COMPETENCE DEVELOPMENT & TRAINING IN PROCESS SAFETY – 2018

DEKRA Process Safety

DEKRA

Content

Chilworth, now DEKRA Process Safety International
Expertise in Industrial Process Safety

Since our founding, Chilworth Technology, now DEKRA Process Safety has always considered part of its mission to share its process safety expertise, knowledge of best practices, and industry experience through quality training. Currently the DEKRA Process Safety Academy provides one of the most comprehensive series of process safety courses in the world. As an IACET Authorized Provider, Chilworth Technology, Inc. offers CEUs for its programs that qualify under IACET guidelines.

DEKRA Process Safety Academy courses cover key aspects of process safety, including: Combustible Dust, Electrostatics, Process Safety Management (PSM), Process Hazard Analysis (PHA), Safety Instrumented Systems (SIS) and Safety Integrity Level (SIL), PSM, ATEX/DSEAR Compliance, Consequence Modeling, Chemical Reactivity, Emergency Relief Systems and much more.
From multiple global offices located in North and South America, Europe and Asia, DEKRA Process Safety Academy courses are delivered through a variety of methods and formats including:

- Multiple languages (e.g., English, German, Spanish, French, Italian, Chinese, Japanese, Portuguese, Hindi)
- Private, in-company training (at the client's chosen location)
- Public, open-enrollment (scheduled courses in various locations globally)
- Multimedia (instructor-led webinars, e-learning and computer-based delivery)

The ultimate objective of a technical training course is to provide understanding through the effective transfer of knowledge. DEKRA has designed its courses to achieve this objective through the use of multiple media and delivery methods, including:

- Instructor-led content presentation (using PowerPoint slides)
- Open question-and-discussion forum
- Instructor-led demonstrations
- Trainee participation through case studies and role-playing exercises
- Quizzes
- Course Evaluation Feedback forms
- Certificates of completion

This design helps ensure a diverse, engaging and effective learning experience through the use of auditory, visual and tactile based instruction.

To verify understanding of the subject material and to apply for eligible CEU's, Chilworth Technology administers a short course quiz with review at the end of each course, and a certificate is awarded to participants for each completed course.

We are also developing a diploma-based training curriculum for Process Safety Specialists comprised of three modules:

1. Core process safety competencies (explosions, chemical reactions, thermal instability, static electricity, etc.)
2. Process Hazard Analysis (including HAZOP, What-if and other PHA methodologies) and PHA leadership
3. Advanced process safety (vent sizing, safety instrumented systems, etc.)

30 Years of Open Course & In-company Training, With New Additions in E-learning and Webinars

While open training events can provide a good platform for training small numbers of staff, or introducing topics to specific individuals, corporate competency programs benefit greatly from in-company delivery.

Open-training

Traditional classroom education is the starting point for genuine competence.

We offer over 100 open training courses delivered through our local centers of excellence across the globe (Europe, America, Asia and the Middle East) in a wide variety of languages. You can discover all our training sessions in our Global training calendar available on our website.

The course portfolio we have built up to over 30 years is interactive, including practical case studies, examples from industry with workshops and live demonstrations where possible.

Our 2018 venue:
Hotel Reservations must be made directly with each hotel.
The cost of accommodations is NOT included in the course fee. Hotel parking fees may apply. We strongly recommend making reservations as early as possible.

A list of hotels in the area can be provided for overnight stays.

In-company

We work with you to develop a suite of courses tailored to YOUR process safety proficiency program, YOUR industry, and YOUR needs.

DEKRA has partnered with many clients to raise process safety awareness across teams, sites and entire corporations.

Before developing a program, we assess knowledge gaps and establish clear targets and skills to be developed which are most relevant to day-to-day activities in specific roles.

We have a range of core competencies and specialist process safety courses which can be adapted to suit the specific requirements of your organization. Our in-company sessions can be conducted at your premises, anywhere in the world, which is particularly useful if you have a large number of delegates in need of training or need to tailor a course to a specific process/industry. Sessions will be held at a time convenient to you, and can work out to be a more cost-effective option as delegate travel and accommodation expenses are not required.

OUR TRAINING LOCATIONS

Princeton, NJ

DEKRA Process Safety
113 Campus Drive
Princeton, NJ 08540

Midland, MI

Holiday Inn of Midland, Michigan
810 Cinema Drive
Midland, MI 48642

Las Vegas, NV

Tropicana Las Vegas
3801 Las Vegas Boulevard South
Las Vegas, NV 89109

NFPA 652 – Standard on Fundamentals of Combustible Dust – Understanding the Requirements (1-Day)

DATE: March 27, 2018 - Princeton, NJ
DATE: June 21, 2018 - Midland, MI
TIME: 9:00-5:00 pm Eastern Time
COST: $595.00
CEUS: 0.6

Course Design and Objectives

The NFPA 652 will be coming into effect very shortly with certain mandatory requirements for the management of the fire, flash fire, and explosion hazards posed by combustible dusts. Although this standard provides some flexibility in approaches for ensuring the safety of the occupants, facility, processes, and equipment, some of the requirements must be complied with retroactively.

