Building a Culture of Safety at Faro Mine Complex Faro, Yukon

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What is Faro Mine Complex?

Faro Mine

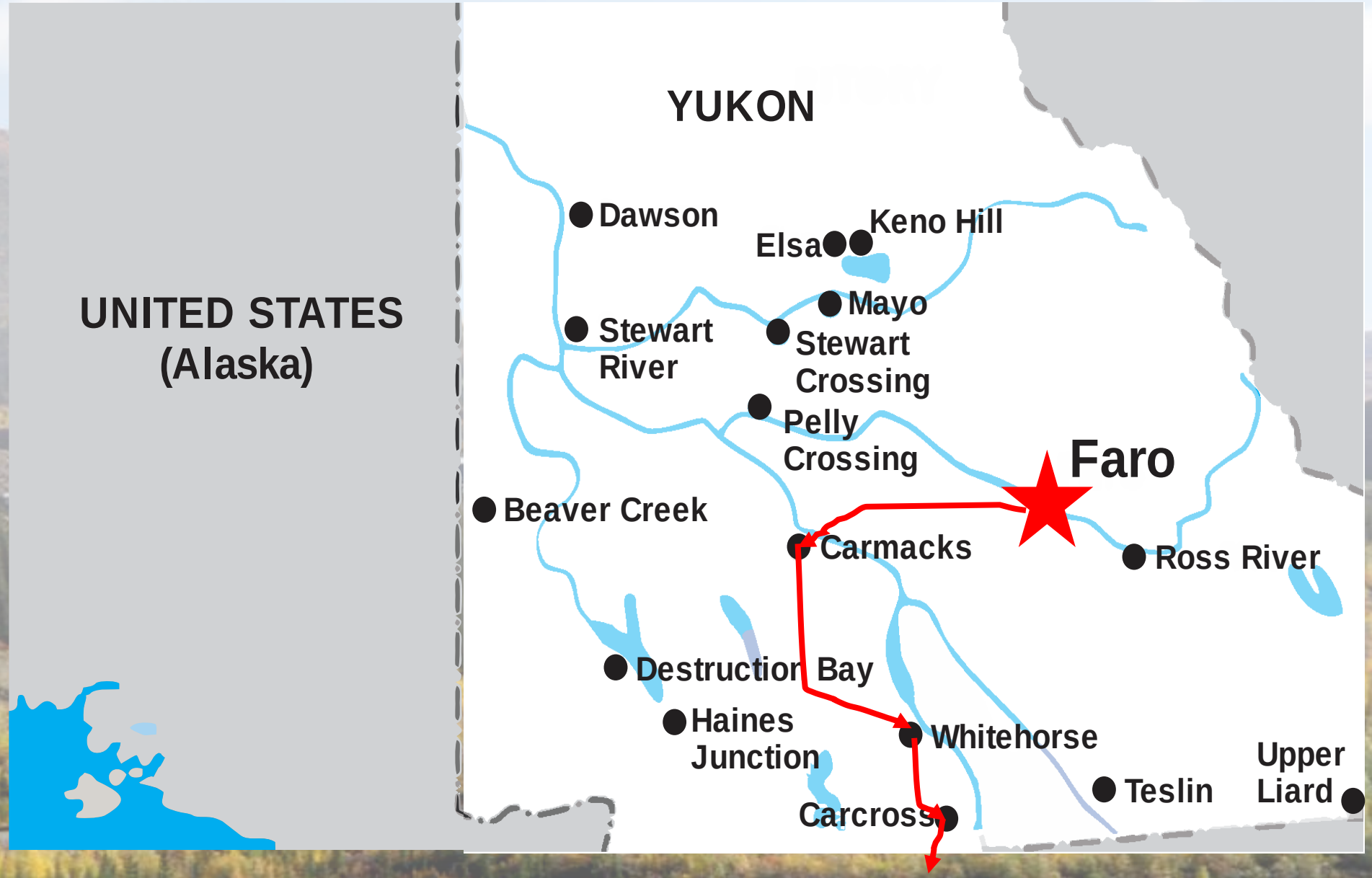
Located in the Yukon on a 2,500 hectare site 350 kilometers northeast of Whitehorse

Open pit mine produced lead and zinc, operated from 1969 until 1998

In 1998 the last operator, Anvil Range Mining Corp, went into receivership

Deloitte and Touche was the court appointed Interim Receiver until 2009

Faro Mine Complex (FMC) Location



FMC History: Overview

- The Faro Mine Complex (FMC) is one of the largest and most complex contaminated sites in Canada.
- Located in a remote area in the south central Yukon, FMC was an open-pit lead-zinc mine that operated from 1969 until 1998.
- The FMC site covers approximately 2,500 hectares and includes 70 million tonnes of tailings and 320 million tonnes of waste rock.
- The tailings and waste rock contain high concentrations of heavy metals and are prone to creation of acid rock drainage.
- A care and maintenance (C&M) regime, including diversion of clean surface water and collection and treatment of contaminated water, is currently in place at the site.

