HAZMAT Incident Commander Workshop

FINAL PROCEEDINGS BY:

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Quincy, MA

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Executive Summary

This report is an outcome of *HAZMAT Incident Commander Workshop* held at NFPA Headquarters Conference Center on November 2 & 3, 2016 conducted in conjunction with a Workshop on *Key Performance Capabilities and Competencies for High Hazard Incident Commanders* (addressed in separate proceedings).

There have been several emergency pipeline and rail car incidents involving crude oil spills in North America. These incidents often involve a complex interaction with various governmental and agency authorities, first responders, and industry personnel. Experience has shown that local personnel often do not have adequate in-depth knowledge of the hazard or response techniques, thereby taxing the ability of local responders to manage the incident in a safe and effective manner.

NFPA codes and standards are written in a broad perspective - establishing a framework that can be applied to a wide range of incidents. To manage and coordinate incidents, the incident commander needs the tools to plan and implement an incident action plan. In order to address the scope and magnitude of a High Hazardous Flammable Train (HHFT) or Pipeline incident, the incident commander needs to understand all the variables associated with these incidents. There is also a sense of urgency to meet the HHFT and Pipeline emergency incident awareness for first responders and the needs of the first responder and the public’s awareness for professional thinking and leadership. This workshop was aimed at reviewing, clarifying and confirming tools for incident commander to manage events involving pipeline and rail car spills of crude oil.
Acknowledgements

This workshop was supported by Pipeline and Hazardous Materials Safety Administration (PHMSA), (U. S. Department of Transportation) grant for the project on *Enhancing Incident Commander Competencies for Management of Incidents Involving Pipeline and Rail Car Spills of Flammable Liquids*. The support and participation of Transport Canada in this workshop is also greatly appreciated.

This workshop summary report has been prepared by Sreenivasan Ranganathan, Fire Protection Research Foundation, Quincy, MA. The information contained herein is based on the input of numerous professionals and subject-matter-experts. While considerable effort has been taken to accurately document this input, the final interpretation of the information contained herein resides with the report author. The content, opinions and conclusions contained in this report are solely those of the authors and do not necessarily represent the views of the Fire Protection Research Foundation, NFPA, Technical Panel or Sponsors. The Foundation makes no guaranty or warranty as to the accuracy or completeness of any information published herein. Photographs included in this report and not in PowerPoint slides were provided by Sreenivasan Ranganathan, FPRF.

About the Fire Protection Research Foundation

The Fire Protection Research Foundation plans, manages, and communicates research on a broad range of fire safety issues in collaboration with scientists and laboratories around the world. The Foundation is an affiliate of NFPA.
About the National Fire Protection Association (NFPA)
Founded in 1896, NFPA is a global, nonprofit organization devoted to eliminating death, injury, property and economic loss due to fire, electrical and related hazards. The association delivers information and knowledge through more than 300 consensus codes and standards, research, training, education, outreach and advocacy; and by partnering with others who share an interest in furthering the NFPA mission. All NFPA codes and standards can be viewed online for free. NFPA’s membership totals more than 65,000 individuals around the world.

Keywords: Competency, HAZMAT, Incident Commander, Emergency, Railroad, Crude oil, Flammable liquid, Professional qualification, Pipeline, HAZMAT FLIC

Report number: FPRF-2016-29
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1) Background and Overview

1.1. Background:
Several emergency pipeline and rail car incidents involving crude oil spills have been occurring in North America. These incidents often involve a complex interaction with various governmental and agencies authorities, first responders, and industry personnel. Experience has shown that local personnel often do not have adequate in-depth knowledge of the hazard or response techniques, thereby taxing the ability of local responders to manage the incident in a safe and effective manner. NFPA standards are written in a broad perspective - establishing a framework that can be applied to a wide range of incidents. To manage and coordinate incidents, the incident commander needs the tools to plan and implement an incident action plan. In order to address the scope and magnitude of a high hazardous flammable train or pipeline incident, the incident commander needs to understand all the variables associated with these incidents. There is also a sense of urgency to meet the needs of the first responder and the public’s awareness for professional thinking and leadership.

1.2. Workshop Goal:
The goal of HAZMAT Incident Commander Workshop was to: Review, clarify and confirm tools for incident commander to manage events involving pipeline and rail car spills of crude oil. This workshop was conducted in conjunction with another workshop on Key Performance Capabilities and Competencies for High Hazard Incident Commanders to develop a competency framework with an in-depth analysis and a planned approach for exploring and validating opportunities to synthesize this concept into the professional qualifications standards.

1.3. Workshop Agenda:
The two day workshop agenda is listed in Table 1. This report is focused on the workshop agenda which is highlighted below.

<table>
<thead>
<tr>
<th>Date/Time</th>
<th>Description</th>
<th>Speakers/Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Day 1: Hazmat Incident Commander Workshop</strong></td>
<td></td>
</tr>
<tr>
<td>0730 – 0830</td>
<td>Workshop registration/Breakfast</td>
<td></td>
</tr>
<tr>
<td>0830 – 0900</td>
<td>Call to order, Workshop overview</td>
<td>Casey Grant, FPRF</td>
</tr>
<tr>
<td></td>
<td>Welcome</td>
<td>Jim Pauley, NFPA</td>
</tr>
<tr>
<td></td>
<td>PHMSA, DOT</td>
<td>Arthur Buff, PHMSA/DOT</td>
</tr>
<tr>
<td></td>
<td>Transport Canada</td>
<td>Nicole Girard, Transport Canada</td>
</tr>
<tr>
<td>0915 – 1015</td>
<td>Managing the HAZMAT Incident and HHFT IC</td>
<td>Greg Noll, Noll Associates</td>
</tr>
<tr>
<td>1015 – 1030</td>
<td>Break</td>
<td></td>
</tr>
<tr>
<td>1030 - 1100</td>
<td>Flammable Liquid Pipeline IC</td>
<td>Greg Noll, Noll Associates</td>
</tr>
<tr>
<td>1100 - 1130</td>
<td>Competency Guidelines</td>
<td>Chris Powers</td>
</tr>
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</table>
### Key Performance Capabilities for Hazardous Materials Incident Commanders

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Presenter(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0130 - 0230</td>
<td>Competencies, Capabilities &amp; Complexity</td>
<td>David Hooton</td>
</tr>
<tr>
<td>0230 - 0245</td>
<td>Break</td>
<td></td>
</tr>
<tr>
<td>0245 - 0345</td>
<td>Competencies, Capabilities &amp; Complexity (continued)</td>
<td>David Hooton</td>
</tr>
<tr>
<td>0345 - 0400</td>
<td>Day 1 - Summary/wrap up</td>
<td>Tom McGowan, NFPA</td>
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</table>