With over 25 years of experience in conducting thousands of dust hazard assessment and control studies for our clients around the world, we have designed this one-day workshop to help you better understand the applicability of this standard and make the compliance with its requirements manageable and practical.

You Will Learn

- Determine if a dust flash fire or explosion hazard exists within your facility;
- Compliance requirements of NFPA 652;
- Identify the gaps in the dust hazard management systems
- Identify gaps in your facility's dust fire and explosion prevention and protection requirements;
- How to investigate the validity of any laboratory data that you might already have to support the NFPA 652 compliance requirements;
- Identify any gaps that might exist in the required laboratory data;
- Identify the dust sample(s) that need to be tested and the necessary laboratory tests;
- Conduct a Dust Hazard Analysis (DHA);
- Identify practical measures for not only ensuring compliance but going beyond compliance.

Who Should Participate

Personnel involved with plant operations including management, engineering, maintenance, and process safety management and auditing activities, where combustible dust is being generated, processed, or handled. These types of facilities include the chemical & processing industries, including bulk and finished pharmaceuticals, chemicals, petrochemicals, food, plastic & rubber, metals, textiles, wood, pulp & paper, and agrochemicals.

This workshop will provide management and supervisors with the insight necessary to identify those indicators with the equipment, operations, processes, and activities that could lead to dust explosions and then help them with the steps that they can consider to not only ensure compliance but to go beyond compliance to a true safety commitment.

Course Outline

- **Introduction**
  - Conditions required for dust flash fires and explosions – NFPA 652 applicability
  - Relationship between this NFPA 652 and the existing Industry/commodity-specific NFPA standards such as NFPA 61, NFPA 484, NFPA 654, NFPA 655, NFPA 664
  - Authority Having Jurisdiction (AHJ)
- **Requirements for the design, construction, maintenance, and management system of equipment and processes**
  - Protection of occupants not in the immediate proximity of the ignition
  - Prevention of serious injury from flash fires and explosions
  - Ensuring the ongoing production/operation capability

- **Retroactive Requirements**
  - Determination
  - Options/flexibility
- **Requirements for Appropriate Combustibility/ Explosibility Data**
  - Sample selection and preparation
  - Combustibility/explosibility
  - Characterization of ignition sensitivity and explosion severity
  - Use of historical facility data
- **Requirement Options for Ensuring Safety of the occupants, facility, processes, and equipment**
  - Prescriptive approach, including:
    - Dust Hazard Analysis (DHA)
    - Documented risk assessment
    - Written management systems and procedures
  - A performance-based design approach
- **Dust Hazard Analysis (DHA)**
  - Definition
  - Compliance deadline
  - Dust Hazard Analysis (DHA) vs. Process Hazards Analysis (PHA) requirements of the OSHA regulation
  - Qualification of person conducting DHA
  - DHA Review and update frequency period
- **Risk Assessment to Determine the Level of Design and Features for:**
  - The building and equipment
  - Housekeeping and dust control
  - Ignition source control
  - Explosion prevention and protection
  - Personal protective equipment
  - Fire protection
- **Written Management Systems for Operating Safe Operation of the Facility and Equipment, Including:**
  - Operating Procedures, Practices, Inspection, Testing, and Maintenance
  - Training and Hazard Awareness
  - Emergency Planning and Response
  - Incident Investigation
  - Management of Change
- **Performance-Based Alternative Designs**
  - Qualification of person Performance-Based Design
  - Documentation

Discussion
Quiz
Course Evaluation Sheet

Register now for

March 27, 2018: Princeton, NJ

June 21, 2018: Midland, MI

How to Identify and Control Flammable Hazards & How to Specify Equipment for Hazardous Areas (3-Day)

DATE: May 7, 8 & 9, 2018 - Princeton, NJ
DATE: October 15, 16 & 17, 2018 – Las Vegas, NV
TIME: 9:00-5:00 pm Eastern Time
COST: $1,795.00
CEUS: 1.8

Course Design and Objectives

This course is designed to enable engineers and process safety personnel who are involved with chemical processes and operations to identify the hazards associated with flammable gases, vapors, and mists, and combustible dusts and give the knowledge and insight on how to protect against them.

Every operation involving flammable and combustible substances - including gases, liquids, and bulk solids and powders - requires a Basis of Safety to minimize the potential fire and explosion risk. Several of these Bases of Safety involve controlling various elements of the Fire Triangle: (1) fuel; (2) oxidant; and (3) ignition source and Combustible Dust Pentagon: (1) fuel; (2) confined; (3) dispersed; (4) oxidant; and (5) ignition source. When none of the elements of the Fire Triangle or combustible dust pentagon can be controlled with certainty, the risk of fire and explosion will persist and Explosion Protection must be considered. Even when one or more of the elements of the Fire Triangle or Combustible Dust Pentagon can be controlled, the consequences of a fire or explosion may be so great as to warrant the use of Explosion Suppression to minimize the risk.