FMC Care & Maintenance Program: Project Work Scope

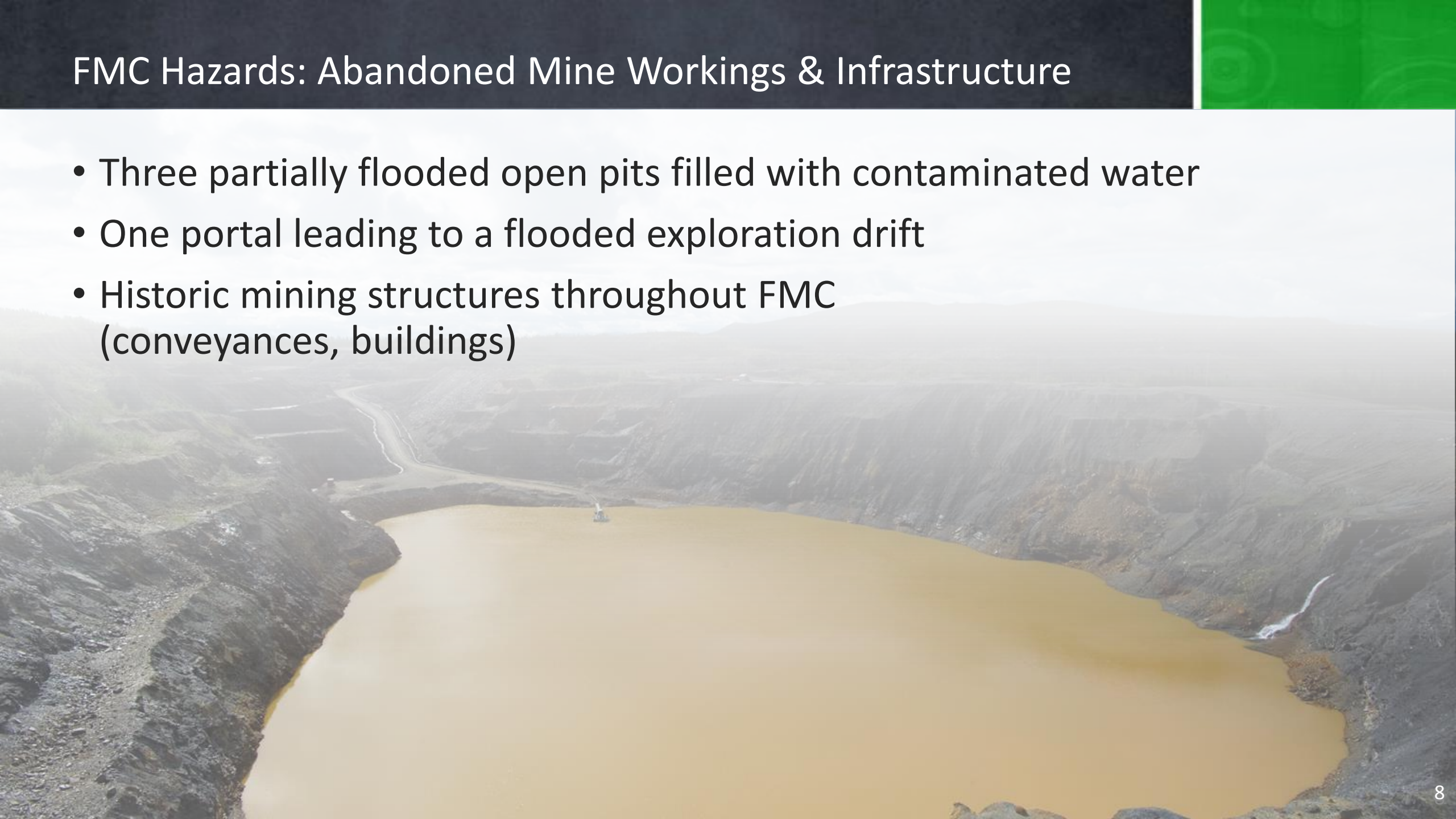
1. Year-round, 24/7 site security and access control;
2. Responsibility for health and safety management of the Site, including functioning as the Constructor under Yukon Occupational Health and Safety Act;
3. Provision of adequate emergency response capability, including on-site fire response, First Aid, spill response, and Mine Rescue Team;
4. Procurement and management of on-site inventories of parts, supplies, critical spares, and consumables;

FMC Care & Maintenance Program: Project Work Scope, cont.

