/Blocked Valve

➤ Effect

- Potential rupture or leak of process fluids

➤ Detectable Condition at Component

- High Pressure

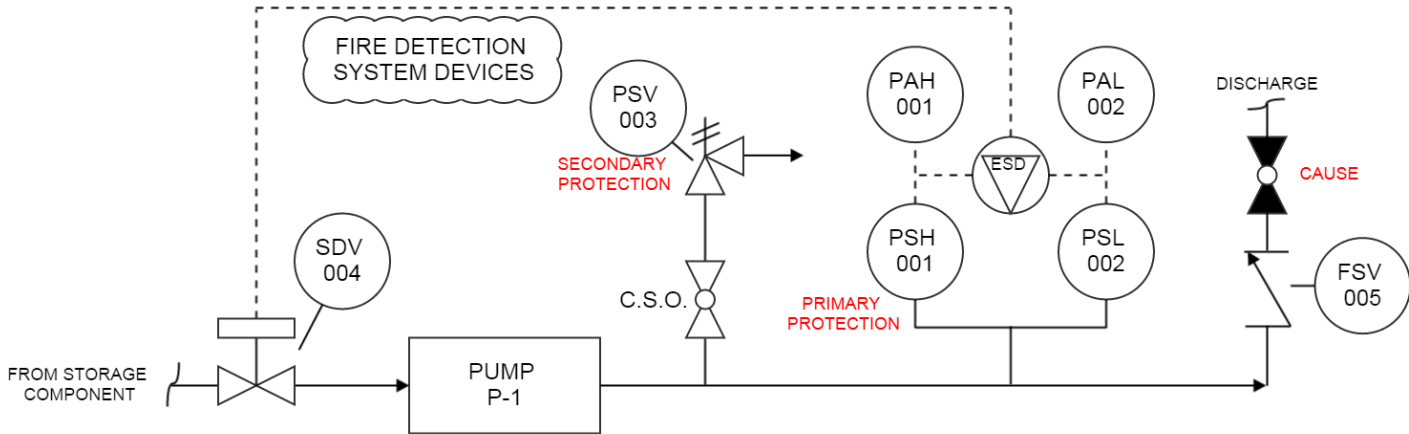
➤ Primary Protection

- Pressure Safety High (PSH) shutdown

➤ Secondary Protection

- Pressure Safety Valve (PSV) relieves system pressure

SAFE Chart Audit Example



Pump Component Checklist (pipeline pumps)

- Pressure Safety High (PSH)
 - Installed
- Pressure Safety Low (PSL)
 - Installed
 - Pump does not handle hydrocarbons.
- Pressure Safety Valve (PSV)
 - Installed
 - Pump is kinetic energy type and incapable of generating a head greater than the MAWP of the discharging pipe.
- Flow Safety Valve (FSV)
 - Installed

SAFE Chart (Pump Example)



EXAMPLE

SAFETY ANALYSIS FUNCTION EVALUATION CHART

Rev. 9/14

Drawing Number

Page 1 of x

Process Component				Device I.D.		Alternate Protection		SHUTDOWN OR CONTROL DEVICE ID	Function Performed					
Identification		Service		PSH	001	SAC REF. Number	Alternate Device if Applicable		MAIN ANNUNCIATOR PANEL (ALARM)	PRESSURE RELIEF	MINIMIZE BACKFLOW	CLOSE SDV INLET	SDV 004	STOP PUMP P-1
P	1	PIPELINE	PUMP					PSL						
				PSV	003				X			X		X
				FSV	005					X				

Safety Analysis Checklist (SAC)

- Lists process components
- List of all recommended safety devices
- List conditions under which particular safety devices may be excluded (SAC'd out)

Process Safety Audit – Lessons Learned

➤ Audit Execution

- Remind personnel that goal is to keep processes operating as intended, to manage risk, and to keep personnel safe on the platform.
- Avoid tracing piping when simultaneous operations are occurring at the facility.
- Overhead scaffolding and welding habitats can obscure the piping from the walkways, requiring much more time to check and verify the P&IDs/SAFE Charts.
- Communicate with Operation & Maintenance personnel regarding component/device controls during the field verification process to validate operating as intended, when possible.
- When available, device test records are valuable in checking that the correct device labels are present on the P&IDs, as well as checking the device functionality listed on the SAFE charts.
- Take temporary tags for devices/valves that are missing tags for later permanent tag installation.

Process Safety Audit – Lessons Learned (continued)

➤ Post Audit

- Recommend Management of Change (MOC) procedures include drawing revisions when equipment or control logic are changed.
- One goal is to improve communications between Engineering, Operations & Maintenance, and Health/Environmental/Safety (HES) personnel when process changes are made.
- Process Safety Audit provides feedback whether Process Hazard Analysis (PHA) → Pre-startup Safety Review (PSSR) with overarching MOC procedures are being effectively used for risk management.
- Process Safety Audit approaches vary and should migrate towards evaluation of the levels of documentation, implementation, and effectiveness for risk management.

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