This 3-day course focuses on the flammable liquids, vapors and mists and combustible dusts, their associated hazardous properties that cause fires and explosions, and how to control the risks. The course will also discuss all the various types of ignition sources for flammable and combustible materials. This course presents the techniques available for both preventing flash fires and explosions and protecting people and plant from their effects. It presents a systematic approach to flash fire and explosion hazard assessment directed towards obtaining a basis of safety for a process and how to specify both the HAC and equipment for the process.

You Will Learn

NOTE: These three days will build on one another – so it is mandatory to attend all three days

Upon completion of the course, participants will gain a practical understanding of the following:

- Identify Flammable materials – liquids, vapors, mists and combustible dusts
- Associated properties of flammable materials that create the hazards
- Gain knowledge of the rules and regulations that govern flammable materials
- Be able to identify the 13 types of potential ignition sources
- Gain understanding of electrostatics and how static charge can be an ignition source
- Serious consequences of flash fires and explosions from hazardous materials
- Conditions under which fires and explosions can occur
- How to store and handle flammable and combustible materials
- How to develop a Basis of Safety for associated hazardous processes and equipment

- How to identify and classify hazardous areas where flammable and combustible materials are stored, utilized and processed
- The regulatory requirements of codes and standards for the classification of hazardous areas
- How to specify equipment for hazardous processes
- Precautions for prevention and protection of people and plant from effects of an explosion
- Electrostatic hazards that can trigger industrial fires and explosions, and will have an awareness of how to control electrostatic charge in order to reduce or eliminate such risks
- Role of laboratory data and how to interpret test data

Who Should Attend

Personnel (e.g., management, technical, operations and maintenance) involved with process safety, EH&S, process design, operations and maintenance from the chemical & processing industries, including bulk and finished pharmaceuticals, chemicals, petrochemicals, oil and gas, food, plastic & rubber, metals, textiles, wood & paper and agrochemicals who desire a more in depth understanding of most flammable chemical hazards.

DAY 1 – FLAMMABLE GASES, VAPORS AND MISTS & ELECTROSTATICS

Course Outline

- Introduction to flammable atmospheres
  - Conditions for a Vapor/Gas Explosion
- Flammability of Vapors, Gases and Mists
  - Sensitivity to Ignition
  - Flammability Properties and factors affecting them: Flash Points, Temperature Limit of Flammability, Flammable Ranges, Explosion Severity, Autoignition Temperatures, Limiting Oxidant Concentration
  - Testing Methods
  - Operating Conditions that Affect Flammability Properties
- Conditions Affecting Flammability Properties
  - Temperature, Pressure, Oxidant, Mixtures
- Introduction to Electrostatics
  - Background Information and Definitions
- Types of Electrostatic Discharges
  - Four Types of Discharges
  - Evaluation of discharges in terms of incendivity in Gas, Vapor, Aerosol Atmospheres
  - Hands-on Demonstration of various types of discharges in the laboratory
- Factors Affecting Electrostatics
  - Relative Humidity
  - Temperature
  - Resistivity of Powders and Liquids
  - Transport Mechanism (pneumatic, screw, spray, manual pouring etc)
  - Immiscible Flows
- Electrostatic Hazards Evaluation

  A systematic approach to the diagnosis of electrostatic hazards associated with:
  - People, Equipment and Facilities
  - Liquid-Vapor Handling
  - Use of Plastics
- Tests to Evaluate Electrostatic Characteristics of Liquids
  - Conductivity – Liquid
  - Chargeability – Liquid
  - Hands-on Demonstration of Various types of Electrostatic Tests in Laboratory
- Establishing a Basis of Safety for Flammable liquids, vapors and mists
  - Identifying 13 ignition sources
  - Charge generation, Charge accumulation, Electrostatic discharges
  - Control of static electricity & Avoiding Ignition Sources
  - Static Electricity, Friction, Impact, Electrical Equipment
  - Avoiding Flammable Atmosphere / Concentrations
  - Ventilation, Temperature Control
  - Avoiding Oxidant
  - Inert Gas Blanketing
  - Minimizing Consequences of Fire
  - Explosion containment
  - Venting, Isolation, Suppression
  - Storage of flammable liquids, vapors and mists
  - Handling of flammable liquids, vapors and mists

