Advanced API 580 and API 581 Risk-Based Inspection Training Course

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Overview

Advanced API 580 and API 581 Risk-Based Inspection is a one-week course for inspection, integrity, reliability, corrosion, maintenance, asset ownership, and risk professionals, who leave with a Risk-Based Inspection Program and Inspection Plan. The course connects RBI program governance, equipment data quality, probability of failure, consequence of failure, risk ranking, inspection effectiveness, interval planning, mitigation, and review controls for pressure equipment. Agile Leaders Training Center presents risk-based inspection planning using API and ASME methods.

Who Should Attend

- Teams responsible for pressure-equipment inspection scope, method selection, and evidence
- Functions accountable for mechanical integrity, degradation control, and asset risk
- Reliability teams responsible for failure analysis, maintenance priorities, and availability
- Corrosion functions responsible for damage mechanisms, rates, and monitoring strategies
- Asset owners responsible for risk acceptance, resources, and management approval
- Risk analysts responsible for probability, consequence, uncertainty, and decision records

The course assumes participants already work with equipment records, inspection findings, degradation information, or risk decisions and leaves out introductory inspection terminology and certification-exam preparation.

Departments and Industries

The course supports inspection and asset-integrity work across:

- Oil, gas, refining, and petrochemical operations
- Chemical processing and industrial manufacturing facilities
- Power generation and utility asset-management departments
- Inspection, corrosion, reliability, and maintenance functions
- Engineering assurance, process safety, and enterprise risk teams

Learning Objectives

By the end of this course, participants will be able to:

- Apply API 580 principles to RBI governance and team responsibilities
- Analyze equipment data, damage mechanisms, and inspection history
- Use API 581 methods to structure probability and consequence inputs
- Evaluate risk rankings and inspection-method effectiveness
- Prioritize inspection intervals, mitigation actions, and review triggers
- Build an ASME PCC-3-aligned inspection plan and decision file

Course Agenda

Day 1: RBI Framework and Data

- API 580 RBI Purpose, Scope, and Limits Map
- RBI Team Roles and Responsibility Matrix
- Equipment Boundary and Screening Register
- RBI Data Quality and Validation Checklist
- Damage Mechanism Review Record

Day 2: Probability and Consequence Analysis

- API 581 Probability of Failure Workflow
- Damage Factor and Inspection History Worksheet
- Consequence of Failure Scenario Map
- Safety, Environmental, and Business Impact Matrix
- Uncertainty and Assumption Register

Day 3: Risk and Inspection Effectiveness

- Risk Matrix and Risk Ranking Method
- Inspection Method Effectiveness Comparator
- Inspection Coverage and Confidence Assessment
- Risk Target and Acceptance Decision Record
- Sensitivity and Risk Driver Analysis

Day 4: Inspection Planning and Governance

- ASME PCC-3 Inspection Planning Framework
- Next-Inspection Date and Interval Decision Worksheet
- Risk Mitigation and Inspection Strategy Matrix
- RBI Recommendation Tracking and Closure Register
- Program Review, Revalidation, and Management Approval Gate

Day 5: Applied RBI Practice

- Exercise: Equipment and Damage Data Validation
- Exercise: Probability and Consequence Input Analysis
- Exercise: Risk Ranking and Inspection Effectiveness Test
- Exercise: Risk-Based Inspection Plan Construction
- Capstone Exercise: Risk-Based Inspection Program and Inspection Plan

Practical Exercises

The course uses suggested activities to connect inspection evidence with risk decisions and planning controls:

- Suggested activity: validate pressure-vessel and piping records against damage-mechanism assumptions
- Suggested activity: structure probability and consequence inputs for a process-equipment scenario
- Suggested activity: compare inspection methods against degradation type, coverage, and confidence
- Suggested activity: assemble risk rankings, intervals, mitigation actions, and approvals into an inspection plan

FAQs

Who does advanced API 580 and API 581 risk-based inspection suit, and what does it assume?

It suits professionals who manage inspection, integrity, corrosion, reliability, maintenance, asset risk, or approval decisions and assumes working familiarity with equipment records, inspection findings, and degradation information.

How does API 580 and API 581 risk-based inspection differ from introductory inspection training?

Risk-based inspection integrates governance, probability, consequence, risk ranking, inspection effectiveness, and interval decisions, while introductory inspection training concentrates on basic terminology, techniques, and equipment examination.

How do API 580 and API 581 work together in risk-based inspection?

API 580 provides RBI program principles and elements, while API 581 supplies quantitative methods for structuring probability of failure, consequence of failure, and risk calculations.

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What role does ASME PCC-3 play in risk-based inspection planning?

ASME PCC-3 supports inspection planning for fixed pressure-containing equipment through risk-based methods ranging from qualitative to quantitative approaches and assessment of inspection programs and plans.

How does inspection effectiveness affect an RBI decision?

Inspection effectiveness changes confidence in detecting and characterizing relevant damage, which influences the selected method, coverage, timing, residual uncertainty, and risk-reduction decision.

Conclusion

Participants take back a Risk-Based Inspection Program and Inspection Plan containing governance roles, validated equipment data, damage-mechanism records, probability and consequence inputs, risk rankings, inspection strategies, intervals, mitigation actions, and review controls. The work product changes disconnected inspection records into a traceable risk decision system. It supports repeatable revalidation, escalation, closure tracking, and management approval.

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