



# **15<sup>th</sup> Annual BC MEND Workshop**

**Improving Inmet's Tailings Management:  
Applying Towards Sustainable Mining guidance  
at our operating and closed mines**

Vancouver

December 4, 2008

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Craig Ford

Inmet Mining Corporation



# Questions on our mine waste management approach

- Why have a mine waste policy?
- How does your policy tie into your values and leadership charter?
- Why have company Standards for mine waste management?
  - Shouldn't the approach be site specific?
  - Don't you approach closed mines differently?
- What is Towards Sustainable Mining and why use the guidance?
  - Why not something else? CDA, ICOLD, other?
- How do you apply your policy, Standards and TSM?
  - What actually happens at the sites?

Our growth strategy is clear...

The public view of mining is not

The screenshot shows the CBC News website in a Mozilla Firefox browser window. The browser's address bar displays 'http://www.cbc.ca/news/'. The website header includes 'CBC News' and navigation links for 'RADIO' and 'TELEVISION'. A search bar is located in the top right. The main content area features a large banner for 'THE UGLY CANADIAN' under the 'THE NATIONAL FEATURES' section. Below the banner are four image-based links to news stories:

- THE PHILIPPINES: MARCOPPER**: Accompanied by an image of a large industrial pipe or structure in a rocky, industrial setting.
- KUMPTOR: KYRKYZSTAN**: Accompanied by an image of a large concrete dam or bridge structure over a river.
- GUYANA: OMAI**: Accompanied by an image of a large, reddish-brown earth excavation or tailings pile.
- LOS FRAILES: SPAIN**: Accompanied by an image of a large-scale mining operation with a significant amount of red earth and rock.

The left sidebar contains a navigation menu with categories such as NEWS, CANADA, WORLD, BUSINESS, SPORTS, ARTS & ENTERTAINMENT, WEATHER, HEALTH & SCIENCE, CBC ARCHIVES, KIDS, PROGRAM GUIDE, SERVICES, CONTACT US, and ABOUT CBC. At the bottom of the browser window, a status bar indicates 'Transferring data from sdc.cbc.ca...'

# our strategy

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“To grow responsibly as a base metal mining company, providing superior returns to shareholders.”

# about Inmet

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Inmet is a Canadian-based global mining company that produces copper, zinc and gold. We're active in production, development and exploration — three key components to delivering sustainable growth and long-term value for our shareholders.

