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Athéna Full-Scale Exercise Summary Report

ISR Report 6074-01-14

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SUMMARY

Transport Canada and its partner, Defence Research and Development Canada's Centre for Security Science (DRDC CSS), conducted the Athéna Full-Scale Exercise on February 25 and 26, 2107, at the *Institut maritime du Québec* (IMQ) in Lévis, Québec. The objective of the exercise was to make first responders' aware of the unique aspects of responding to derailments involving Class 3 flammable liquids. The exercise is the result of a valuable partnership between industry and the Government that provides the opportunity to highlight the capabilities and resources that industry can provide to support first responders in their response to such incidents. This initiative is in direct response to the 2013 tragedy in Lac-Mégantic, Québec. The exercise is part of the program to increase first responder's awareness that started in March 2016 with the Vulcan exercise in British Columbia and that ultimately seeks to support the development of a national training program for first responders.

The exercise consisted of two days of events and an e-learning taken by participants before the exercise. The first day of the exercise was conducted in a classroom and involved a number of demonstrations and presentations from industry specialists. The second day was centred on a hands-on response in the form of a series of activities based on scenarios of incidents involving flammable liquids. An evaluation methodology was established to record the strengths and areas for improvement identified throughout the exercise. Participants' knowledge was assessed through surveys conducted before the e-learning and at the end of the exercise. Participants provided their feedback during a session at the end of the second day. Evaluator feedback was obtained from the observation sheets they completed and at the after action review session, which involved the evaluators and the people in charge of designing the exercise.

The evaluation process revealed that the participants' knowledge regarding a response to a rail incident involving flammable liquids had increased after the two-day exercise. The participants learned about the resources available to them (especially support from CANUTEC and Remedial Measures Specialists (RMS)), identifying hazardous materials, using the train consist, activating the Emergency Response Assistance Plan (ERAP), and especially the importance of not acting hastily in the event of this type of incident.

Participants demonstrated that they were more comfortable assessing the situation and determining the appropriate action to take based on the hazards at the site in the event they have to deal with an incident involving flammable liquids. They are also better informed about the resources that industry, the railway companies and Transport Canada can provide to support them and help them make appropriate decisions.

The evaluation process also identified certain areas for improvement with respect to the Incident Response Guide (a quick reference tool for first responders in the form of a checklist) [4], the in-class training, the system for rotating through the activities and the content presented during some of those activities. These items will have to be reviewed in order to make the appropriate changes, which will be useful for the development of the training program.

1. INTRODUCTION

1.1 Background

The Canadian Safety and Security Program (CSSP) is a program funded by the federal government to strengthen Canada's ability to respond to serious accidents, natural disasters, and terrorist and criminal acts through the convergence of science and technology. CSSP is managed by DRDC CSS.

After the catastrophic derailment in Lac-Mégantic, Québec, in July 2013, the Transport Dangerous Goods Directorate (TDG) of Transport Canada (TC) underwent regulatory and operational changes to better respond to incidents involving flammable liquids by establishing and promoting best practices for internal and external actors. These changes respond to the recommendations of the Emergency Response Task Force (ERTF), which was created following the Lac-Mégantic incident. The recommendations include research studies on the properties of flammable liquids (petroleum crude oil), amendments to standards for tank cars, and a program improving response capabilities for derailments involving flammable liquids.

In support of the changes made by TC, a program of exercises was designed to share and demonstrate the effectiveness of rural communities' current capabilities to respond to a derailment involving flammable liquids (which today require an Emergency Response Assistance Plan or ERAP). The exercises also sought to improve the knowledge of TC ERAP program and services of CANUTEC, hazards associated with flammable liquids, appropriate response tactics, and resources offered by rail and petroleum industry specialists. The exercises also sought to evaluate first responders' level knowledge before and after the exercise to identify the strengths and gaps in terms of best practices.

The first series of exercises took place in British Columbia in 2015-2016 (Vulcan Exercises). To validate the impact of the program on various competencies across the country, a second series of exercises, Athéna, was held in Québec in 2016-2017. Like Vulcan, Athéna consisted of a tabletop exercise and a full-scale exercise. Athéna also used the lessons learned from Vulcan to improve the program and validate new tools. The program of exercises also made it possible to test the Canadian Association of Petroleum Producers (CAPP) and the Canadian Association of Fire Chiefs (CAFC) e-learning entitled "Emergency Preparedness for Rail Incidents Involving Flammable Liquids" [1].

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1.2 Objectives

The ultimate objective of the Athéna Full-Scale Exercise (FSX) was to provide awareness and response training for rail incidents involving Class 3 flammable liquids, in order to identify any strengths and areas for improvement with a view to supporting the development of a national training program for first responders.

More specifically, the Full-Scale Exercise sought to enhance the knowledge of first responders in regards to the following elements:

- Transport Canada's ERAP program;
- The existence of and access to specialized response resources (petroleum industry, railway industry and TC);
- The hazards and the unique challenges related to a derailment involving a train carrying flammable liquids, as well as the appropriate response strategies and techniques with the assistance of industry experts; and
- The coordinated efforts from all participating organizations under an organized command system.

The exercise also allowed to:

- Collect and evaluate feedback on the use of a checklist for first responders that can be used as an intervention support tool;
- Gather and assess feedback on the use of a virtual prototype as a training tool to be used to perform a comprehensive assessment of a derailment scene involving flammable liquids;
- Collect feedback on the CAPP-CAFC e-learning;
- Evaluate the impact of the changes made to the exercise program following the results of Vulcan; and
- Evaluate training elements and identify strengths and gaps in order to support the development of a national program for the response to incidents involving flammable liquids transported by rail.

1.3 Scope of the Document

This report describes the strengths and areas for improvement identified during the Full-Scale Exercise. These points cover the results of the comprehensive assessment of the simulated scenario, the results of the response on the simulated tank car (prop), the results of the evaluation of the Incident Response Guide (checklist / aide-mémoire) and the e-learning as well as the awareness training provided by members of the petroleum industry, the rail industry, and TC. This report also contains recommendations to address the gaps identified, as well as solutions to improve the exercise program with the ultimate goal of supporting the development of a national awareness program for the response to incidents involving flammable liquids transported by rail.

2. EXERCISE CONDUCT

The Full-Scale Exercise was based on the expectations set out in the Athéna Full-scale Exercise Control and Evaluation Manual v3-0 [2].

2.1 Exercise Date and Location

The exercise took place on February 25 and 26, 2017, at the Institut maritime du Québec (IMQ), 2965 de l'Etchemin Street, Lévis, Québec. Registration began at 7:30 a.m. (EST).

2.2 Participating Organizations

The partners for the FSX included members of:

- DRDC CSS;
- Transport Canada;
- International Safety Research (ISR);
- CN Rail (CN);
- Genesee & Wyoming Canada, Inc. (G&W);
- Railway Association of Canada (RAC);
- Canadian Pacific (CP);
- Suncor Energy;
- Emergency Response Assistance Canada (ERAC);
- MD-UN;
- École nationale des pompiers du Québec;
- GHD;
- Williams Fire and Hazard Control;
- IMQ.

The participants for the FSX included members of the following fire departments:

- Saint-Henri;
- Saint-Anselme;
- Laurier-Station;
- Beaumont;
- Lévis;
- Saint-Lambert-de-Lauzon;
- Sainte-Claire;
- Nouvelle-Beauce Regional County Municipality (RCM);
- Saint-Charles-de-Bellechasse; and
- Scott.

2.3 Exercise Schedule

The exercise consisted of a classroom training component, a field training component, and several interactive simulations. The tables below (Table 1 and Table 2) present the exercise agenda.

Table 1: Day 1 Agenda – February 25, 2017

Time	Activity	Presenters
7:30 to 8:00	Registration	ISR
8:00 to 8:15	Introductions and administration	TC, DRDC CSS, YSR
8:15 to 8:40	Emergency Response Assistance Plan Program and CANUTEC	TC
8:40 to 9:00	Tools for the response to rail incidents	ISR, TC
9:00 to 9:30	Properties and hazards of flammable liquids	Alain Carmel (Suncor)
9:30 to 10:00	Site and hazard assessment	Jean-Pierre Couture (RAC), Yves Hamel (CN), Sylvain Brière (G&W)
10:00 to 10:15	Break	
10:15 to 12:00	Visit to the rail yard	Jean-Pierre Couture (RAC), Yves Hamel (CN), Sylvain Brière (G&W)
12:00 to 12:45	Lunch	
12:45 to 13:15	Train consist	Jean-Pierre Couture (RAC), Yves Hamel (CN), Sylvain Brière (G&W)
1:15 to 1:45	Practical training with the train consist	Jean-Pierre Couture (RAC), Yves Hamel (CN), Sylvain Brière (G&W)
1:45 to 2:35	Integration of responders at the site of an incident	Alain Carmel (Suncor), Louis-Philippe Ethier (ERAC), Jean-Claude Morin (MD-UN)
2:35 to 3:30	Strategies and techniques from the petroleum and rail industry	Alain Carmel (Suncor), Louis-Philippe Ethier (ERAC), Yves Hamel (CN)
3:30 to 4:30	Demonstration of strategies and techniques from the petroleum and rail industry	Alain Carmel (Suncor), Louis-Philippe Ethier (ERAC), Yves Hamel (CN)
4:30 to 5:00	Summary of the day	ISR

Table 2: Day 2 Agenda – February 26, 2017

Time	Activity	Presenters
8:00 to 8:15	Summary of Day 1	ISR
8:15 to 8:30	Introduction to Day 2	ISR
8:30 to 10:30	Activity – Rotation No. 1	
10:30 to 12:30	Activity – Rotation No. 2	
12:30 to 1:15	Lunch	
1:15 to 3:15	Activity – Rotation No. 3	
3:15 to 3:45	Evaluation of exercise by the participants	ISR
3:45 to 4:30	Summary of exercise and feedback	ISR

2.4 Exercise Scenario

A primary scenario was presented to the participants during the interactive activities on the second day. The primary scenario was divided into two parts.

The first part of the scenario (Activity 1) focused on the initial considerations and activities involved for site assessment, notification, requests for support, assessing the train consist, logistics, and non-intervention tactics. The second part (Activity 2) sought to integrate responders under an ERAP, then carry out the steps required to apply the technique for cooling and fire extinguishment on a simulated tank car, under the supervision of industry specialists. Figure 1 shows how the scenario played out between the two parts and the simulated time compression within each part.

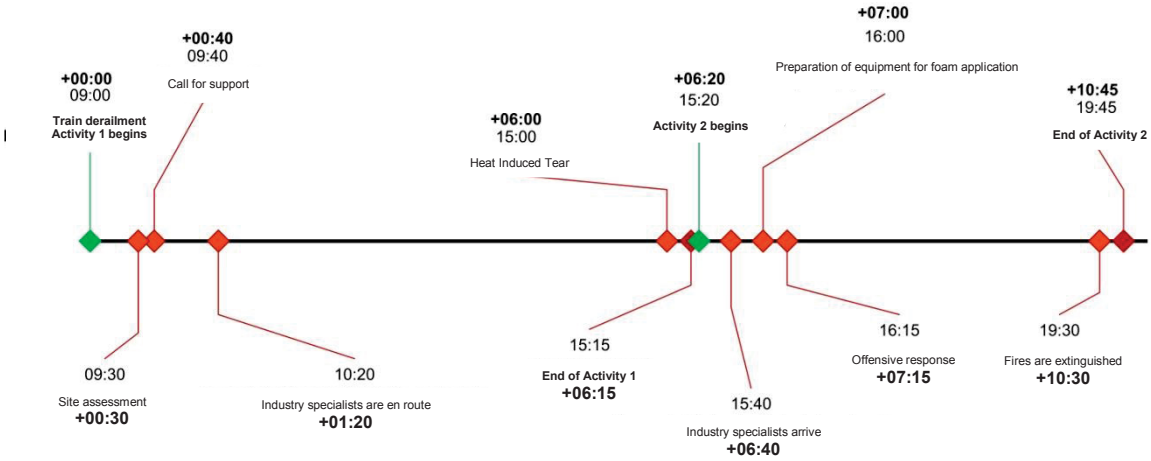

Figure 1: Scenario Chronology

2.4.1 Scenario Start State

There has been very heavy rain in the area for nearly a week. In the past 6 hours the temperature has dropped, and the rain has turned into snow.

On December 7 at 9:00 a.m., a freight train of 115 tank cars, 6 of which contained petroleum crude oil, approached the municipality of Saint-Charles-de-Bellechasse, Québec, at a speed of 35 km/h.

When the train approached the town from the southwest, the locomotive engineer noticed what appeared to be a deviation in rail alignment and elevation (the track had been washed out). He started applying the brakes, but it was too late to prevent the locomotive and several cars from derailing. The train crew managed to escape the locomotive and there were no injuries. The train crew began heading towards the derailment scene. Several residents alerted emergency services. The local fire department was dispatched to the scene.

The train consist indicates that several of the cars were carrying diesel (UN 1202), sulfuric acid (UN 1830), wood products, fly ash and petroleum crude oil (UN 1267). Diesel spilled from damaged tanker TILX280978 caused a fire. The smoke headed towards the residential area, covering an area of several square kilometres. The burning spilled liquid propagated towards the adjacent tanker GBRX70082, creating a risk of Heat-Induced Tear (HIT). Due to the severity of the incident, Saint-Charles-de-Bellechasse has initiated its emergency plan. The fire department is present on the scene of the accident and due to the severity of the incident, other fire departments from adjacent jurisdictions are also present, thanks to mutual aid agreements.

2.4.2 Activity 1

Activity 1 focuses on considerations and measures to take upon arriving at the scene of an incident: protecting first responders, securing the scene, assessing the scene and the hazards, requesting support, assessing the train consist, non-intervention tactics, and preparing to coordinate with the resources that will eventually arrive in scene (rail industry, petroleum industry and Transport Canada).

The virtual prototype on electronic tablets was the primary tool that enabled the participant to observe the scene and put into practice the site assessment process and the measures set out in the Incident Response Guide (Transport Canada checklist / aide-mémoire) [4].

2.4.3 Activity 2

Activity 2 gave participants the opportunity to carry out the steps required to prepare for the arrival of external organizations (industry experts, then the Transport Canada Remedial Measures Specialist (RMS)), integrate them into an organized command structure and develop a joint action plan for the response. Participants were then asked to carry out response strategies by applying cooling and fire extinguishing techniques (using foam) to the simulation tank.

2.4.4 Activity 3

Activity 3 was a combination of interactive sessions on the Emergency Response Guidebook (CANUTEC), the air monitoring including familiarization with available detection devices (GHD), and the display of equipment from a response contractor (MD-UN).

3. EVALUATION AND FEEDBACK

3.1 Evaluation Process

The exercise was evaluated in four parts:

- Before the exercise: A survey collected data on the first responders' initial level of knowledge.
- During the exercise: Evaluators identified gaps in the processes and procedures.
- At the end of the exercise: A survey gathered data on the responders' final level of knowledge. A feedback form was also used to have participants evaluate the training components.
- After the exercise: The day after the exercise, the After Action Review enabled partners (planners, controllers and evaluators) to do a full review of the exercise.

All these evaluations allowed to identify potential modifications to improve participants' knowledge, with the ultimate goal of supporting the development of a national training program for the response to rail incidents involving flammable liquids.

The FSX was not intended to assess the performance of individuals, but rather to offer an opportunity for learning and identifying gaps in current processes and procedures. Respondents' anonymity was protected, since all the results were compiled in aggregate for analysis.

The criteria for this assessment were designed based on the training participants received previously and during the two days of exercises. The key response areas (Table 3) were taken into consideration in developing the evaluation methodology and data collection methods.

Table 3: Areas of Response

Area of Response	Criteria
Site Assessment	Take initial protective measures
	Determine the immediate risks
	Secure the scene
	Confirm the presence of dangerous goods
	Obtain help
Hazard Assessment	Identify dangerous goods, types of cars and physical, electrical and other hazards present at the scene
	Identify the properties of the flammable liquids
	Identify the potential hazards related to the tank car that may affect the response
Response Considerations	Assess the fire and potential leak of the products involved
	Determine response actions
	Select appropriate personal protective equipment based on the hazards
	Incorporate industry into an organized command structure
	Establish an action plan
	Consider environmental and remediation factors

3.2 Data Collection

To support the evaluation process, several data collection methods were developed for the purposes of this exercise.

3.2.1 Baseline Survey

The participants filled out an online survey a few weeks prior to the exercise. This survey included many questions based on a scenario and related to the response to a derailment involving flammable liquids. Using open-ended questions, it sought to identify the actions that the participants would take during a simulated response involving flammable liquids. The responses also allowed to gather information on the participants' level of preparedness in terms of response and their awareness of the support and resources available to them.

The participants had to complete this survey before they could start the CAPP-CAFC e-learning and attend the training associated with the exercise. This survey allowed to determine a baseline of the participants' initial level of knowledge so it could be compared with their level of knowledge after the exercise. The online survey was identical to the survey used after the exercise and is available in Appendix A.

3.2.2 Evaluation Guide

Evaluators were assigned to each of the scenarios. To facilitate the collection of observations, the evaluators received an evaluation guide for their respective scenario which contained the specific criteria to be observed. These guides also contained details of the specific measures and discussions anticipated among the responders during the activities. The data collected would allow to determine the strengths and weaknesses of the procedures followed by the responders. The evaluation guides can be found in the Athéna Full-scale Exercise Control and Evaluation Manual [2].

3.2.3 Post-Exercise Survey

Once the exercise was completed, the participants filled out the same survey as they completed before the exercise, but this time on paper and in the classroom. The results of the two surveys would then be studied and compared to measure any changes in the level of knowledge resulting from the training received and activities carried out during the exercise. The survey can be found in Appendix A.

3.2.4 Feedback

In addition to giving their impressions of the CAPP-CAFC e-leaning and the information provided in class and in the field, participants were given the opportunity to provide their evaluation of the response tools, the virtual prototype and the exercise as a whole.

A plenary discussion was carried out to identify the strengths and weaknesses in each of these areas, then the participants received a feedback form to note their individual responses. This data will be used to improve the training and future exercises. The participant feedback form can be found in Appendix B.

3.2.5 After Action Review Process

The day after the exercise, an After Action Review (AAR) session was conducted to get partners' and evaluators' feedback. This feedback session sought to evaluate the strengths and weaknesses of the training and the actions that occurred during the full-scale exercise. AAR discussions were addressed for each activity, and the partners and evaluators discussed the following points.

- Extent to which participants' knowledge of the Transport Canada ERAP Program changed;
- Access to specialized response resources (petroleum industry, rail industry and Transport Canada);
- Response strategies and techniques; and
- Coordination of organizations under an organized command system.

Partners and evaluators also discussed how information and training tools should be modified to better support the exercise program.

3.3 Data Analysis

The results of the baseline and post-exercise surveys were analyzed to evaluate how the exercise affected participants' level of knowledge. The results are presented in percentages, based on the number of participants who provided the expected responses, and indicate areas where there were changes for each of the three areas of response that were evaluated, based on the exercise objectives.

The observations gathered by the evaluators and discussed during the AAR were analyzed and used as a support to the results of the surveys. The observations regarding the improvement of the shared knowledge and the exercise were identified for each area and are included with the results.

The participant feedback results were compiled and analyzed with respect to the same methodology and the subject addressed. These results were analyzed to determine ways to improve the knowledge shared, the exercise design, and the tools used for the response and simulation.

3.4 Demographics

The exercise participants were volunteer firefighters from the various jurisdictions listed in section 2.2. It was not required to have specific training or experience to participate in the Athéna exercise. To preserve anonymity, all data collected was analyzed in aggregate form. Consequently, the number of participants included in this sample does not necessarily reflect the number of participants in the exercise, or the number of participants who filled out the participant feedback survey, due to last-minute changes in the participant list.

The evaluation involved 27 participants who filled out the baseline survey and 23 who filled out the post-exercise survey. A total of 27 participants took part in both days of the exercise.