DAY 2 – COMBUSTIBLE DUSTS & ASSOCIATED ELECTROSTATICS

Course Outline

- Introduction
  - Basic Theory and Definitions
  - History of Dust Explosions
  - Conditions for a Dust Explosion
- Dust Hazard Codes & Standards
  - OSHA's & EPA's "General Duty" clauses
  - OSHA Instructions on Combustible Dust – National Emphasis Program
  - U.S. and International Fire, Mechanical & Building Codes
  - NFPA and other Recommended Practices
  - How Codes and Standards Apply to Your Facility and Workplace: Case Study
- Combustibility Assessment Using Standardized Laboratory Testing
  - Ignition Sensitivity
  - Explosion Severity
  - Thermal Instability
  - Hands-on Demonstration of Various Types of Dust Tests in the Laboratory
- Conditions Affecting Combustibility
  - Oxidant
  - Temperature
  - Physical Characteristics
  - Moisture
- Dust Explosion Hazard Control (Basis of Safety)
  - Avoiding Flammable Concentrations
  - Avoiding Ignition Sources
  - Avoiding Oxidant
  - A Problem-Solving Workshop to Evaluate the Explosion Hazard of Dust Handling Equipment
- Explosion Protection Techniques
  - Pressure Relief Venting
  - Suppression
  - Containment
  - Isolation
- Types of Electrostatic Discharges
  - Four Types of Discharges
  - Evaluation of discharges in terms of incendivity in Dust Cloud Flammable Atmospheres
- Electrostatic Hazards Evaluation
  A systematic approach to the diagnosis of electrostatic hazards associated with:
  - People, Equipment and Facilities
  - Powder Handling
  - Use of Plastics
  - Use of Flexible Intermediate Bulk Containers (FIBCs) (Super sacks)
- Tests to Evaluate Electrostatic Characteristics of Powders
  - Volume Resistivity and Charge Relaxation Time – Powder
  - Chargeability – Powder
  - Hands-on Demonstration of Various types of Electrostatic Tests in Laboratory
- Establishing a Basis of Safety for Combustible dusts
  - Identifying 13 ignition sources
  - Charge generation, Charge accumulation, Electrostatic discharges
  - Control of static electricity & Avoiding Ignition Sources
  - Static Electricity, Friction, Impact, Electrical Equipment
  - Avoiding Flammable Atmosphere / Concentrations
  - Ventilation, Temperature Control
  - Avoiding Oxidant
  - Inert Gas Blanketing
  - Minimizing Consequences of Fire
  - Explosion containment
  - Venting, Isolation, Suppression
  - Storage and handling of flammable and combustible dusts

DAY 3 – HAZARDOUS AREA CLASSIFICATIONS (HAC) & EQUIPMENT

Course Outline

- Introduction
  - Overview of Regulatory Requirements
  - Relevant Codes, Standards, and Guidelines: NFPA, EN, ATEX, etc.
  - Recognition of Fire and Explosion Hazards
  - Flammability Characteristics Relevant to Ignition Sensitivity and Hazardous Area Classification
- Establishing a Basis of Safety
  - Identifying basis of safety for the area and associated equipment

- Methodology for Hazardous Area Classification
  - Identification of Hazardous (Classified) Areas or Zones, Class I, Class II and Class III
  - North American and International Hazardous Area Designation
  - Classifying and Determining the Extent of Areas Containing Flammable Gases, Vapors, and Dusts
  - Effects of Ventilation, Temperature, and Pressure on the Extent of Zones
- Assessment of Non-Electrical Equipment and Components Intended for Use in Ignitable Atmospheres
  - Ignition Hazards associated with Non-Electrical Equipment and Devices
  - Methodology of the Assessment
- Selection of the Electrical Equipment for Hazardous Areas
  - Methods of Protection and Summary of Commonly Used Protection Methods for Different Divisions & Zones
  - Ingress Protection: IP Codes. NEMA and UL Types of Enclosures
  - Intrinsic Safety

Q&A/Group Discussion

Quiz

Course Evaluation Feedback Form

Register now for

May 7, 8 & 9, 2018: Princeton, NJ

October 15, 16 & 17, 2018: Las Vegas, NV

Chemical Hazards Assessment and the Prevention of Runaway Reactions (Day 1) & Design of Safety Relief Systems (Day 2)

DATE: May 10-11, 2018 Princeton, NJ
DATE: October 18-19, 2018 Las Vegas, NV
TIME: 9:00-5:00 pm Eastern Time
COST: Day 1 $595.00 or Day 1&2 $995.00
CEUS: Day 1 - 0.6 CEUs or Day 1&2 - 1.2 CEUs

Course Design and Objectives

This 2 day course will teach attendees how to identify the thermal and chemical reactivity hazards associated with a chemical process based on the principles of scale-up and development followed by introduction to emergency relief device sizing for runaway reactions.

On Day 1 attendees will learn how to conduct risk analysis of reactive systems to ensure safety prior to process operations and how to interpret the results of preliminary screening tests through the use of chemical engineering concepts relating to safe plant operation. The course will discuss characterization of thermal runaway reaction through calorimetry methods and the latest techniques for process optimization. Day 2 of the course is designed to cover the major aspects of safety relief systems sizing for single and multi-phase flow arising from loss of control of an exothermic chemical process. The course concentrates on the quantification and sizing of emergency vent systems for runaway reactions using experimental data derived from laboratory investigations. Emphasis is on the identification of the failure scenario and application of the appropriate calculation techniques required to arrive at correct system dimensions.

Problem solving sessions are included throughout the course.

