Five (5) training modules 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 Distillation Columns; 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. Basic training includes the following modules *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

Modules above are presented in parallel during instructor-led example problems. The outline below lists learning objectives/topics; however, the content is delivered concurrently and not necessarily in linear order listed below.

RV 201 Mechanics of iPRSM®
iPRSM® Function and Use

- **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

- **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 3: 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 4: Additional Related Functions**
    - About Additional Related Functions
      - Working with Documents
      - Managing Revisions
      - Cloning
  - **Lesson 5: 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
- **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 (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

- **Direct Integration and Two-Phase Flow Model**

  - Numerical integration of the isentropic nozzle equation
  - Determination of the theoritical mass flux
  - Run through example
  - Discharge coefficient and backpressure correction factors.

*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)

ADVANCED TRAINING

These modules 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 Columns 8 Hours
- RV 501 Headers 8 Hours
- RV 601 Low Pressure Tanks 4 Hours

RV 401 Distillation Columns
Distillation Columns and how to determine required relief rates (complex) with instructor-led sample problems

- **Distillation Calculations**
  - Unbalanced vaporization model to calculate relief loads
- **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 501 Headers
Using iPRSM® to evaluate collection & header systems
How to link relief systems and add headers
Adjusting and evaluating header scenarios

- **Discharge Evaluation Zones & Headers**
  - **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
  - **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
- **Sample Calculations**
  - **Lesson 1: Complete Sample Systems**
    - Complete Example Header Review
      - Example System Data will be loaded into iPRSM® and participants are to work through sample problems.

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

- **Evaluating a Protected System**
  - **Lesson 1: Equipment**
    - About equipment types
      - Tank Vent Equipment
      - LP Other Equipment
      - Tank Equipment
  - **Lesson 2: Contengency Scenario Events**
    - Tank Inbreathing (Vacuum)
      - Pump Out
      - Tank Draining
      - Steam Out
    - Tank Out-breathing (Pressure)
      - Pump In
      - Fire
      - Pressure Transfer Blowthrough
      - Control Valve Failure

- **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.

**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)