#### Day 2: Hazmat Incident Commander Workshop

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Presenter(s)</th>
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<tbody>
<tr>
<td>0730 - 0830</td>
<td>Breakfast</td>
<td></td>
</tr>
<tr>
<td>0830 - 0900</td>
<td>Day 1 Review &amp; Day 2 Overview</td>
<td>Tom McGowan, NFPA</td>
</tr>
<tr>
<td>0900 - 1045</td>
<td>HH-IC Key Performance Capabilities</td>
<td>David Hooton</td>
</tr>
<tr>
<td>1045 - 1100</td>
<td>Break</td>
<td></td>
</tr>
<tr>
<td>1100 - 1215</td>
<td>Ideation Spark Session: Integrating KPC with NFPA Standards</td>
<td>David Hooton</td>
</tr>
<tr>
<td>1215 - 0100</td>
<td>Lunch Break</td>
<td></td>
</tr>
<tr>
<td>0100 - 0115</td>
<td>Foam application rate for HHFT incidents</td>
<td>Ken Willette, NFPA</td>
</tr>
<tr>
<td>0115 - 0200</td>
<td>Workshop – Summary &amp; Wrap-up</td>
<td>Tom McGowan (NFPA) &amp; Casey Grant (FPRF)</td>
</tr>
</tbody>
</table>

The other portions (not highlighted above) of this workshop agenda are addressed and summarized in a separate proceedings report titled *Workshop on Key Performance Capabilities and Competencies for High Hazard Incident Commanders.*
2) Presentations Overview

2.1. Overview
Presenters addressed a wide range of issues around effective, safe mitigation of the flammable liquid transport through rail car and pipeline emergency incidents, with a primary goal of ensuring first responders' safety. Jim Pauley, NFPA welcomed all the participants and presenters for the workshop and their contribution to NFPA was acknowledged. Arthur Buff, PHMSA DOT and Nicole Girard, Transport Canada gave a quick overview of the activities on flammable liquid transportation safety by PHMSA and Transport Canada respectively. Greg Noll of South Central PA Regional Task Force addressed the management of HAZMAT incidents, High Hazard Flammable Liquid Trains (HHFT) and Flammable Liquid Pipeline emergency incident command.

![Figure 1: Greg Noll presenting about management of HAZMAT incidents](image)

The discussion from Greg Noll was focused into three sections. The first section focused on the HAZMAT incidents in general and the role of an incident commander. Further he discussed the tactical guidance and information for the On-Scene Incident Commander responsible for the management of bulk flammable liquid emergencies involving High Hazard Flammable Trains (HHFT), with a focus upon petroleum crude oil and ethanol. The application and use of a risk-based response (RBR) methodology for both planning and response purposes are critical success factors in the successful management of a HHFT incident. The RBR process is a systematic process by which responders:

- Analyze a problem involving Hazmat
- Assess the hazards
- Evaluate potential consequences
• Determine appropriate response actions based upon facts, science and the circumstances of the incident.

It need to be noted that *NFPA 472: Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents*, Chapter 8 provides requirements for competencies for incident commanders responsible for the on-scene management of hazardous materials emergencies and is the primary response industry standard. NFPA 472 is written from a broad perspective - establishing a framework that can be applied to a wide variety of incidents regardless of the hazardous material(s) that may be involved, but does not provide product specific guidance for individual products, such as the crude oil or ethanol. The HHFT incident commander field guide and the liquid petroleum emergency field guide reviews the key lessons learnt from these incidents with a focus on planning, the containers, the products being transported, pipeline design and construction, tactical and incident management considerations, and the use of RBR for incident management. See appendix B for detailed presentation. The full reports are available at [www.nfpa.org/hazmatic](http://www.nfpa.org/hazmatic).

![Figure 2: Chris Powers presenting about the competency guidelines for HHFT incidents](image)

Chris Powers presented the competency guidelines for HHFT incidents developed by the Transport Canada Emergency Response task force in partnership with the National Fire Protection Association. Chief Powers provided the background of the Lac Megantic incident occurred on July 6th, 2013, where a 73-car Montreal, Maine & Atlantic train carrying Bakken crude oil destined for the Irving Oil Refinery in St. John N.B. rolled away from where it had been parked in Nantes, Quebec. The train descended almost 400 feet over 10 miles and may have been moving at up to 100 kph resulting in derailment of 63 of the 72 tank cars and resulting in an immediate fire. 47 people died, over 30 buildings were destroyed in the incident. The Minister of Transport announced the creation of the Emergency Response Task Force (ERTF) under the Transportation of Dangerous Goods Directorate (TDG Directorate) on April 23, 2014, to work on strengthening emergency response capacity across the country. Chief Powers was appointed Chair of the ERTF. The ERTF completed their work on in March 2016 and have submitted forty
(40) recommendations to Transport Canada. The complete competency guideline document can be found in the Transport Canada website.

Weihua James Li, Thunkable Inc., gave an introduction to the NFPA’s HAZMAT FLIC app. This electronic mobile application was developed as a part of the Research Foundation’s project on “Enhancing Incident Commander Competencies for Management of Incidents Involving Pipeline and Rail Car Spills of Flammable Liquids” funded through a PHMSA (DOT) grant. The app provides the on-scene incident commander with pertinent guidance materials for managing emergency responses for high hazard flammable train and liquid petroleum pipeline emergencies. Features:

- Instant access to two Fire Protection Research Foundation reports:
  - “Liquid Petroleum Pipeline Emergencies On-Scene Incident Commander Field Guide”
  - “High Hazard Flammable Trains (HHFT) On-Scene Incident Commander Field Guide”
  Each report provides the incident commander with tactical guidance and information for managing an emergency, including the application and use of risk-based response methodology.

- A multi-tiered size-up checklist that includes steps for incident management, problem identification, hazard assessment/risk evaluation, PPE selection, logistics resource management, post-emergency response operations, and spill control and fire control operations

- A collection of additional resources that includes links to incident reports, emergency numbers for rail lines, and links for additional train-specific and pipeline-specific information

This app is available for free download from Google Play store and Apple store.

Figure 3: Snapshot HAZMAT FLIC mobile application
Doug Forsman, Fairfield Bay Fire Dept., and Bill Peterson, current Chair of the NFPA Professional Qualifications Correlating Committee discussed the fire service professional qualification system in North America. They gave an overview of the history of Pro-Qual standard framework along with its origin and major changes. There is an ever growing demand for new and expanded professional qualifications standards. The future opportunities remain in aligning today’s Pro-Qual Standards and tomorrow’s best practices in learning and performance development.

They also discussed the current thinking and the evolution of competency models which is an integrated approach to define the critical skills, behaviors and capabilities that ensure high performance (Appendix B). Further discussion revolved around the discussion on Job Performance Requirement (JPR) based leadership and competency leadership approach. A snapshot of the difference between these leadings are given in the Figure 5.

Figure 4: Doug Forsman and Bill Peterson discuss the fire service professional qualification system
The above discussions formed the basis for the breakout sessions on competencies and capabilities for incident commanders facilitated by David Hooton. As mentioned before the HAZMAT IC workshop was conducted in conjunction with another “Workshop on Key Performance Capabilities and Competencies for High Hazard Incident Commanders”. The main part of this workshop program was the panel discussions and activities. The purpose of these panel discussions was to focus on several specific topics that were perceived to be points of future planning. A separate report from these segments are available at: www.nfpa.org/hazmatic and www.nfpa.org/foundation.