4. RESULTS

4.1 Overall Results

In general, the exercise was a great success; the participants indicated that their preparedness to respond to this type of incident increased considerably in all the areas. The greatest increase in knowledge was observed for site assessment, from 19% before the exercise to 78% after the exercise. Hazard assessment knowledge increased from 33% to 86%, and response knowledge increased from 37% to 90%. However, these results show that an average of 10% of participants feel they are still not ready to respond to this type of incident. This result may indicate both the need to improve training in this regard and the participants' awareness of the complexity of these types of incident and the specific skills required. Figure 2 shows the results of participants' self-evaluation of their knowledge and general skills before and after the exercise.

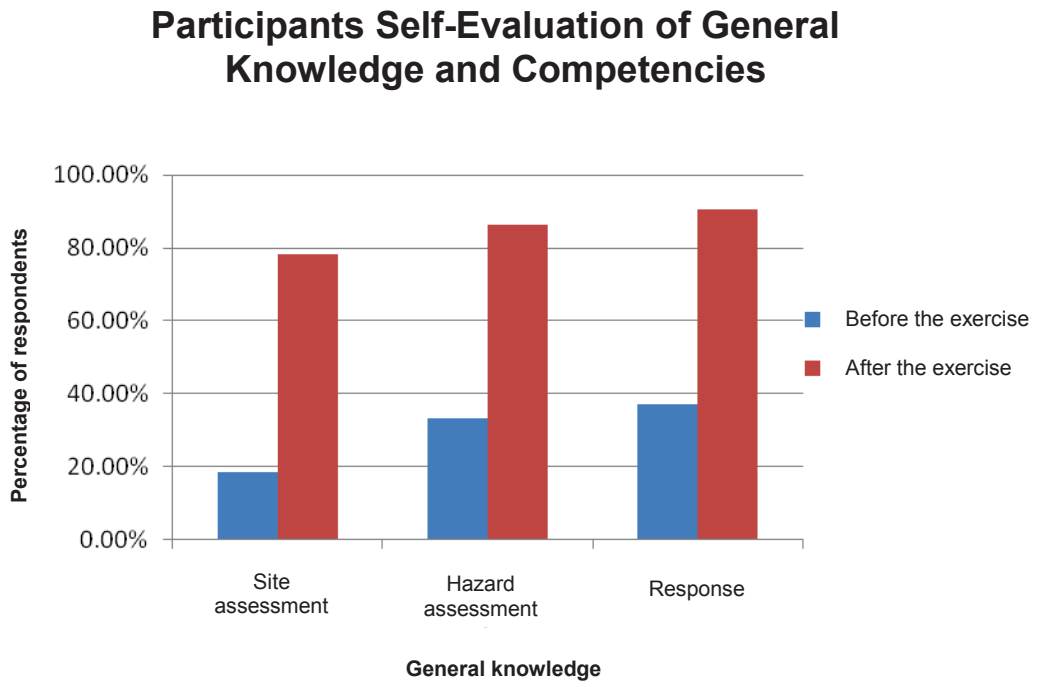

Figure 2: Participants Self-Evaluation of General Knowledge and Competencies

4.2 Shipping Documents

The exercise increased participants' awareness of how to safely obtain the train consist. Before the training, 78% of participants indicated that they were aware of how to obtain shipping documents. After the exercise, 100% of participants indicated that they were now aware of how to do so. The answers to the questions supported this conclusion, since there were detailed discussions over the components of a train in the responses obtained after the exercise.

4.3 Emergency Response Assistance Plan

The percentage of participants who knew what is meant by an Emergency Response

Assistance Plan (ERAP) increased from 89% to 100%. This is a major difference from Vulcan, where only 22% of participants were aware of the ERAP in the baseline survey. In addition, of those who indicated that they knew what is meant by ERAP, there was an increased in their capacity to look for ERAP information upon arrival on scene, from 4.0 (out of 5) before the exercise to 4.8 (out of 5) after the exercise. Only one participant reported not being able to do so after the exercise. This significant increase shows that the exercise objectives have been achieved, since there was an increase in participants' awareness of the ERAP. After the exercise, participants were aware of many services and capabilities available to them when an ERAP is activated, such as specialized response capabilities and the availability of resources and equipment on site to support the response. In addition, 78% of participants indicated that they would contact CANUTEC to request ERAP activation. Some participants (65%) also indicated that they would use the railway company's emergency number to initiate this process.

The evaluators also noted that during Activity 1, the participants requested assistance from the ERAP holder.

4.4 CANUTEC

CANUTEC's role was identified by all the participants (100%) before and after the exercise. This is a considerable improvement over Vulcan, where only 68% of participants were aware of CANUTEC's role before the exercise. This is another indication that the level of basic training is greater than it was for Vulcan participants. In addition, for Athéna, all participants knew how to contact CANUTEC before and after the exercise.

Moreover, the average probability of immediately contacting the railway using their emergency number increased from 4.7 (out of 5) before the exercise to 5.0 (out of 5) after the exercise. Participants were able to determine other methods to find this telephone number and also identified the most efficient ways to do so.

After the exercise the biggest variation in the means identified to contact CANUTEC was calling *666 on a cell phone (see Figure 3), which increased from 27% to 48%. The participants also demonstrated that they are now more aware of the means available to contact CANUTEC, in particular, the telephone number and the CANUTEC website. After the exercise, participants were less likely to use the Emergency Response Guidebook (ERG) or the dispatch centre: while they could provide the required information, participants learned during the training that these methods were less efficient.

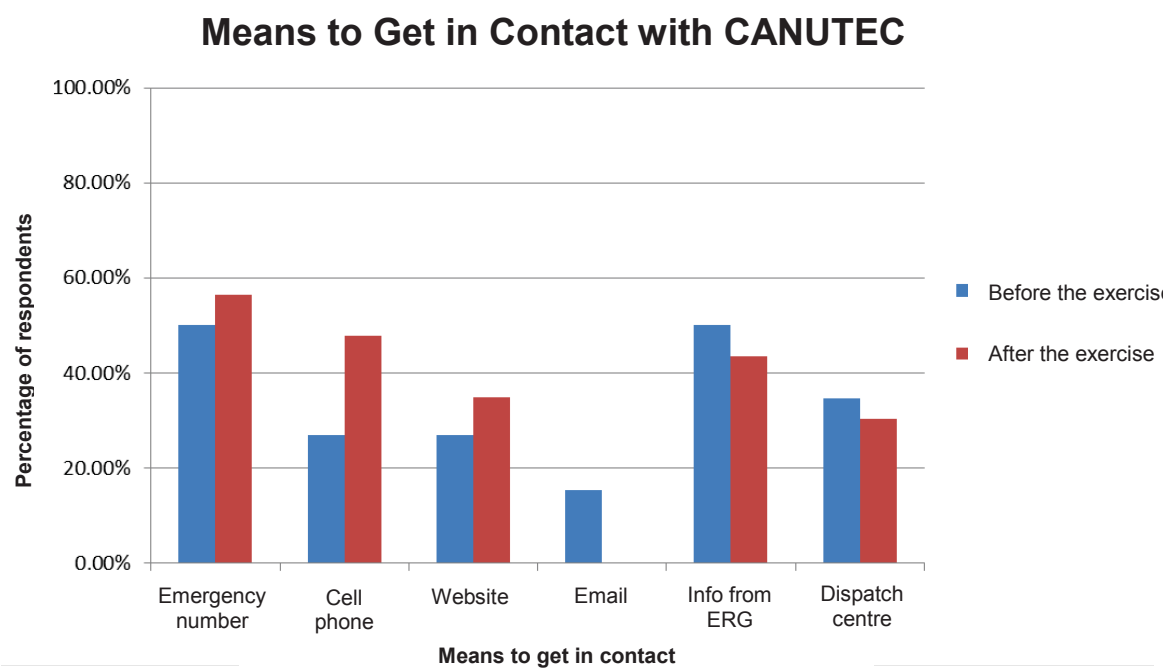

Figure 3: Means to Get in Contact with CANUTEC

The participants had to identify the different kinds of assistance that CANUTEC could provide. Before the exercise, only 8% of participants indicated that they would contact CANUTEC to be put in touch with the resources available to them for this type of incident. After the exercise, this number increased to 36%, the greatest increase for this question. This is a particularly important point, given that CANUTEC can also provide support to overcome language barriers (French-English) that may occur between first responders and industry specialists. Figure 4 shows participants' results for areas of assistance in which CANUTEC can help.

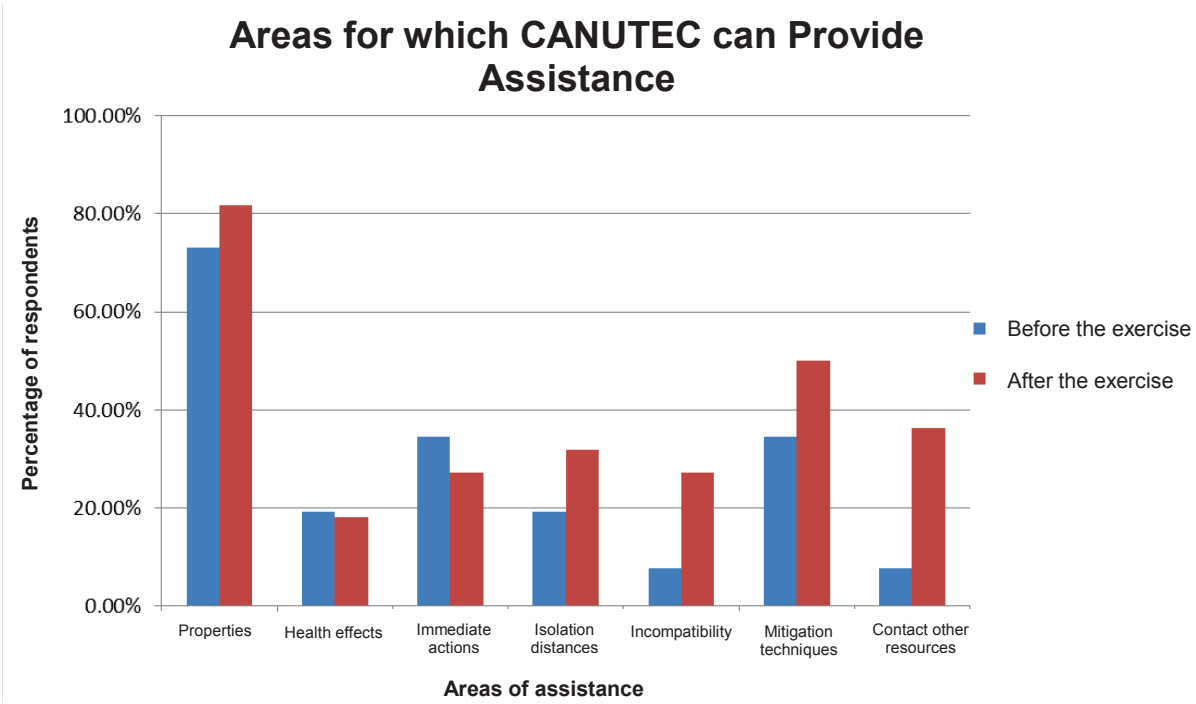

Figure 4: Areas for which CANUTEC can Provide Assistance

4.5 Site Assessment

The participants were asked to visualize a derailment scene using the scenario provided and to conduct a site assessment as though they had just arrived on scene. Before the exercise, the vast majority of actions consisted of securing the scene, contacting the dispatch centre, determining wind direction, evacuating people, identifying the products and establishing a security perimeter. After the training, a number of participants kept the same responses, but they also identified stopping rail traffic, activating the ERAP, and contacting CANUTEC and the railway company. As mentioned above, none of the participants mentioned stopping rail traffic before the exercise, while after the exercise only a few participants failed to do so. This step was therefore well understood by the majority of participants; however, given that it is an important step indicated in the Incident Response Guide (checklist / aide-mémoire) provided for the scenario in Activity 1, the training could further emphasize that this is one of the first steps that responders must carry out when they arrive on scene. This finding was also noted by the evaluators who observed that one of the first steps taken by the majority of participants to stop rail traffic was to contact the railway company, either by using their emergency number or through a member of the train crew.

Before the exercise some participants indicated that they would use resources (such as the ERG) to determine isolation zones for example, and this number increased after they exercise; which represents a better result than Vulcan, where the results were lower both before and after the exercise. In general, none of the participants acted hastily (rushing in) before or after the exercise, which is a positive point.

Before the exercise, several participants indicated that the immediate precautions to take to ensure responder safety while analyzing the situation were: identifying the

products involved, establishing a security perimeter and isolation zones, calling the supplier and approaching from upwind (with the wind at your back). Some participants also discussed personal protective equipment (PPE) and the possibility of contacting additional resources, such as industry specialists. Like in the previous question, the responses did not change greatly after the exercise, but more participants mentioned calling CANUTEC or using the ERG to determine isolation and evacuation distances, while keeping responders safe. In addition, participants also explicitly mentioned staying at a safe distance and not acting hastily (not rushing in).

Before the exercise, participants were asked to identify immediate protection measures to put in place for the public. The most frequent responses were: evacuation and establishing a security perimeter. These responses were based on information obtained from the products, the ERG, or by contacting CANUTEC. Other suggestions were contacting other organizations such as Sûreté du Québec (Québec provincial police). After the training, the responses provided were more or less the same in terms of evacuation and isolation zone, but the participants demonstrated that they had less need for consultation and their responses were more detailed, such as using a predetermined value of 800 m for the isolation zone. Once again, this demonstrates that the exercise activities made participants more familiar with the services and resources available to them, while giving them a good idea of the procedures to follow and the safety distances to establish before even contacting CANUTEC or any other organization; these calls would therefore serve to confirm or support the plans already established by the first responders.

After the exercise, the greatest increase in identifying the dangerous goods that cars may contain was using identifying marks on tank cars, which increased from only 31% before the exercise to 80% after the exercise (see Figure 5). In addition, after the exercise, there was an increase in the number of participants who would use the danger placards, the shipping documents and AskRail mobile app. Also after the exercise, participants were less likely to use CANUTEC or rely on the shape and type of a rail tank car to determine whether dangerous goods were present. It is possible that these changes are the result of the exercise activities, many of which presented the use of identifying tank car markings, including with the use of the virtual prototype. The training given was focused on using first the available tools, and then using CANUTEC later in the response.

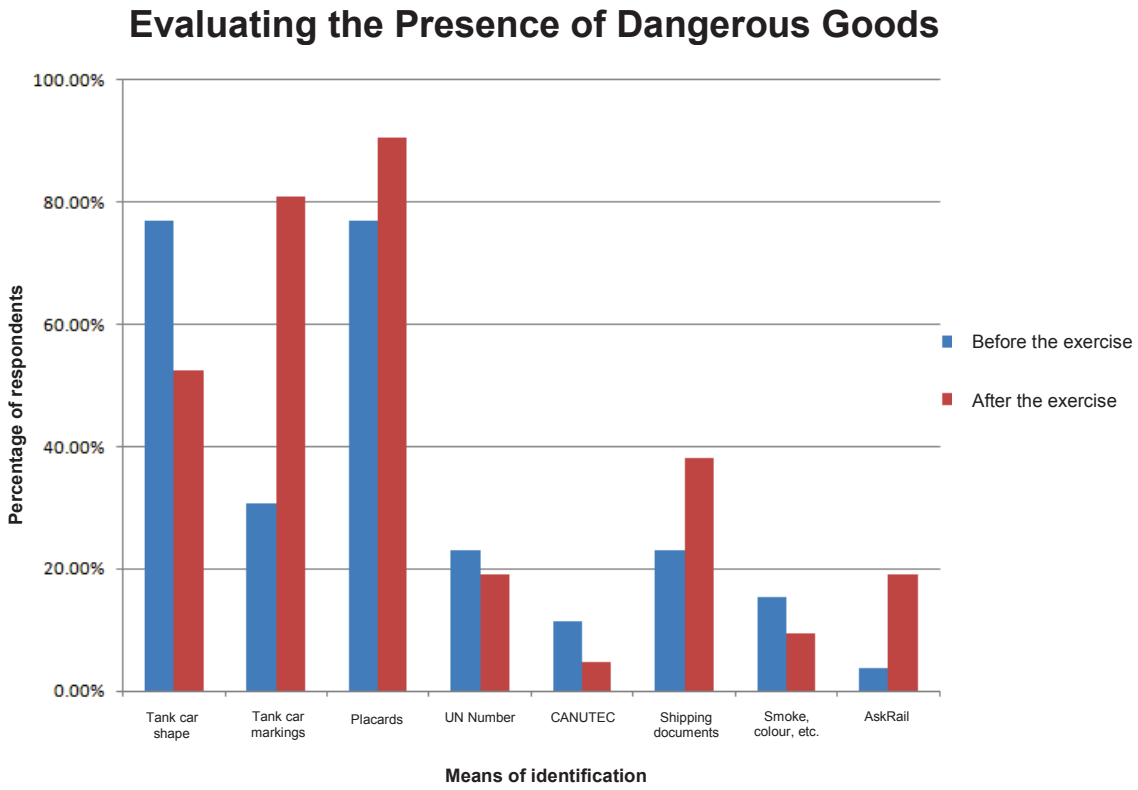

Figure 5: Evaluating the Presence of Dangerous Goods

The visit to the rail yard is a new element added since Vulcan. According to the post-exercise survey, this visit was appreciated by the vast majority of the participants, who felt it was beneficial and an opportunity to acquire new knowledge. After the exercise, the participants demonstrated an increase of knowledge of certain physical characteristics of tank cars that carry flammable liquids; this includes the various connectors such as manholes, bottom outlet valves, vacuum relief valves and heater coils. Before the exercise, 52% of participants were aware of these characteristics, and after the exercise this number increased to 86% (see Figure 6). Thanks to the two-day exercise, participants' knowledge of danger placards and how they indicate the presence of dangerous goods in a tank car has also increased.

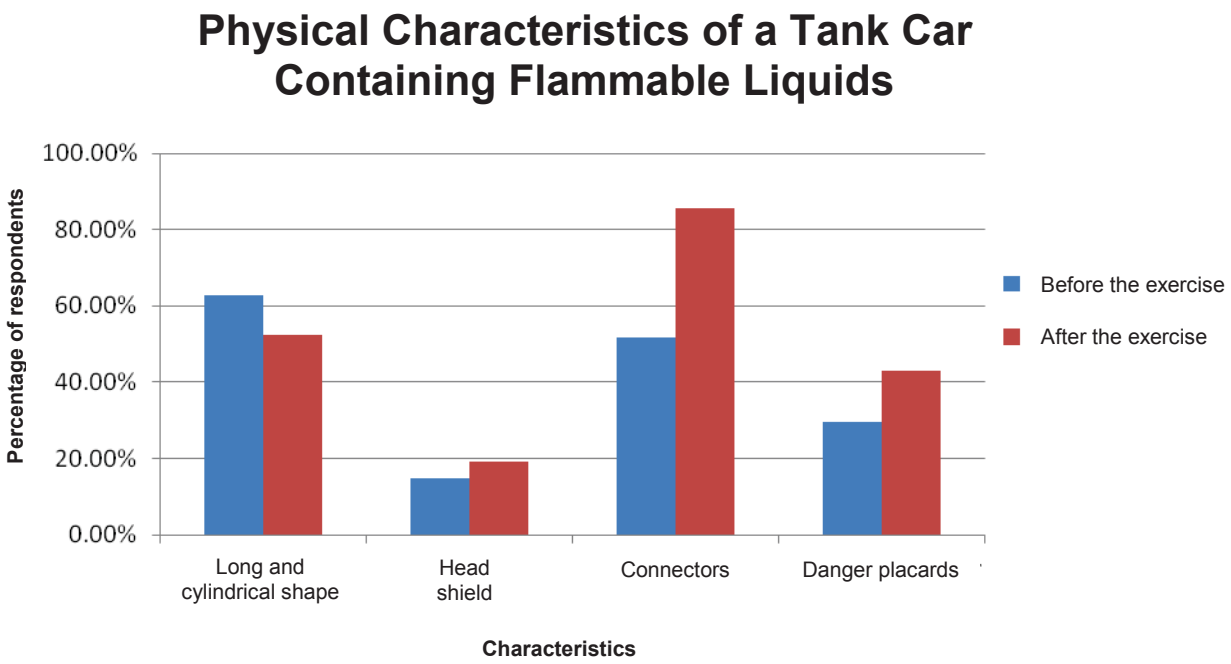

Figure 6: Physical Characteristics of a Tank Car Containing Flammable Liquids

The training component was very useful for making participants aware of the various ways to verify which dangerous goods are involved in the incident. After this exercise, an increase was noted in five of the seven ways to determine the nature of the dangerous goods. The biggest increase was for contacting the railway company (24%). The participants demonstrated that they were less likely to obtain the information directly from the train crew, with a decrease of 13%. This is probably due to the fact that the training emphasized that train crew members may not be available to provide the necessary information at the beginning of the incident or that even if they could do so, they would not have the same level of expertise and knowledge of the nature of the dangerous goods involved as CANUTEC or the railway company. The training also taught participants that some of these resources could provide assistance in sending other appropriate resources to the scene of the incident and activating the ERAP, while the support of the train crew in these areas may be limited. Figure 7 shows the methods for verifying the dangerous goods that may be involved in this type of incident.