5. Monitoring, operation, maintenance, repair and upgrading of;
   - Environmental compliance program (surface water, groundwater, treated effluent, geotechnical structures, tailings impoundment and seepage);
   - Surface water conveyance and storage infrastructure;
   - Physical infrastructure including buildings, roads, electrical supply systems, Faro housing;
   - Contaminated water collection, storage, conveyance, and treatment systems, including 2 lime-based water treatment plants;
   - All equipment on the Site, including YG-owned mobile, light, medium, and heavy duty equipment
6. Management of waste (solid waste, treatment sludge, waste mechanical fluids)

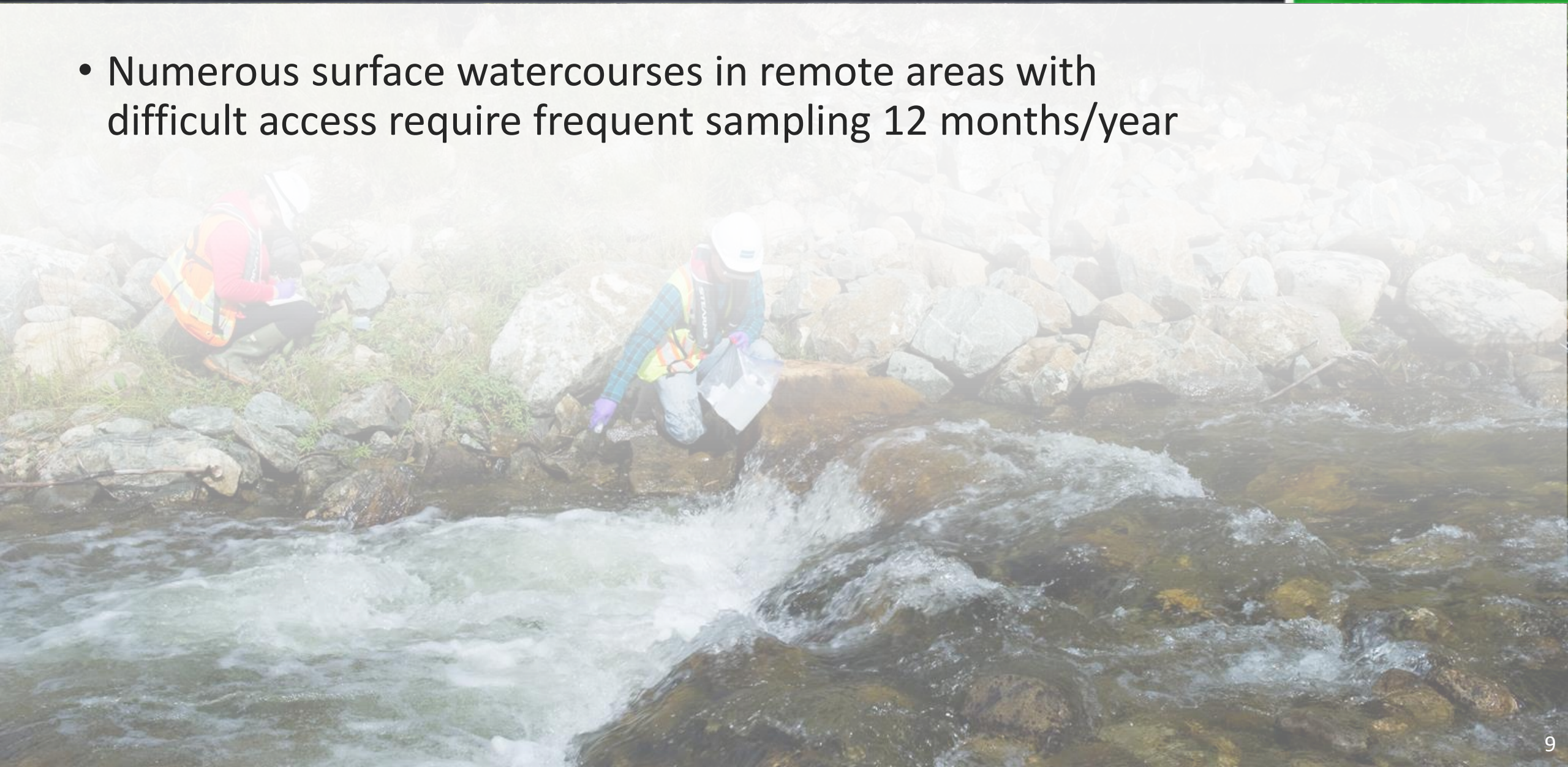
FMC Hazards: Abandoned Mine Workings & Infrastructure

- Three partially flooded open pits filled with contaminated water
- One portal leading to a flooded exploration drift
- Historic mining structures throughout FMC (conveyances, buildings)