On Day 2 of the workshop, Ken Willette, NFPA discussed the need for research on the foam application rates for HHFT incidents. Flammable liquid spills in the rail road tank car incidents are hybrid and multi-dimensional in nature, consisting of surface spills, pooled product, and product absorbed into the rail bed and soil. Class B foams are recommended for vapor suppression and as an extinguishing agent for flammable liquid fires. First responders to flammable liquid incidents recognize NFPA 11: Standard for Low-, Medium-, and High Expansion Foam for its value when calculating foam concentration applications for spills and fires at facilities that refine and storage flammable liquids. Product control and vapor suppression techniques used for rail car flammable liquid incidents may not be as accurate when determining foam concentrate calculations from NFPA 11. A knowledge gap has been identified with respect to what has been taught and trained against the reality. Additional research of information gathering, testing and validation is required to have a better understanding of the foam application rates for HHFT incidents.

For any additional details please refer to the presentation materials available in Appendix B.
2.2. Bio of Speakers

**Greg Noll** serves as the Program Manager for the South Central PA Regional Task Force (SCTF), one of nine regional task forces established throughout Pennsylvania. Greg has also served as a senior partner with Hildebrand and Noll Associates, a consulting firm specializing in emergency planning, response and incident management issues. A retired member of the U.S. Air Force Reserve with over 29 years of service, Greg has served as a subject matter expert for various DoD hazardous materials and counterterrorism response training programs. He serves as a Team Leader with the SCTF Type-3 Incident Management Team (IMT) and is a member of the PA Type-3 IMT. Greg has 46 years of experience in the fire service and emergency response community, and is the co-author of nine textbooks on hazardous materials emergency response and management topics. He currently serves as Chairperson – NFPA Technical Committee on Hazardous Materials / WMD Response Personnel (NFPA 472), as a member of the Inter Agency Board (IAB) Training and Exercise Sub Group, and as a member of the IAFC Hazardous Materials Committee.

**Chris Powers** is a retired Fire Chief with over forty years of experience in management of both career and composite fire departments. He has served as Fire Chief in five municipalities including Bathurst N.B., Cumberland, Nepean Oakville, and Whitchurch – Stouffville Ont. He is a past member of the Board of Directors of the Ontario Association of Fire Chiefs. He has served as the Management Co-chair of the Ontario Ministry of Labour Fire Services Section 21 Advisory Committee that advises the Minister of Labour on matters of health and safety affecting the fire service in Ontario. Chief Powers represented the Canadian Association of Fire Chiefs on the Transport Canada, Transportation of Dangerous Goods Advisory Council for many years. Chief Powers has worked with various municipal fire services as a consultant to develop Fire Master Plans. Chief Powers is the recipient of both the Federal and Ontario Exemplary Service medals, the Ontario Association of Fire Chiefs – Bill Williams Humanitarian Award and has achieved the Ontario Municipal Management Institute, Certified Municipal Manager III and Fire Service Executive designation.

**Bill Peterson** joined Strategic Government Resources as a Senior Vice President for Executive Placement in 2009 after retiring as a Regional Administrator for the U.S. Department of Homeland Security / FEMA. Prior to being appointed by the President of the United States to this role, Bill served as Fire Chief and Emergency Management Coordinator in Plano, Texas. He also served as Fire Chief in Waukegan, IL and with the Bolingbrook and Evergreen Park, IL Fire Departments. He has served in board or other key leadership roles with the Institution of Fire Engineers, the International Association of Fire Chief’s, the International Fire Service Training Association, National Fire Protection Association, the Society of Fire Protection Engineers, and the Texas Fire Chief’s Association. He currently is the Chair of the NFPA Professional Qualifications Correlating committee. In 2013, Bill received the highest recognition awarded by the U.S. Branch of the Institution of Fire Engineers for his untiring work and tenacity in moving the fire service discipline to new heights. Bill was also named as Fire Chief of the Year by the International Association of Fire Chiefs and FIRE CHIEF Magazine in 2000. He holds a BA in Fire
Protection Administration from Lewis University and a Master’s degree in Public Administration and Human Relations from Webster University in St. Louis, MO.

**Douglas Forsman** - Chief Forsman is completing his 51st year in the fire service, starting as a volunteer firefighter in a suburb of Kalamazoo, Michigan. He has served as a Fire Chief for 33 years in the communities of Wabash Township, Indiana; Norfolk, Massachusetts, Greeley, Colorado and Champaign, Illinois. Doug holds degrees in Fire Protection and Safety Engineering Technology, and Trade and Industrial Education from Oklahoma State University. During his career he has served as the Chairman of the International Fire Service Training Association and the International Fire Service Accreditation Congress. He subsequently filled the role of Executive Director of those organizations and as Director of Fire Service Training for the State of Oklahoma. Chief Forsman is the Past President of the Colorado Fire Chiefs’ Association and has served as the Chairman of the National Fire Protection Associations’ Standards Committee on Fire Service Professional Qualifications Standards. He was elected as a Fellow of the Institution of Fire Engineers, International in 2012. He served 4 years on the Board of Visitors for FEMA’s National Emergency Management Institute. He retired from his second stint as Fire Chief and Emergency Manager for the City of Champaign, Illinois in 2013 and is currently serving as the volunteer Deputy Fire Chief for Operations in Fairfield Bay, Arkansas as well as President of his consulting firm, Firescope Mid-America.

**David B Hooton, Ed. D.** facilitated the workshop segments related to competencies and capabilities for Incident Commanders. David extensively worked with the ProQual Correlating Committee and many ProQual technical committees when they converted to Job Performance Requirements, has served on 1033 and 921, and also consulted with NFPA on their training outreach. Additionally, he has worked with volunteer fire departments, HAZMAT teams, and in EMS serving many roles, including Chief. He earned his doctorate from Vanderbilt University.

**Ken Willette** is currently the Segment Director focused on the needs of First Responders, at NFPA. Ken has 35 years of fire service and emergency preparedness planning experience. He spent 26 years of his career at the Wilbraham, Mass. fire department, with seven of those years serving as fire chief and emergency management director. Ken held the same position at the Concord, Mass. fire department, from 2003 until 2009. His career includes a variety of other fire service related positions, including coordinator of fire officer training at Massachusetts Fire Academy, instructor at Springfield Technical Community College, and an airfield/structural firefighter for the Department of Defense. Ken is a member of the International Association of Fire Chiefs and past president of the Fire Chiefs Association of Massachusetts. Ken graduated with a Bachelor of Science in Fire Protection Administration from Empire State University in Stony Brook, N.Y. He is a certified fire officer and fire instructor. He is also a graduate of the Executive Officer program of the National Fire Academy.
3) Summary Observations

This report is an outcome of HAZMAT Incident Commander Workshop held at NFPA Headquarters Conference Center on November 2 & 3, 2016.

Changes in the North American energy sector and the increased utilization of HHFT and pipelines have brought new challenges to the emergency response community. These incidents are large, complex & lengthy response scenarios. Application and use of risk-based response methodologies for incident management planning and response was discussed in this workshop.

