Five (5) training courses are available. This training curriculum is designed to enable trainees to become proficient in all aspects of pressure relief safety management.

**BASIC TRAINING**

This curriculum is designed to enable trainees to become proficient in basic pressure relief system audit for overpressure protection using iPRSM® software. It is not intended as refresher course or introduction to overpressure protection concepts, applicable codes/standards, or hardware types and terminology.* It does not address advanced topics such as Two-Phase Flow & Distillation; Discharge Zones & Headers; or Low Pressure Tanks.

Courses presented online or in-person. Sessions include instruction and time to cover breaks, additional topics, Q&A with class or individual student help on sample problems. Online format presented in four (4) sessions over four (4) consecutive days. In-person format presented in three (3) consecutive days with 2 full days and 1 half day session. Basic training includes the following sessions at a minimum and is not eligible for customization or truncation of schedule.

- RV 201  Mechanics of iPRSM®  10 Hours
- RV 301  Relief Contingencies  10 Hours

**RV 201 Mechanics of iPRSM®**

iPRSM® Function and Use

- **Module 1: Overview of iPRSM®**
  - **Lesson 1: Introduction to iPRSM®**
    - About iPRSM®
      - iPRSM® User Interface Structure
      - iPRSM® Structure Map
  - **Lesson 2: How to Use iPRSM®**
    - Product Demonstration
      - iPRSM® Requirements
      - Security
      - Page Components
      - Page Types
      - Using the Database
      - User Interface Tips
      - Common Commands and Controls
      - Multi-tasking
      - Navigation
Module 2: Designing a Protected System with iPRSM®

- **Lesson 1: Equipment**
  - About equipment types
    - Relief Equipment
    - Protected Equipment
    - Overpressure sources
    - Ancillary Equipment
    - Managing Equipment

- **Lesson 2: Protected Systems**
  - About Protected Systems
    - Protected Systems View
    - Stream Flashes
    - Contingency Scenarios
    - Piping Losses

- **Lesson 2: Protected Systems (continued)**
  - Demonstration: Protected Systems
    - Creating a Protected System
    - Linking Pieces of Equipment to the System
    - Adding Streams and Flashes
    - Adding Contingency Scenarios
    - Calculating Piping Losses
    - Adding Distillation Columns

- **Lesson 3: Additional Related Functions**
  - About Additional Related Functions
    - Working with Documents
    - Managing Revisions
    - Cloning

- **Lesson 4: Checking and Signing Off**
  - About Checking Systems
    - Demonstration: Checking and Signing Off
      - Checking and Signing off the Protected System
      - Checking Equipment within the unit
      - Checking and Signing off the Unit
      - Checking and Signing off the Plant
      - Logging Out
Module 3: Sample Calculations
  Lesson 1: Complete Sample Systems
    Complete Example System Review
      Example System Data will be loaded into iPRSM® and participants are to work through sample problems.

RV 301 Relief Contingencies
How to determine relief rates/contingencies
Stream flashes and phases defining what to use when
With samples to walk through

Contingency Analysis (Overpressure Sources)
- Understanding and identifying Relief Systems based on Piping & Instrument Drawings (P&ID's)
- Safety System components and overpressure sources
- Understanding Relief Contingency Analysis
  - Blocked Outlet
  - Abnormal heat Input
  - Exchanger Tube Rupture
  - Automatic Control Failure
  - Reflux Failure
  - Fire
  - Cooling Failure
  - Power Failure
  - Instrument Air Failure
  - Inadvertent Valve Opening
  - Mechanical equipment Failure
  - Series Fractionation
  - Thermal
  - Loss of Quench
  - Chemical Reaction
  - Steam Out
ADVANCED TRAINING

These courses expose trainees to more advanced iPRSM® features after basic relief system audits have been mastered. Advanced modules are not intended as refresher courses or introduction to overpressure protection concepts, applicable codes/standards, or hardware types and terminology.* It is assumed students have either a) completed iPRSM® Basic Training** class, or b) demonstrated proficiency in basic relief system evaluations using iPRSM® software.

Courses presented online or in-person. Sessions include instruction and time to cover breaks, additional topics, Q&A with class or individual student help on sample problems.

- RV 401 Distillation and Two-Phase Flow 8 Hours
- RV 501 Discharge Evaluation Zones & Headers 8 Hours
- RV 601 Low Pressure Tanks 8 Hours

RV 401 Distillation and Two-Phase Flow
Distillation, oil assay, 2 Phase Flow, how to determine required relief rates (complex) with instructor-led sample problems

- **Module 1: Distillation Calculations.**
  - DIERS Presentation (Separate Outline)

- **Module 2: Oil Boiling Point Curves**
  - Review D86 Test Rig
  - Show example entering data and discuss issues as you go.
  - Comparison of VMG to Hysys and PROII

- **Module 3: Direct Integration and Two-Phase Flow Model**
  - Numerical integration of the isentropic nozzle equation
  - Determination of the theoretical mass flux
  - Run through example
  - Discharge coefficient and backpressure correction factors.
RV 501 Discharge Evaluation Zones & Headers
Using iPRSM® to manage discharge evaluation (D.E.) zones & headers
How to link relief systems and add headers
Adjusting and evaluating header scenarios

➢ Module 1: Discharge Evaluation Zones & Headers

  o Lesson 1: Discharge Evaluation (D.E.) Zones
    ▪ About D.E. Zones
      • Scenarios
      • Common D.E. Zones
    ▪ Working with D.E. zones
      • Adding D.E. zones
      • Linking system scenarios to D.E. zones

  o Lesson 2: Headers
    ▪ About Headers
      • Piping & fittings configuration supported by iPRSM®
      • Header feeds supported by iPRSM®
      • Output configurations supported by iPRSM®
    ▪ Working with Headers
      • Adding headers
      • Working with header scenarios
      • Header drawings
RV 601 Low Pressure Tanks
Using iPRSM® to determine venting capacity for low-pressure/tank vents
Evaluate the required inbreathing and out-breathing overpressure events for atmospheric and low-pressure storage tanks

➢ Module 1: Evaluating a Protected System

  o Lesson 1: Equipment
    ▪ About equipment types
      • Tank Vent Equipment
      • LP Other Equipment
      • Tank Equipment

  o Lesson 2: Contingency Scenario Events
    ▪ Tank Inbreathing (Vacuum)
      • Pump Out
      • Tank Draining
      • Steam Out
    ▪ Tank Out-breathing (Pressure)
      • Pump In
      • Fire
      • Pressure Transfer Blowthrough
      • Control Valve Failure

*Recommended pre-requisites to iPRSM® Basic Training can include:
1. RV101 – Fundamentals of Pressure Protection Hardware (by FES)
2. Relief System Design & Documentation Class (by FES)
3. Experience Sizing/Selection Relief Devices (2-3 years)
4. Experience with Safety Relief System Design/Audit (3-5 years)

**Recommended pre-requisites to iPRSM® Advanced Training can include:
1. iPRSM® Basic Training (by FES)
2. Experience Sizing/Selection Relief Devices in iPRSM® (1-2 years)