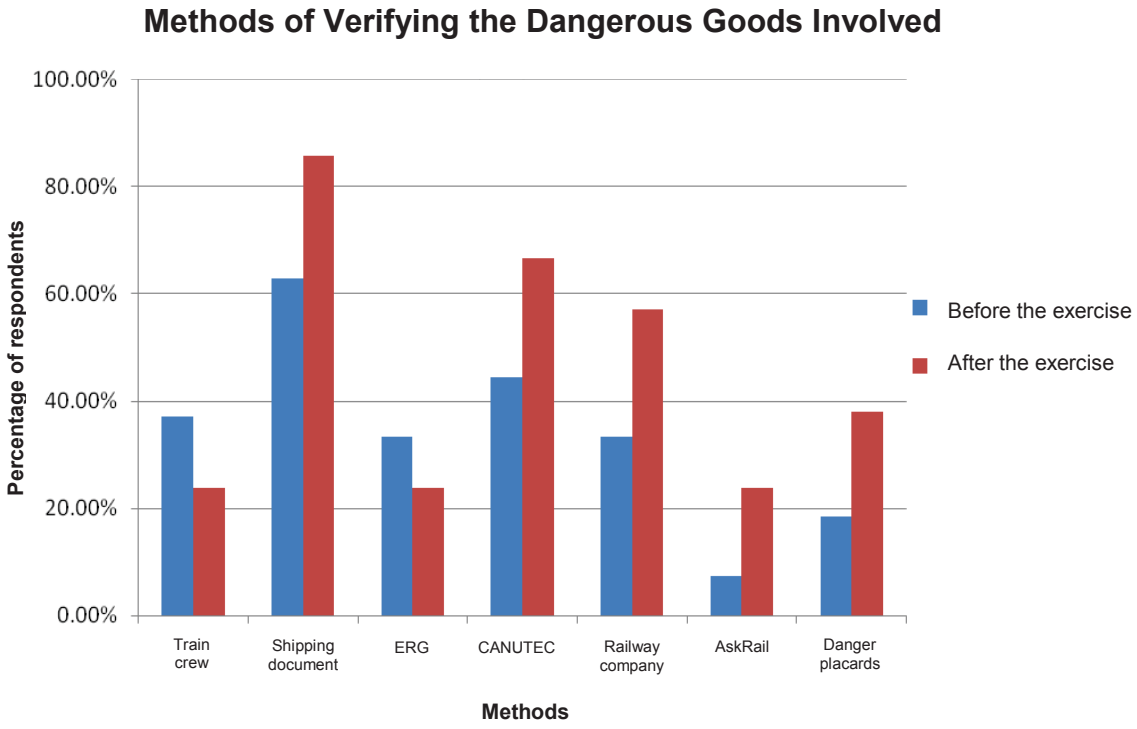

Figure 7: Methods of Verifying the Dangerous Goods Involved

Participants' knowledge of the information available in the shipping document (train consist) generally increased as a result of the training (see Figure 8). In particular, there was a significant increase in identifying the name of the dangerous goods, from 38% to 77%. After the training, more participants indicated that they would use the train consist to determine the total number of cars involved, the ERAP number and quantity of products present in the tank cars. In addition, one of the primary objectives of the exercise was to increase participants' knowledge of how to contact the ERAP holder directly. This corresponds with Vulcan, even though the training has been modified to include a practical activity with the train consist. This demonstrates that this method of training was beneficial, compared with the single presentation made during Vulcan.

Figure 8: Information Available on the Shipping Document

The participants had to determine how they would proceed to find the railway company's emergency number upon arriving on scene of a rail incident. The results are presented in Figure 9. In general, the responses obtained increased, and the participants were able to determine the methods necessary. The greatest increase observed (from 27% to 83%) was using the grade crossing as a reference to find the emergency number. The second-greatest increase (from 27% to 74%) was using CANUTEC to obtain the emergency number. This demonstrates that this part of the training was well understood by the participants. However, the number of participants who indicated that they would use their own dispatch centre to find the emergency number decreased after the exercise from 58% to 35%. This means that the training taught the participants to discover and identify other more efficient methods of finding the emergency number. In addition, some participants noted that their response plans at the command post also contained the railway company's emergency number; this is a good practice to potentially be implemented in neighbouring fire services to ensure that this information is easily accessible.

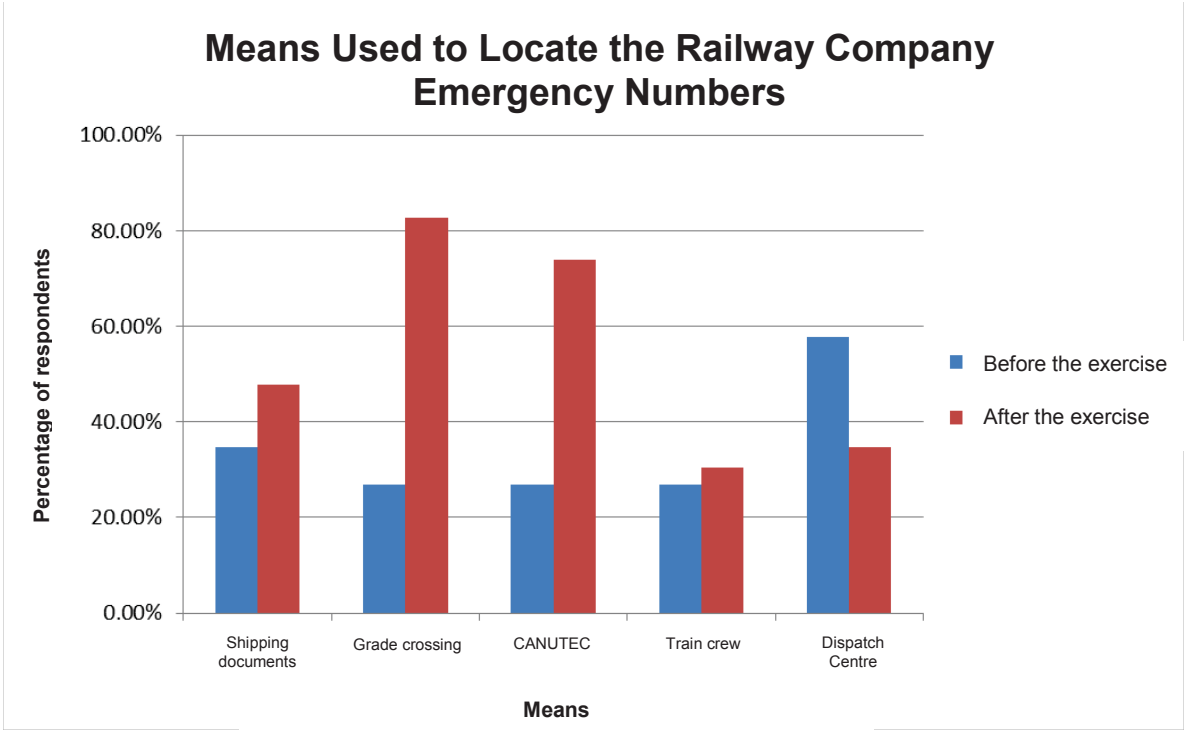

Figure 9: Means Used to Locate the Railway Company Emergency Number

The training considerably increased participants' knowledge of the services and capabilities available when an ERAP is activated. Before the training, only 35% of participants reported knowing about these services, but after the training all participants indicated that they were aware of them.

The participants were asked whether they knew which flammable liquids require an ERAP, and the only participants who were provided the opportunity to answer where those who said they were aware of the capabilities and services available when an ERAP is activated. Before the training, 57% of participants indicated that they were familiar with the flammable liquids requiring an ERAP, while after the training, 78% of participants were aware. This shows an increase in participants' knowledge of which flammable liquids requires an ERAP. However, it should be noted that this training could still be improved, as 22% of participants still were not familiar with the flammable liquids requiring an ERAP after the training.

The participants were asked to indicate whether they knew how to activate an ERAP upon arrival at the scene of a rail incident. Once again, only participants who said they were aware of the services and capacities available when an ERAP is activated were asked this question. Before the training, 71% of participants indicated that they knew how to activate an ERAP, whereas after the training, this number reached 100% (Figure 10).

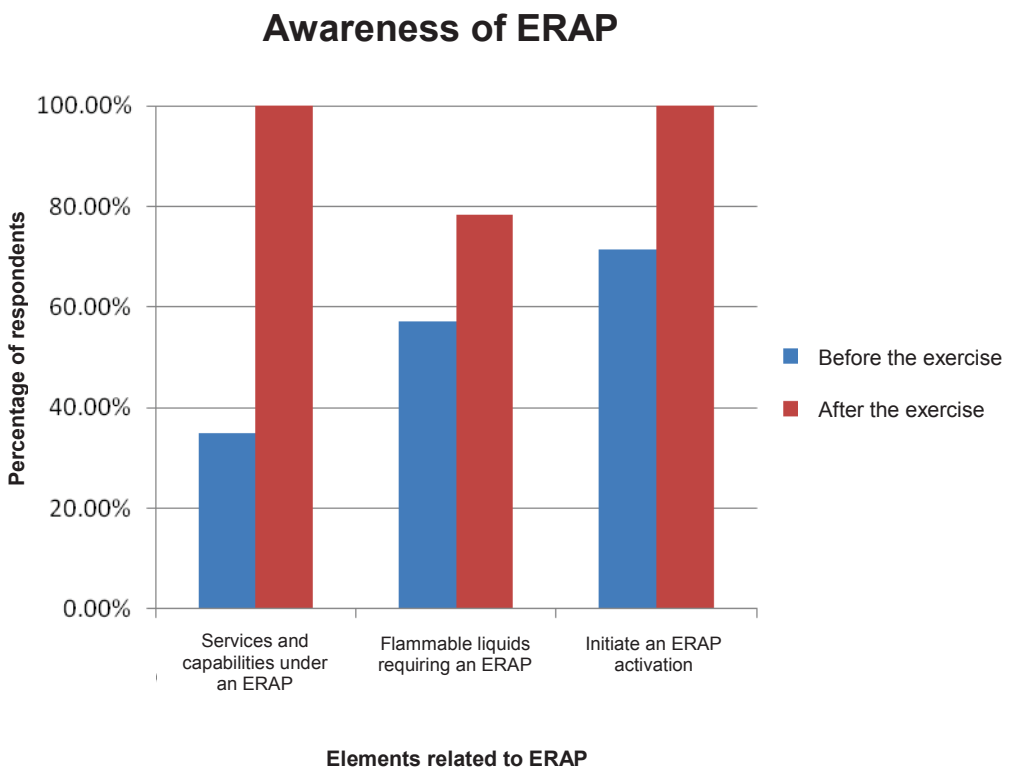

Figure 10: Awareness of ERAP

Before the training, participants were asked whether they were familiar with Transport Canada's Remedial Measures Specialist (RMS) role, and only 22% were. After the training, 91% of participants were aware of this role. These results correspond with those of Vulcan. However, after Vulcan, 97% of participants were familiar with the RMS role. This may show that Athéna did not put enough emphasis on the RMS role during the various presentations and interactive activities.

The participants were asked to indicate the ways they knew to contact an RMS. In the baseline survey, only participants who were familiar with the RMS role (22%) were asked this question, and 83% answered that they knew how to contact an RMS. However, after the training, all participants were asked this question, and 81% answered yes. In addition, after the training, 91% of participants indicated that they were familiar with the RMS role. These results show that there has been an increase in participants' knowledge of RMSs. However, the training and the exercise did not sufficiently emphasize this topic, since there are still participants who do not know what to do.

Participants were then asked how to contact an RMS. The analysis found that after the exercise, only 67% of participants indicated that they would call CANUTEC to contact an RMS, while 57% of participants would use an alternative method, such as contacting their dispatcher or the railway company. Before the exercise, 67% of participants indicated that they would call CANUTEC and 67% also indicated that they could use an alternative method. The lack of increase may be due to the fact that different numbers of participants answered the question before and after the training; there was an over 300% increase in the number of answers. Future training should stress the importance of using CANUTEC as a primary source for contacting an RMS. Once again, in the

baseline survey, only participants who indicated that they were familiar with an RMS's role (22%) were asked this question.

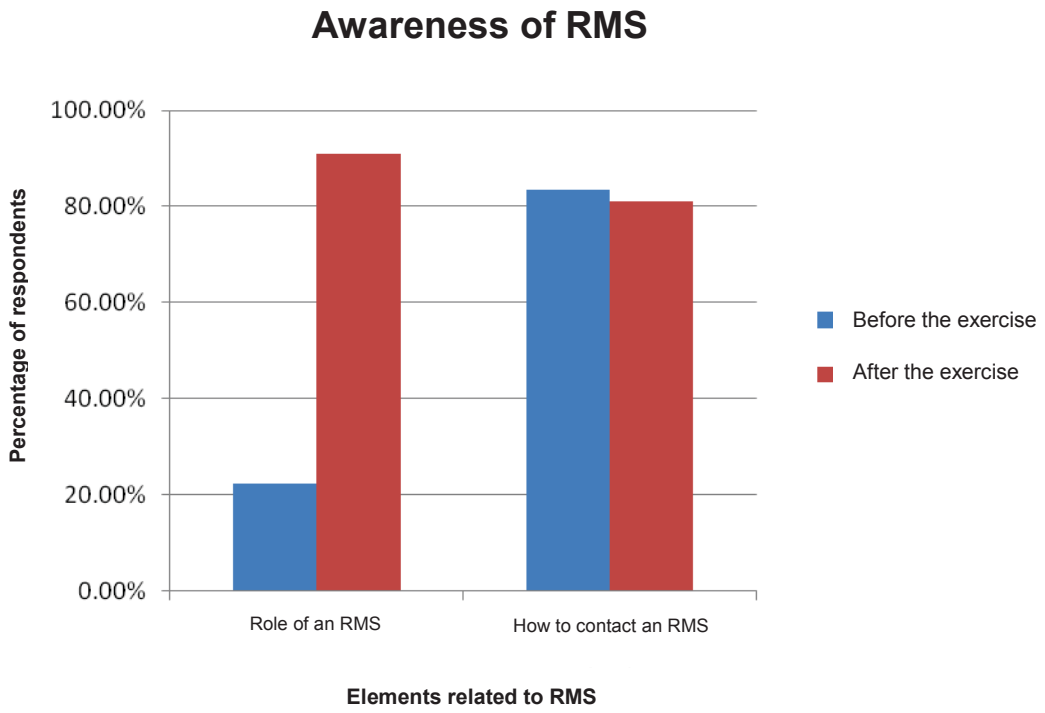

Figure 11: Awareness of RMS

4.5.1 Strengths

The training enabled participants to become familiar with the assistance offered by industry specialists, and particularly the type of assistance provided by CANUTEC. In addition, one of the positive points in this section involved the ERAP, which all participants now know how to activate, which was not the case before the training. Another strength was identifying (danger placards, rail car markings, tank car shape, etc.) and verifying (shipping documents, CANUTEC, railway company, etc.) the dangerous goods involved, as well as the physical characteristics of a rail car containing flammable liquids. The participants demonstrated a significant gain in knowledge of the means available to locate the railway company's emergency number, specifically by using the grade crossing or CANUTEC. Lastly, the participants clearly demonstrated their understanding of the fact that they must not rush in and must keep a safe distance.

4.5.2 Areas for Improvement and Recommendations

Some areas to improve are identified in this section. First, some participants still did not mention in the post-exercise survey that rail traffic needs to be stopped, even though this is a crucial step, as indicated in the Incident Response Guide (checklist / aide-mémoire) provided during the training. This may mean that there was not enough training on the Incident Response Guide provided to participants, or that the Guide needs to be modified to clearly indicate that this is one of the first measures that responders must

take when they arrive on scene. The second point concerns the RMS, since, after training, some participants still did not know what their role is or how to contact them, which shows that the training did not focus sufficiently on this topic. In addition, future training should indicate the importance of using CANUTEC as a primary source to contact an RMS.

4.6 Hazard Assessment

The participants were asked whether the protection measures and precautions taken to ensure the safety of response personnel and the public had to be modified when the cargo involved in the incident is petroleum crude oil. Participants' base level of knowledge was relatively high. There was a slight increase in terms of safety of the public and a slight decrease in terms of safety of responders, which is not very significant. The decrease observed may be due to the different number of participants who answered the question before and after the exercise. The training did not greatly affect the results obtained before and after the exercise (see Figure 12), so the training could be modified to strengthen and further increase participants' knowledge of this subject.

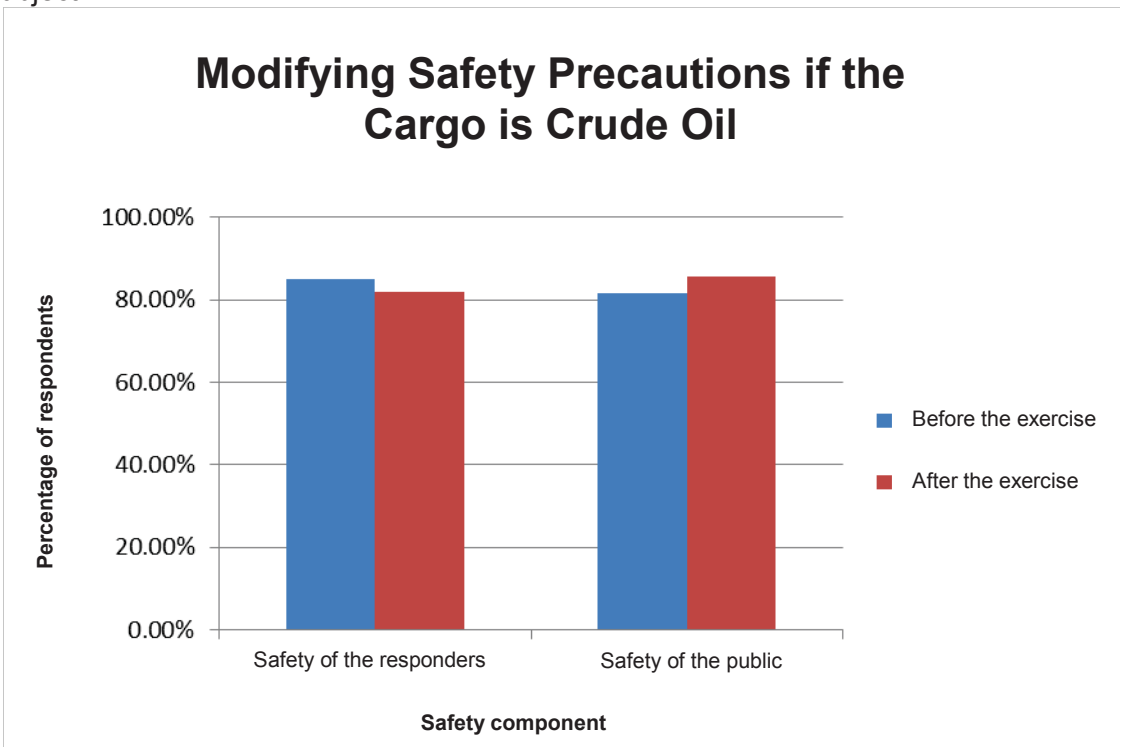

Figure 12: Modifying Safety Precautions if the Cargo is Crude Oil

The participants were asked to identify the risks related to crude oil that may affect their strategy. In other words, they had to indicate the properties of crude oil that play an important role. Based on the results of the two surveys (before and after), this question led to confusion, since the vast majority of participants responded differently: they talked about results involving impacts on the environment and the safety of responders and the public. For those who answered the question, the property that was raised most often was flammability, both before and after the exercise. The evaluators also indicated that these properties were not particularly discussed during the interactive activities. In the

future, the training could further emphasize the properties of crude oil, if this is pertinent for planning the response and identifying all the potential hazards.