The information and understanding of the products transported and the containers used are important for effective incident management. While applying risk-based response, critical size-up questions need to be asked. The competency guidelines for responders to incident involving flammable liquids in transport indicates what competencies are required for emergency responders for managing hazardous material incidents. The need for additional research on the mechanisms of foam applications during these surface oil spills of multi-dimensional nature were also discussed along with the release of NFPA HAZMAT FLIC electronic mobile application tool.
Annex A: Workshop Presenters and Participants

The following were the workshop presenters on “HAZMAT Incident Commander Workshop”, held at NFPA Headquarters Conference Center, Quincy, MA on November 2 & 3, 2016.

Jim Pauley, NFPA
Arthur Buff, PHMSA DOT
Nicole Girard, Transport Canada
   Greg Noll,
Chris Powers, Past chair
Weihua James Li, Thunkable Inc.
   Bill Peterson,
   Doug Forsman,
   David Hooton
Ken Willette, NFPA

The following were the workshop attendees on “HAZMAT Incident Commander Workshop”, held at NFPA Headquarters Conference Center, Quincy, MA on November 2 & 3, 2016.

Arthur Buff, PHMSA/DOT
   Bill Peterson, IFSTA
Bradley Hoekstra, Edmonton Fire Rescue Services (EFRS)
   Brian Brauer, Illinois Fire Service Institute
   Casey Grant, FPRF
   Chris Engrissei, Marathon Pipeline LLC.
Chris Powers, Past Chair, Emergency Response Task Force
Clem Schinikowski, Canadian Pacific Railroad
   Curt Floyd, NFPA
   Dan Gorham, FPRF
Danny Simpson, CN Railways
   David Hooton
Derek Lampkin, BNSF Railway
Doug Forsman, Fairfield Bay Fire Dept.
Ed Conlin, NFPA
Fred Terryn, US Dept. of the Air Force
Frederick Piechota, National Board on Fire Service Pro-Qual
Gordon Descutner, Alaska Fire Standards Council
Greg Noll, South Central (PA) Task Force
James Li, Thunkable
John Eimmnizer, Dept. of Energy & Environment
John Montes, NFPA
Ken Willette, NFPA
Larry Jantzen, Austin Fire Dept.
Larry Preston, Maryland Fire Rescue Institute
Lisa Hartman, NFPA
Louis Marcotte, Transport Canada
Manny Ehrlich, US Chemical Safety Board
Neal Mullane Jr, Boston Fire Dept.
Nicole Girard, Transport Canada
Pete Jensen, Ventura County Fire Dept.
Ray Palczynski, Illinois Fire Service Institute
Rick Mason, NFFF
Robert Fash, NFPA
Shayne Mintz, NFPA
Sreenivasan Ranganathan, FPRF
Steve Edwards (OSU)
Steve Fitzgerald, HAZMAT Battalion, FDNY
Tom McGowan, NFPA
Tracie Young-Brungard, PA State Fire Academy
William Larkin, Jones & Bartlett
Annex B: PowerPoint Slides

NFPA HAZMAT INCIDENT COMMANDER WORKSHOP – Introduction on HAZMAT Incident & Incident command by Gregory G Noll, South Central (PA) Task Force

WHAT IS A HAZMAT INCIDENT?

- Incident Command Perspective
  - Dispatched as a HM incident
  - May include HMRT response
  - Establishment of HM Group or HM Branch
- Health and Safety Perspective
  - Not classified as a HM incident
  - Results in harmful exposures to responders (IDLH environment)
  - May involve HM tasks (incident analysis, air monitoring, field decon, etc.)

“THE WORLD IS CHANGING”...

- Significant changes during the current decade in the domestic energy sector
- Commensurate impacts upon ER community
- E&P and ref. facilities in areas where little historical energy footprint
- Expansion of ops & transportation corridors to meet marketplace needs
- Changing hazards and risks posed by the use of energy-related products and resources

BUT THEN AGAIN, SOME THINGS AREN’T

Deja Vu All Over Again!
- The challenges are not new...
- The challenges are not unique...
- But our frame of reference is different

HAZMAT RESPONDER FATALITIES

- Identified 26 incidents since 1960
- Resulted in 100+ responder fatalities
  - HM FR Ops = 94
  - HazMat Techs = 2

HAZMAT INCIDENT LODD’S

- 1960’s = 8
- 1970’s = 32
- 1980’s = 23+
- 1990’s = 10
- 2000’s = 10
- 2010’s = 12

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HAZARD CLASS INVOLVED

- Class 1 HM = 2
- Class 2.1 HM = 15
- Class 2.3 HM = 1
- Class 3 HM = 5
- Class 4 HM = 2
- Class 5 HM = 3

MANAGING THE HM INCIDENT

- Risk-based vs. Procedure-based response?
- APIE (NFPA 472 / 1072)
- Eight Step Process® (HM:MTI)
- GEDAPER (National Fire Academy)
- PHMSA TRIP-R and NFPA IC Projects (Eight Step Hybrid)
- Others?

RISK-BASED RESPONSE (RBR) PROCESS

Systematic process by which responders:
- Analyze a problem involving Hazmat
- Assess the hazards
- Evaluate potential consequences
- Determine appropriate response actions based upon facts, science and the circumstances of the incident.

TRANSITION
I. PLANNING CONSIDERATIONS

- Tremendous growth in 2013-2015 on use of HHFT’s
  - Future will be influenced by economics, market forces and political decisions
  - 2014 vs. 2016 - significant reduction in crude oil TC movements
  - Recently seeing more product moving by pipeline as compared to HHFT’s
- Number of TC’s involved in derailment scenarios dependent upon number of factors, including:
  - Train speed
  - Train make-up
  - Track configuration (e.g., curve, grade)
  - Type of tank car (DOT-111 / CPC-1232 / DOT-117)
  - Kinetic energy is “king”

![Crude By Rail Routes](image)

Weekly average number of crude oil trains from the Duluth Shale in North Dakota that pass through each county

<table>
<thead>
<tr>
<th>County</th>
<th>Passes</th>
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<tr>
<td>0</td>
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<tr>
<td>1</td>
<td>10.1 to 25</td>
</tr>
<tr>
<td>2</td>
<td>&gt;25</td>
</tr>
</tbody>
</table>

Source: State Department of Revenue

MOVING ETHANOL TO MARKET

![Ethanol Map](image)

PLANNING CONSIDERATIONS

- HM 101 Commonalities
- Relationships are critical in establishing trust & credibility
- Planning tools include commodity flow studies, corridor assessments and ops capability assessments
- Will likely require mutual aid and a more robust on-scene ICS than responders normally use.

