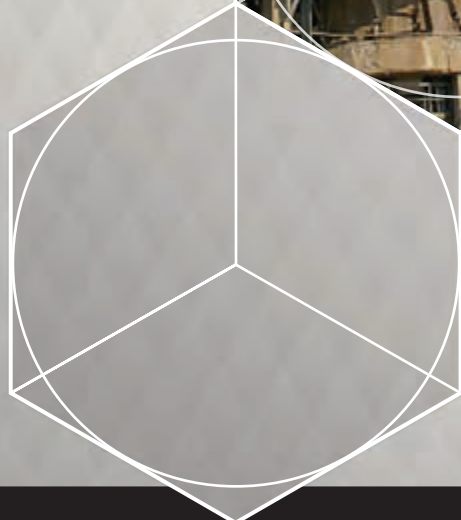
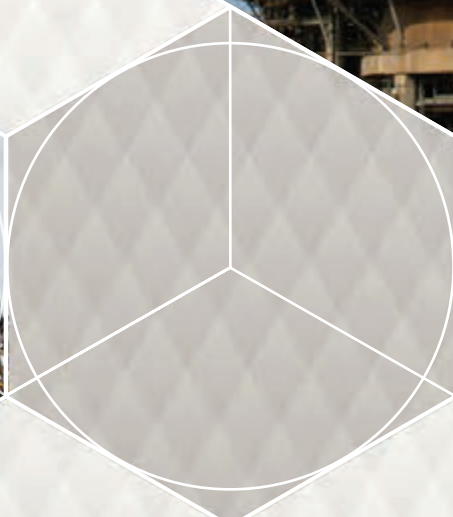




**A *PROCESS*  
SAFETY  
MANAGEMENT  
COMPANY**



**Provenance Consulting**  
*Powerful information management services and software  
for the oil, gas, and chemical industries*



## IPL LIFECYCLE SUPPORT



### IPL LIFECYCLE SUPPORT

From the moment in a PHA when credit is taken for a safeguard as an IPL, throughout the documentation effort and during the ongoing visual inspection and proof testing process, Provenance Consulting provides support for IPL-related tasks that are required throughout the IPL lifecycle. Our services are designed to ensure compliance with industry, corporate and facility requirements, ensuring that the work processes and project deliverables incorporated into our client's systems are reflective of industry best practices, corporate standards, and site procedures.

### OUR APPROACH

Provenance's success is due to our understanding of not only the IPL lifecycle, but of the contributing and dependent systems, processes, and decisions that influence each IPL. This comprehensive approach ensures that our processes are efficient, deliverables are robust, and the resulting management systems are effective and easily maintained.

### OUR SERVICES

Provenance provides the following services related to the documentation, design and maintenance of new and existing IPLs:

- Generate comprehensive IPL Listings from PHA/LOPA databases and other related data sources, pulling key information together into a single access point for facility personnel.
- Validate IPL-related process safety information (PSI) throughout other facility documentation, drawings and data systems such as operating procedures, DCS systems, P&IDs, and operating limit lists.
- Develop IPL lifecycle implementation strategies based on total facility and IPL risk profiles.
- Generate Safety Requirement Specifications (SRS) or other safety basis document, consolidating IPL functions and PSI into a single document that clearly explains the basis and function of the IPL.
- Calculate and document Process Safety Time (the time from initiation of cause to potential consequence) to ensure adequacy, and incorporate results into SRS documents.
- Perform SIL calculations to determine the Safety Integrity Level of the Safety Instrumented System (SIS).
- Schedule and perform field visual inspections of IPL components.  
Generate proof test procedures, specifying how and when to test the IPL to confirm successful operation in accordance with the SRS. Perform and/or facilitate proof tests.
- Ensure PHA action items are implemented in accordance with the IPL requirements prior to closure.
- Execute design projects related to IPLs, including both new IPL design and modification to existing IPLs.

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# Provenance Consulting

Provenance Consulting has relief system design experience in all aspects of the petrochemical industry. The relief systems documentation at any facility is critical to its continued safe operation, and Provenance approaches each evaluation with this importance in mind. Additionally, our implementation and documentation practices are executed with a focus on long-term utilization. We recognize that our deliverables will be used at all levels of an organization, and our appreciation of this fact guides our documentation and execution practices. Provenance ensures adherence to relief system industry codes, standards, and practices, as well as client specific guidelines.