Who Should Attend

The course will benefit attendees from a broad spectrum of backgrounds and job responsibilities including chemical engineers, process engineers/scientists, plant/process safety/risk managers, facilities managers and others who need to understand the risks and hazards that can lead to accidents, injuries, property damage and business interruptions to the plant. Those who review technical reports on relief sizing for runaway reactions will gain a basic understanding of the data to enable competent review.

You Will Learn

On Day 1, the course will teach attendees how to assess chemical reactivity through:

- Use of Chemical Engineering principles to study the potential runaway reactions for storage and reactor risk assessments
- Small-scale studies
- Performing risk analysis of chemical processes
- Development of inherently safer processes

On Day 2, participants will learn about the principles of Emergency Relief System Design for Reactive Systems:

- Learn how to identify credible relief scenarios
- Gain an understanding of how the worst credible relieving scenario is determined
- Review the principles of emergency relief systems for runaway reaction
- Understand how vapor, gassy and hybrid relief types are determined
- Gain an understanding of the DIERS methodology for evaluating relief requirements, determine the required relief size, determining relieving capacity of existing systems, all for single and two-phase flow regimes.

COURSE OUTLINE – DAY 1

Chemical Hazards Assessment and the Prevention of Runaway Reactions

- Introduction to Chemical Reactivity Hazards
- Where Hazards Arise
  - Case Histories Involving Runaway Reactions and Current Regulations
- Chemical Reaction Hazard (CRH) Assessment Strategy
  - Integration of a testing and assessment strategy into the development lifecycle of a chemical process.
- Fundamental Principles of Scale-up and Reaction Runaway
  - Pressure Generation
  - Exothermicity
  - Thermal inertia and scale-up
  - Kinetics, heat loss and reagent accumulation
  - Criticality classes
- Identification of Highly Energetic Materials
  - Strategy for Assessing Explosivity, including theoretical and experimental analysis techniques
- Reactive Chemical Thermal Stability Assessment Techniques
  - Experimental protocols and analytical techniques, including specific methods for powder drying, packaging, and storage stability testing
- Reaction Characterization through Reaction Calorimetry
  - Characterization of a process when it is running under control
- What happens when control is lost – Characterization of Thermal Runaway Reaction through Adiabatic Calorimetry
  - Runaway kinetics and generation of thermal data for vent sizing
- Safety Measure Selection
  - Process control considerations
  - Discussion of various safety measures available to protect / prevent runaway reactions

Workshops

- A process failure condition with a diazo compound
- Putting it into Practice - Data Interpretation
  - A workshop designed to enable delegates to interpret the data derived from the experimental techniques discussed so far

Q&A/Group Discussion

Quiz

Course Evaluation Feedback Form

COURSE OUTLINE - DAY 2

Design of Safety Relief Systems

- Hazard Assessment
  - A short review of hazard identification techniques and their use to determine possible causes of over pressurization
- Relief Devices
  - The features, advantages, and use of relief valves, bursting discs and other devices. Combinations of devices. The choice of relief set pressure
- Introduction to DIERS Methodology
  - Consideration of the behavior of a reactor and vent line during discharge, identifying the flow regimes involved in venting
- Experimental Testing for Relief Design
  - The use of specific tests to evaluate the parameters required by the DIERS methodology
- Relief Device Design Using DIERS Methodology
  - The characterization of relieving vessels. The effect of vapor and gas generation on the relief process. An examination of the calculation process.
- Special Cases
  - Discussion on various aspects of vent design for non-simple systems and dryers

Workshops

- Hazard Identification and Venting
- Runaway Reaction Venting Workshop

Q&A/Group Discussion

Quiz

Course Evaluation Feedback Form

Register now for

May 10, 2018: Day 1 - Princeton, NJ

May 10 - 11, 2018: Day 1&2 - Princeton, NJ

October 18, 2018: Day 1 - Las Vegas, NV

October 18-19, 2018: Day 1&2 - Las Vegas, NV

Training Course Schedule

Course	Price	Duration	March	May	June	October
NFPA 652 - Standard on Fundamentals of Combustible Dust - Understanding the Requirements of NFPA 652	$595.00	1-Day	27		21	
Chemical Hazards Assessment	$595.00	1-Day		10		18
Chemical Hazards Assessment & Design of Safety Relief Systems	$995.00	2-Days		10-11		18-19
Flammable Hazards	$1,795.00	3-Days		7-9		15-17

Registration

You can register and pay for any training course by logging onto **https://www.dekra-process-safety.com/process-safety-academy/training-courses-registration**. We accept Visa, Mastercard and American Express. You will receive a confirmation of your registration emailed to you following your registration. Course fees include continental breakfast, breaks and lunch. Each day of training starts at 9:00am and ends at 5:00pm.

Cancellations

Absolutely no refunds will be made if cancellations are made within 30 days prior to the course date; a credit for a future course may be arranged. DEKRA reserves the right to make last minute changes and/or cancellations.

Trainers' Biographies

Mike Snyder, PE, CSP, CFPS, Vice President, Process Safety Consulting, has over thirty years of experience transforming safety performance and improving leadership capabilities across the world. He offers his clients award-winning expertise and problem-solving skills that get results, reduce exposures, and save lives.