# our current production base



**Troilus (100%)**



**Pyhäsalmi (100%)**

**Çayeli (100%)**



**Ok Tedi (18%)**



# our Closed Sites



**Samatosum**

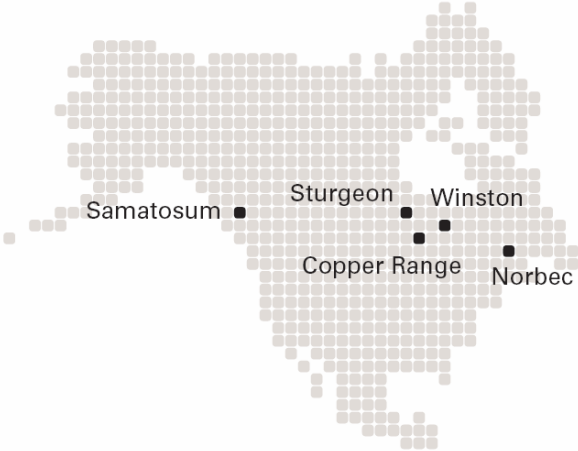


**Sturgeon**



**Winston**

**Copper Range**



**Lac Dufault**



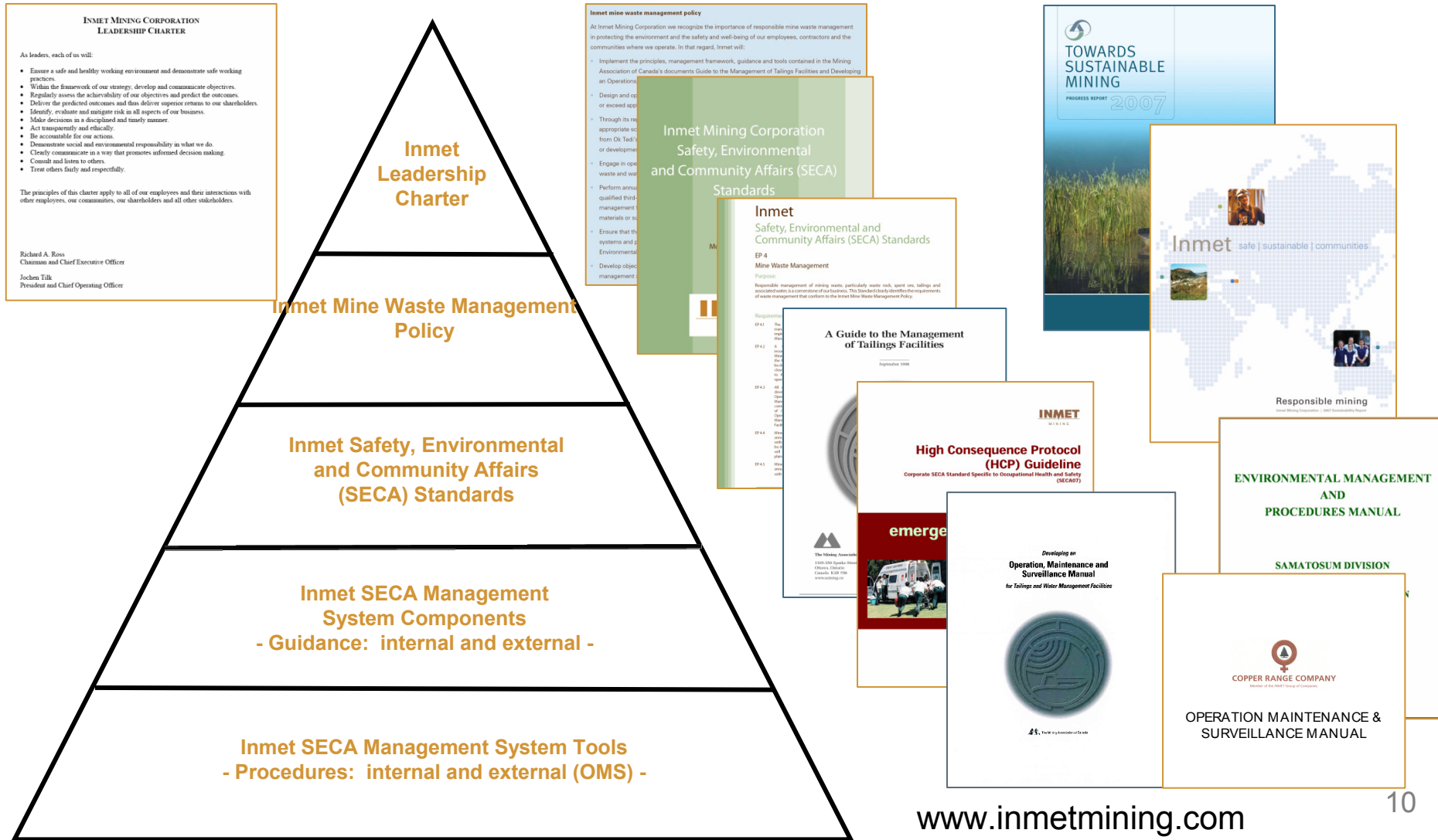


# what guides us?

Every decision we make is tested against four core values:

- operate safely
- make a profit
- protect the environment
- treat people and communities well

# implementing our strategy: using the tools, assessing, and reporting



# driving performance at Inmet: SECA strategy, five year strategic goals and annual objectives



## **Our five-year strategic SECA objectives**

- Implement higher standards for safety and environmental performance
- Incorporate increased levels of operational sustainability to better align our operations with community expectations
- Contribute to furthering the development of sustainable communities