Our **RELIEF SYSTEM SERVICES** include the following:

- Engineering Design
  - New and Existing Installations
  - Preliminary or Conceptual Design
  - Design Correction
  - Detailed Engineering Design
- Pressure Relief Analysis and Revalidation
  - Overpressure Identification, Rate Quantification, and Relief Device Adequacy
  - Ensure Client Documentation is Current and Compliant with OSHA PSM Standard
- Flare and Disposal System Evaluation
  - Disposal Header Hydraulics Evaluation
  - Global Overpressure Identification
- Process Simulation
  - Simple Unit Operation or Complex Process Units
- Onsite Engineering Support or Remote Execution
- Third-party Audits

### SOFTWARE EXPERTISE

Provenance has extensive experience in multiple commercial software applications including:

- Pressure Protection Manager™
- iPRSM®
- SuperChems™ and ioXpress™
- Client-specific Spreadsheet and Custom Database Applications

To further support the relief system design efforts, Provenance can perform equipment and unit modeling in the following software:

- Aspen Plus®
- HYSYS®
- Flare System Analyzer®
- Promax®
- VisualFlow

*Provenance does not have a vested interest in any particular relief system design or process modeling software program, allowing us to help clients select the most appropriate and cost effective tool for their relief system design needs.*

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# Provenance Consulting



Provenance Consulting has extensive experience with hazard identification, evaluation, and mitigation services. Understanding accurate application of risk tolerance criteria is critical for our clients to properly steward their resources. We recognize applying the most appropriate risk identification and evaluation techniques is critical to a successful study. Provenance has facilitated Process Hazard Analyses (PHAs) for many oil and gas processing technologies, as well as many specialized chemical processes unique to specific clients. The quality and comprehensiveness of each risk study drives many other aspects of your overall Process Safety Management (PSM) program – our facilitators perform every study with this in mind.

Since Provenance's inception, our team of dedicated facilitators has completed hundreds of PHAs, Layers of Protection Analysis (LOPA), and other hazard evaluation studies. From nearly every sector, Provenance has worked with some of the largest companies in the petrochemical industry. Additionally, we are well-versed in how to apply PHAs to the life-cycle stage of a plant – including design, startup, projects, initial unit PHAs, unit revalidations, and decommissioning studies.

## PHA TECHNIQUES

- Hazard and Operability Studies (HAZOP)
- Layers of Protection Analysis (LOPA)
- Failure Mode and Effects Analysis (FMEA)
- What-If Studies
- Project PHAs

## SERVICES PERFORMED

- Preparatory Services
- Facilitation and Scribing
- Reporting
- Training
- Revalidation Services
- Action Item Resolution
- QA/QC Services

## SOFTWARE EXPERTISE

Provenance has extensive experience in multiple commercial software applications including:

- PHA-Pro®
- PHAWorks®
- PHA Leader™
- Client-specific Spreadsheet and Custom Database Applications

*Provenance does not have a vested interest in any particular PHA software program, allowing us to help clients select the most appropriate and cost effective tool for their study.*

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# Provenance Consulting





Provenance Consulting supports all aspects of implementing and executing a fixed equipment Mechanical Integrity (MI) and Inspection program. Our philosophy and approach ensure that our program implementations are comprehensive, accurate, and of the highest quality. Our emphasis is on long-term projects and client partnerships, rather than short-term (turnaround-type) staffing.

A complete MI program should account for the entire equipment lifecycle, and each stage of the equipment lifecycle requires specific activities that should be performed from a MI perspective. This ensures the safe operation and reliability of the equipment.

Our **MI/INSPECTION SERVICES** for fixed equipment and piping include:

- Pre-Operation
  - Equipment Design Validation
  - Vendor Shop Audits and Quality Assurance Inspection during Fabrication
  - Field Inspection to Confirm Proper Installation and Document Initial (Baseline) Equipment Condition
- Operation
  - Inspection Software Implementation and Maintenance, using a Life-based or Risk-based (RBI) Approach
  - Piping Isometric and Equipment Inspection Drawing Generation and Maintenance
  - Inspection Planning and Analysis
  - Internal/External API Inspections and Nondestructive Examination (NDE)
  - Analysis of Inspection Findings (including Fitness for Service Evaluations per API 579), Corrective Action Identification and Modification of Inspection Plans
- Modification/Decommission
  - Leverage Inspection History to Predict Retirement Dates and Confirm Suitability for Service
  - Generate Repair Plans to Correct Equipment Deficiencies
  - Generate or Validate Alteration and Rerate Plans and Associated Design Calculations

Additionally, Provenance has a great deal of experience in generating policies, procedures, and work processes related to MI and Inspection, as well as defining and reporting Key Performance Indicators (KPIs) and metrics. We have performed program assessments and gap analyses of existing MI programs, and recommended and implemented improvements where identified.