The participants were asked to identify the possible physical hazards associated with the tank car. Before the training, 93% of participants answered this question, and the most common response was tank car failure (80%) and spill (30%). It should be noted that participants did not give more details, and some answered briefly by responding: physical hazards on the scene (15%). After the training, 100% of participants responded to the question and a slight increase was observed in the majority of the results. Tank car failure declined to 78%, spill remained steady at 30% and physical hazards on the scene increased to 22%.

The training made some participants aware of the hazards that may be caused by a breach in the tank car. Before the training, only 31% of participants indicated that a boil over was a potential hazard, whereas 65% of participants were able to identify this hazard after the training. However, the training did not greatly affect their knowledge of the hazards of a froth over, propagation of flammable liquids (creating pooled spill), fire spread, venting of hazardous vapours, and excess heat. In these cases, there was either a slight increase in knowledge (no more than 5%) or a decrease, the greatest of which was for fire spread (-41%). Further training on the types of potential hazards related to a breach may be necessary in future exercises.

In addition, the responses given by the participants after the training contained some terms taught in the training, such as BLEVE (Boiling Liquid Expanding Vapour Explosion) and HIT (Heat Induced Tear). This shows that participants have become more aware of the hazards associated with tank cars carrying flammable liquids.

While the training seems to have increased responders' awareness of the physical hazards present during a derailment, the results after the training remain relatively low (see Figure 13). The hazard most often identified after the training, which also represents the greatest increase (14% to 58%), is stressed rails.

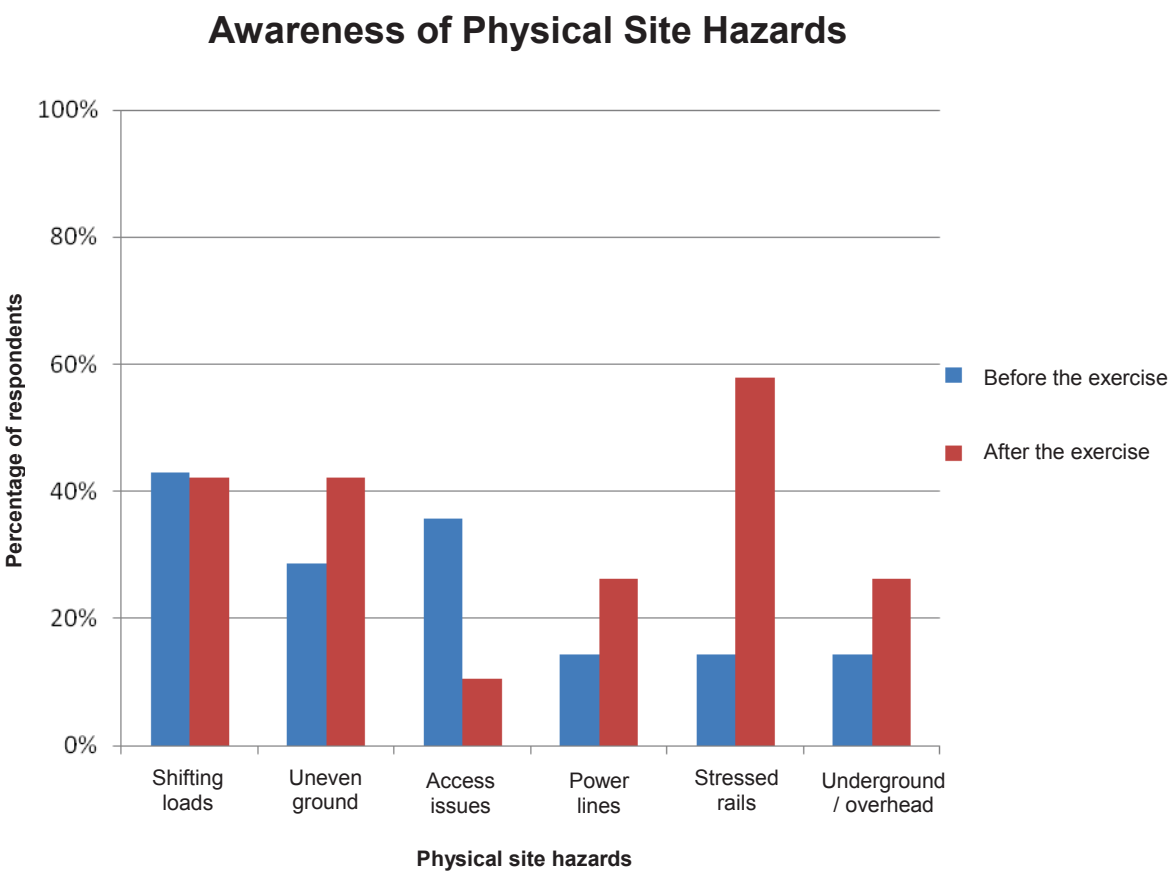

Figure 13: Awareness of Physical Site Hazards

The participants were asked to identify the personal protective equipment (PPE) required for a response involving crude oil. Participants' knowledge did not change after the training, they all identified this equipment before and after the training. The most common responses included Self Contained Breathing Apparatus (SCBA).

4.6.1 Strengths

A number of participants indicated, before and after the training, the need to modify the safety precautions when the dangerous goods identified is crude oil, which is a positive point. In addition, the terminology used by the participants during the exercise contained a number of terms taught during the training, such as BLEVE and HIT, which shows greater participant awareness of the hazards associated with tank cars transporting flammable liquids.

4.6.2 Areas for Improvement and Recommendations

While the vast majority of participants indicated the need to modify the safety precautions when the dangerous good was identified as crude oil, some did not do so, either before or after the exercise. This procedure, which is necessary and very important, must be carried out by all responders; it is therefore essential to review this part of the training to ensure that all participants understand its importance. In addition, the evaluators indicated that the properties of crude oil playing an important role in the

response were not specifically discussed during the activities. The training could therefore require greater attention to the properties for crude oil, if this is found to be pertinent for planning the response and identifying all potential hazards. Another point to improve is the hazards that may be caused by a breached tank car, since 35% of participants were not able to answer this question after the training. More in-depth training about the hazards of a breach may be necessary in future exercises. Lastly, the results regarding the physical hazards present at the scene of a derailment were relatively low, and greater attention to this subject is therefore necessary.

4.7 Response Considerations

One of the primary objectives of the training was to make participants aware not to rush into the scene of a rail incident while waiting for the arrival of external resources. The results after the training show that this objective was met particularly well (see Figure 14). Before the training, 44% of participants indicated that they would choose a defensive operation using water as initial response to prevent the fire from propagating to the other tank cars. Only 41% chose "non-intervention", meaning limiting themselves to assessing and monitoring the scene, while keeping watch for signs of propagation. After the training, the large majority of participants (87%) indicated that they would not rush in and would choose non-intervention; only 9% of participants indicated a defensive operation as their first reflex. An offensive operation (fighting the fire with water) was one of the multiple choices for this question, but none of the participants chose it either before or after the training. The exercise evaluator noted that most participants chose non-intervention during Activity 1, which was the recommended method for the scenario presented.

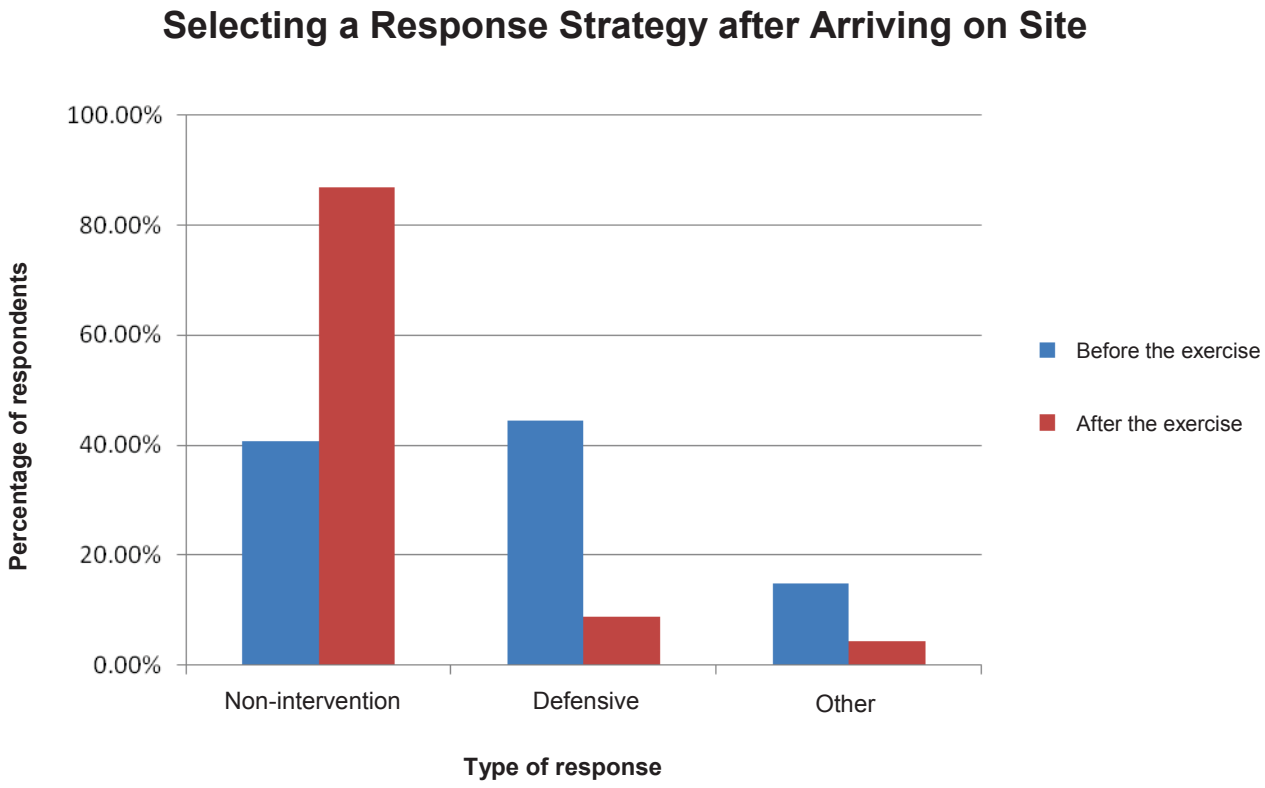

Figure 14: Selecting a Response Strategy after Arriving on Site

The results of the surveys before and after the exercise show that participants are aware of the use of foam to fight fires involving flammable liquids. The participants also indicated that external resources (industry specialists) would bring foam supplies to support the response. After the exercise, some participant also indicated other resources, such as foam cannons, foam application specialists, and various additional equipment that could be provided by the specialists.

The participants were asked to identify non-intervention measures before and after the training. Before the training, setting up exclusion zones was the most frequent response with 71%, but this choice dropped to 45% after the training. On the other hand, the biggest increase was for site assessment, from 29% to 68%. The other non-intervention measures, such as communication with emergency response resources (railway company, CANUTEC, ERAP, shipper, etc.) and preparing for the arrival of the response teams and equipment saw a slight increase, of 6% and 9% respectively. Keeping watch for signs of propagation and evacuating the public to ensure their safety saw a decrease in responses, -12% and -6% respectively. Nevertheless, the exercise evaluators indicated that all the methods in the figure below were discussed during the exercise. This may be a sign that the training was well received by the participants, but that the question asked in the survey was not well understood. Figure 15 below gives a comparison of non-intervention measures.

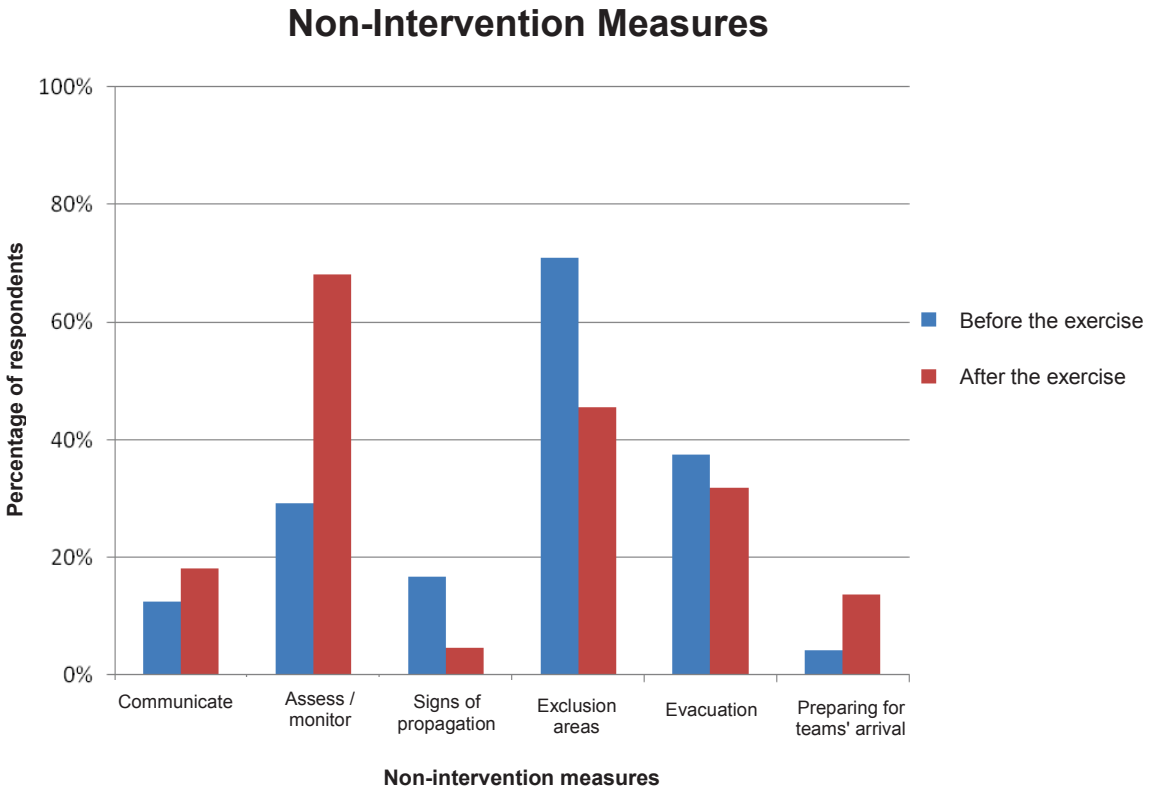

Figure 15: Non-Intervention Measures

The participants were given a scenario that led them to use a defensive response approach. They then had to identify the factors to take into consideration for the defensive approach, which consists primarily of putting water on the adjacent tank car.

The factor with the greatest change is the use of run-off water to fight the fire (contained, diverted or reused to minimize environmental impact), which increased from 15% to 48% after the exercise. Having enough water supply was indicated as an important factor by a number of participants before and after the exercise, with 58% and 52% of responses respectively. This training strongly emphasized non-intervention and offensive response, without discussing in detail the defensive method, which may explain the low number of responses for this question. In addition, the exercise evaluators noted that most, if not all, participants discussed the measures illustrated in Figure 16 below when planning their approach during Activity 2.

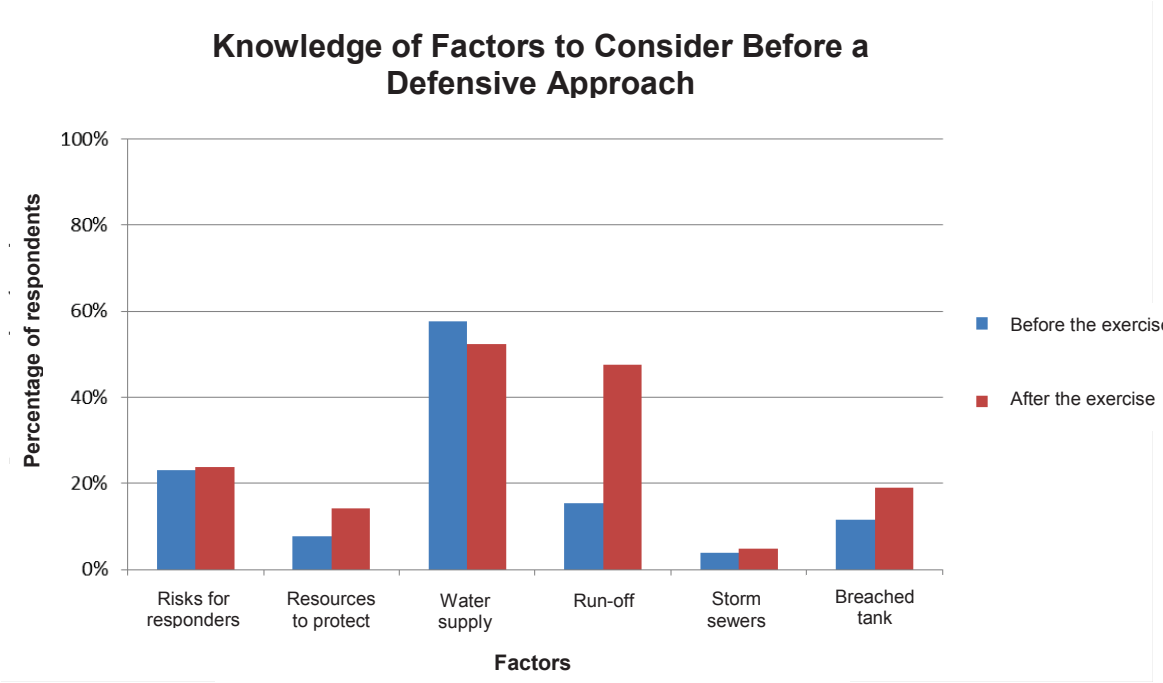

Figure 16: Knowledge of Factors to Consider Before a Defensive Approach

The training was a success in terms of teaching participants to apply cooling water to the tank car's vapour space, an approach that was not really considered before the training. Practical training during Activity 2 with the tank car may have been beneficial and helped ensure that participants understand this information.

During the scenario, participants had to monitor ambient air for toxic gases emanating from the presence and burning of crude oil. The participants had to identify resources that could provide services for air monitoring and gas detection. The resource most frequently identified by the participants after the exercise was the response team deployed upon activation of the ERAP, with 89%, an increase of over 64% (see Figure 17). Activity 3 with GHD probably facilitated the transmission of this information to the participants.