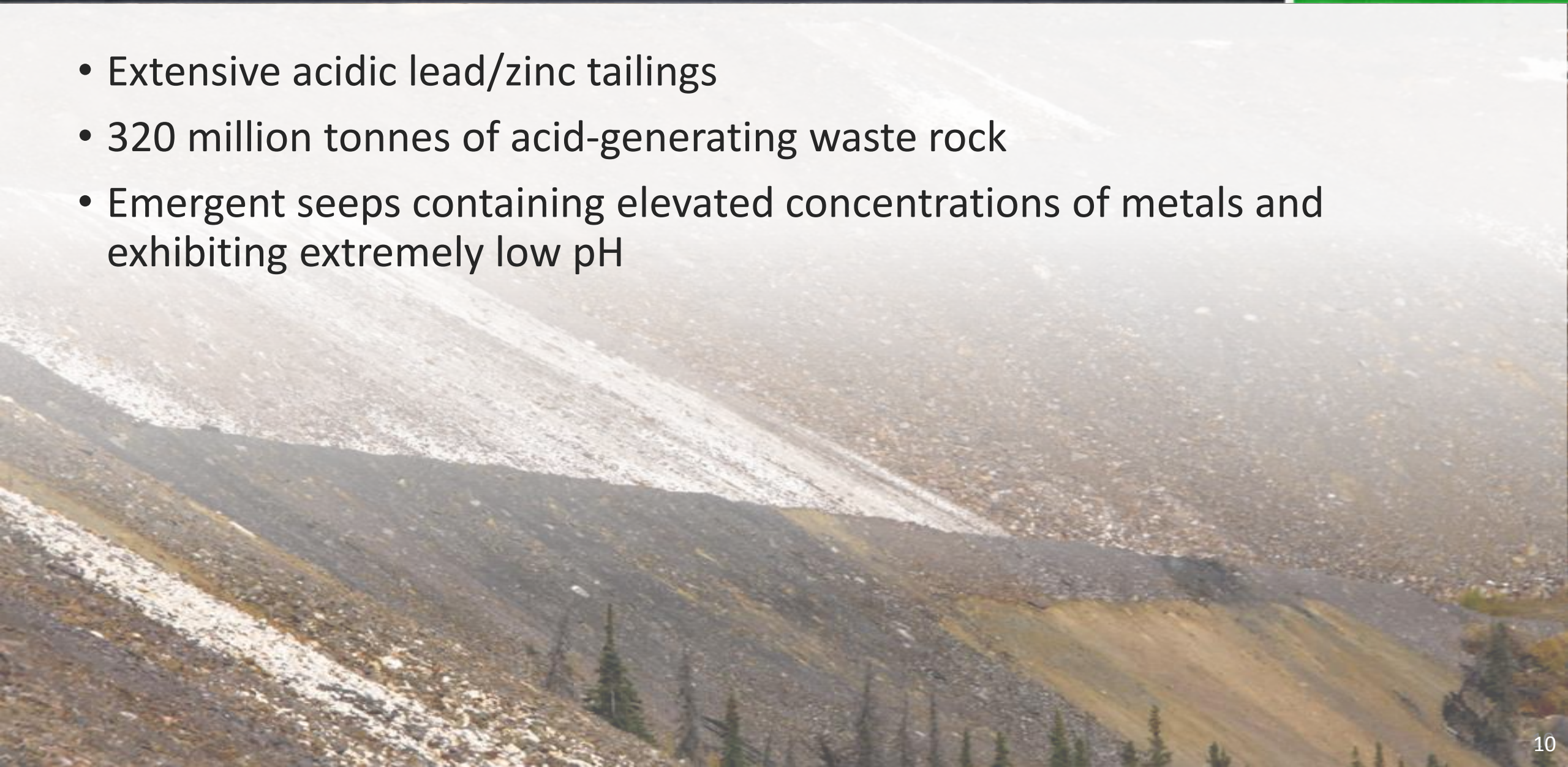
FMC Hazards: Natural Water Hazards

- Numerous surface watercourses in remote areas with difficult access require frequent sampling 12 months/year



FMC Hazards: Acid-generating Waste Rock and Tailings

- Extensive acidic lead/zinc tailings
- 320 million tonnes of acid-generating waste rock
- Emergent seeps containing elevated concentrations of metals and exhibiting extremely low pH



FMC Hazards: Large-Scale Industrial Processes

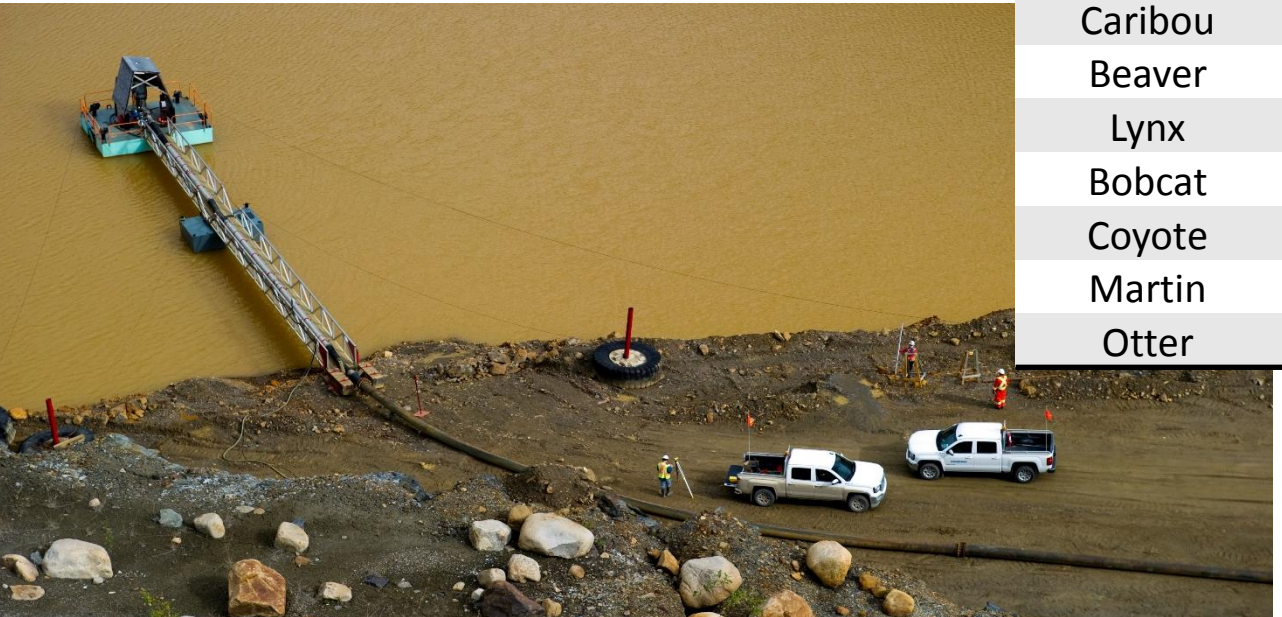
- 3 seasonal water treatment plants processing 9,000 USGPM (>4,000,000,000 gallons/year)
- Lime-based process to remove metal contamination through precipitation process