Provenance has implemented and maintained MI/Inspection programs for a large number of upstream, midstream, and downstream facilities, along with chemical and petrochemical plants.

*Provenance does not have a vested interest in any particular IDMS or RBI software program, allowing us to help clients select the most appropriate and cost effective tool for inspection program management.*

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## Provenance Consulting

Provenance Consulting has developed several software applications specifically for the oil, gas, and chemical industries. Currently, several major oil and gas companies use these programs to track and verify information that impacts their operations, the safety of their employees, and their profitability. We provide value through custom architected solutions, or by improving the utilization of your existing applications, helping you meet Process Safety Management (PSM) objectives.

## ARTS™ – ASSET AND RECORDS TRACEABILITY SYSTEM



ARTS represents a breakthrough in information management by providing user-friendly, customizable, and comprehensive access to correct, clean, and consistent data across multiple data sources. The ARTS system aggregates data from multiple departments into a single user interface for quick review and evaluation. Using this aggregated data, ARTS is designed to:

- Store Engineering Data, Documents, and Photos for Any Equipment Type
- Identify Data Discrepancies
- Verify the Correct Value from the Right Records
- Facilitate Data Correction
  - Changes are Made Once, Correctly, Across All Systems
  - Eliminate Duplication of Efforts and Reduce Labor Costs
  - Reduce Resource Requirements for Process Safety Information (PSI)
- Monitor Future Changes

With all engineering data available, traceable, and verifiable, ARTS has been recognized as a PSM program strength during Process Safety compliance audits.

## CERTS – CERTIFICATION AND EMPLOYEE REFRESHER TRAINING SYSTEM

Provenance's CERTS application provides a mechanism to track and document activity, satisfying the OSHA PSM Operator Refresher training requirement. This allows the employee to "take credit" for routine, everyday activities, which result in a review of standard operating procedures. These types of activities include: review and signoff on Management of Change (MOC) related to a procedure, update and rewrite procedures, train exercise (scenario drill) participation, and self-study and procedure review. By tracking and documenting the employee's participation in these types of activities, CERTS can demonstrate that actions were taken to comply with the OSHA requirement.

## CUSTOM SOFTWARE & UTILITY DEVELOPMENT

Provenance maintains a broad level of expertise in the implementation and framework of third-party applications commonly used throughout the oil, gas, and chemical industries. Additionally, Provenance has significant experience in developing custom desktop, server, and web-based applications, as well as custom utilities, scripts, and macros to solve specific real-world problems that our clients have faced. We place a high level of importance and focus on leveraging automation to provide solutions to such problems.

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# PROCESS SAFETY INFORMATION (PSI) & OTHER SERVICES



## PSI AND CAD SERVICES

Provenance Consulting recognizes that correct and manageable Process Safety Information (PSI) is at the foundation of any successful petrochemical process or system. Too frequently, systems and processes are implemented without adequate review and updating of the data and documents that feed these systems and processes. Additionally, ongoing safety, hazard, and operability reviews of each facility are dependent on the accuracy of the information utilized during the evaluation.

In order to comply with all required regulatory, legal, and internal standards, PSI must consist of information pertaining to the equipment in the process. Provenance has proven methods to verify that this information is accurate and consistent and is capable of creating and updating PSI as necessary to maintain accuracy. Our services include:

- PSI Audits and Reviews
- Validation of Existing PSI (P&IDs, PFDs, Plot Plans, Instrument Loops, etc.)
- Generation of PSI
- Data Consistency Checks
- Data Discrepancy Mitigation
- Equipment File Reconciliation and Consolidation
- CAD & Drawing Services
  - Drawing Updates and Generation (P&ID, PFD, Plot Plan, Isometrics, Instrument Diagrams, etc.)
  - Custom Menu Development
  - Custom Scripts and Routine Development
  - CAD Standards Development and Implementation, including “Intelligent” Drawings
  - Data Extraction, Import, and Management
  - CAD Training

## OTHER PROCESS SAFETY MANAGEMENT (PSM) SERVICES

Even though the PSM Standard was enacted in the early 90's, facilities continue to struggle with compliance. Provenance offers various services to ensure facilities are compliant, such as:

- PSM Training
- Incident Investigation System Implementation
- Emergency Planning and Response
- MOC Program Development and Management
- Compliance Audits
- Facility Siting
- PSSRs
- Procedure Development

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