Emergency Response Actions and the Safe Cleanup Following a Derailment

Presented By:
Alana MacKinnon, P.Eng.
Conestoga-Rovers and Associates

The League of Railway Industry Women
Technical Conference
Montreal 2014
About Me

• Degree in Civil Engineering
• ~8 years in environmental consulting working directly with Canadian railroads
• Due diligence, storm water infrastructure assessments at yards, industrial hygiene, emergency response, air monitoring, emergency response planning, cleanup, long-term remediation and monitoring
• LRIW Canadian Director since 2013
Derailments
Shipping by Rail – Some Facts

- 24% of Canada’s dangerous goods are shipped by rail
- Petroleum products account for 77% of dangerous goods shipped in Canada
- Shipment of crude increased from 500 cars in 2009 to 160,000 cars in 2013
- In 2013, 7 accidents where dangerous goods were released

**Dangerous Goods:** Explosives, gases, flammable liquids, flammable solids, oxidizing substances, toxic and infectious substances, radioactive materials, corrosives

Source: Transport Canada Transportation in Canada 2012 Overview Report; Transportation Safety Board Statistical Summary Railway Occurrences 2013
EMERGENCY RESPONSE
WHEN DOES IT START?

Long before a derailment!
Preparedness

✓ Emergency Response Plans
  • Know who to call, what to do
  • Know location of appropriate response teams and resources

✓ Identify sensitive receptors
  • Residences, institutions, waterways, groundwater, etc.

✓ Have equipment and supplies ready
  • Response time
  • Mobilization
Emergency Response

- What was released? How much? What could release?
- Nearby receptors?
- Other factors? E.g. fires, weather, accessibility
- Action levels
Emergency Response – Air Monitoring

- Number 1 goal – **SAFETY!** For the community and workers
- Ensure air quality is acceptable – particulate, volatiles, LEL, Oxygen
Emergency Response – Air Monitoring
Emergency Response – Air Monitoring

- Real-time data collection
Emergency Response – Air Monitoring

- Real-time measurements of VOCs, toxic gases, LEL, Oxygen
- Real-time measurements of VOCs (e.g. benzene)
Emergency Response – Action Levels

- Stop Work
  - Evacuate work area
  - Reassess procedures

- Notify Authorities
  - Evacuate surrounding community

- Increase Personal Protective Equipment
  - Supplied Air/SCBA
Emergency Response – Cleaning Up

- **Railway**
  - Restoring the track
  - Removing damaged rail cars
  - Transferring bulk products

- **Agencies**
  - Communicating with the public
  - Ensuring clean up in accordance with regulations and standards
  - Providing clean up direction
Emergency Response – Cleaning Up

- Consultant/ER Crews
  - Contain released product
    - Construct berms, ditches, holding ponds, underflow weirs
  - Delineate
    - Soil sampling - boreholes
    - Groundwater sampling – monitoring wells
    - Surface water sampling – rivers, streams, lakes
  - Treat impacted media
    - Excavation
Emergency Response – Cleaning Up

- Oil containment boom
- Oil skimmer
- Oil-absorbent pads
- Vacuum Truck
Post-Derailment Remediation

- Within 1 to 2 weeks, the excitement around a derailment has usually dissipated.
- However, environmental impacts linger.
  - Sources usually removed, but the extent can be widespread.
- Remediation technologies used after a derailment vary depending on the extent and nature of impacts.
  - Soil/groundwater? Rivers/streams? Air?
- Remediation solutions consider short-term and long-term effectiveness, operation and maintenance costs, long-term monitoring programs, etc.
Post-Derailment Remediation

- In-Situ Treatments
  - Can target soil or groundwater impacts
  - Bioremediation or chemical oxidation
  - Permeable Reactive Barriers for passive treatment

Remediation and monitoring can continue for years following a derailment!
Post-Derailment Remediation
Questions/Comments?

Thank You!

Alana MacKinnon
Conestoga-Rovers and Associates
(519) 884-0510
amackinnon@craworld.com