## **Five-year SECA targets**

- Eliminate fatalities and significant environmental incidents and deliver 10 percent year-over-year improvements in SECA metrics
- Reduce fresh water withdrawal by 20 percent
- Designate 0.5 percent of after-tax profits to community development priorities
- Reduce energy consumption and greenhouse gas emissions intensity by 10 percent
- Annually review and update community socioeconomic assessments
- Develop a constructive relationship with at least one non-governmental organization (NGO) to contribute to operational and community improvements

## **Our 2008 SECA objectives**

These objectives apply to head office and all majority-owned operations; the objectives have been incorporated by the operations into their site-specific objectives.

- Complete High Consequence Protocols and develop implementation plans
- Develop implementation plans for the SECA Standards at our operations
- Increase community affairs resources at our operations
- Conduct a socioeconomic assessment at each operation
- Develop energy and water conservation plans at each operation
- Join the United Nations Global Compact, an international multistakeholder initiative for businesses committed to aligning their operations and strategies with 10 universally accepted principles in the areas of human rights, labour, the environment and anti-corruption. The Global Compact website is [www.globalcompact.org](http://www.globalcompact.org).

# driving performance at Inmet: the checklist and measuring performance against our annual objectives...



## Our performance checklist

We met our 2007 targets for safety and occupational health. One exceedance prevented us from achieving our environmental target of zero permit exceedances of total suspended solids. More work is needed to identify community priorities for community-directed foundations at our active majority-owned operations and at Las Cruces. As a result, achieving our objective to establish community-directed foundations was delayed.

### 2007 Objectives

1. Identify behaviour and risk-based safety system improvements, evaluate them and implement the best solutions.
2. Reduce total injury frequency (TIF) and disabling injury frequency (DIF) by 10 percent.
3. Explore opportunities to expand and improve our occupational health systems.
4. Reduce the number of reportable environmental incidents by 5 percent and eliminate all permit exceedances related to total suspended solids.
5. Expand community dialogue and document community priorities and concerns.
6. Investigate opportunities to establish community-directed foundations at active operations and Las Cruces.

### 2007 Performance

✓	In our biweekly Safety Task Force (STF; see p. 24 for more detail) meetings we continued to focus on methods to reinforce risk-based behaviours in our employees and contractors. We also established a High Consequence Protocol process as a result of the investigation of the contractor fatality.
✓	TIF and DIF declined by 11 percent and 17 percent, respectively.
✓	We developed summaries of common Inmet workplace exposures and evaluated ongoing workplace health monitoring.
≈	Reportable environmental incidents decreased by 33 percent to a total of 10. One total suspended solids exceedance was reported at Troilus.
✓	Progress was made in expanding consultation with our communities, particularly at Las Cruces, Cayeli and Cerattepe. Dedicated community affairs staff was appointed at two sites.
✗	We did not achieve this objective. We found that further work to better understand community priorities was necessary and that is underway.



# Mining Association of Canada's TSM: driving performance



# Toward Sustainable Mining: TSM scoring:



<b>Performance Rating</b>	
<b>Level</b>	<b>Criteria</b>
<b>1</b>	No systems in place; activities tend to be reactive; procedures may exist but they are not integrated into policies and management systems
<b>2</b>	Procedures exist but are not fully consistent or documented; systems/processes planned and being developed
<b>3</b>	Systems/processes are developed and implemented
<b>4</b>	Integration into management decisions and business functions
<b>5</b>	Excellence and leadership