![Response Challenges](image)

PLANNING CONSIDERATIONS

Response Challenges
- Location of the incident
- Amount of product involved
- Size of the initial problem
- Amount, type and nature of resources necessary for fire control, spill control, clean-up and recovery

- Thirty (30) derailments involving Hazard Class 3 liquids since 2006
  - Sources: FRA, NTSB, Open Source
- 20 crude oil incidents / 10 ETOH incidents
- 21 HHFT / 9 Manifests derailments involving 530 (+/-) TC’s
  - Spill / Fire (21); Spill / No Fire (8); No Release (1)
  - Approximately 62% of TC’s were breached
- Spill sizes ranged from 500 to 1,568 million gallons, with average at 169,000 gallons (equivalent to total loss of 5+ tank cars)
- 48 Fatalities (Lac Megantic = 47; Cherry Valley, IL = 1)
II. THE PRODUCTS

- Crude Oils
- Dilbit / Synbit
- Bitumen
- Diluent
- Ethanol

CRUDE OIL CHARACTERISTICS

Petroleum Crude Oil
Sweet
CAS No. 8002-05-9
UN1267
DOT Hazard Class 3
FLAMMABLE LIQUID
Hazard Rating = High
ERG Guide No. 128

CRUDE OIL CHARACTERISTICS

Petroleum Crude Oil
Sour
CAS No. 8002-05-9
UN3494
DOT Hazard Class 3
FLAMMABLE LIQUID
Hazard Rating = High
ERG Guide No. 131

ETHANOL CHARACTERISTICS

Ethanol
Alcohol n.o.s./Denatured Fuel
Ethanol/Ethanol Gasoline Mixture
UN1170, 1987, 3475
DOT Hazard Class 3
FLAMMABLE LIQUID
Hazard Rating = High
ERG Guide No. 127, 128

THE PRODUCTS

- Must have basic understanding of physical and chemical properties.
- Light vs. Heavy Crude (Shale Oil vs. Tar Sands Oil)
- Sweet vs. Sour Crude Oil (> 0.5% hydrogen sulfide)
- Toxicity – benzene emissions

PROPERTIES RELATED TO SPECIFIC GRAVITY

“Weight” or Specific Gravity:
- Lighter crudes:
  - Lower density
  - Low viscosity
- Heavier crudes:
  - Higher density
  - Higher viscosity
API GRAVITY

- Water = 10°
- Light Viscosity - >31° (shale crudes; Bakken averages 36 to 44°)
- Medium Viscosity - 22 to 31°
- Heavy Viscosity - <22°
  (bitumen/diluent 70/30 or bitumen / syncrude 50/50)
- Extra Heavy Viscosity - <10° (Tar Sands crudes)

THE PRODUCTS – WHAT DO WE KNOW?

- Data points for crude oil / ethanol fires track closely for container behavior, fire behavior, and response experiences.
- Air monitoring at incidents and test fires have shown products of combustion to be significantly different than Class A fires.
- Water-borne spill scenarios – ethanol vs. crude oils = different spill response tactics
- Considerable body of knowledge on crude oil firefighting
  - Crude oil storage tank firefighting
  - Behavioral concepts – frottores, slippage, and boilover
  - Application of water onto the crude oil or TC can increase risk of foaming

THE PRODUCTS – OBSERVATIONS

- The potential presence of dissolved gases in crude oil appears to NO be a significant issue in terms of fire behavior once ignited.
- As light ends burn off, a heavier, more viscous crude oil product will often remain.
- Seldom does the fire consume all product within a TC.

EVALUATING RISKS – AIR MONITORING

<table>
<thead>
<tr>
<th>Spill Type</th>
<th>Fire Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>O₂</td>
<td>O₂</td>
</tr>
<tr>
<td>Explosive Levels (LEL/UEL)</td>
<td>Carbon Monoxide</td>
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<tr>
<td>H₂S</td>
<td>Explosive Levels (LEL/UEL)</td>
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<tr>
<td>Barium</td>
<td>Barium</td>
</tr>
<tr>
<td>Organic vapors (VOCS)</td>
<td>Organic vapors (VOCS)</td>
</tr>
<tr>
<td>Sulfur and Nitrogen Oxides</td>
<td>Particulates (smoke)</td>
</tr>
</tbody>
</table>

SUMMARY - CRUDE OIL

- Physical and chemical properties vary depending on oil reservoir.
- Behavior of crude oil may vary.
- Flammable and toxic vapors are released from spilled product.
- Air monitoring and sampling are key to assessing hazards at the incident site.

III. THE CONTAINERS

- Currently transported in DOT-111 and CPC-1232 TC’s
- 2017 through 2025 these TC’s will either be:
  - Replaced from service
  - Retracts
  - Replaced by DOT-117
- All new TC’s built after 10/1/15 must be built to DOT-117 specifications
- See PHMSA schedule slide
GENERAL SERVICE TANK CARS

DOT 117 SPECIFICATION CAR

I.S. TANK CAR PHASE OUT SCHEDULE

PACKING GROUP DEFINITIONS

CONTAINER BEHAVIOR

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Tank Car</th>
<th>Phase-out / Retrofit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude Oil</td>
<td>D.O.T. 111 Non-Jacketed</td>
<td>January 1, 2018</td>
</tr>
<tr>
<td></td>
<td>D.O.T. 111 Jacketed</td>
<td>March 1, 2018</td>
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<tr>
<td></td>
<td>C.P.C. 1222 Non-Jacketed</td>
<td>April 1, 2020</td>
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<tr>
<td></td>
<td>C.P.C. 1222 Jacketed</td>
<td>May 1, 2025</td>
</tr>
<tr>
<td>Ethanol</td>
<td>D.O.T. 111 Jacketed &amp; Non-Jacketed</td>
<td>May 1, 2023</td>
</tr>
<tr>
<td></td>
<td>C.P.C. 1222 Non-Jacketed</td>
<td>July 1, 2023</td>
</tr>
<tr>
<td></td>
<td>C.P.C. 1222 Jacketed</td>
<td>May 1, 2025</td>
</tr>
<tr>
<td>Other Class 3, PG I</td>
<td>D.O.T. 111, C.P.C. 1222</td>
<td>May 1, 2023</td>
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<tr>
<td>Other Class 3, PG II &amp; III</td>
<td>D.O.T. 111, C.P.C. 1222</td>
<td>May 1, 2023</td>
</tr>
</tbody>
</table>

Release Scenario Hazards:
- Flash fires
- Pool fires
- Fireball from container failures
  - Direct flame Impingement
  - Radiant heat exposures
- Shock wave?
- Container fragmentation?
**CONTAINER BEHAVIOR – WHAT DO WE KNOW?**

- TC's equipped with jacketing and thermal protection have performed better than legacy DOT-111 and non-jacketed CPC-1232's in derailment scenarios involving fire.
- Number of TC's that breach is dependent upon:
  - Type of TC involved (e.g., DOT-111, CPC-1232 jacketed vs. non-jacketed TC)
  - Derailment configuration (e.g., in-line vs. accordion)
  - Speed of train and energy associated with derailment
- TC's that pile up sustain more car-to-car impacts = greater probability for breaches or cascading thermal failures from pool fires.

**CONTAINER BEHAVIOR – WHAT DO WE KNOW?**

- TC's have failed as quickly as 25 minutes after initial derailment and 10+ hours later.
- Liquid pool fires lead to failure of valve gaskets = additional leaks and issues for both response and recovery ops.
- Residual product remains in TC's & produces internal vapors. Anticipate flash fires any time (wreck clearing & clean-up ops).

