The High Cost of Paper Relief and Flare System Documentation

*Paper in a paperless world*
“It should not be necessary for each generation to rediscover the principles of process safety which the generation before discovered. We must learn from the experience of others rather than learn the hard way. We must pass on to the next generation a record of what we have learned.”

- Jesse C. Ducommun
  Safety Pioneer

Quoted from the Report of the BP U.S. Refineries Independent Safety Review Panel
We are as fast as our slowest parts
Relief & Flare Design

Documentation

How much feed rate can we increase?
What if we push x% more feed?
Can our operations handle it?
What modifications do we need to make?
Can we handle more gas from the well as compared to oil for which our upstream facility was designed for?

Internal or External Audits
Atmospheric Tie-ins- Compliance, Environmental Maintenance, Turnaround cases
Ownership Changes

Relief Systems – The last line of defense
Are we safe to operate?
What do you need for Relief Studies

- Design Unit Basis
- Limiting Equipment Data
- Stream Properties
- Relief Device Information and Capacities

- System Definition & Equipment Info.
- Overpressure Contingencies & Relief Rates
- Formulas & Calculations
- Reports and Documentation
(ISO) International Standards Organization

Specifies general requirements for safety valves irrespective of the fluid for which they are designed.

(API) American Petroleum Institute

The only national trade association that represents all aspects of America's oil and natural gas industry. Has 600 members consisting of oil and gas producers, refiners, suppliers, pipeline operators, marine transporters, and service and supply companies that support all segments of the industry.

Corporate Standards

Each company has its own internal standards derived out of the history of their operation and goals of the organization. Salus works with our customers to provide them the flexibility to perform the work needed to operate with in these requirements.

Industry Best Practices

These associations and/or sources provide a more detailed instructions and/or case studies supplementing the API and/or ASME standards.
What is the end result?

Paper Reports or .PDFs

- Data can get scattered across different departments, systems, employee desks
- Different owners across the operating facility for different PSI
- Multiple PSI Systems
- Project based documentation
Communication gaps and inconsistent analysis between various contractors resulting in expensive reworks for operators.
Data Fragmentation

Equipment and Relief Device Data

Data can quickly become out of sync with each other and relies on strong communication between business segments.

Change “A”

Change “B”
There has been progress
Implementation of Technology

- Faster Simulations
- Faster Hand Calcs
- Digital Paper
- Digital File Cabinet

- Traditional work made faster
- Still Siloed
- Collaboration Limited
- Work is duplicated
- Deliverables still fragmented
The faster we get the more expensive the delay
The Impact...

Up to **80%**

Rework

*Seen for relief valves on a new facility design (specially if the EPC is not familiar with codes & standards).*

*Full or majority revalidation of relief systems*

- Decisions made with incomplete data
- Missed opportunities
  - Safely increase rates
  - Alternate modes of operation
  - Effective debottlenecking
- Installation of relief valves or equipment not needed
- Failure to understand the impact of a change.
- Corporate or Site standards not consistent.
Salus & Symmetry
Build an Ecosystem

Data consistency between Relief Systems and Flare models

Consistency between design and as-built revisions for flare and relief systems.

Provide flare data mining across multiple versions

Provide reporting capabilities using the results and inputs of flare runs.

Availability of working, approved, and as-built models in one place.
An Evergreen Solution

- Baseline pressure relief and flare analysis
- Concerns Identified as part of study
- Action Item Resolution, Concern Mitigation & Risk Ranking
- Initiate work-packages for field installation or Accepting in-place risk
- Detailed Engineering
- As-built relief and flare systems
- Management of Change
- Capital Projects

Concerns Identified as part of study
Affects of Change

Site Operations

Mechanical Changes

Relief and Flare Analysis

Mitigation Changes
Flare Connection
A evergreen ecosystem for relief and flare analysis