# TSM scoring: striving for level 3 effective implementation



Criteria for scoring a level three (3) Performance Rating	
PI	Indicator name and Criteria
1	<b>Policy and commitment</b> in conformance with MAC's <i>A Guide to the Management of Tailings Facilities (Guide)</i> , developed/reviewed with community, endorsed by senior management, and budgeted.
2	<b>Tailings management system</b> , in conformance with <i>Guide</i> , developed/reviewed with community, and implemented.
3	<b>Accountability formally assigned</b> to an executive officer. Responsibility, budgetary authority and accountability for implementation of, and reporting on, the tailings management system in conformance with the <i>Guide</i> and formally delegated to operations/corporate personnel.
4	<b>Formal annual corporate tailings management review</b> in conformance with the <i>Guide</i> and reported to the accountable executive officer.
5	<b>Formal internal, independent audit or assessment</b> the OMS manual are in conformance with MAC's <i>Developing an Operating, Maintenance and Surveillance Manual for Tailings and Water Management Facilities</i> . Results reported to the annual corporate review of tailings management. Emergency preparedness and response plans tested.

# TSM – reporting on tailings performance 2005 to 2007

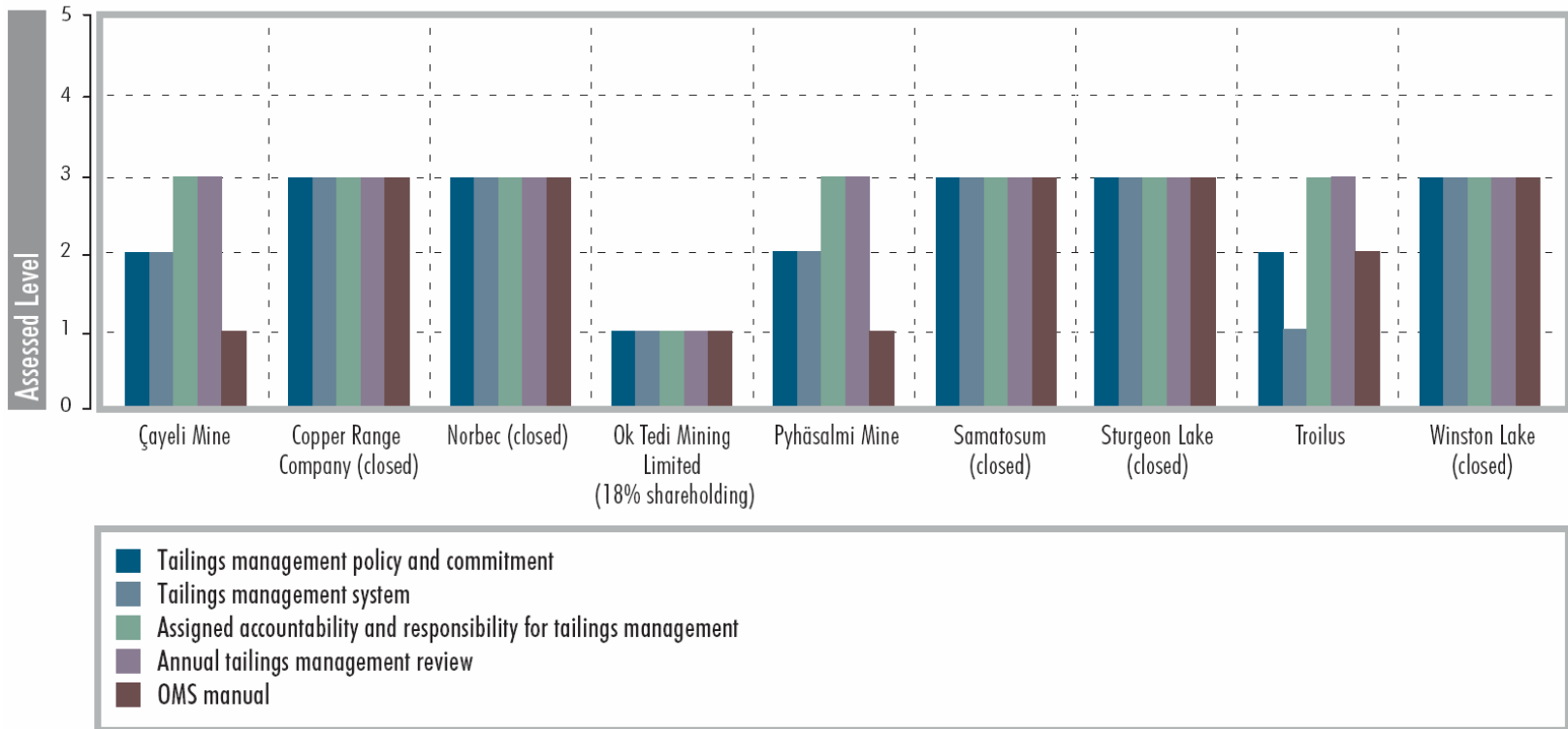


Albian Sands Energy Inc.	Muskeg River Mine
ArcelorMittal Mines Canada*	Mont-Wright
ArcelorMittal Mines Canada*	Port-Cartier
Barrick Gold Corporation	Eskay Creek Mine
Barrick Gold Corporation	Hemlo Operations
BHP Billiton Diamonds Inc.	EKATI Diamond Mine
Diavik Diamond Mines Inc.	Diavik Diamond Mine