**IV. APPLYING RISK-BASED RESPONSE (RBR)**

- Are there any immediate life threatening issues that must be addressed?
- Can responders safely approach the incident?
- Is the incident rapidly increasing in size or scope?
- Do responders fully understand the nature and scope of the problem?

**CRITICAL SIZE-UP QUESTIONS**

- Heat induced tears will differ from BLEVE scenarios
- Observed on both ETOH & crude oil TC's
- Observed no relationship between PRD activation and blistering of the TC shell
- Observed no evidence of linear cracking / separation in crude oil HHFT scenarios.
- Thermal & radiant heat.

**CRITICAL SIZE-UP QUESTIONS**

- Determine what is happening:
  - Has product been released?
  - Where is the spill going?
  - Is there fire involved? What type?
  - Is fire impinging on other TC's?
  - Are EVI's actuated?
  - Are there breached tank cars with product burning inside of the container?
  - Do responders have the capability to apply cooling or foam streams?
RBR - HEAT INDUCED TEARS VS. BLEVE

- NFPA - "...major container failure, into 2 or more pieces..."
- No separation of DOT-111 or CPC-1232 TC in crude service
- Two incidents of separation in ETON service
  - Arcadia, OR
  - Pinawa, MB

RBR - "EQUILIBRIUM"

- Fire no longer expanding & has achieved a "steady state" of fire and container behavior
- Usually after light ends have burned off & fire intensity no longer increasing
- Fire Behavior & Incident Characteristics:
  - Fire confined to a specific area w/little probability of growth in either size or intensity
  - Low probability of additional hit’s or container breaches caused by fire impingement upon TC’s
  - No current PRD activations indicating continued heating of TC’s

RBR - KEY POINTS

- Every incident will arrive at some outcome, whether responders intervene or not.
- Responders goal is to favorably change or influence the OUTCOME of the incident.
- If responders cannot favorably change the natural outcome, defensive or non-intervention strategies may be the best option.

INCIDENT TIMELINE NOTES

- Training tool only – designed to show the relationship between:
  - Behavior of the tank car(s) and their contents
  - Key incident management benchmarks
  - Strategic response options
- Specific response timeline elements will vary based upon local response timelines and operational capabilities.
- Train speed and energy will directly influence container breach and the size / scope of the incident
- Container breaches have occurred as soon as 25 minutes and as long as 10 hours+

STRESS / BREACH / RELEASE BEHAVIORS

Problem vs. Response Timeline

- Equilibrium
- Incidents
- Response
- Effectiveness

- Equilibrium
- Incidents
- Response
- Effectiveness

- Risk-Based Decision
- Analyze Problem
- Assess Impact / Consequences
- Available Resources
- Assign Resources
MOSIER, OR. RESPONSE TIMELINE

- Risk Based Response
  - Analyze Problem
  - Assess Impact
  - Evaluate Risk/Consequences
  - Available Resources
  - Additional Resources
  - Incidence Frequency
  - Probability of Container Failure

V. MANAGING THE INCIDENT

- HHFT incidents are large, complex & lengthy response scenarios
- Likely the largest flammable liquid incident encountered by most response agencies.
- Challenges will include:
  - Incident location
  - Overall size and scope of the problem
  - Rapid growth of the fire and spill problem, and
  - Level of resources available at the beginning of the incident.

RULES OF ENGAGEMENT

- Response operations will be guided by National Contingency Plan (NCP)
- Require a Unified Command Structure
- Regulatory-based C&G Assignments
  - Public Information Officer (PIO)
  - Liaison Officer (LIO)
  - Environmental Unit Leader (Enviro)
SUMMARY

- Changes in the North American energy sector and the increased utilization of HHFT have brought new challenges to the emergency response community.
- Facilitate the application and use of risk-based response methodologies for HHFT planning and response.

THE END
**OBJECTIVES**

- Assist emergency planning and response personnel in preparing for liquid petroleum pipeline incidents.
- Review key lessons learned from pipeline incidents, focusing on the following factors: planning; the products being transported, pipeline design and construction, tactical and incident management considerations.
- Facilitate the application and use of risk-based response methodologies for pipeline emergency planning and response.
- Provide a forum for discussion.

**HISTORICAL OBSERVATIONS**

- Communications between responders and pipeline operators in initial minutes are critical (i.e., delayed response, common terminology).
- Represent low frequency, high consequence response scenarios
  - Incident location & overall size and scope of the problem
  - Potential for rapid growth of the fire and spill problem
  - Level of resources initially available
- Can be large and complex response scenarios
  - Early establishment of unified command
  - Need for an expanded ICS organization
  - Response phase vs. post-emergency response operations (HERO)

**PIPELINE EMERGENCIES (PE) CURRICULUM**

- NASFM - Pipelineemergencies.com
- PE Curriculum Options
  - Awareness (1-2 hours)
  - Operations (4 – 6 hours)
  - Technician (10 – 12 hours)
- 3rd edition currently under development

**LPPE INCIDENT COMMANDER FIELD GUIDE**

**SCOPE:** Provide tactical guidance and info for the IC responsible for management of liquid petroleum pipeline emergencies.

**PURPOSE:** Provide individuals currently trained and certified as HM On-Scene IC's with requisite knowledge and information to safely and effectively manage a liquid petroleum pipeline emergency.

**PRE-REQUISITES:**
- NFPA 472, Chapter 8
- ICS-300
- Knowledge on selection, application and use of Class B extinguishing agents for large flammable liquid fire scenarios.
RISK-BASED RESPONSE (RBR) PROCESS

Systematic process by which responders:
- Analyze a problem involving Hazmat
- Assess the hazards
- Evaluate the potential consequences
- Determine the appropriate response actions based upon facts, science, and the circumstances of the incident.

I. PLANNING CONSIDERATIONS

What Should Responders Know?
- Location of pipelines in response area
  - National Pipeline Mapping System [https://npsms.phmsa.dot.gov]
- Name of pipeline operator and how to contact them
- Product(s) being transported by the pipeline
- Shut-off valve locations
  - Responders should NEVER attempt to isolate pipeline valves on transmission pipelines unless under direction of pipeline operator
- Worst-case discharge / scenario

II. THE PRODUCTS

- Petroleum Crude Oils
  - Crude oil
  - Dilbit / Synbit
  - Bitumen
- Intermediate Products
- Refined Petroleum Products
  - Gasoline
  - Distillate Fuels
  - Aviation Gas (Jet A)
  - Jet Fuels (Jet A, J-1, J-8)
  - Ethanol

API GRAVITY

- Water = 10°
- Light Viscosity: 22° to 31° (shale crudes; Bakken averages 36 to 44°)
- Medium Viscosity: 22° to 31°
- Heavy Viscosity: <22° (bitumen/diluent 70/30 or bitumen / syncrude 50/50)
- Extra Heavy Viscosity: <10° (Tar Sands crudes)

III. PIPELINE OPERATIONS

- Basic operating principles
- Batch system for product transportation
- Size can range from 8 – 12 inches lines up to 42-inch transmission pipelines
- Flows / conditions monitored by Pipeline Control Center (PCC)
  - Supervisory Control & Data Acquisition System (SCADA)
CONTAINER BEHAVIOR

Release Scenario Hazards
- Spill — No Ignition
  - Source control
  - Spill control
  - Ignition control
- Spill and Fire
  - Pool fire
  - Running spill fire
  - Exposure protection

CONTAINER BEHAVIOR – WHAT DO WE KNOW?