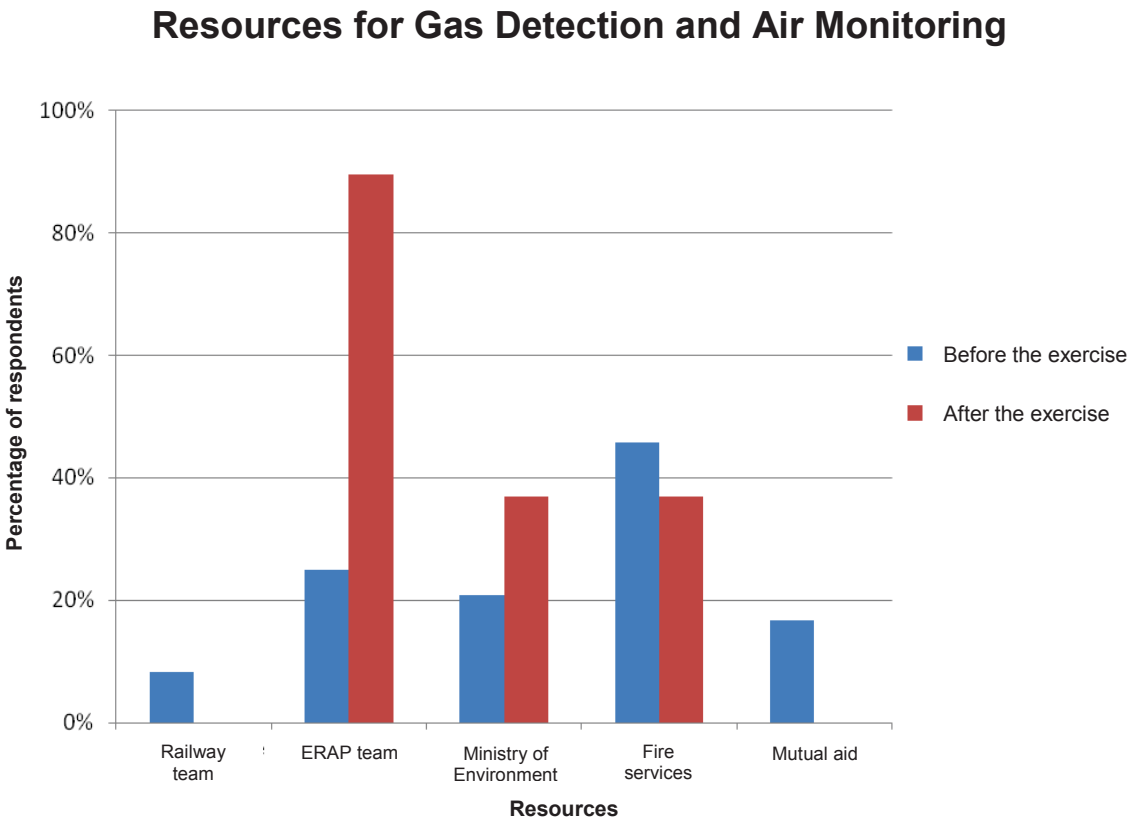

Figure 17: Resources for Gas Detection and Air Monitoring

The participants were asked to identify reasons why it is necessary to perform air monitoring on the scene of the incident and in the neighbouring area (Figure 18). The results were the same before and after the exercise, with participants identifying the safety of responders and the public as the key factors. However, even though responder safety was mentioned, the equipment necessary for the response depends greatly on air quality, and this point was not raised.

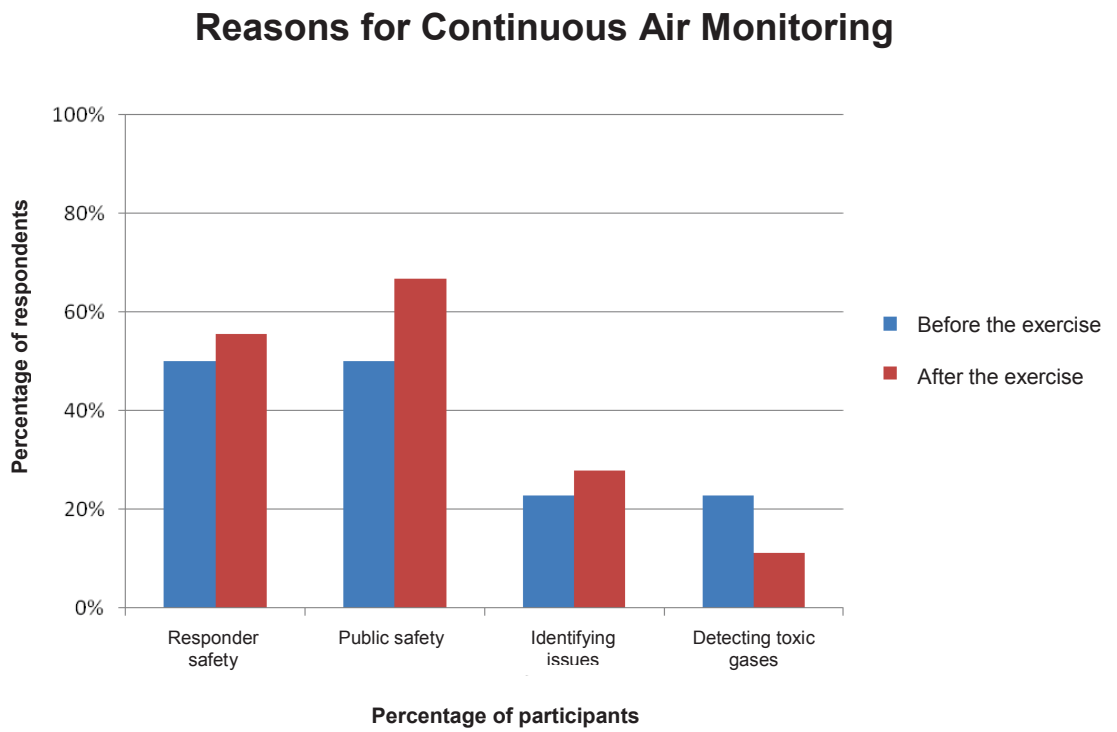

Figure 18: Reasons for Continuous Air Monitoring

4.7.1 Strengths

One of the most positive points in this section is that after the exercise, 87% of participants indicated that they would not rush onto the scene to respond and that they would choose the non-intervention approach. In addition, the training successfully taught participants to apply cooling water on the vapour space of the tank cars, which was not really an option considered before the training. The practical training during Activity 2 with the tank car may have been beneficial to ensure that the information was clearly understood by the participants. A number of participants indicated that the primary supplier of air monitoring equipment was the ERAP team; it is therefore concluded that Activity 3 with GHD probably facilitated the transmission of this information. Lastly, the participants successfully identified several reasons why it is necessary to ensure continuous air monitoring on scene of the incident and in the neighbouring area. The points discussed demonstrate that these sections of the training were well assimilated by the participants and the information provided was presented clearly.

4.7.2 Areas for Improvement and Recommendations

Non-intervention measures were generally well identified (in the surveys) by the participants, except for the need to watch out for the propagation of fire and evacuate the scene, two elements that declined in post-training responses. However, the exercise evaluators indicated that all the non-intervention measures were discussed during the exercise. This means that even throughout the training was well assimilated by the participants, the question that was asked in the survey did not lead them to give these answers. A small number of participants mentioned a defensive response, even though the training strongly emphasized the non-intervention method and offensive response,

without discussing defensive response in detail. If a defensive approach had to be considered by the participants in the future, the training would have to be reorganized. While a number of participants identified reasons why it is necessary to continue monitoring the air at the scene of the incident and the neighbouring area, none of them mentioned the required gas detection equipment. Additional training to include equipment, which depends greatly on air quality, is necessary.

4.8 Participant Feedback Form

4.8.1 CAPP-CAFC e-Learning

The Canadian Association of Petroleum Producers and the Canadian Association of Fire Chiefs CAPP-CAFC e-learning was greatly appreciated by the Athéna participants. According to participants' post-exercise feedback, 87% of participants rated the effectiveness of the e-learning as excellent, while the rest, 13%, rated it acceptable. None of the participants rated the e-learning as unsatisfactory. This positive feedback shows that the CAPP-CAFC e-learning completed by the participants before the exercise was useful for the rest of the training and the exercise. Figure 19 below shows participants' overall impression of the effectiveness of CAPP-CAFC e-learning.

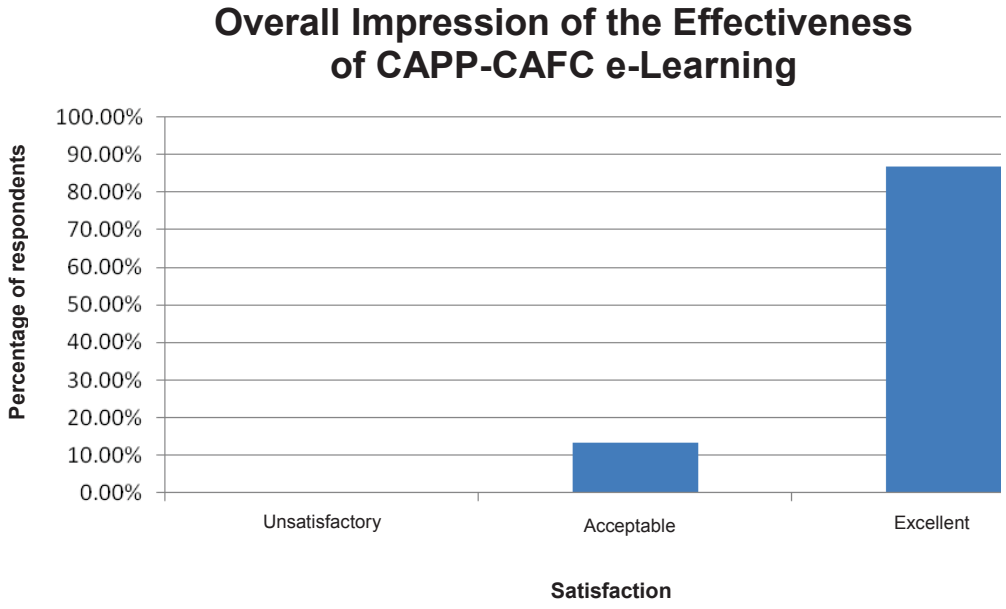

Figure 19: Overall impression of the Effectiveness of CAPP-CAFC e-Learning

The participants were asked to evaluate the content of the CAPP-CAFC e-learning by giving it a rating for the level of detail and the usefulness of several sections of the training. For the level of detail, a rating of 1 indicated that it was insufficient, a rating of 2 indicated appropriate and a rating of 3 indicated excessive. For usefulness, a rating of 1 indicated that the training was not useful, a rating of 2 indicated that it was useful and a rating of 3 indicated that it was very useful. The training was divided into three parts for the evaluation: Emergency Response in Canada (Part I), Identifying Hazards at the Scene of a Rail Incident involving Flammable Liquids (Part II) and Evaluating Hazards Specific to Site and Response (Part III). The participants considered the level of detail of the e-learning appropriate, giving it an average rating of 2.10, 2.13 and 2.06 for Parts I, II

and III respectively. The feedback on the level of detail of the e-learning was very positive, since the majority of participants indicated that it was useful, even very useful. The ratings for usefulness were 2.60, 2.61 and 2.64 for Parts I, II and III respectively. Figure 20 gives a visual representation of this data.

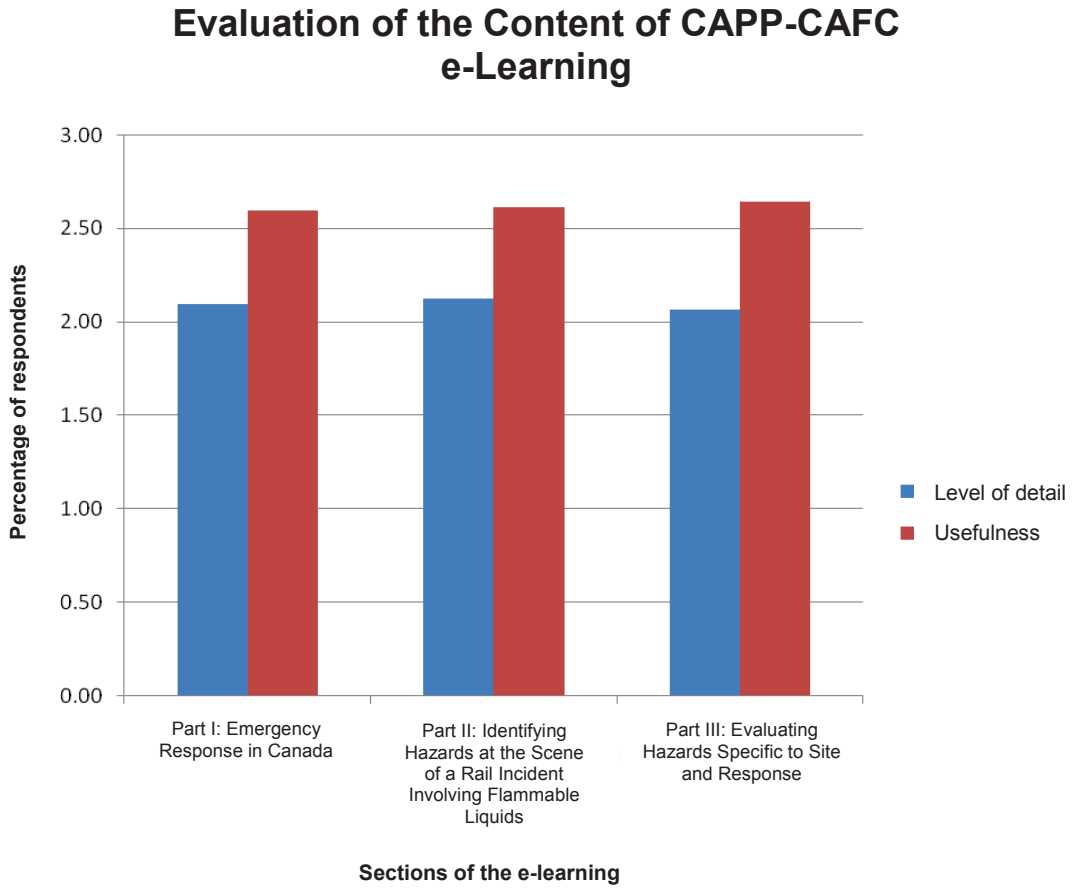

Figure 20: Evaluation of the Content of CAPP-CAFC e-Learning

The CAPP-CAFC e-learning was generally completed in less than 2.5 hours: 35% of participants completed the training in under 2 hours, while the largest portion of participants (41%) reported that it took between 2 and 2.5 hours. A minority of participants (6%) reported that this training took between 2.5 and 3 hours, while the rest (18%) indicated that it took more than 3 hours. Figure 21 shows the time needed to complete the CAPP-CAFC e-learning.

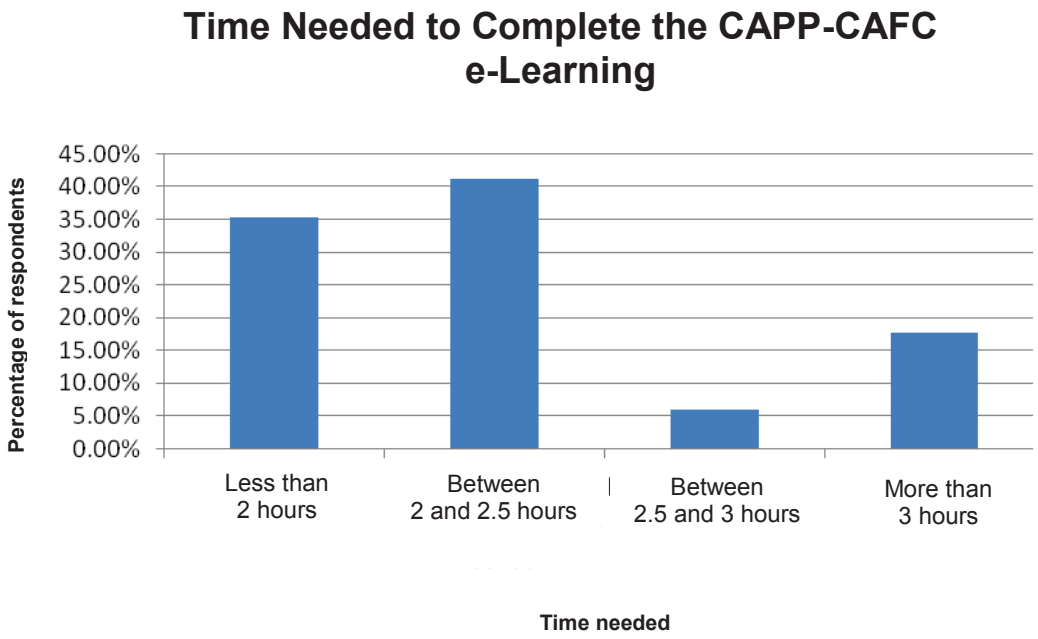

Figure 21: Time Needed to Complete the CAPP-CAFC e-Learning

Figure 22 shows that the majority of participants found the "Takeaway Notes" sections of the e-learning useful (35%) or very useful (41%). However, there may be changes to be made to these sections, since some participants (24%) did not find them useful.

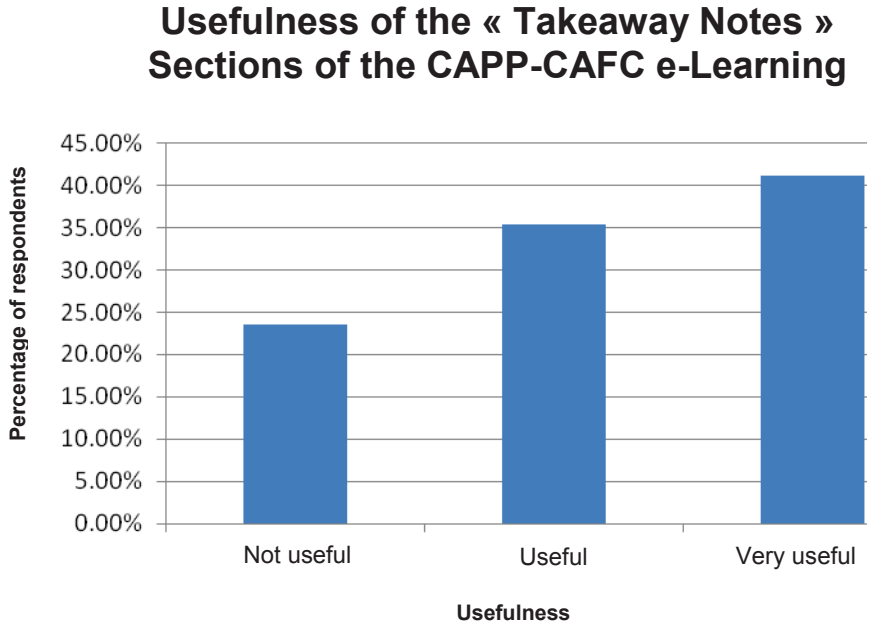

Figure 22: Usefulness of the "Takeaway Notes" Sections of the CAPP-CAFC e-Learning

The participants had the opportunity to make suggestions to improve the CAPP-CAFC e-learning. The feedback received varied (see Figure 23). The majority of participants (29%) indicated that adding interactive components to the e-learning would be useful. 24% of participants suggested adding tests at the end of lessons, and 18% suggested

inserting mini-quizzes. Some participants (24%) indicated that no changes were needed. Other participants suggested additional ways to improve the e-learning, such as including testimonials, providing the objective at the beginning of each block, having more practical components, or having the possibility of printing the training content to consult it later.

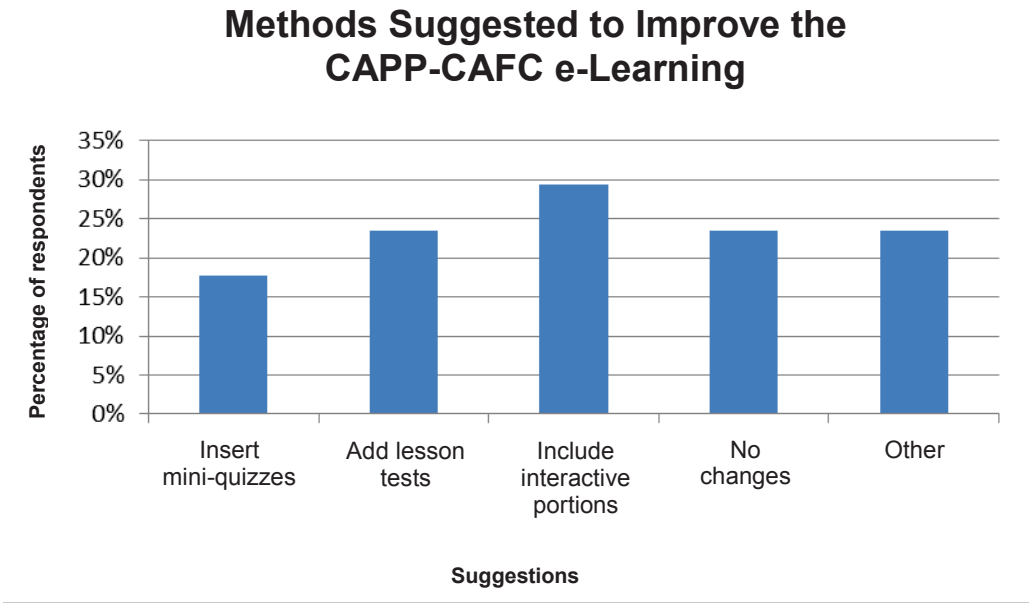

Figure 23: Methods Suggested to Improve CAPP-CAFC e-Learning

4.8.2 E-Learning and Full-Scale Exercise Training

The next section analyzes and compares the CAPP-CAFC e-learning and the training provided during the full-scale exercise.