FMC Hazards: Common Industrial Hazards

1. Operating Equipment
2. Hazardous Materials
3. Electrical Hazards
4. Emergency Response Time
5. Weather Extremes
6. Wildlife
7. Work at Heights
8. Slips/trips/falls
9. Heavy Lifting

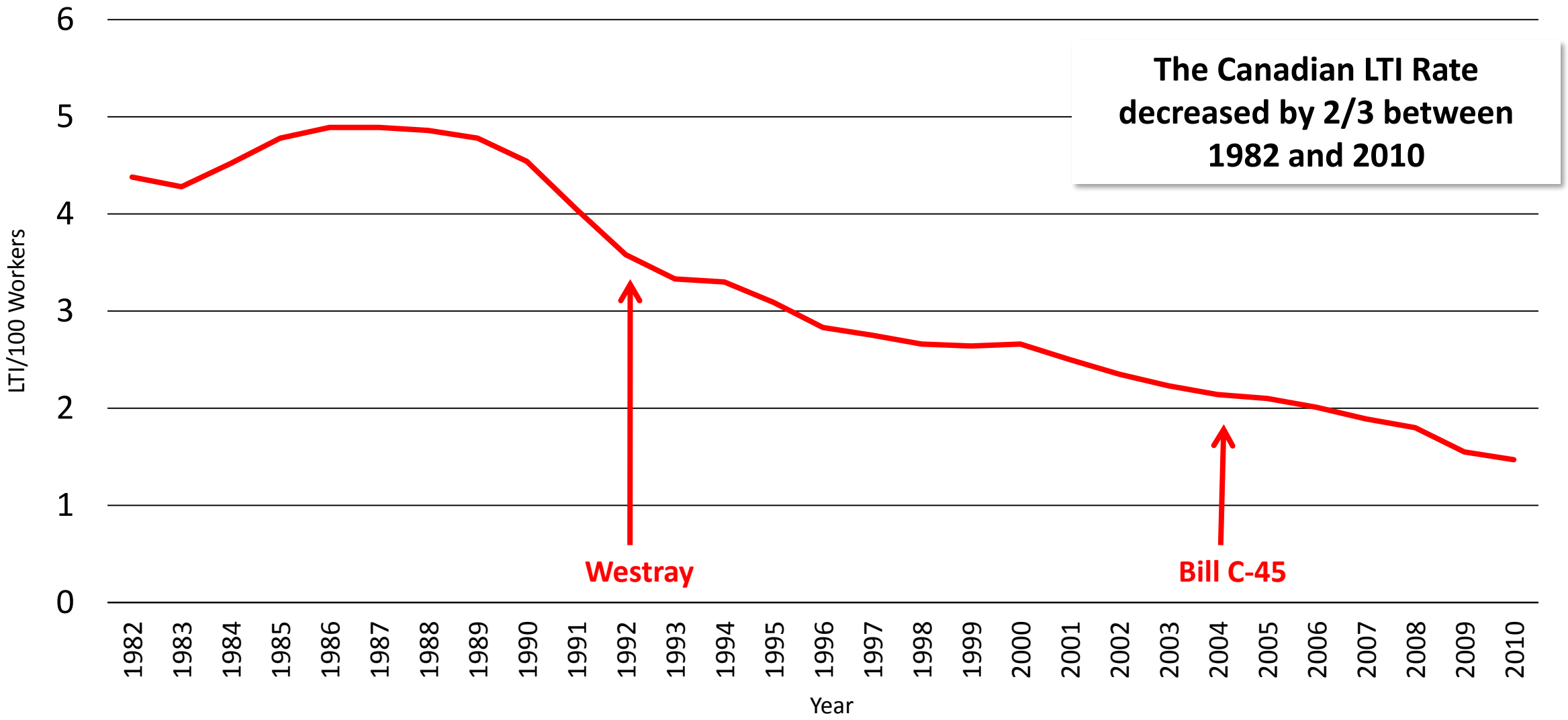
Common FMC Hazards

Animal	Sightings
Sheep	744
Moose	88
Porcupine	62
Fox	56
Black Bear	54
Grizzly Bear	35
Caribou	18
Beaver	15
Lynx	11
Bobcat	3
Coyote	3
Martin	2
Otter	2