- Pipeline shutdown
  - SCADA monitoring
  - Communications to PCC
- Pipeline isolation
  - Automatic valves isolated at PCC
  - Manual valves
- Backflow & Volume of potential release
  - Pipeline diameter
  - Distance between isolation valves
  - Elevation differences

IV. APPLYING RISK-BASED RESPONSE (RBR)

CRITICAL SIZE-UP QUESTIONS

- Are there any immediate life-threatening issues that must be addressed?
- Can responders safely approach the incident?
- Do responders fully understand the nature and scope of the problem?
- Spill vs. fire scenario

CRITICAL SIZE-UP QUESTIONS

- Determine what is happening:
  - Where is the spill going?
  - Is there fire involved?
  - What are your exposures?
  - Do responders have immediate access to Class B foam and water supplies for control/suppression operations?
  - Fire extinguishment vs. environmental clean-up issue
RBR - KEY POINTS

- Every incident will arrive at some outcome, whether responders intervene or not.
- Responders goal is to favorably change or influence the OUTCOME of the incident.
- If responders cannot favorably change the natural outcome, defensive or non-intervention strategies may be the best option.

V. MANAGING THE INCIDENT

- Pipeline incidents involving Class 3 liquids will be large, complex & lengthy response scenarios
- Challenges will include:
  - Incident location
  - Overall size and scope of the problem
  - Rapid growth of the spill and fire problem, and
  - Level of resources available at the beginning of the incident.

TACTICAL CONSIDERATIONS - INITIAL OP

A. Incident Management Principles
B. Problem Identification
C. Hazard Assessment & Risk Evaluation
D. Select Personal Protective Clothing & Equipment
E. Logistics & Resource Management
F. Implement Response Objectives
G. Clean-Up and Post-Emergency Response Operations

TACTICAL CONSIDERATIONS: SPILL AND FIRE CONTROL

- Problem
- Objectives
- Resources
- Organization

MANAGING THE INCIDENT

- Incident management issues
  - Environmental, health & safety
  - Fire, spill and leak control
  - Public protective actions
  - Situational Awareness
  - Logistics & resource management
  - Information management
  - Public affairs
  - Community issues
  - Incident investigation
  - Infrastructure impacts & restoration

SUMMARY

- Changes in the North American energy sector have brought new challenges to the emergency response community.
- Seeing construction of new pipelines and reuse/reversal of pipelines already in service.
- Facilitate the application and use of risk-based response methodologies for PPL planning and response.
Development of Competency Guidelines for HHFT Incidents by Transport Canada Emergency Response Task Force (ERTF) and the NFPA – by Chris Powers, Past Chair, ERTF

Background Lac Megantic

- July 6th, 2013, a 72-car Montreal, Maine & Atlantic train carrying Bakken crude oil destined for the Irving Oil Refinery in St. John N.B. rolls away from where it had been parked in Nantes, Quebec.
- The train descended almost 400 feet over 10 miles and may have been moving at up to 100 kilometres per hour.
- At 01:15 hours in the morning, 63 of the 72 tank cars derailed and caught fire immediately.
- 47 people died, over 30 buildings were destroyed

Fireball over Lac Megantic from HIT

Volume of Crude (estimates by Quebec Ministry of Environment)

- 7,600,000 liters of crude oil on train
- 5,978,000 liters spilled or burned
- 100,000 liters spilled into Chaudière River
- 41,600,000 liters of oily water removed in and around Lac Megantic up to Oct. 21st, 2013

Fire Service Mutual Aid

- Initial response of approx. 150 firefighters from nearby fire departments
- Total response of over 1000 firefighters from 60+ fire departments in Quebec and Maine
- Mutual Aid Fire Depts. from Franklin County in the State of Maine
Examples of Crude Derailments and Fires
- July 4th, 2013 - Lac Megantic, Quebec
- November 2013 in Pickens County Alabama
- December 30th 2013 near Casselton, N.D.
- January 7th, 2014 near Plaster Rock N.B.
- April 30th, 2014 Lynchburg Va
- Feb. 14th, 2015, near Gogama Ont.
- February 14th, 2015, Mi. Carbon W. Va.
- March 5th, 2015, near Galena Ill.
- March 7th, 2015, near Gogama Ont. (2nd Incident)

Transportation of Dangerous Goods
General Policy Advisory Council
At the TDG General Policy Advisory Council (GPAC) on Nov. 21st, 2013 Minister of Transport Lisa Raitt identified the concerns of the federal government with respect to the urgent need to make improvements to help ensure safe transportation of dangerous goods.
Three (3) Working Groups were established at the meeting and designated as:
- Emergency Response Assistance Plan (ERAP) Working Group
- Classification Working Group
- Means of Containment Working Group

What is an Emergency Response Assistance Plan? (ERAP)
- An ERAP describes what is to be done in the event of a transportation accident involving a certain hazardous dangerous goods.
- The ERAP is required by Part 7 of the Transportation of Dangerous Goods Regulations (TDGR) for dangerous goods that require special expertise and special equipment to respond to an incident.
- The plan is intended to assist local emergency responders by providing them with technical assistance and specially trained and equipped emergency response personnel at the scene of an incident.
- The plan is also in emergency preparedness, including personnel training, reserve exercises and equipment maintenance.
- The ERAP plans must be integrated with other organizations to help mitigate the consequences of an incident. This is accomplished by working within an Incident Command System or ICS.

ERAP Working Group Recommendations
On January 31, 2014, the ERAP Working Group tabled their report to the Minister of Transport. Recommendations 14.1 and 14.6 stated that:
- ERAPs are required for all Packing Group I and Packing Group II Class 3 Flammable Liquids in accordance with TDGR Regulations Part 7. Furthermore, it is recommended that Transport Canada conduct further study on the properties of different Class 3 Flammable Liquids to determine if ERAPs should be required for these products.
- An ERAP Working Group on Flammable Liquids continue to work on all aspects that are required to implement a national flammable liquids emergency response capability.
On April 23, 2014, the Minister announced the establishment of a TDG Emergency Response Task Force.

Emergency Response Task Force (ERTF)
- In June 2014 the Emergency Response Task Force (ERTF) began work on reviewing and making recommendations on means to improve response to dangerous goods incidents involving flammable liquids transported by rail and the ERAP program.
- Interest in the work of the ERTF resulted in many requests to participate and eventually over 90 individuals participated in 88 meetings and on sub-working groups.
- The ERTF has completed its mandate with the final meeting on March 17, 2016 and over two years made 40 recommendations to the Director General of TDG for consideration.