After completing the e-learning and the exercise, the participants had to give their opinion on the language and terminology used during the training and the pace at which the information was presented. For the category "language and terminology", a rating of 1 means needs improvement, a rating of 2 means acceptable, and a rating of 3 means exceptional. For the pace at which the information was presented, a rating of 1 means needs improvement, a rating of 2 means acceptable, and a rating of 3 means perfect. The average rating given by the participants for these two categories in the CAPP-CAFC e-learning is the same, 2.29. This means that the language and terminology used by the narrator are acceptable and not exceptional, and the same for the pace at which information is presented. This shows that there is room for improvement, since these ratings are the lowest average obtained for this question. The language and terminology used by the classroom presenters were better received by the participants, with an average rating of 2.53. The pace of presentation in the classroom also received an average rating of 2.53. Lastly, the pace of the presentation in the field received the highest rating, averaging 2.59, while the language and terminology used were considered acceptable by the participants, with an average rating of 2.47. Figure 24 below illustrates the results for this question.

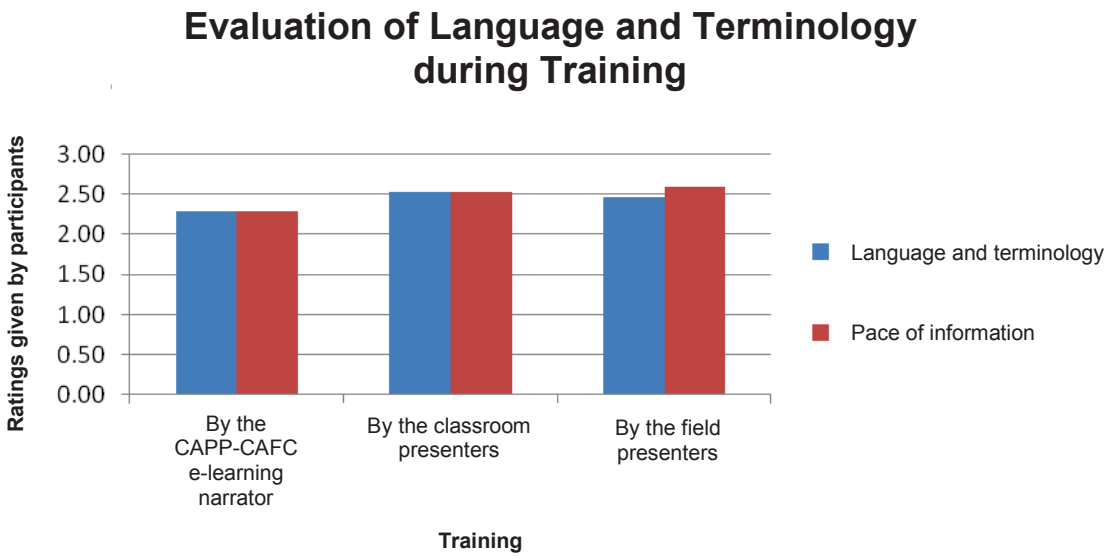

Figure 24: Evaluation of Language and Terminology during Training

The participants were asked whether the presentations duplicated information provided in the CAPP-CAFC e-learning and in the exercise training. The majority of participants (62%) indicated that there was duplication, and only 38% did not find duplication. However, some participants who indicated that there was duplication specified in their response that the duplication was good.

4.8.3 Incident Response Guide (Checklist / Aide-Mémoire)

As illustrated in Figure 25, participant feedback shows that the Incident Response Guide (checklist / aide-mémoire) is a tool representative of the response steps to follow for an incident involving flammable liquids. None of the participants felt that this tool was not representative of the steps to take; 83% of participants indicated that it was representative, and only 17% indicated that it was acceptable. These positive results show that the Incident Response Guide can be a reminder and a reference tool for first responders for this type of incident.

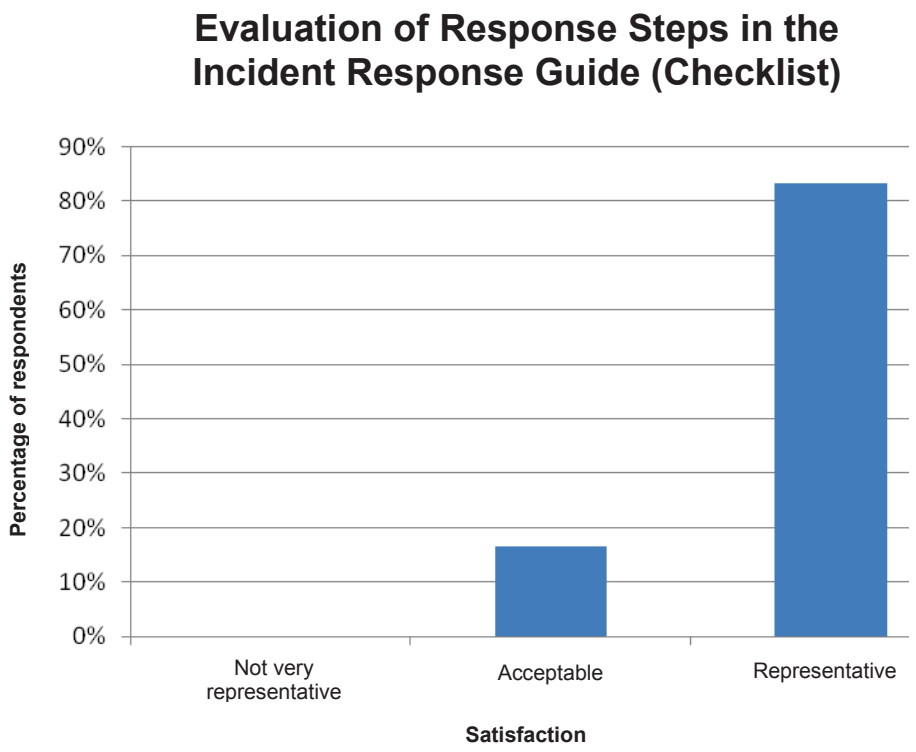

Figure 25: Evaluation of Response Steps in the Incident Response Guide (Checklist)

Despite the participants' positive feedback regarding the Incident Response Guide, some steps in the Guide were found not to be very clear, or to require further elaboration. Before presenting the results, it is important to take into account the fact that only 39% of participants responded to this question. This low number of respondents may be due to the fact that the vast majority of participants considered the Incident Response Guide to be fully representative of the steps to take when responding to an incident involving flammable liquids. Most participants who answered the question indicated that the step to elaborate on or clarify was related to the response itself, with 43%. In second place was securing the scene (29%). Not rushing into the scene and obtaining assistance were each identified by 14% of participants. None of the participants found that determining hazards and evaluating the situation were an unclear step. According to the results above, a change in the step related to the response step may be necessary in the future. Figure 26 shows the results for this question, for the 39% of participants who responded.

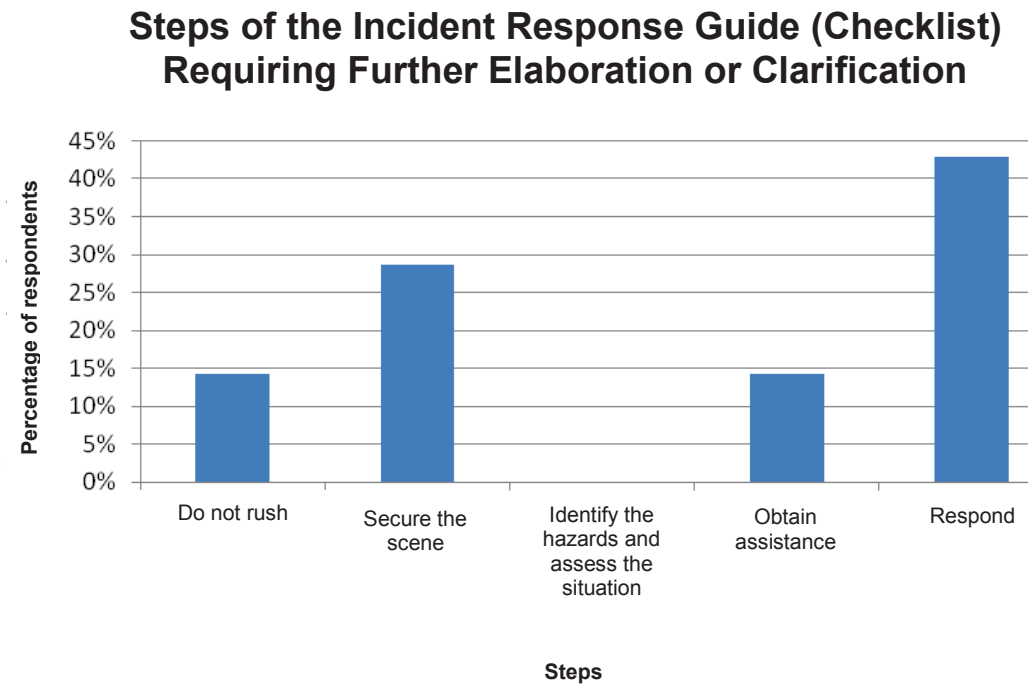

Figure 26: Steps of the Incident Response Guide (Checklist) Requiring Further Elaboration or Clarification

4.8.4 Visit to the Rail Yard

The visit to the rail yard is a new element introduced in the training following Vulcan. According to the results of the post-exercise feedback, this visit was greatly appreciated by the large majority of participants, who identified it as beneficial and a new opportunity to gain more knowledge. As shown in Figure 27, only a minority of participants (19%) found this visit to be somewhat ineffective, and none of the participants indicated that it was ineffective; 63% of participants found that this visit was effective, 6% that it was very effective and some (13%) found it to be extremely effective. This new addition to the training was seen as positive and useful, even very positive and very useful, by some participants.

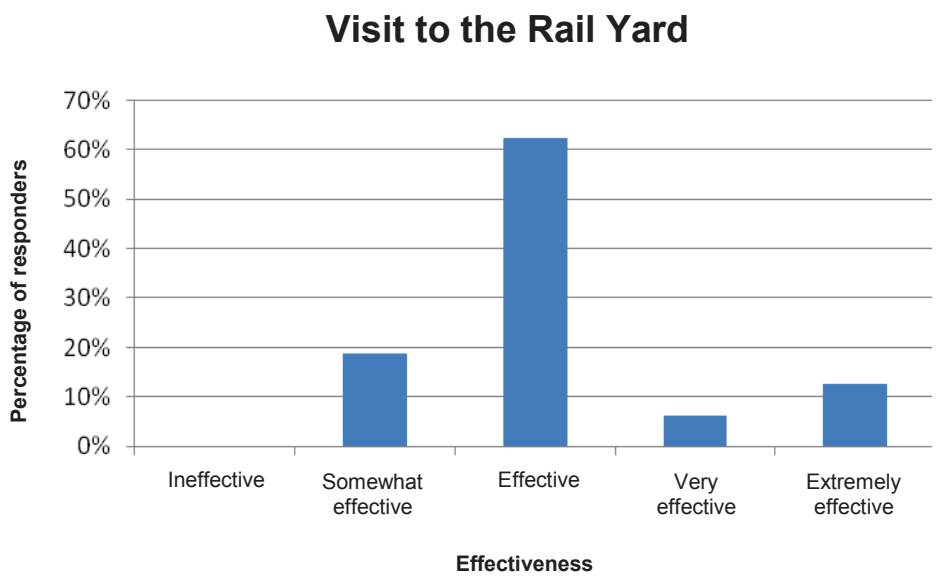

Figure 27: Visit to the Rail Yard

4.8.5 Virtual Prototype (Simulation Tool)

The virtual prototype is also a new element added to the training since Vulcan. This tool, which was used in Activity 1, added realism to the exercise. Figure 28 shows that the virtual prototype was considered very easy to use by 83% of participants, while the other participants (17%) found it acceptably easy to use. Note that the participants had not used this tool before the training and were using it for the first time during the exercise. The feedback was therefore positive.

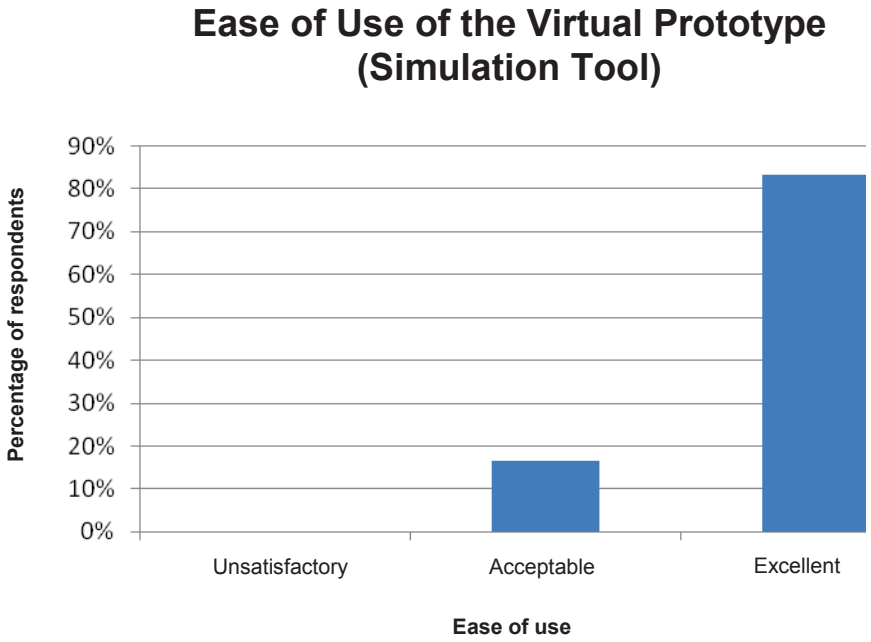

Figure 28: Ease of Use of the Virtual Prototype (Simulation Tool)

In addition, the realism of the scenarios presented the virtual prototype was evaluated positively by the participants, with 72% of them indicating that the tool is representative of real train derailment conditions, and 28% of participants considering it acceptable. Once again, none of the participants found that the tool was not representative of real conditions. The results discussed above are shown in Figure 29.

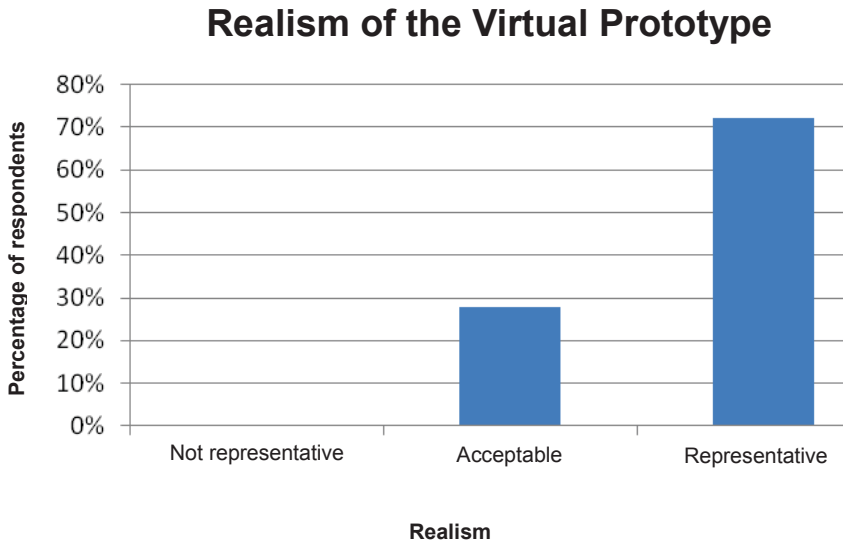

Figure 29: Realism of the Virtual Prototype

Once again, participants' feedback on the virtual prototype was very positive, as shown in Figure 30. All the participants found that the virtual prototype was, at the very least, effective. The majority of participants (67%) indicated that it was very effective and some participants (22%) even found it extremely effective. The rest of the participants (11%) found the virtual prototype effective. These results indicate that this new tool should be used in future exercises and training because it was greatly appreciated by all the participants.

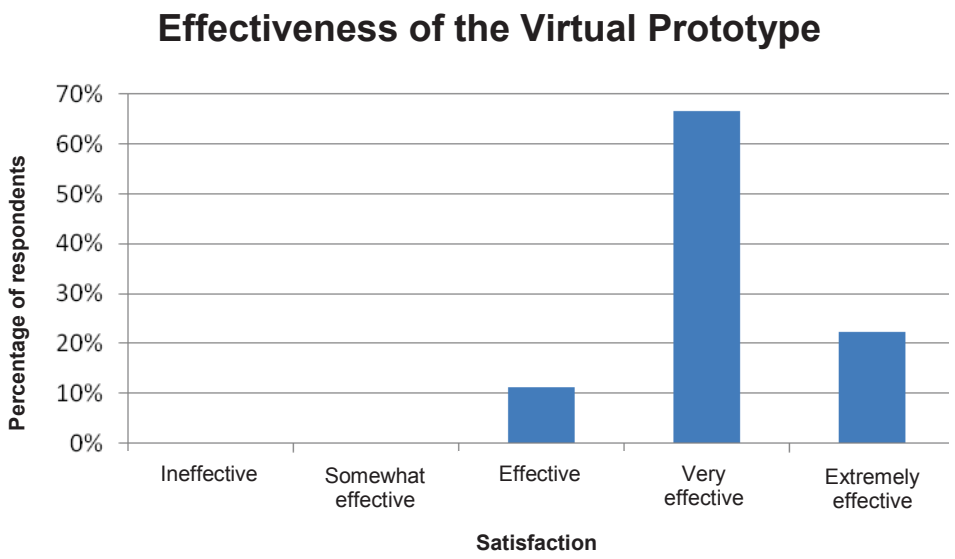

Figure 30: Effectiveness of the Virtual Prototype

4.8.6 Simulation Tank (Prop)

The participants were asked to evaluate the effectiveness of the training using foam on the simulation tank (Activity 2). This training was appreciated by all the participants (see Figure 31): 71% found it very effective, 24% extremely effective and the rest (6%) effective. However, despite the very positive feedback on this training on using foam, some areas for improvement were identified. The most common suggestion was to increase the duration of the activity so participants can have more practice. Other suggestions were: using different methods for the application of foam in different situations, discussing the required equipment to generate foam, or having a larger diesel fire.

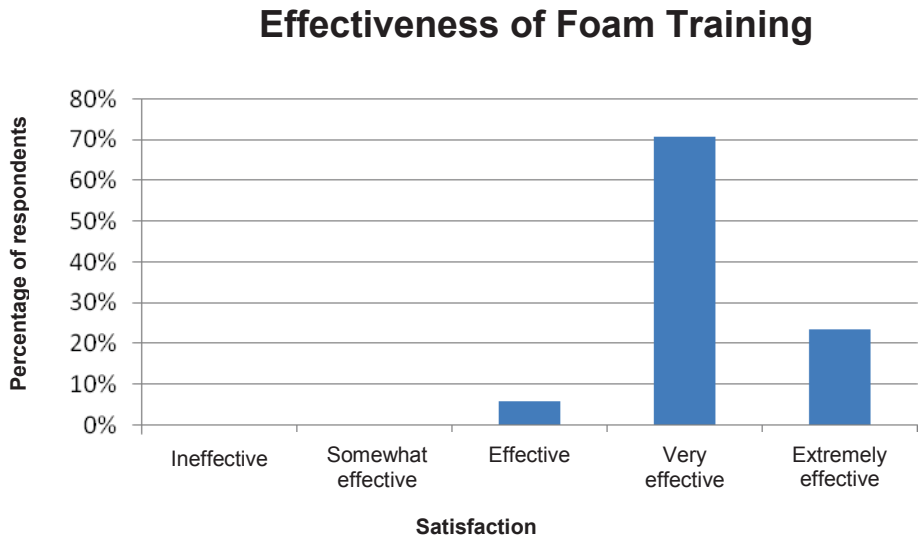

Figure 31: Effectiveness of Foam Training

4.8.7 Interactive Sessions (Activity 3)

The participants were asked to evaluate the effectiveness of the interactive activities (Emergency Measures Guidebook, air monitoring and response contractor equipment display) carried out as part of Activity 3. As Figure 32 below shows, the interactive activity found to be least effective was air monitoring, with 29% of participants evaluating it as ineffective and 12% as somewhat ineffective. However, some participants found that this activity was effective (29%), or even very effective (29%). The third interactive activity (response contractor equipment display) was appreciated by the majority of participants: 41% found it effective, 12% very effective and 29% extremely effective. Despite this positive feedback, a minority of participants found it somewhat ineffective (12%) or even ineffective (6%). The Emergency Measures Guidebook was the interactive activity considered most effective by the participants: none of the participants evaluated it as ineffective or somewhat ineffective; it was considered effective by 44% of participants, very effective by 44% as well, and extremely effective by 13%.

