MILLENNIUM
EMS Solutions Ltd.

SASKATCHEWAN MINING ASSOCIATION

October 18, 2018

MILLENNIUM
EMS Solutions Ltd.

Obed Mountain Mine
2013 Mine Wastewater Release

MILLENNIUM
EMS Solutions Ltd.

Outline

- History
- Regulatory Process/Progress
- 2018 Work
- Lessons Learned
- Questions

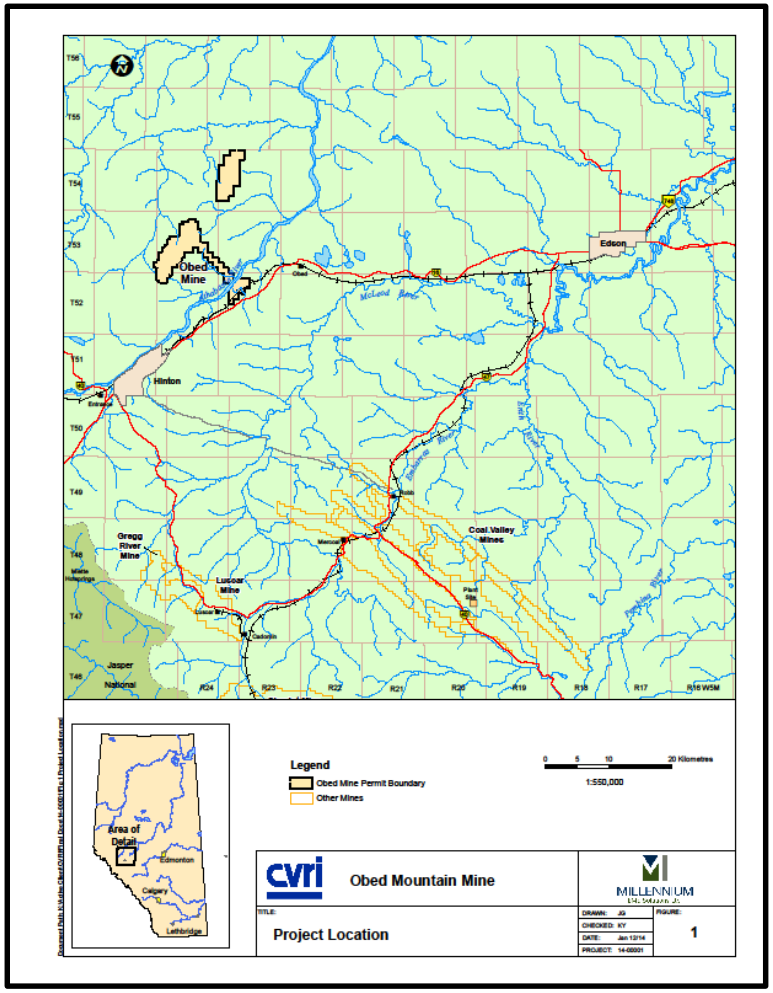
MILLENNIUM
EMS Solutions Ltd.