HudBay Minerals Inc.	Hudson Bay Mining and Smelting Co., Limited
Inmet Mining Corporation	Çayeli Mine
Inmet Mining Corporation	Copper Range Company (closed)
Inmet Mining Corporation	Norbec (closed)
Inmet Mining Corporation	Ok Tedi Mining Limited (18% shareholding)
Inmet Mining Corporation	Pyhäsalmi Mine
Inmet Mining Corporation	Samatosum (closed)
Inmet Mining Corporation	Sturgeon Lake (closed)
Inmet Mining Corporation	Troilus
Inmet Mining Corporation	Winston Lake (closed)
Iron Ore Company of Canada	Labrador City
Suncor Energy Inc.	Oil Sands Facility
Syncrude Canada Ltd.	Oil Sands Facility
Teck Cominco Limited	Highland Valley Copper
Vale Inco	Manitoba Operations
Vale Inco	Ontario Operations
Xstrata Copper Canada	Horne Smelter
Xstrata Copper Canada	Kidd Metallurgical
Xstrata Nickel	Raglan Mine
Xstrata Nickel	Sudbury Mines/Mill
Xstrata Nickel	Sudbury Smelter
Xstrata Zinc Canada	Brunswick Mine
Xstrata Zinc Canada	CEZinc



# our TSM tailings indicator scorecard

## Tailings Management Assessment Inmet Mining Corporation



# learning from the Closed Sites: next steps for our operations



- Pyhäsalmi implemented an OMS manual as part of its ISO 14001 program; the team is now working to improve its integration of tailings and water management
- Çayeli has initiated its water and tailings OMS manual for its tailings discharge
- Troilus mill departments is making improvements on integrated tailings and water management



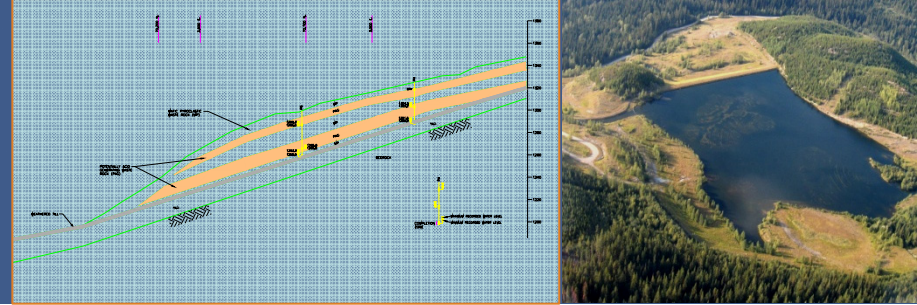
# Closed Sites

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Our Closed Sites are **actively managed** by our team of experienced employees and contract operator/inspectors