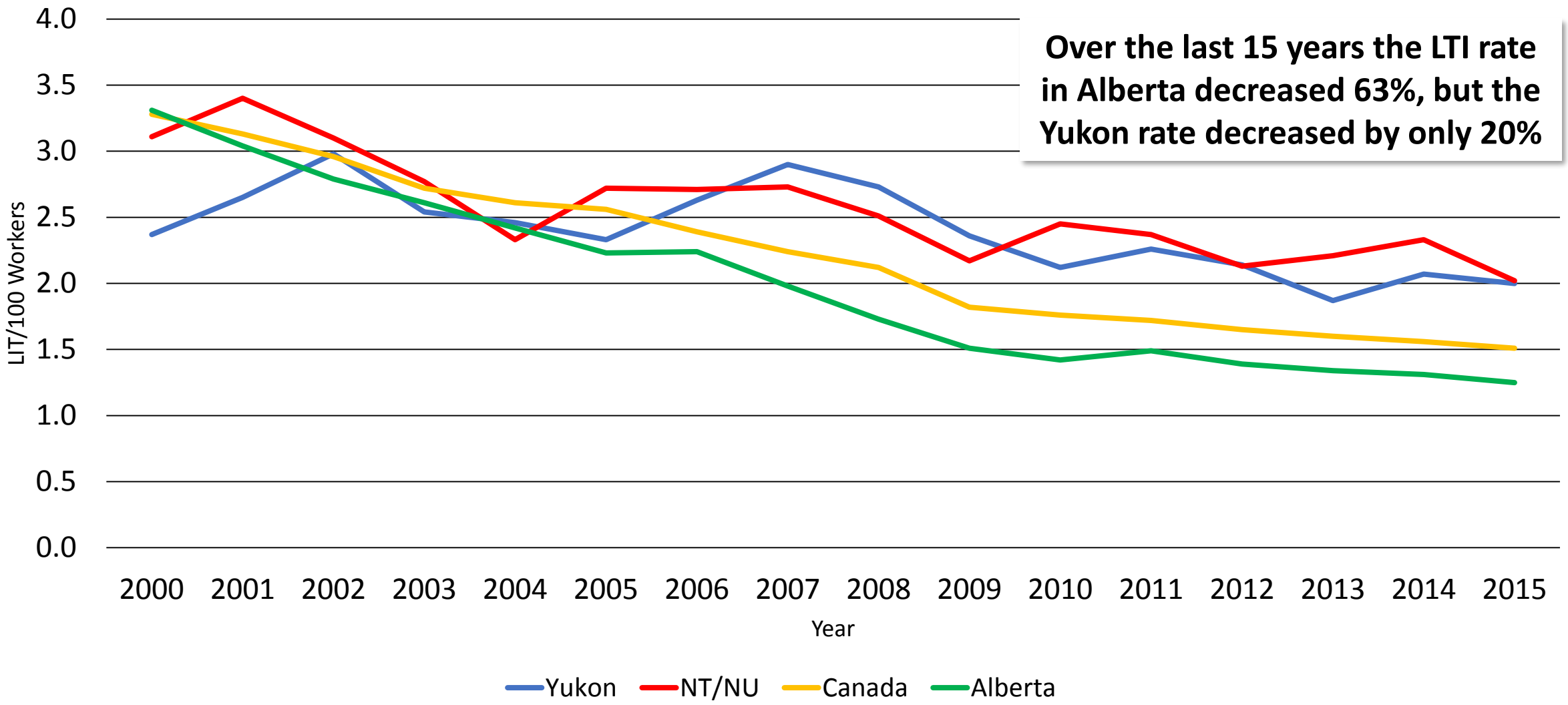
National and Northern Health and Safety Trends

Canadian Lost Time Injury Rate/100 Workers



Source: HRSDC calculations based on data from Association of Workers' Compensation Boards of Canada.