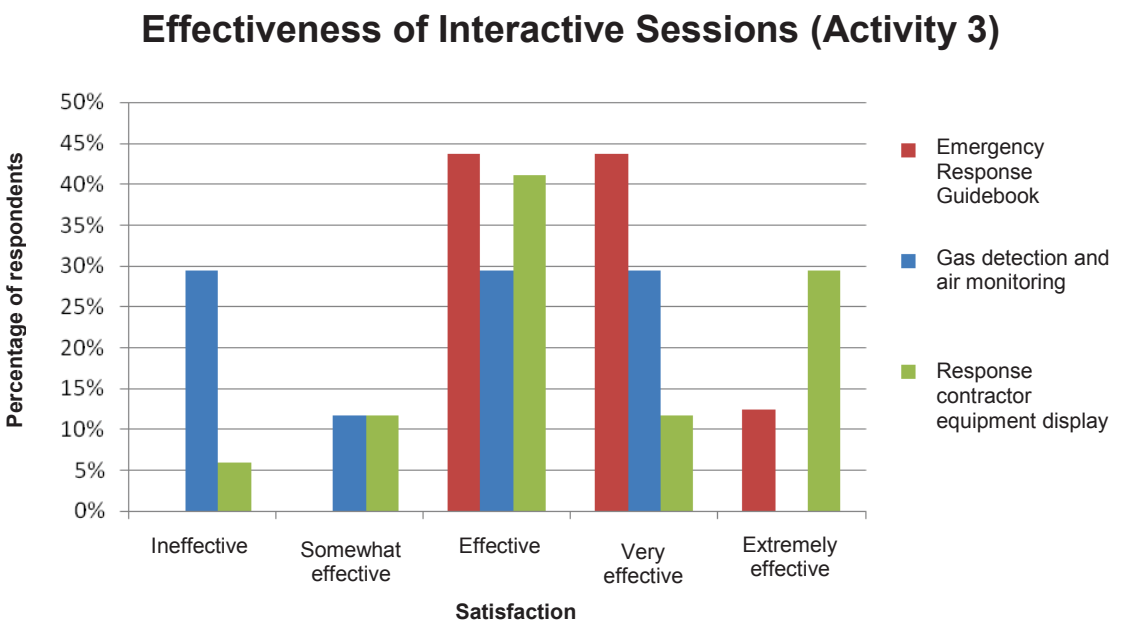

Figure 32: Effectiveness of Interactive Sessions (Activity 3)

The participants were then asked to what extent the interactive sessions made them comfortable calling upon contractors' expertise. Figure 33 shows that most of the participants (63%) thought their level of comfort calling upon contractors' expertise was acceptable, while others (38%) felt they were now completely comfortable.

Figure 33: Level of Comfort Calling upon Contractors' Expertise

4.8.8 Overall Appreciation

Once the exercise was completed, the participants were asked for their overall impression of its effectiveness. All the participants found that the exercise was, at a minimum, effective. The majority (56%) found the exercise very effective and some participants (31%) found it extremely effective. The rest of the participants (13%) indicated that the exercise was effective. These results are presented in Figure 34 below. This positive participant feedback towards the exercise shows that it was successful.

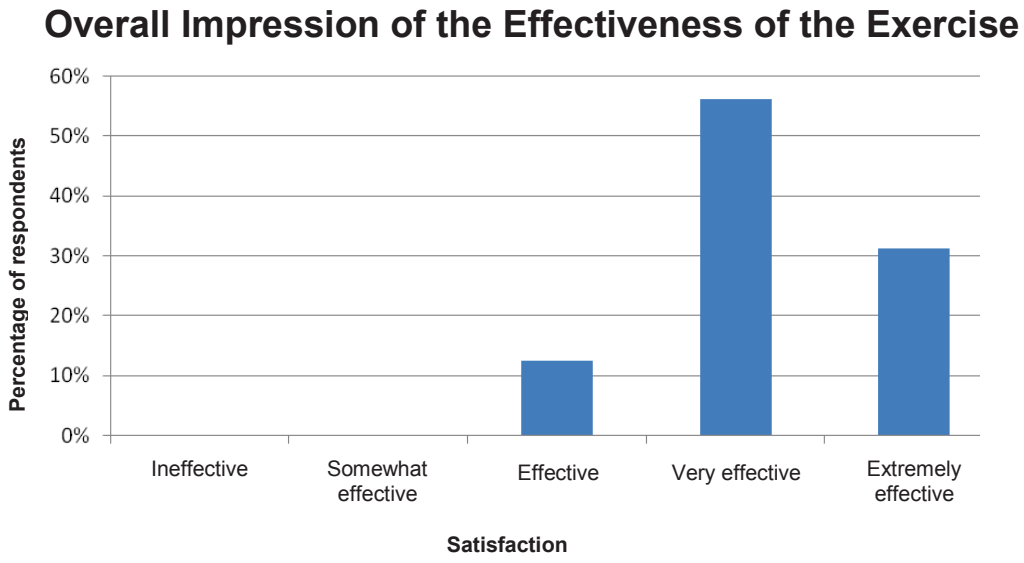

Figure 34: Overall Impression of the Effectiveness of the Exercise

The training and exercise greatly contributed to participants' preparedness for a derailment incident in their region. As shown in Figure 35, 88% of participants reported that after Athéna, they felt completely prepared to deal with this type of incident, and the

rest of the participants (12%) felt somewhat more prepared. The points identified for improvement in the future and the different suggestions provided by the participants will make it possible to increase participants' preparedness in future training and exercises.

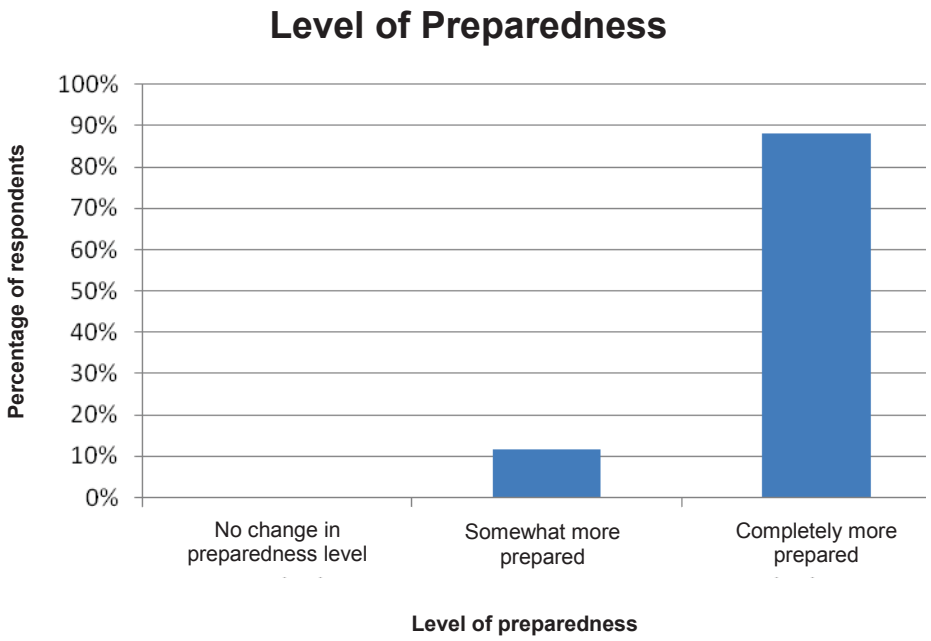

Figure 35: Level of Preparedness

The participants were asked to indicate in which section of the training certain elements were delivered most effectively (see Figure 36). For determining the presence of dangerous goods, Activity 1 stood out among the other sections of the training with 40% of the votes, followed by the in-class training with 27% of the votes. For notifying Transport Canada, the rail industry and the petroleum industry, the in-class training was most useful and presented the information most effectively (58%). In second place was the CAPP-CAFC e-learning, with an average of 21%. For the properties of flammable liquids, once again the in-class training was in first place with 58%, followed by Activity 2 with 16%. For strategic response considerations, participants' feedback was varied: 26% indicated that the simulation tank training and Activity 2 were most effective. According to the results, the participants generally found Activity 3 as the least effective at conveying the information.

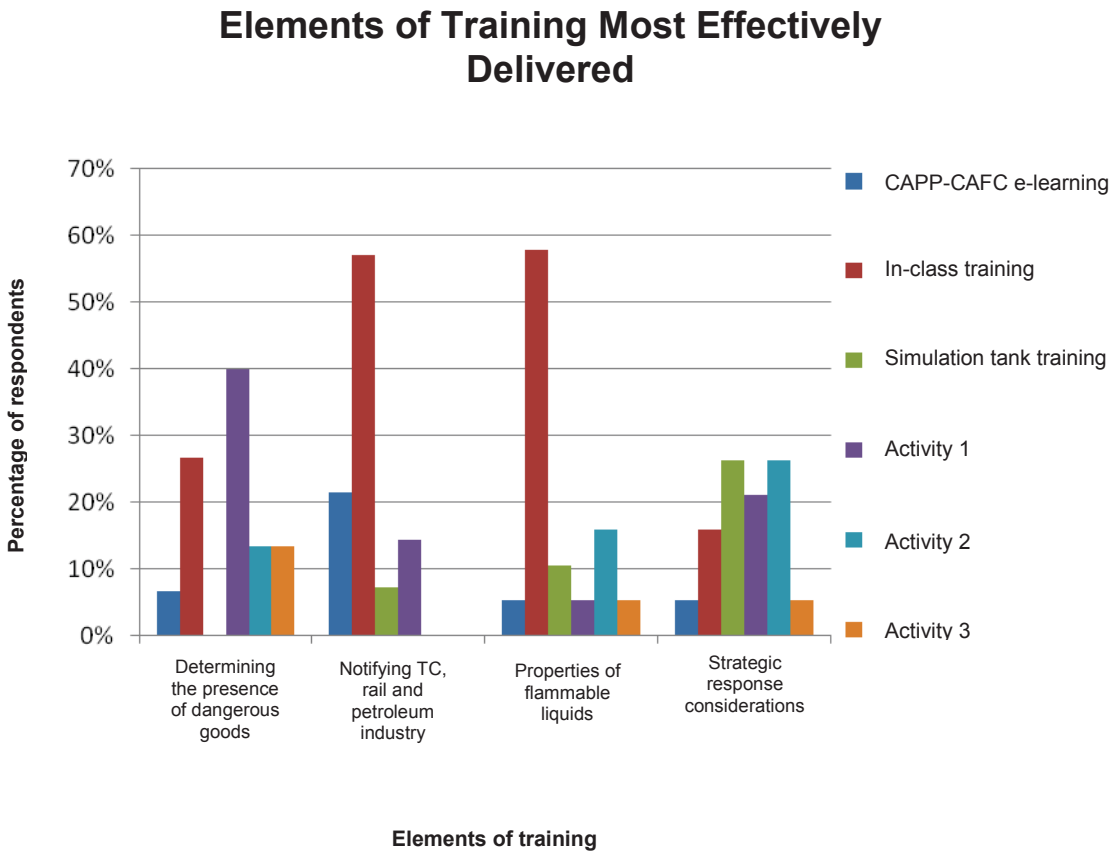

Figure 36: Elements of Training Most Effectively Delivered

The participants were asked to evaluate the different sections of the training based on their value as compared with the exercise as a whole (Figure 37 and Figure 38). A rating of 1 means needs improvement, a rating of 2 means acceptable, and a rating of 3 means exceptional. The two sections of the training with the greatest need for improvement, according to some participants, were the visit to the rail yard and Activity 3, with ratings of 1.88 and 1.94 respectively. Despite the fact that the visit was appreciated by many participants and was evaluated as effective, some feel it nevertheless needs improvement. The other sections were considered acceptable by the majority of participants. The virtual prototype was considered exceptional by most participants, with an average rating of 2.71, followed by Activity 2 with 2.65.

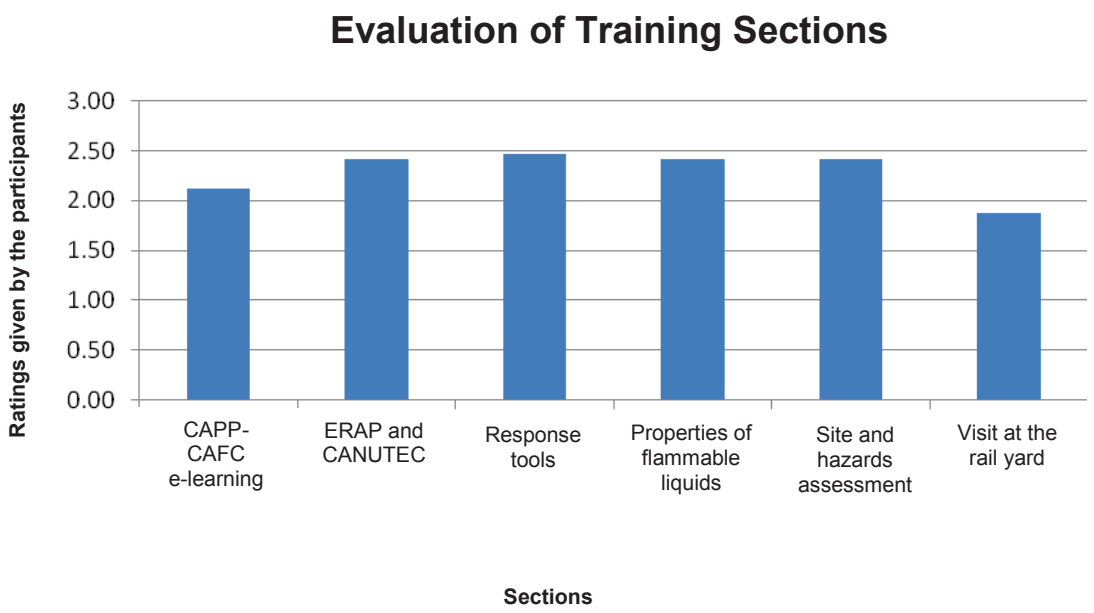

Figure 37: Evaluation of Training Sections

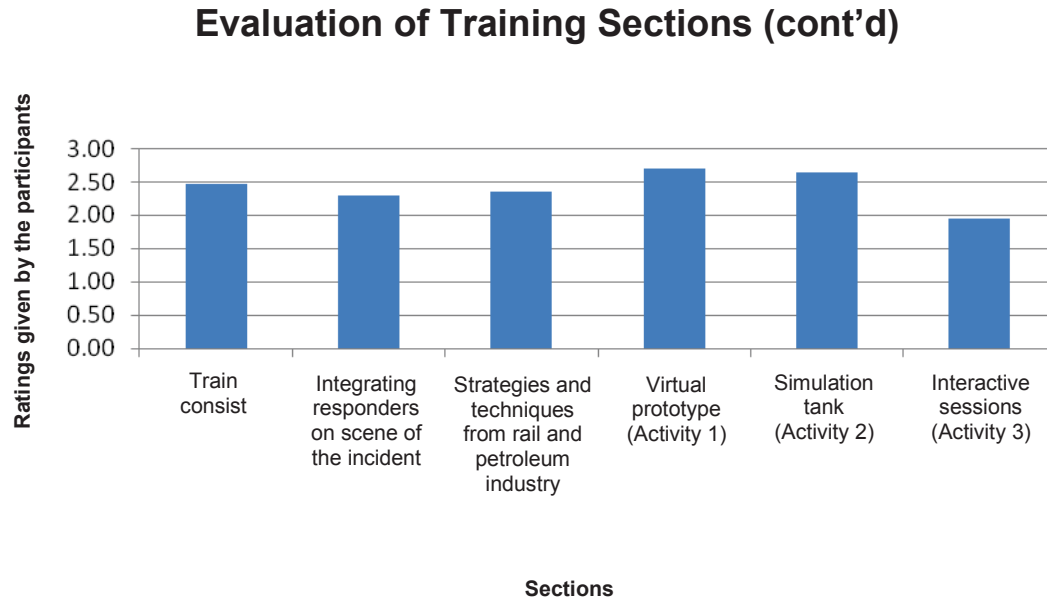

Figure 38: Evaluation of Training Sections (cont'd)

In addition, the participants were asked to make suggestions to improve the exercise program presented. Several comments dealt with Activity 3, some of which said there were too many representatives while others thought the equipment demonstrated by the company representatives did not apply to them, that they would not use this equipment and that they would prefer to have information on the products and equipment that they would be more likely to use, such as foam. Lastly, some participants wanted more practice.

To conclude this section, participants' feedback for the exercise as a whole was very

positive. They found it constructive, very interesting and above all very useful to learn how to respond to a derailment involving flammable liquids in their region. The training was therefore a success, and the general objectives set at the beginning were achieved.

4.9 After Action Review

4.9.1 Activity 1

The evaluators of Activity 1 indicated that the context of the scenario was good. The positive element was that the participants were not acting hastily and were trying to follow the Incident Response Guide. However, although a number of participants called for the rail traffic to be stopped immediately, some did not do so. Another point raised is the absence of a procedure or preparation for communication for a large response of this kind. Some evaluators indicated that, during this activity, the participants tried to make many calls to request the support of industry specialists, and the preparation for the arrival of these resources was not covered during the training. Other evaluators indicated that some important elements would be present in the real world, but were not particularly discussed during the training (for example, environmental protection). In addition, it was noted that none of the participant took into account the health of the actor playing the train conductor during this activity, and they were only interested in obtaining the train consist. Another important point raised is that participants considered the tank car containing residue as empty. The evaluators also indicated that there were not enough electronic tablets (for the virtual prototype) and that only a limited number of participants had the opportunity to try it. The evaluators found that the participants were very involved during the first activity, that they demonstrated a desire to manage all the information they were provided during the training and apply it to the scenario given. In addition, the virtual prototype enabled participants to practice the response virtually with an overview of real situation conditions. Finally, this training provided participants with a unique opportunity to practice a response involving flammable liquids, since small community fire departments do not have the same resources as larger cites' fire departments.

4.9.2 Activity 2

The evaluators indicated that the first team needed much more preparation and assistance than the other teams due to the established rotation system. In addition, there was not really any interaction with the first group; this group focused its efforts more on finding the missing information. The safety plan was identified by the evaluators as an area to improve; some participants could do so in detail while others did not manage to do so, even though this is an important step in the activity. Some participants had a number of questions about the hazards associated with the products and the chlorine car, and they needed more information on this subject. Some evaluators indicated that they would have to review the weighting of the exercise to give greater weight to the tabletop exercise, because the knowledge needs to be acquired before it can be translated into actions. In addition, it was also indicated that it would be important to ensure to choose commanders from among the people who are qualified for this type of position. The level of expertise of the chosen commanders varied from group to group, and that affected how the scenarios played out. In general, Activity 2 went well, and the fire was lit several times (at least 4 times per rotation).

4.9.3 Activity 3

For Activity 3, the evaluators found that the GHD presentation (air monitoring) was less relevant to the participants than the CANUTEC and MD-UN presentations. This is because the participants would be less involved in the use of this equipment since it is provided by a specialized service.

Participant satisfaction could be improved by better preparing industry specialists before the exercise, possibly with an exercise preparation conference for the partners. Industry specialists' presentations focusing in analysis of real cases, with photos and videos, would strengthen the exercise objectives and training, and would capture participants' attention.