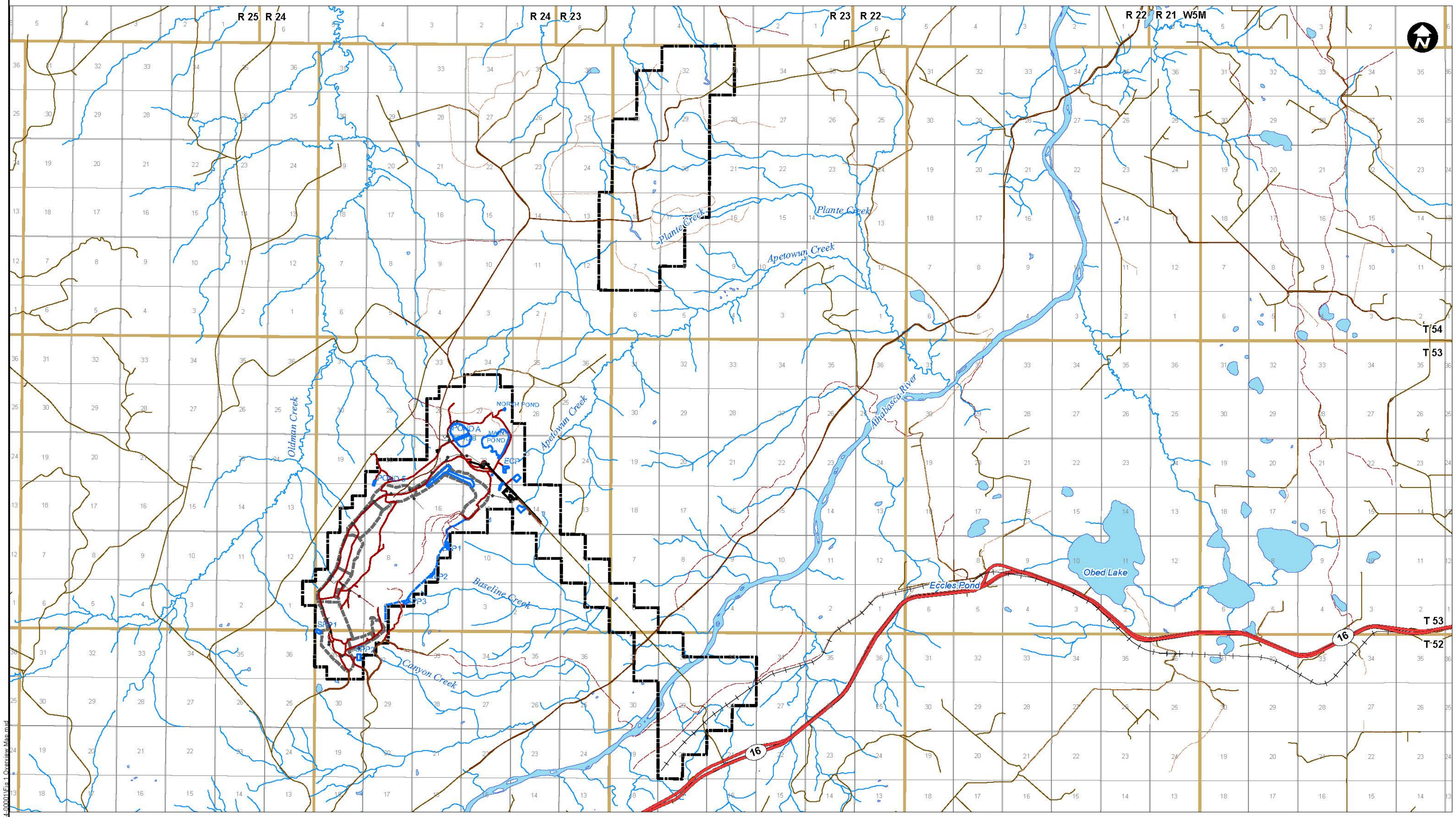
History

- October 31, 2013 uncontrolled release of mine wastewater from the Obed Mountain Mine
  - Mine was in a suspended operations mode
  - Previous operations included dragline mining, on-site coal processing, conveyor and rail load out.
- Approximately 670,000 cubic meters of water and sediment were released .

Obed Mountain Mine

- The Obed Mountain Mine is located approximately 20 km east of Hinton, Alberta
- The mine has been in operation since 1980
- The mine is currently being reclaimed





Legend

- Mine Permit
- Mined Out Pits
- Railroad
- Facilities
- Impoundments
- Power Line
- Access and Haulage Roads
- Trail; Cutline
- Collector Ditch
- Expressway / Highway
- Arterial
- Resource / Recreation; Local / Street; Service Lane; Collector; Local / Strata; Ramp

REF: CVRI Ltd, Mar 2009; Geogratis; Geobase.

0 1.5 3 6 km

1:120,000

cvri

Obed Mountain Mine

MILLENNIUM EMS Solutions Ltd.

TITLE:

Overview Map

DRAWN:	JG
CHECKED:	KP
DATE:	Jan 15/15
PROJECT:	14-00001

FIGURE: 1

Regulatory Process

- Gov't of Alberta issued EPO-2013/34-CR to operator and parent company on November 19, 2013
  - Outlined and directed remediation and assessment plans.
    - Immediate Sampling & Monitoring Plan
    - Solids Recovery Plan
    - Impact Assessment Plan
    - Long Term Sampling & Monitoring Plan
    - Wildlife Mitigation Plan

Regulatory Process

- EPO-2013/34-CR cont'd
  - Remediation Plan
  - Water Management Plan
  - Waste Management Plan
  - Reporting

Response/Progress

- Each of the EPO requirements had specific dates and requirements for submission.
- Millennium coordinated the technical response team and the owners team submissions.
  - All requirements of the EPO have been completed.
  - Final remediation efforts are underway

Impacts

Downed timber and soil erosion

- Timber was uprooted and deposited in windrows beside the flow path
- Large accumulations in some areas
- Upper soil horizons eroded by the flood waters in some areas

Impacts

Creek bed and banks

- Bank undercutting
- Channel widening
- Loss of channel
- Beaver dams damaged

Impacts

Solids deposition

- Deposits were a mix of released material and material eroded along the release path

Major deposits located where the water slowed and pooled:

- DX road crossing
- Upper and lower blowout areas

02/01/

Initial assessment November 2013

- Substantial erosion of stream bank materials
- Disturbance to mature black spruce vegetation community
- Deposition of released material

2013/11/08

MILLENNIUM
EMS Solutions Ltd.