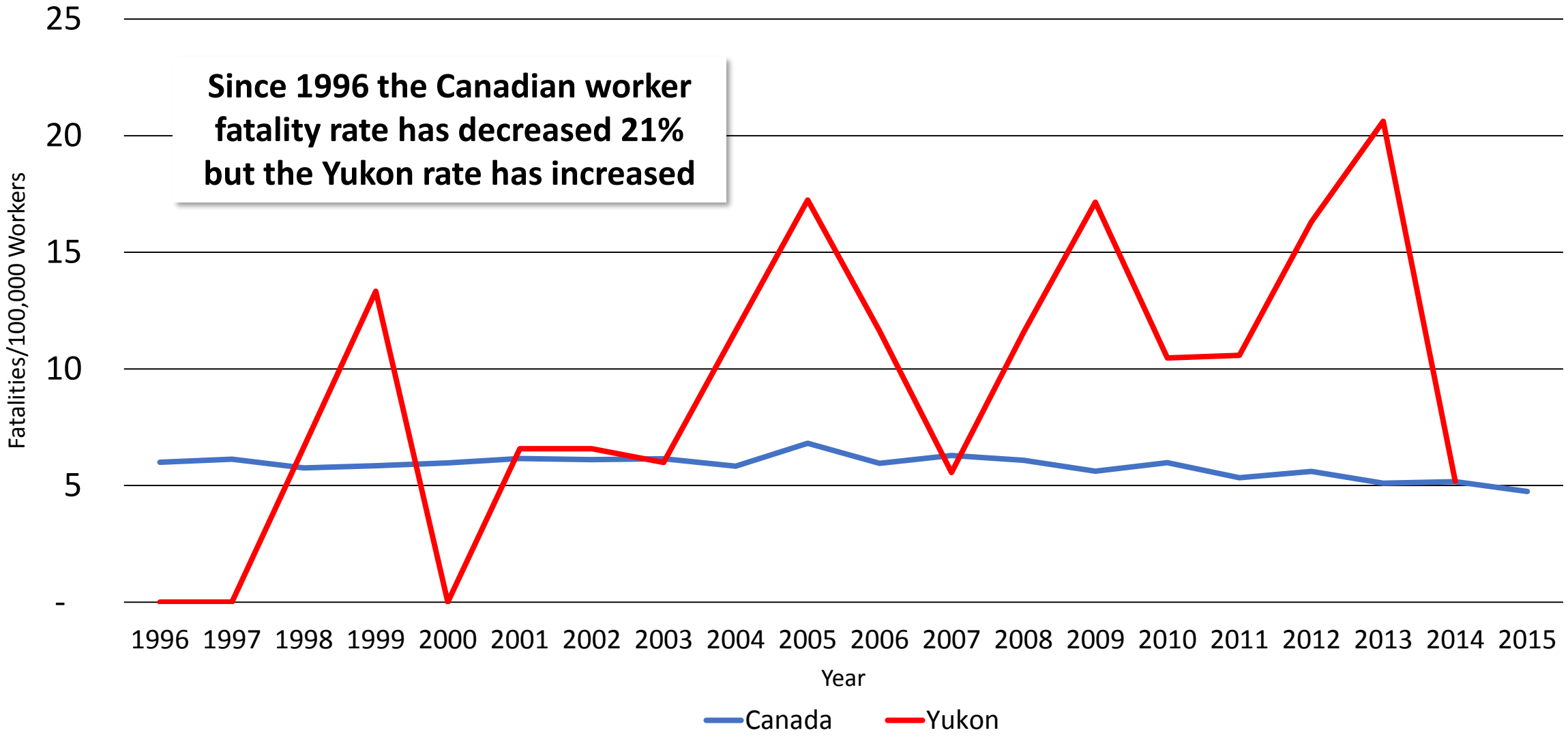
Canadian Lost Time Injuries/100 Workers



Over the last 15 years the LTI rate in Alberta decreased 63%, but the Yukon rate decreased by only 20%

Source: http://awcbc.org/?page_id=11803

Workplace Fatalities/100,000 Workers



Source: http://awcbc.org/?page_id=11803; http://www5.statcan.gc.ca

Work in the North: Safety Challenges

What are some of the factors in the north that contribute to these statistics?

1. Culture of “get ‘er done”
2. Resource limitations
   - Human resources
     - Small populations, limited availability of workers
   - Equipment resources
     - Do not always have access to wide range of resources
   - Supply logistics not straightforward
   - The more remote the site, the greater the challenges
3. Climate
4. Access/Egress

Work in the North: Cultural Change Advantages

From another perspective, performing work in the north can convey some unexpected advantages in the implementation of a culture of safety:

1. First-hand knowledge of what can go wrong is likely present in the workforce.
2. If you fail to plan, you plan to fail
3. Unpredictability begets Adaptability
4. We’re all in this together

Implementation of Cultural Change

Implementation of Cultural Change

- October 2015 – New YG PM assumes C&M oversight
  - YG's concerns with existing H&S system:
    - 'Bottom of Pyramid' approach
    - Punitive system
    - Two-way communication not evident
    - Culturally rejected by workforce
    - Prioritization of safety by management not evident
    - Limited client involvement
    - Statistically consistent record for a Northern Work Site
- Determines that change is necessary for the system to function effectively

Ok….HOW?