Mike is a team builder and a problem solver, who knows how to bring disparate groups together for a common purpose. He has helped transform decentralized and fragmented safety processes into globally standardized and integrated systems, and has led global process safety and occupational safety development programs across multiple educational and collaborative networks. Before joining DEKRA, Mike was global director of safety, industrial hygiene, and loss prevention for one the world's leading specialty chemical companies. While there, he led international programs in employee health and safety, emergency preparedness, and chemical process safety. He also assured his company's commitment to continual improvement of health, safety, and environmental performance through the chemical industry's global Responsible Care™ initiative.

Mike served as a standing member of his company's global hazardous materials shipping governance team and was the corporate compliance process owner for occupational and process safety disciplines. He led programs that received notable honors, including IChemE's North America Safety Award and EHS Today Magazine's award for America's Safest Companies. His work in professional development of loss-prevention technical staff has also been featured in the National Fire Protection Association Journal.

Mike is actively engaged in the global thought leadership areas of loss prevention and chemical process safety, serving as a member of the National Fire Protection Association (NFPA) Standards Council and the Center for Chemical Process Safety (CCPS) Advisory Board. He also brings extensive experience from the municipal emergency service sector, having served as a fire marshal and fire chief of a local fire department.

Mike holds a bachelor of science in chemical engineering from Cornell University and a master of science in occupational safety and health from Columbia Southern University. He is a licensed professional engineer and a certified safety professional, as well as a certified fire protection specialist.

haddeus C. Speed, physicist and safety professional, is the Senior Process Safety Specialist for DEKRA Process Safety's explosives testing and analysis division, Safety Consulting Engineers, Inc. Mr. Speed has more than 25 years experience in hazards analysis, process and system safety, and in testing, evaluating and characterizing explosives and other energetic materials. He has published numerous papers on electrostatic discharge safety (ESD), explosives testing methods, ignition and initiation phenomena, in-process classification of energetic materials, and similar topics. B.S. Physics and Astronomy (1984); Certified Safety Professional (1994); approved by the DOT to examine explosives and recommend classifications (per 49 CFR 173.56) (1999).

Mr. Speed's explosives process hazards and characterization expertise is further enhanced by an in-depth understanding of system safety and the inter-related areas of facility siting, regulatory compliance, process safety management, material characterization and incident analysis. He has developed courses and trained government officials, plant managers, other safety professionals and line operators in various aspects of explosives safety, both as general courses and as tailored training for specific issues, companies and operations.

David E. Kaelin, Sr., B.S.Ch.E., Mr. Kaelin has over 30 years experience in the specialty chemical manufacturing industry and 20 years specializing as a Process Safety Engineer. He has participated in the design and construction of numerous chemical processing facilities and provided support and training in all areas of PSM. As a Process Safety Engineer he has led process hazard analysis, risk assessments and facility siting reviews. At the corporate level he has created and taught courses in PSM and hazard recognition methods.

Mr. Kaelin has led or provided technical assistance to many fire, explosion and runaway reaction incident investigations including incidents involving nitrations, chlorinations, hydrogenations, thermal heat transfer fluids, spontaneous combustion, dust explosions and thermal oxidizer and incinerator operations.

Mr. Kaelin is an expert in the application of hazard recognition techniques including: HAZOP, FMEA. What-If, Fault Tree Analysis, Risk Screening and Checklist. He is an active member of AIChE, and NFPA.

Swati Umbrajkar, Ph.D. is the Manager of the Chemical Process Evaluation Group. Dr. Umbrajkar received her Doctorate from the New Jersey Institute of Technology. Her research interests include the synthesis of metal/metal oxide nanocomposites; analysis of highly energetic materials using X-ray diffraction, scanning electron microscopy (SEM), differential scanning calorimetry (DSC), and a number of post analysis techniques to characterize the thermodynamic and kinetic parameters of a test system.

Dr. Umbrajkar consults with clients on a variety of process safety issues including but not limited to high-pressure DSC cell tests, adiabatic calorimetry (ARC and ADC), reaction calorimetry (RC-1), all of which allow for the safe scale-up of batch and semi-batch processes. She has expertise in determining self-acceleration decomposition temperature (SADT) and time to maximum rate (TMR), which are critical issues associated with the storage of bulk materials. As the Manager and Consultant in the Chemical Process Evaluations Laboratory, she is proficient in the interpretation of data for a wide variety of process safety scenarios. She has authored several articles in the fields of, 'Synthesis and Analysis of Highly Energetic Materials' and 'Chemical Process Safety'.

She received the Excellence Award from NASA for her services in NASA's SHARP student program in 2005 and Research Experience for Undergraduate (REU) students at the New Jersey Center for Engineered Particulates (NJCEP) in 2006. She was awarded the Best Graduate Student Research Overall presented at the Graduate Student Research Day on November 6, 2006. She is also the recipient of the 'best presenter' award at the AIAA (American Institute of Aeronautics and Astronautics) Young Professionals in Science and Engineering Conference (Northeast Section) in November 2006. She is a member of the American Institute of Chemical Engineers.