Cloud Architecture
Users will only need a browser

Salus PSV Analysis
Contingency Management
Relief Properties
Rate Dependent Calc., PSV Sizing Data

Add to
Updated Results
Revision System with new back pressure

Salus Flare Connector
Relief Device Properties
Flare load Information Contingencies

Monitor for Change
New Back Pressure
Results saved in Salus Added to data insights

VMG Steady State Flare
Create\Update Model
Create\Update Contingencies
Populate data from Salus Add extra data

Map to
Pull From
Results from Analysis & File saved for future runs

Symmetry Flare will be wrapped in Salus Cloud Architecture

Smith & Burgess
Process Safety Consulting
Data Insights
Search your data or analyze it for concerns

Findings Analysis
Search your data to identify issues with your relief systems.

• Undersized RD
• P-drop issues
• High Relief Temps
• Min Outlet Temp
• Rate Dependent

Data Mining
Browse, filter, and search your data for your business needs.

• Relief Devices
• Equipment
• Control Valves
• Systems
• Streams
• Contingencies

Relief Study Data

Read only
Get Answers Fast

- How many Consolidated PSVs do we have?
- How many of our PSVs are going to the atmosphere?
- Why are PSVs and Flare work so cool and fun to analyze?
- What is the operating pressure versus set pressure for this PSV?
1. Add more columns to your search results
2. Export any search to Excel to take advantage of Microsoft’s toolset or email results
3. Perform Advanced searches to quickly refine results.
4. We provide results in 15 seconds or less
1. Quickly analyze for a number of concerns using our industry standard queries.
Process Hazard Analysis

- Improved quality of Analysis
- Quick answers to questions
- Action Tracking Avoidance
1. PHA facilitator can prepare before the PHA by searching contingencies analyzed.
2. Select the Unit being analyzed.
3. Perform an advanced search for all closed outlets.
4. Review, print, and analyze before the PHA kicks off.
A Centralized Workspace
Hosted Environment

Data Center
Servers and data reside in data facilities comply with rigorous standards set by trade groups and certifying organizations.

Cloud

Customer Access
Users access Salus through their browser which allows them to use the application as though it was installed on their machine.

Unlimited Storage

Disaster Recovery

Continuous Deployment

Customer Machines
Centralized Data Management

- Operator has full control over the centralized data set.
- Consistency and standards are enforced across all parties.
- Data is available for everyone to view for their specified use cases.
- Operator owns and can update the models.

Consistency and real time data availability
Safety can be effective & affordable

Savings

60%

*See NIST_GCR_04-867 - Cost Analysis of Inadequate Interoperability in the U.S. Capital Facilities Industry

3-5% of the actual cost of the baseline revalidation vs revalidation every 5 years

Site savings varies from Upstream, Midstream, and downstream but is significant.

- Your data is always up to date and is available to all parties.
- Business and operations can make reliable decisions to manage change and increases at a facility.
- Impact of change identified quickly
- Standards are followed between contractors and operators
- Corporate wide data and analytics across sites can be measured
- Findings and risk rankings are better managed
What about data warehousing and digital twin initiatives?
A solution for data fragmentation

Corporate data is often stored in many locations which lends for double data entry and data fragmentation. An update to one does not always propagate through all the other business systems. This can lead to documentation and analysis that are missing information and can quickly become outdated.

Integration support for 3rd party software

Salus provides an working application programming interface (API) which allows for connectivity to any software that supports this kind of connection. Business systems such as SAP, Oracle, AVEVA, and other can all work with Salus to help make sure your data is updated as per your corporate workflows.
A Complete Ecosystem

- Promote cross business communication of change
- Affective view of data from any dashboard
- Automated transfer and notification of change
- Elimination of fragmented data
- Corporate wide view of information
- Consistent report generation
Its Question Time!

Jeremiah McAfoose - Smith and Burgess
7600 W. Tidwell Road, Suite 600  Houston, Texas 77040  1-713-802-2647
www.smithburgess.com