Lessons

- *Data acquisition and management is a tremendous task.*
  - Required the use of specialized and specific processes and tools.
- *Background information was expected by the EPO and generally missing or absent.*
  - Required significant effort to retrieve baseline operating/assessment documents for the operation
  - Required scientific justification for use of representative environmental conditions.

2014 – 2017 Activities

- 2014
  - Downed Timber Management
    - Saw teams and mulchers used to salvage useable timber and remove access and water flow impediments
  - Solids recovery
    - Access developed and accumulated solids were removed
  - Stabilization
    - Four small settling ponds were constructed on Apetowun Creek
    - Fish passage was required on all of the traps
    - All weather access provided for maintenance activities
    - Full flow through on ST1 and ST2 while ST3 was a partial flow through (flows greater than 0.3 m^3/sec entered the trap)
    - Enhanced performance with treated jute curtains and anionic floc blocks
  - First Impact Assessment Report

Solids Recovery

Trap Construction

Trap Construction

Stabilization Activities

MILLENNIUM
EMS Solutions Ltd.

Lessons

- *Language is important.*
  - Reports that reference "*remediation*" created confusion as the Remediation Plan was not yet approved.
- *The Public face of the Project is as important as the technical submissions*
  - Significant effort was required to ensure that stakes and rights holders were getting the appropriate information
  - Senior corporate accountability as early as possible in the incident is critical

2014 – 2017 Activities

- 2015
  - Reporting and trap maintenance
    - Water quality data compilation
    - Soils quality data compilation
    - Refinement of the Impacts Assessment
      - Prepare and submit a 2015 update to the Impacts Assessment Report
  - Trap maintenance to remove accumulated sediments and continue solids recovery

2014 – 2017 Activities

- 2015 Impact Assessment
  - Water quality, soils quality and data compilation
  - Soils quality data compilation
  - Development of the Impacts Assessment
  - Impacts identified to
    - Impacts confined to upper reaches of Apetowun Creek
      - » Fish habitat (alteration of previous habitat
      - » Vegetation (removal of mature tree cover)
      - » Soils (deposition and removal)
      - » Wildlife (disruption to habitat)

MILLENNIUM
EMS Solutions Ltd.

Lessons

- *Agreement to a systematic approach must be unanimous.*
  - The idea of measure – assess – fix…as an agreed upon process needed to be established early in the Project.
- *Personnel changes are detrimental to the Project*
  - Both regulatory and Owners team personnel changed during the incident response.
- The impacted areas continued to degrade due to natural hydrologic processes


09/06/

2014 – 2017 Activities

- 2016 - 2017
  - Remediation plans
    - EPO requirement to finalize the plan for repair of the 2013 incident
    - DFO involvement for “restoration of habitat” and creation of new habitat
  - 2016 major storm event at the Mine created additional erosion, accumulated sediments and solids to recover

2014 – 2017 Activities

- 2016 - 2017
  - Final Remediation Plan approval
    - Geomorphic design criteria utilized to build a responsive and ultimately sustainable remediated channel
  - Remediation Project Development
    - Owners team approval of final project schedule and costs
    - Co-ordination of “in-stream RAP” with regulators

MILLENNIUM
EMS Solutions Ltd.

Lessons

- *Multiple approval requirements, both internal and external required additional project related time.*
  - Both internal (Owners Team) and external (Federal and Provincial Gov'ts) had several and occasionally disparate approval requirements.
- *Design to construction connections need to be closely managed.*
  - Particularly with the detailed, approved geomorphic plan, the execution methodology required additional resources.

2018 Activities

- 2018
  - Reporting and data collection and assessment continues
    - Water quality data compilation
    - Soils quality data compilation
    - Assessment update and release of accumulated data
  - Trap maintenance to remove accumulated sediments and continue solids recovery
  - Removal and reclamation of ST3

2018 Activities

- 2018
  - Apetowun Creek Remediation Project Kick-off
    - Beginning on the mine-site with the remediation of the MTP spillway.
    - Proceeding downstream with a 'reach by reach' construction plan
  - Fish bearing waters required isolation and fish salvage
  - Detailed water management plan coordinated by Obed Mine

MILLENNIUM
EMS Solutions Ltd.

Summary

- Lessons
  - Data, data, data
  - Data - information - opinions has to be actively managed from Day 1
  - Everything takes longer than you plan for
  - Make plans to actively manage personnel changes (especially in the regulators)
  - Extremely detailed designs create extremely detailed execution plans – ensure you account for that

MILLENNIUM
EMS Solutions Ltd.

Questions

Thank you.