Richard W. Prugh, M.S.Ch.E., CSP, PE, Mr. Prugh is a Senior Process Safety Specialist and provides process safety engineering expertise to clients at large and small plants to improve the safety of chemical manufacturing operations. During his career with the Du Pont Company, he was involved in instrument engineering, explosion-hazards testing, explosives manufacturing and testing, pilot-plant supervision, organic-chemicals research, safety and fire protection audits, and process-safety consulting. Since 1985, he has provided process safety services to chemical and petrochemical plants in thirty-two states and in twelve foreign countries. He is the author of "Guidelines for Vapor Release Mitigation" and 25 presentations to Loss Prevention Symposia, and he prepared the "Toxicity" section for the 2008 issue of "Perry's Chemical Engineers' Handbook" and the "Safety" sections for three encyclopedias. His recent experience involved overseeing the safety analyses of nerve-gas destruction plants and auditing the safety status of a dozen off-shore installations, including evaluation of management and employee safety culture.

Vladimir Stetsovsky, M.S., is a Senior Process Safety Specialist with over 30 years experience in the manufacturing industry and utilities, and 18 years specializing as an Electrostatic Safety Engineer. His career involved converting and specialty chemical manufacturing with numerous hazardous chemicals in both batch and continuous operations. He has participated in the design and construction of several large chemical and converting processing facilities and provided support and training in all areas of Process Electrostatic Safety Management. As an Electrical Engineer he has led process hazard analysis, risk assessments and facility siting reviews. At the corporate level he has created installation specifications and taught courses in ESD and hazard recognition methods and provided technical safety support to manufacturing sites producing adhesives and pressure sensitive products.

Mr. Stetsovsky has led or provided technical assistance to many fire and explosion incident investigations including incidents involving thermal heat transfer fluids, spontaneous combustion, dust explosions and thermal oxidizer and incinerator operations. In these investigations he has provided valuable insight into the root cause and made practical suggestions for eliminating or controlling the identified hazards.

Steven J. Luzik, PE, CFEI, is a Senior Process Safety Specialist. with over 30 years experience in the area of fire and explosion hazards including gas/vapor explosions, dust explosions and fire and explosion protection strategies. He graduated from the University of Notre Dame with a BS degree in Chemical Engineering. He is a registered Professional Engineer in the State of Pennsylvania and a Certified Fire and Explosion Investigator (CFEI) with the National Association of Fire Investigators (NAFI). As a former Mine Safety and Health Administration [MSHA] manager and technical specialist, he has investigated a multitude of incidents involving flammable vapors, gases and dusts that have included surface and underground mining facilities and industrial facilities where fires and explosions have occurred. He has conducted dust explosion hazard assessments at several coal-fired power plants.

He also has served as a moderator of a flammability and dust explosibility laboratory, processing requests from MSHA and other Federal agencies for testing to determine the flammability and explosibility properties of solids, liquids, dusts and vapors. In this capacity, he has been called upon to provide expert testimony on the explosibility hazards associated with the manufacturing, processing and handling of these materials. He is a member of the American Society for testing and Materials (ASTM) E-27 Committee on Hazardous Properties of Chemicals, the National Association of Fire Investigators (NAFI) and the National fire Protection Association (NFPA). He has authored numerous publications in the areas of fire and explosion prevention, protection and investigation.

Robert L. Gaither, CSP, Ph.D., is a Senior Process Safety Specialist. Dr. Gaither has more than 30 years experience in company operations, regulatory compliance, management consulting, and process safety/risk management. He has led organizations at site, division and corporate levels to achieve record safety performance, significant cost savings, and external / internal recognition for accomplishments.

Dr. Gaither has proven leadership and interpersonal skills that enable customers to discover synergies for business excellence. His keys to successes are working effectively with all organizational levels, strong communication skills, assessing customer/business partner needs and finding solutions, mentoring staff, promoting teamwork, and leveraging systems and resources already in place.

Dr. Gaither is a trained expert in HAZOP and SIL/LOPA Facilitation; and Chevron RISKMAN2 / IHAZID Process. He is also a trained and experienced PHAST User.

Pieter Zeeuwen, M. Sc., is a Senior Process Safety Specialist. He has more than 30 years experience in the gas and dust explosion fields, including materials testing, small and large scale explosion research, and consultancy for industry and government agencies in a number of countries. His areas of expertise include gas and dust explosion hazard assessment, gas and dust explosion prevention and protection, electrostatic hazard assessment, hazardous area classification, and gas cloud explosions as well as incident investigations.

Over the years, Mr. Zeeuwen has served on many working groups including various Standards committees, both nationally and internationally, e.g. most recently CEN (European Standards Committee) working groups on explosion protection methods and on test methods. He regularly lectures on various aspects of explosion safety and acts as seminar chairman and course director. Mr. Zeeuwen has published numerous articles in scientific journals and presented many papers at international conferences.