ERTF Terms of Reference
- A major issue was the need for a single comprehensive reference standard to address the unique emergency response requirements needed to deal with major rail incidents involving flammable liquids.
- Approval of ERAPs for flammable liquids required a reference for competencies for emergency responders.
- Most Fire Services in Canada use NFPA 1001 and 472 Standards for firefighters training programs.
- March 18th, 2014 NFPA and the Fire Protection Research Foundation (FPRF) sponsored a Workshop with the ERTF in Ottawa to identify needs and how NFPA could assist in this project.
- "New Project Initiation Form" was submitted to the NFPA Standards Council to consider a proposed new Standard on Competencies for Responders to Incidents of Flammable Liquids in Transport – High-Hazard Flammable Train (HHFT).

Need for Reference/Standard for HHFT Incidents Identified
- Approval of ERAPs for flammable liquids required a reference for competencies for emergency responders.
- Most Fire Services in Canada use NFPA 1001 and 472 Standards for firefighters training programs.
ERTF Training Working Group Outline for a Competency Guideline

- On Oct. 16/15, the ERTF Training Working Group met with Tom McGowan and Shyanne Watts of NFPA to begin work on the Guideline.
- Tom McGowan developed a template based on NFPA 477, all knowledge and skills required by the various sections from Awareness Level to Incident Command and also Specialized Employee C & 6A.
- Task force members then identified and discussed additional knowledge and skills required specifically for ERTF incidents set in the 473 standard.
- Following a number of meetings and reviews, the template was used to develop the Competency Guidelines document which was published in March 2016.
- Participation by NFPA and Tom McGowan’s help and support were essential in completing this project.

Guidelines are available on the Transport Canada website

Foam Application rate for HHFT incidents – Ken Willette, NFPA

Foam Application Principles

Their Expectations

Challenges
- Knowledge
- Skills
- Available agent
- Proper application
- Multi-dimensional

How They Are Taught

The Reality Is

Is There A Gap?
Solution

- Conduct workshop
- Develop responder tools
- Validate application rates

Thank You
The Fire Service Professional Qualifications System in North America – A short history and a look into the future – William Peterson and Doug Forsman

**Origins of the System**
- Based on the United Kingdom’s Fire Service Certification system - the idea.
- Joint Council of National Fire Service Organizations, a result of the America Burning Report - let’s run with it.
- National Fire Service Professional Qualifications Board - make it happen.

**The initial framework**
- Five Basic Standards
  - Firefighter
  - Fire Officer
  - Fire Instructor
  - Fire Inspector
  - Fire Investigator
- Steps as needed within the Standards
- Progressive system dependent on a career path approach
- A means for national level certification

**The standards**
- Five committees, structured membership, under the NFPA process
- Firefighter Standard (NFPA 1001) issued in 1974
- The other four standards followed
- Each had individual steps

**The Certification System**
- National Board on Fire Service Professional Qualifications - representatives from each of the JCNFSO member organizations
- Accredit State/Provincial/Local certification entities
- Issue National level certifications as an option
- Goal of professionalism and reciprocity

**Major Changes**
- Progression no longer built on standards as a career path (1983 to present)
- JCNFSO and NBFSPO disbanded in 1989
- IFSAC (1990), renewed Pro Board (1992)
- NFPA assumes all responsibility for standards (1990)
- Job Performance Requirement format adopted (1992)
**Why JPR's**

- Need for objectively measurable standards
- Organized and required job task analysis process
- Aided in reducing the number of levels within standards
- Provided givens, what must be accomplished, within what parameters and to what level of proficiency.

**Where we are**

- Ever expanding demand for new and expanded professional qualifications standards.
- Broadening scope of users
- Pressures on volunteer committees for time and talent
- Current thinking in the fields of competency and measurement

**Future State Opportunities**

- Aligning today's Pro Qual Standards and tomorrow's best practices in learning and performance development

**The Growing Need for Lifelong Learning**

"We now accept the fact that learning is a lifelong process of keeping ahead of change. And the most pressing task is to teach people how to learn." - Peter Drucker

**How do We Proceed?**

- What can the Pro Qual CC do to address the issues, capitalize on the opportunities, and evolve our approaches to better serve our customers and ensure our mission remains current, flexible and relevant?

**Evolve Our Competency Model**

- A well-crafted competency model addresses many of the identified issues.
- Although we talk about competencies, we are not really using a competency model today...rather components of instructional design models.
- Competencies are specific work behaviors distinguishing high and low job performance.
- Today, 85% of US organizations use competency models to drive performance, training, and qualification, including most governmental agencies.
What is using this approach?

- Centers for Disease Control
- U.S. Coast Guard
- Department of Defense
- Microsoft
- US Department of Veteran Affairs
- University of Florida
- Disney Institute
- Austin, TX ISD
- Many Others

What are competency models?

- Integrated approach to defining those critical skills, behaviors, and capabilities that ensure high-performance (specifically knowledge or specific roles).
- A common language that aligns disparate talent capabilities and processes.
- A talent management method that ensures both career and job capabilities are easily defined and understood by employees.
- An approach to simplify the alignment of developmental and assessment activities across an organization.
- Helps to identify skills gaps and ways to close them that align with individual and organizational goals.

Another Example

Leadership Competency

- Motivating Others
- Inspiring, Enthusiastic, Dynamic, People who can motivate others to do things that help the organization.
- Governing others: people do what they are told.
- carrots to encourage people to do something.
- Delegation: things that need to be done are given to the person to do the task.

Another Example

DOD-wide Competency Taxonomy

Using the context of the competency model and definitions, this shows the criteria for selecting competencies for the job or role, then they augment with high-performance career competencies for that role and other critical information.

High performer & career aligned competencies
Think About Competency: Types, or Levels, for use within Job Classifications

**Example Competency: Build Effective Teams**

**Overview:**
Builds cohesive teams of people within the organization, aligns with and supports that each team member feels valued and appreciated, greater teams to establish and achieve goals.

**Proficiency Levels**

<table>
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<tr>
<th>Level</th>
<th>Task</th>
<th>Competency 1</th>
<th>Competency 2</th>
<th>Competency 3</th>
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<tr>
<td>1st</td>
<td>Can organize people</td>
<td>2nd</td>
<td>3rd</td>
<td>4th</td>
</tr>
<tr>
<td>2nd</td>
<td>Relative</td>
<td>1st</td>
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<td>3rd</td>
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<tr>
<td>3rd</td>
<td>Understand</td>
<td>2nd</td>
<td>3rd</td>
<td>4th</td>
</tr>
<tr>
<td>4th</td>
<td>Work with</td>
<td>1st</td>
<td>2nd</td>
<td>3rd</td>
</tr>
</tbody>
</table>

- Acknowledge roles and responsibilities for the team
--Shares roles and responsibilities for the team
- Communicates effectively and in a positive manner
- Instructs and trains new employees

Assessment and Implementation

Your Efforts Provide Direction

These are your standards.
- The future direction should reflect the thinking of competent, professional fire service leaders.
NFPA HAZMAT FLIC Mobile App – by Weihua James Li, Thinkable Inc.

HAZMAT FLIC
Mobile Apps

James Li
wei@thinkable.com

Drag, Drop & Block It

HAZMAT FLIC

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- Desktop & Web Apps
- Native & Web Apps
- Cross-platform

- Support via app
- Push notifications
- in-app purchases
- Cloud-based

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