Title: Design and Maintenance of Aboveground Atmospheric Storage Tanks

Potential PDH: 24 **Code:** BTT021

Description:

Upon completion of this course, participants will have gained an understanding of the design and maintenance requirements of aboveground atmospheric storage tanks in accordance with API-650 and API-653 respectively. This course discusses the design and maintenance requirements of aboveground atmospheric storage tanks.

Outline:

Part I - API-650

- Storage Tank Types and Features
  - o Tank Types and Functions
  - o Primary Components
  - o Appurtenances
  - o Design Specifications
- Material Selection
  - o Material Property Considerations
  - o Acceptable Material Specification
- Mechanical Design Requirements
  - o Mechanical Design Parameters
  - o Shell Thickness Determination
  - o Wind Girder Requirements
  - o Nozzle Design Details
  - o Roof Requirements
  - o Bottom Requirements
  - o Designing Tanks for Small Internal Pressures
  - o Optional Design Basis for Small Tanks
  - o Elevated Temperature Storage Tanks
  - o Austenitic Stainless Steel Storage Tanks
- Fabrication Details
  - o Types of Welded Joints
  - o Welding Methodology
  - o Weld Detail Requirements
- Inspection and Testing Requirements
  - o Types of Weld Defects
  - o Inspection Methods
  - o Inspection Requirements
  - o Dimensional/Tolerances
  - o Testing
- Vents and Fire Protection Systems
  - o Vents for Fixed Roof Tanks
  - o Vents for Floating Roof Tanks
  - o Fire Protection Systems
- Supplementary Information

- o API Recommended Practice 651
- o API Recommended Practice 652

Part II - API-653

- • Introduction
  - o Scope of API-653
  - o Definitions
  - o Starting an API-653 Compliance Program
  - o Cost of an API-653 Compliance Program
- • Tank Inspection
  - o Objectives
  - o Prioritization
  - o Inspection Frequencies
  - o Record Keeping
  - o Inspector Qualification
- • Tank Component Evaluation
  - o Shell
  - o Bottom
  - o Nozzles
  - o Roof
  - o Foundation
  - o Shell and Bottom Settlement
- • Leak Detection Methods
- • Tank Repair and Alteration
  - o General Considerations
  - o Material Considerations
  - o General Requirements for Repair and Alteration
  - o Removal, Repair, and Replacement of Shell Plate Material
  - o Repair, Addition, Replacement, and Alteration of Shell Penetrations
  - o Repair of Tank Bottoms
  - o Tank Roof Repair
- • Dismantling and Reconstruction
  - o Dismantling Methods
  - o Reconstruction
  - o Dimensional Tolerances
- • Examination and Testing
  - o General
  - o Welding Inspection
  - o Hydrostatic Testing

Instructor:

Nadarajah ("Ranjan") Chithranjan, Ph.D, PE, career has spanned over 18 years of worldwide involvement in petrochemical industries for ExxonMobil Research and Engineering. Prior to joining Becht Engineering, he worked as a fixed equipment specialist at ExxonMobil Research and Engineering and he has worked in more than a dozen countries worldwide to solve complex mechanical plant problems as well as mechanical support for large scale projects. He has extensive knowledge in pressure vessels, piping, and storage tanks, design and maintenance codes. At ExxonMobil, he was the lead fitness for service specialist and he is very well versed with the fitness for service codes as well as

linear and non-linear finite element methods to solve complicated plant problems. Ranjan was also the Mechanical Delayed Coker and Storage Tank subject matter expert at ExxonMobil Research and Engineering. He was a former member of API-650 Welded Steel Tank for Oil Storage and presently he is a member of the ASME Working Group on Section VIII, Division II, Design by Analysis and Working Group on Section VIII, Division II, High temperature design. He has more than twenty publications and two patents. Dr. Nadarajah received his PhD and Bachelors in Mechanical Engineering from the University of Strathclyde, Glasgow, United Kingdom.