Walter S. Kessler, B.S.Ch.E., Mr. Kessler has 23 years experience in the refinery, gas processing, specialty chemical, pharmaceutical, manufacturing, and HVACR (Heating, Venting, Air Conditioning and Refrigeration) industries, including 8 years experience performing Process Safety Engineering functions. He was instrumental in the design and construction of several refinery, gas and chemical processing facilities, designing a pharmaceutical filling process, improving several manufacturing processes, and also has experience in six sigma and lean manufacturing. He has been involved in HAZOPS on new and existing facilities, developing and designing DCS and SIS control systems and the associated cause and effect charts, process safety reviews, and developing and implementing various stages of the 14 elements of the PSM program in facilities. He has a very safety conscious attitude and perspective and has even trained with and been actively involved in chemical plant ERT teams.

Lisa C. Hutto, B.Sc., MBA, SIIRSM is a Senior Process Safety Specialist with over 23 years of combined HSE&S experience in manufacturing, chemical and oil and gas industries with 12 of the years specializing in Process Safety Management. She has an extensive background in health, safety, environmental and security, to include the reduction of incident rates, reduced emissions by implementing new projects, facility security development, as well as being the driver for supporting business and HSE objectives. Her PSM experience includes implementing and developing new Process Safety Management programs, PSM Audits and Gap Analysis, establishing management of change programs, developing procedures for all 14 elements of PSM, emergency response plan development and leading Process Hazards Analysis for oil and gas, chemical and manufacturing companies. She also has a strong background of upstream and downstream oil & gas experience, to include work on the North Slope of Alaska, with multiple oil & gas companies.

Guibing Zhao, Ph.D. is a Process Safety Specialist.
Dr. Zhao received his Doctorate of Chemical Engineering from the Sichuan University in China. His research interests include emergency relief system design using DIERS technology; chemical process safety evaluation; multiphase flow hydrodynamics; customized calorimetrical technology including water bath and water flow calorimetry; high temperature molten salt electrolyte based fuel cell and battery technology; nonthermal plasma technology for gas processing including NOx abatement, methane and hydrogen sulfide conversion, and plasma enhanced hydrogen separation; supercritical CO2 enhanced oil recovery; microreactor; waste to fuel conversion; and advanced signal processing technology.

He has participated in engineering design and scale-up of several chemical processing facilities. Dr. Zhao is proficient in the interpretation of data for a wide variety of process safety scenarios. He has authored 40+ peer- reviewed articles in the multidisciplinary fields.

Michael F. Carolan, BSE, Ph.D. is the Operational Excellence – PS Laboratory Testing, Flammability Group and Safety Site Manager. Proven Technology Developer who uses disciplined approach to solve difficult technical problems and to cost effectively advance technology. Experimental chemical engineer experienced in designing and safely operating equipment using flammable gases at high pressures and temperatures. Internationally known for inventing first-of-its-kind ceramic membrane gas production technologies.

John C. Wincek, CCPSP Consultant Manager, has over 25 years of industry experience, including 17 years dedicated to managing all aspects of Process Safety in the Specialty Chemical Manufacturing industry. He has led Process Hazard Studies, conducted Frequency and Consequence Analyses, Layer of Protection Analyses and Chemical Reaction Safety Assessments for facilities around the globe.

DEKRA Process Safety

The breadth and depth of expertise in process safety makes us globally recognized specialists and trusted advisors. We help our clients to understand and evaluate their risks, and work together to develop pragmatic solutions. Our value-adding and practical approach integrates specialist process safety management, engineering and testing. We seek to educate and grow client competence to provide sustainable performance improvement. Partnering with our clients we combine technical expertise with a passion for life preservation, harm reduction and asset protection. As a part of the world's leading expert organization DEKRA, we are the global partner for a safe world.

Process Safety Management (PSM) Programs

- Design and creation of relevant PSM programs
- Support the implementation, monitoring, and sustainability of PSM programs
- Audit existing PSM programs, comparing with best practices around the world
- Correct and improve deficient programs

Process Safety Information/Data (Laboratory Testing)

- Flammability/combustibility properties of dusts, gases, vapors, mists, and hybrid atmospheres
- Chemical reaction hazards and chemical process optimization (reaction and adiabatic calorimetry RC1, ARC, VSP, Dewar)
- Thermal instability (DSC, DTA, and powder specific tests)
- Energetic materials, explosives, propellants, pyrotechnics to DOT, UN, etc. protocols
- Regulatory testing: REACH, UN, CLP, ADR, OSHA, DOT
- Electrostatic testing for powders, liquids, process equipment, liners, shoes, FIBCs

Specialist Consulting (Technical/Engineering)

- Dust, gas, and vapor flash fire and explosion hazards
- Electrostatic hazards, problems, and applications
- Reactive chemical, self-heating, and thermal instability hazards
- Hazardous area classification
- Mechanical equipment ignition risk assessment
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