5. RECOMMENDATIONS

5.1 General

The exercise was created to make first responders aware of what to do on the scene of a rail incident involving Class 3 flammable liquids. The recommendations made to improve the exercise in the future are presented below. These recommendations are based on participant feedback obtained through surveys and the feedback form, the evaluators' after action review session, and any other areas for improvement identified during the classroom training or the exercise itself.

5.2 Response Considerations

The Incident Response Guide (checklist / aide-mémoire) provided to the participants during the training was greatly appreciated and proved very useful for the participants. However, the term "non-intervention" used in the Guide led to confusion since some responders indicated that they thought the term meant doing nothing but waiting, when that is in fact not in the case. Clarification is needed to indicate that there are other steps to take while waiting for the assistance of industry specialists. In addition, monitoring fire propagation must also be clearly identified as one of the non-intervention steps. As mentioned previously, stopping rail traffic is a crucial response step. However, even though it appears in the Incident Response Guide, some participants did not apply this step during the simulation. It is therefore recommended that this should be clearly indicated as one of the steps to take.

The objective of the training was not to emphasize communication between first responders and external resources (response specialists) when they arrive on scene. However, some evaluators indicated that they would like this aspect to be added to the training, even just briefly, to give participants an overview of one of the most important steps that follow later on.

5.3 Training

The in-class training presented several aspects in detail, all of which were identified as areas to improve. This is probably due to the fact that the training was condensed into a single day and there was a lot of information to retain. It was suggested that the training be restructured to include the most important points to retain, or to put more emphasis on certain points. The parts needing reassessment are as follows:

- The role of the RMSs and how to contact them;
- Contact CANUTEC first (primary point of contact);
- The need to modify the safety precautions taken when the dangerous goods are identified as crude oil;
- The properties of crude oil that play an important role in the response;
- The hazards that may be caused by a breached tank car; and
- The physical hazards present during a train derailment.

For the CAPP-CAFC e-learning, several participants suggested including interactive components or adding tests at the end of lessons to increase the level of interaction. In addition, some participants asked to make it possible to print the training (in PDF format) so they could refer to it later.

For the third activity, which was considered by many as a type of "training", the evaluators recommended that the ERG activity be carried out during the first day of training for the participants to receive this training before the second day's interactive activities.

5.4 Exercise Design

The virtual prototype used in Activity 1 was very well received by the participants and evaluators. It was suggested to modify this tool to use different background images to represent multiple possible locations, such as rural and urban areas. The evaluators also emphasized that the number of electronic tablets used during the first exercise should be increased to give everyone the opportunity to try this tool and also to enable participants to play with the tool even before starting the exercise. Given that several evaluators indicated that the rotation system established for this training was not ideal, one suggestion was to have all the participants do Activity 1 at the same time in the classroom before proceeding to the other activities.

Participants and evaluators felt that the post-training participant surveys were too long. Some evaluators indicated that the participants did not know the purpose of these surveys. It was strongly suggested that participants be informed before the exercise (during classroom training, for example) that there were questionnaires to be completed at the end of the training so the results could be compared with those gathered before the CAPP-CAFC e-learning. Some evaluators also suggested sending online questionnaires to be completed after the exercise, and asking the fire chiefs at each station to make sure participants fill them out.

Activity 3 was identified as the training section with the least positive participant feedback regarding the effectiveness of the information presented. This is because some of the equipment presented during the activity was not really relevant to the participants and they would have preferred to have equipment they would be more likely to use. It would therefore be important to re-evaluate the information provided in Activity 3 and keep only the information that is considered useful and practical for the participants. This change could reduce the duration of Activity 3 and make it possible to spend more time on other activities for which more practice or time is needed, or for which there was more interest.

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[2] C. Selman, A. Armitage and F. Lemay. "Exercice complet sur le terrain Athéna – Manuel de contrôle et d’évaluation", v3-0, February 2017.

[3] A. Armitage, D. Duncan and F. Lemay. "Athéna XCT Guide des observateurs", v2-0, February 2017.

[4] Transport Canada. “Guide d’intervention d’incident Classe 3 Liquides inflammables - Rail”, RDIMS #12506171-v7, February 2017.

[5] S. Lavigne, A. Armitage, Alicia and S. Dowker. “Exercise “Vulcan” Final Report”, ISR Report 6057-01-10, DRDC-RDDC-2016-C167, 2016.

APPENDIX A. POST-EXERCISE SURVEY

Introduction

This survey is intended to collect information on the level of awareness of the participants in the Athéna exercise, which dealt with a derailment involving flammable liquids. Please answer all the questions as completely and openly as possible and to the best of your knowledge.

Your participation is an important contribution to the Athéna exercise program. All results will be compiled and analyzed in aggregate form to protect respondent anonymity.

Site Assessment

Scenario: *An eastbound train derails just outside of a rural farming community with 500 residents. An initial 911 phone call was placed to report a fire, and responders have been dispatched to the scene, with an average travel time of 15 minutes to the scene of the incident. When responders arrive on the scene, multiple cars have derailed. One of the cars is on fire and the others may catch fire and explode.*

1. Once you arrive on scene and see the derailed tank car on fire, what is the first thing that you do?

2. Based on the scenario description, which immediate precautions do you take to ensure the safety of response personnel as you begin to analyze the incident?

3. Based on the scenario description above, what immediate protective actions do you put in place for the public?

4. As part of the initial site assessment, how would you quickly identify if any of the cars could be carrying dangerous goods? List as many as you can think of.

5. How would you recognize a flammable liquid tank car (old or new design)? To the best of your knowledge, list some common physical features or visual identifiers that would indicate it may contain flammable liquid.

6. Once you determine that there could be dangerous goods involved, what are some of the ways could use to confirm and verify the identity of the dangerous goods involved in the incident? List as many as you can think of.

7. Based on your current level of training and knowledge, would you know how to safely locate the shipping documents (train consist)?

[ ] Yes
[ ] No

8. What information is available within the shipping document (train consist) that would assist you in your response? Indicate all elements that you know of.

9. In a real situation, upon arrival on scene, how likely would you be to communicate immediately with the railway company using the emergency number?

[ ] Very unlikely
[ ] Unlikely
[ ] Unsure
[ ] Likely
[ ] Extremely likely

10. If you wanted or needed to contact the railway company, where would you locate the emergency number upon arrival on the scene of a rail incident? Name all possible ways.

11. Do you know what an Emergency Response Assistance Plan (ERAP) is?

[ ] Yes
[ ] No

12. How likely are you to look for ERAP information upon arrival on the scene of a rail incident?

[ ] Very unlikely
[ ] Unlikely
[ ] Unsure
[ ] Likely
[ ] Extremely likely

13. Are you aware of the services and capabilities available when an ERAP has been activated?

[ ] Yes
[ ] No

14. What services or capabilities are available by activating an ERAP?

15. Do you know which flammable liquids require an ERAP?

[ ] Yes
[ ] No

16. At a rail incident, would you know how to activate an ERAP?

[ ] Yes
[ ] No

17. How would you initiate the activation of an ERAP? List all the methods possible.

18. Based on your current understanding of ERAPs, what is your overall level of awareness?

[ ] Not at all aware
[ ] Relatively aware
[ ] Moderately aware
[ ] Above average
[ ] Perfectly aware

19. Are you familiar with the role of the Remedial Measures Specialist (RMS) from Transport Canada?

[ ] Yes
[ ] No

20. Describe your current understanding of some of the responsibilities of an RMS. List all known areas of responsibilities.

21. Do you know how to contact an RMS?

[ ] Yes
[ ] No

22. Indicate all the known ways to contact an RMS.

23. Are you aware of the role of CANUTEC?

[ ] Yes
[ ] No

24. How likely are you to contact CANUTEC for support?

[ ] Not likely
[ ] Unlikely
[ ] Unsure
[ ] Likely
[ ] Extremely likely

25. Do you know how to contact CANUTEC?

[ ] Yes
[ ] No

26. List all the ways to contact CANUTEC to the best of your knowledge.

27. What type of support is offered by CANUTEC? List all the known areas of support.

28. Based on your understanding of the current scenario and knowing that other dangerous goods may be involved, do you feel you have sufficient knowledge and expertise to effectively analyze the incident?

[ ] Yes
[ ] No

Risk Assessment

Scenario: *The tank car on fire has been identified and verified to be carrying petroleum crude oil (UN 1267). A hazard assessment must be conducted to determine the response objectives and approach.*

29. Does knowing that the dangerous good is petroleum crude oil change the precautions taken to ensure the safety of response personnel as you begin to assess the hazards?

[ ] Yes
[ ] No

30. Does knowing that the dangerous good is petroleum crude oil change the protective actions implemented for the safety and protection of the population?

[ ] Yes
[ ] No

31. You have confirmed that the derailed car on fire contains petroleum crude oil (UN 1267). Before you consider your response priorities, which hazards associated with crude oil that must you consider that could affect your approach? List all the properties that you know.

32. When conducting a site assessment at a rail incident involving flammable liquids, what potential hazards associated with the rail car itself that may affect your response and will have to be communicated for the sharing of situational awareness? List all the possible hazards associated with the car itself.

33. Upon closer inspection, you notice that the rail car on fire has a large hole in the tank. List all the reasons why this is an important observation (why this could impact the response).

34. In addition from the spill of flammable liquid, what other physical hazards unique to a derailment that could impact the overall response or safety of personnel? Name all the possible hazards that you know.

35. When assessing the type of fire involving a flammable liquid at a rail incident, what are the key elements to look for and consider? These important elements must be communicated to the other response organizations that arrive on scene.

36. Based on your current understanding of the properties of crude oil, what personal protection equipment is most appropriate for the response?

37. Based on your understanding of the current scenario with the knowledge that other dangerous goods could be affected, do you feel you have sufficient knowledge and expertise to effectively conduct a hazard assessment to this incident?

[ ] Yes
[ ] No

Response Considerations

Scenario: *Incident Command has been established at the scene. The tank car continues to burn and crude oil is now spilling out of the car into a pool below the tank. Qualified personnel and additional equipment have been deployed and are en route to the scene of the incident. The fire is impinging on an adjacent car that also contains crude oil.*

38. Incident Command has been established. Based on your current training and level of knowledge on the risk involved, what fire response do you think is the most appropriate until other resources arrive on scene?

[ ] Evaluate and monitor the scene and keep watch for signs of propagation (non-intervention)
[ ] Prevent the fire from spreading to the other tankers with the available water (defensive operation)
[ ] Fight the fire with the available water (offensive operation)
[ ] Other: _____

39. Industry response teams have been deployed to assist with the response effort. To the best of your knowledge, what specialized firefighting capability for flammable liquid fires will they bring to the site?

_____
_____
_____
_____
_____
_____
_____
_____

40. The Incident Commander decides to take a non-intervention approach until the response teams arrive to ensure the safety of the responders at the scene. To the best of your knowledge, what measures are considered important non-intervention actions as part of this fire response to ensure safety? List all the measures you know of.

41. Response teams are en route with equipment and trained personnel; however one of the adjacent tank cars also carrying crude oil is now being impinged by fire. You intend to adopt a defensive approach that consists of cooling the adjacent tank car with the available water to below 100°C until the response teams arrive. Before making this decision, what factors have to be considered before committing to a defensive approach and applying water to the adjacent tank car?

42. Where should the cooling water be directed on the adjacent tank car?

43. The railway company response team will arrive shortly. It is essential that first responders communicate with the railway company throughout each stage of the response and include them in the Unified Command structure. To the best of your knowledge about incident command on site, what information can the railway company provide that will assist in the overall response?

44. The response teams have arrived and a Unified Command structure has been established. A recommendation has been made to the Incident Command to take an offensive approach by applying Class B foam blanket on the car on fire. What environmental factors should be considered before committing to any approach using foam, water or chemical products? List all that apply.

45. There is a requirement to monitor the ambient air due to the toxic gases emanating from the presence and/or burning of crude oil. To the best of your knowledge, who has the capability of providing and setting up monitoring equipment to detect these gases?

46. What are the reasons why you need to continue monitoring the air on scene and in the surrounding area?

47. The response teams at the scene have the capability to conduct plume modelling. How will this information be useful to you?

48. The fire is extinguished and the response team is left with a large pool of crude oil. List all the methods that can be used to confine the spill (on the ground) and prevent further damage and spread of the liquid.

49. When is a liquid transfer necessary?

50. Who is responsible for transferring the liquid?

51. Based on your current understanding of the scenario and knowing that other dangerous goods could be affected, do you feel you have enough knowledge and expertise to effectively respond to this incident?

[ ] Yes
[ ] No

Conclusion

Thank you for filling out the post-exercise survey for the participants to the Athéna Full-Scale Exercise! Your participation contributes significantly to the exercise program.

APPENDIX B. PARTICIPANT FEEDBACK FORM

Canadian Association of Petroleum Producers and Canadian Association of Fire Chiefs (CAPP-CAFC) e-Learning

1. What was your overall impression of the effectiveness and content of the CAPP-CAFC e-learning?

[ ] Unsatisfactory
[ ] Acceptable
[ ] Excellent

2. Evaluate the content of the CAPP-CAFC e-learning in terms of the following:
Level of detail: '1' = insufficient, '2' = appropriate, '3' = excessive
Usefulness: '1' = not useful, '2' = useful, '3' = very useful

CAPP-CAFC e-Learning Section	Subject	Detail	Usefulness
Part I: Emergency Response in Canada	Emergency Response Guidebook (ERG)		
	CANUTEC		
	Emergency Response Assistance Plan (ERAP)		
	Remedial Measures Specialists (RMS)		
Part II: Identifying Hazards at the Scene of a Rail Incident Involving Flammable Liquids	Recognizing flammable liquids tank cars		
	Determining if dangerous goods are present (danger placards, shipping documents)		
	Railway company emergency number		
	Properties of flammable liquids		
Part III: Site-Specific Hazard Assessment and Response	Potential rail car failure		
	Heat induced tears		
	Physical site hazards		
	Fire assessment – rail cars		
	Air monitoring		
	Personal protective equipment (PPE) considerations		
	Considerations for fire response (non-intervention, defensive, offensive strategies)		
	Mitigation		
	Environmental considerations		
	Flammable liquid spill response, with no fire		
	Planning and preparing for a response		
	Incident command		

3. How much time was necessary to complete the CAPP-CAFC e-learning?

[ ] Less than 2 hours
[ ] Between 2 and 2.5 hours
[ ] Between 2.5 and 3 hours
[ ] More than 3 hours

4. Were the "Takeaway Notes" sections useful to summarize each part?

[ ] Not useful
[ ] Useful
[ ] Very useful

5. How, if at all, would you modify the CAPP-CAFC e-learning to enhance the overall learning experience? (Check all that apply)

[ ] Insert mini-quizzes
[ ] Add tests at the end of the lessons
[ ] Include interactive portions
[ ] No changes
[ ] Other: _____

6. Are there subjects in the CAPP-CAFC e-learning that should have been further elaborated on during the presentations?

_____
_____
_____

The following questions will be used to compare CAPP-CAFC e-learning and the training provided during the full-scale exercise:

7. What do you think of the language and terminology used during the training?

Language and terminology: '1' = need improvement, '2' = acceptable, '3' = exceptional
Pace of information is presented: '1' = needs improvement, '2' = acceptable, '3' = perfect

	Language and terminology	Pace of information
By the CAPP-CAFC e-learning narrator		
By the classroom presenters		
By the field presenters		

8. Was there any duplication between the information provided in the CAPP-CAFC e-learning and during the exercise?

Incident Response Guide (checklist / aide-mémoire)

9. Do you think the Incident Response Guide is representative of the response steps to follow during a response involving flammable liquids in your region?

[ ]	Not very representative
[ ]	Acceptable
[ ]	Representative

10. Are there steps in the Guide that are not clear or that need further clarification?

[ ]	Do not rush
[ ]	Secure the scene
[ ]	Identify the hazards and assess the situation
[ ]	Get help
[ ]	Respond

11. Are there steps in the Guide that would not be applicable in your region (due to resources, structure, etc.)?

		Explain why this step does not apply:
[ ]	Protect the first responders	
[ ]	Have rail traffic stopped	
[ ]	Identify the hazards and the dangerous goods	
[ ]	Confirm the isolation perimeter based on the evaluation of the site and the hazards	
[ ]	Communication, information	
[ ]	Prepare to coordinate resources	
[ ]	Establish an action plan with the specialists under the command structure	
[ ]	Evaluate / readjust the action plan	
[ ]	End the incident response	

Rail Yard Visit

12. Evaluate the effectiveness of the rail yard visit.

[ ]	Ineffective
[ ]	Somewhat ineffective
[ ]	Effective
[ ]	Very effective
[ ]	Extremely effective

Virtual Prototype (Simulation Tool) – Activity 1

13. Was the tool easy to use?

[ ]	Unsatisfactory
[ ]	Acceptable
[ ]	Excellent

14. Do you think the simulation tool is representative of real derailment conditions in your region?

[ ]	Not very representative
[ ]	Acceptable
[ ]	Representative

15. How would you improve the simulation tool to make it more representative?

_____

_____

_____

_____

16. Evaluate the effectiveness of the simulation tool.

[ ]	Ineffective
[ ]	Somewhat ineffective
[ ]	Effective
[ ]	Very effective
[ ]	Extremely effective

Simulation Tank (Prop) - Activity 2

17. Evaluate the effectiveness of the foam training.

[ ]	Ineffective
[ ]	Somewhat ineffective
[ ]	Effective
[ ]	Very effective
[ ]	Extremely effective

18. How could the foam training be improved?

_____
_____
_____
_____

Interactive activities – Activity 3

19. Evaluate the effectiveness of the interactive activities. Check one choice per column.

	Emergency Response Guidebook	Air Monitoring	Response Contractor Equipment Display
Ineffective			
Somewhat ineffective			
Effective			
Very effective			
Extremely effective			

20. To what extent did these activities make you more comfortable calling upon contractors' expertise?

[ ]	Little impact
[ ]	Acceptable
[ ]	Completely comfortable

Overall assessment

21. After completing this exercise, what is your overall impression of its effectiveness?

[ ]	Ineffective
[ ]	Somewhat ineffective
[ ]	Effective
[ ]	Very effective
[ ]	Extremely effective

22. To what extent did it help you be better prepared to handle a derailment incident in your region?

[ ]	No change in preparedness level
[ ]	Somewhat more prepared
[ ]	Completely more prepared

23. Indicate in which section of the training the following elements were most effectively address. Check only one section of training per row.

	CAPP-CAFC e-learning	In-class training	Simulation tank training	Activity No. 1	Activity No. 2	Activity No. 3
Determining the presence of dangerous goods						
Notifying TC, rail industry, petroleum industry						
Properties of flammable liquids						
Strategic response considerations						
Other _____						
Other _____						

24. Evaluate the different sections of the training based on their value with regard to the exercise as a whole. '1' = needs improvement, '2' = acceptable, '3' = exceptional

[ ]	CAPP-CAFC e-learning
[ ]	Emergency Response Assistance Plan Program and CANUTEC
[ ]	Tools for the response to rail incidents
[ ]	Properties and hazards of flammable liquids
[ ]	Site and hazard assessment
[ ]	Visit to the rail yard
[ ]	Train consist
[ ]	Integration of responders at the site of an incident
[ ]	Strategies and techniques from the petroleum and rail industry
[ ]	Virtual prototype (simulation tool) - Activity 1
[ ]	Simulated tank car (outside prop) - Activity 2
[ ]	Interactive activities - Activity 3

25. Have you identified any disparities between the different sections of the training?

_____
_____
_____
_____

26. How could the exercise program be improved?

_____
_____
_____
_____

27. In which of the following areas is there the greatest gap between your procedures and the response procedures proposed in this exercise?

[ ] Identifying a situation involving flammable liquids
[ ] Contacting organizations for support, including CANUTEC
[ ] Activating the ERAP
[ ] Identifying the hazards of flammable liquids
[ ] Identifying the tactics and strategies necessary to respond to the situation
[ ] Identifying support available from the industry
[ ] Other: _____

28. Do you think the training provided and the simulation helped resolve these gaps?

[ ] No impact
[ ] Acceptable
[ ] Definitive resolution

29. Additional comments:

_____
_____
_____
_____

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