Implementation of Cultural Change

1. Change Contract and Contractor.
   - April 2016 - Parsons assumes C&M program and YG introduces site safety expectations
   - Kickoff meeting with detailed introduction to the implementation of the safety program at site, with expectations clearly defined.
   - Identification of emphasis on client focus on safety in the program.
   - Inclusion of safety metrics in the quarterly performance review scoring, with detailed criteria for achievement.
   - Requirement for Certificate of Recognition (COR) certification
   - Timely and thoughtful review of safety-related deliverables, with open dialogue.
   - Client presence and involvement in program development.
   - Focus on program improvement throughout the lifecycle of the project.
   - Appropriate resourcing and funding for program success.

Implementation of Cultural Change, cont.

2. Establish New Safety Paradigm
   - Listen
     - Workers will likely disclose what wasn't working, if given the right environment.
   - Practice empathy
     - When a practice/set of behaviors/methodology doesn't reconcile with best practice, try to understand 'why' the process has been happening
   - Ask questions
     - Ideas for program improvement from the workforce can be very valuable, if management is willing to listen.
   - Be patient
     - Rome was not built in a day. Work with people and earn their trust.

Implementation of Cultural Change, cont.

3. Make Your Regulator Part of the Team
   - Initial contact from client to regulator prior to new contractor start-of-work.
   - Understand past challenges/successes/priorities.
   - Open dialogue between regulator, client and contractor for successful correction of deficiencies and program improvement.
   - Added value gained as a result (i.e. Mine rescue trailer visit to site, shared program developed for drilling on ice).

Implementation of Cultural Change, cont.

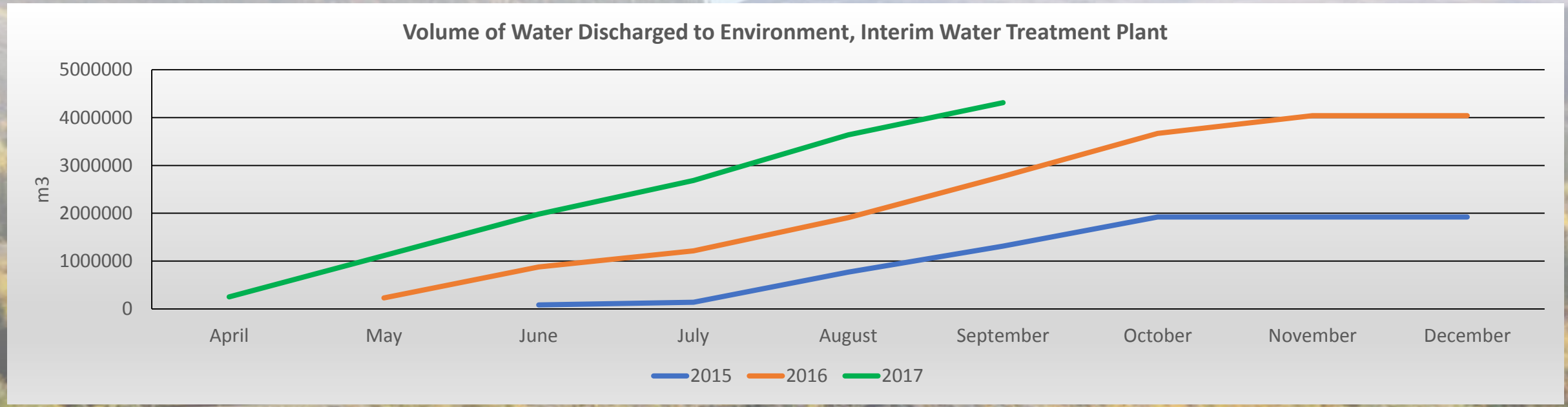
4. Establish Clear Transition Pathway
   - Use easy to relate to acronyms to convey messages
     - SLAM (Stop; Look; Assess; Manage)
     - ALARA (As Low As Reasonably Achievable)
   - Gradually grow ability to understand hazard assessment and risk management concepts to evolve organically into desired culture
     - Plan - we plan each task, and work the plan
     - Accept - we accept our responsibility to work within the structure of the HS program, and our responsibility to each other
     - Care - we care enough about ourselves, our co-workers, our family and our community to be diligent in our approach to safety
     - Lead - we lead every day by the example that we set for those we work with, recognizing that others will mimic what we do more than what we say

Implementation of Cultural Change, cont.

5. Coaching and Management
   - Onsite management plays a key role in cultural change.
   - Team approach required for meaningful 2-way relationship with the workforce
   - Rewarding desirable behavior and correcting undesirable behavior consistently
   - Create the right balance of corrective action and coaching to achieve maximum positive change.

Results

- Achieved COR Certification in first 3 months
- Delivered 5,891 hours of safety-related training in last 18 months
- 152,800 staff hours worked to October 1, 2017 with 2 LTIs
- Doubled discharged water treatment volume in main plant in first year



Summary

- Canada’s north is a challenging and rewarding place to perform work
- Success is most easily achieved when all parties are pointed towards a common goal
- Mutual trust, respect, and two-way communication are central to developing a safety program that everyone who works on a remedial program can be proud of.

THANK YOU

Questions?

www.emr.gov.yk.ca/aam/faro.html