# An Overview: Prevention of Brittle Fractures Due to Autorefrigeration Hazards for Chemical Plants and Oil Refineries

## Autorefrigeration Challenge

- Autorefrigeration events can damage equipment and cause sudden, unexpected large leaks of gases and volatile liquids. This could result in:
  - Lost Production
  - Personal Hazards
  - Fire and Explosions
- Realistic definition of vulnerabilities and practical solutions are needed to determine:
  - Where changes are needed
  - Most cost-effective remedies - options
  - Rational bases for planning and budgeting
- Important elements of the root cause of many damaging events are caused by "human factors"
- Large gains in system safety and productivity are possible by:
  - Upgrading operating and emergency procedures
  - Related training and qualification of personnel

## General Approach

- A top-down approach is applicable to selected units
  - Efficient and cost-effective
  - Independent evaluation (APTECH)
  - Peer review cooperative with in-house specialists
- APTECH's approach is to quantify relative priorities to establish risk exposure using:
  - Simple screening for most equipment
  - More detailed analysis where high impacts are possible to safety or production

## Life Management Approach

- OSHA rule 1910 calls for the application of best engineering practices for safety-related issues
- Direct use of latest codes and standards can require wholesale redesign and replacement of equipment
- Life cycle management using modern condition-based assessments is a very cost-effective alternative
- Life cycle management provides solid rational basis for optimum corporate assets management and assets protection



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## APTECH Experience with Brittle Fracture

- Autorefrigeration hazard seminars
- Autorefrigeration transient evaluation
- Fracture control and life cycle management
- Component code compliance
- Litigation support involving brittle fracture problems

## Project Focus and Objectives

- Assure integrity of pressure-containing systems
- Establish corporate policy and approach
- Develop procedural guidance and criteria
  - Process hazard review (PHR) teams and plant assessment
  - Criteria for identifying susceptible components
  - Assessment and corrective protocols after an event or "near miss" occurs

## Benefits of APTECH Approach

- Participation in PHR process will identify upgrade in practices with regard to treatment of component integrity
- Provide management level data to assess risk and quantify cost using analytical tools versus equipment modification or replacement
- Address often overlooked "human factors" issues in the decision process and potential improvements
  - Provides gains in safety comparable to hardware and control
  - At lower costs quicker

## Why APTECH?

- Immediate benefits by reducing or eliminating hazard
- Experience and skills
  - Reliability analysis
  - Risk analysis
  - Accident Analysis
- Nearly 4,000 projects completed for over 400 clients throughout the US and abroad
- Commitment and attention to detail

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