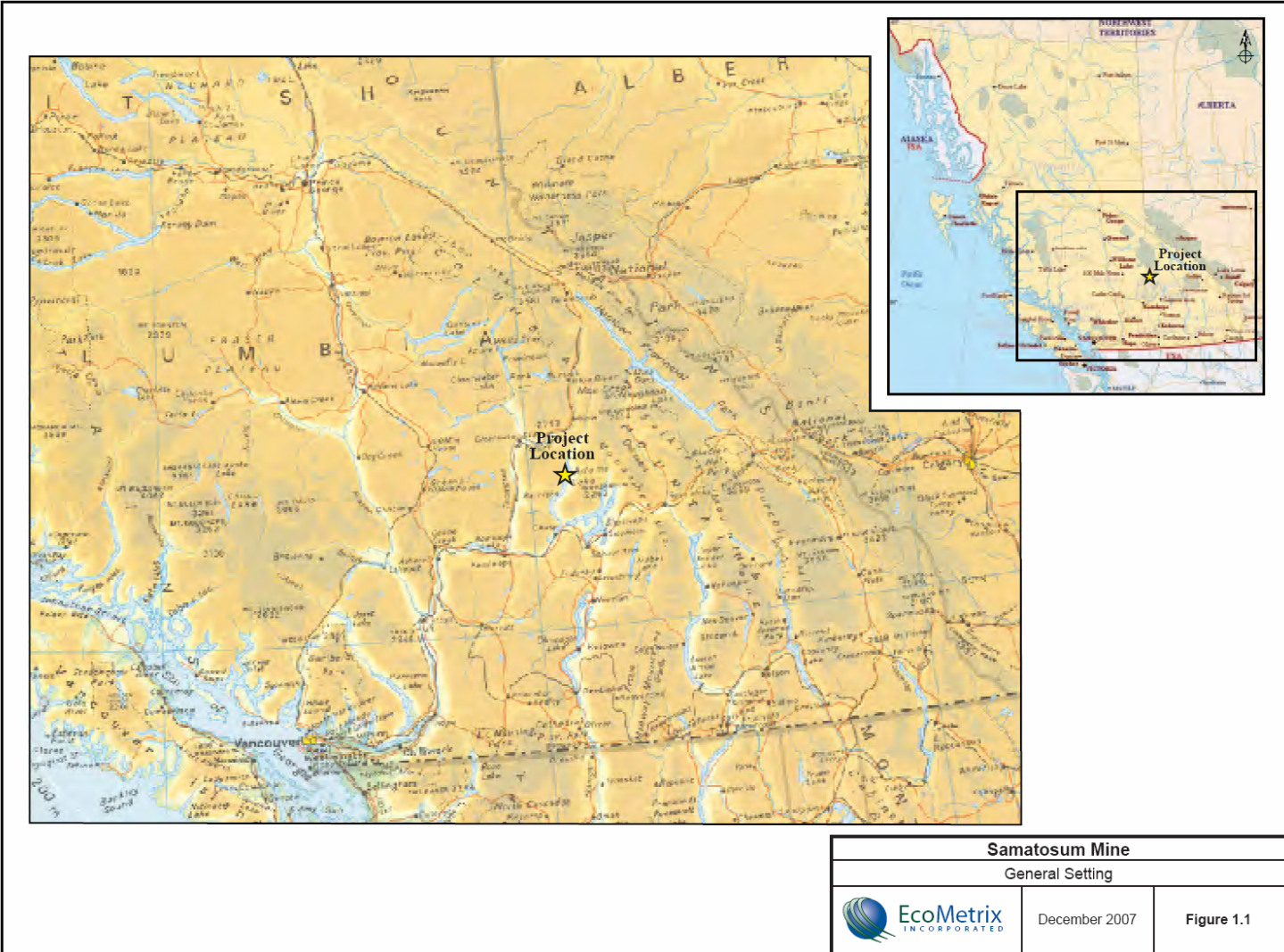
Since its closure in 1992, **Samatosum** has been a leader among our closed sites for diligent implementation of its mine waste and water management systems

# Samatsum overview

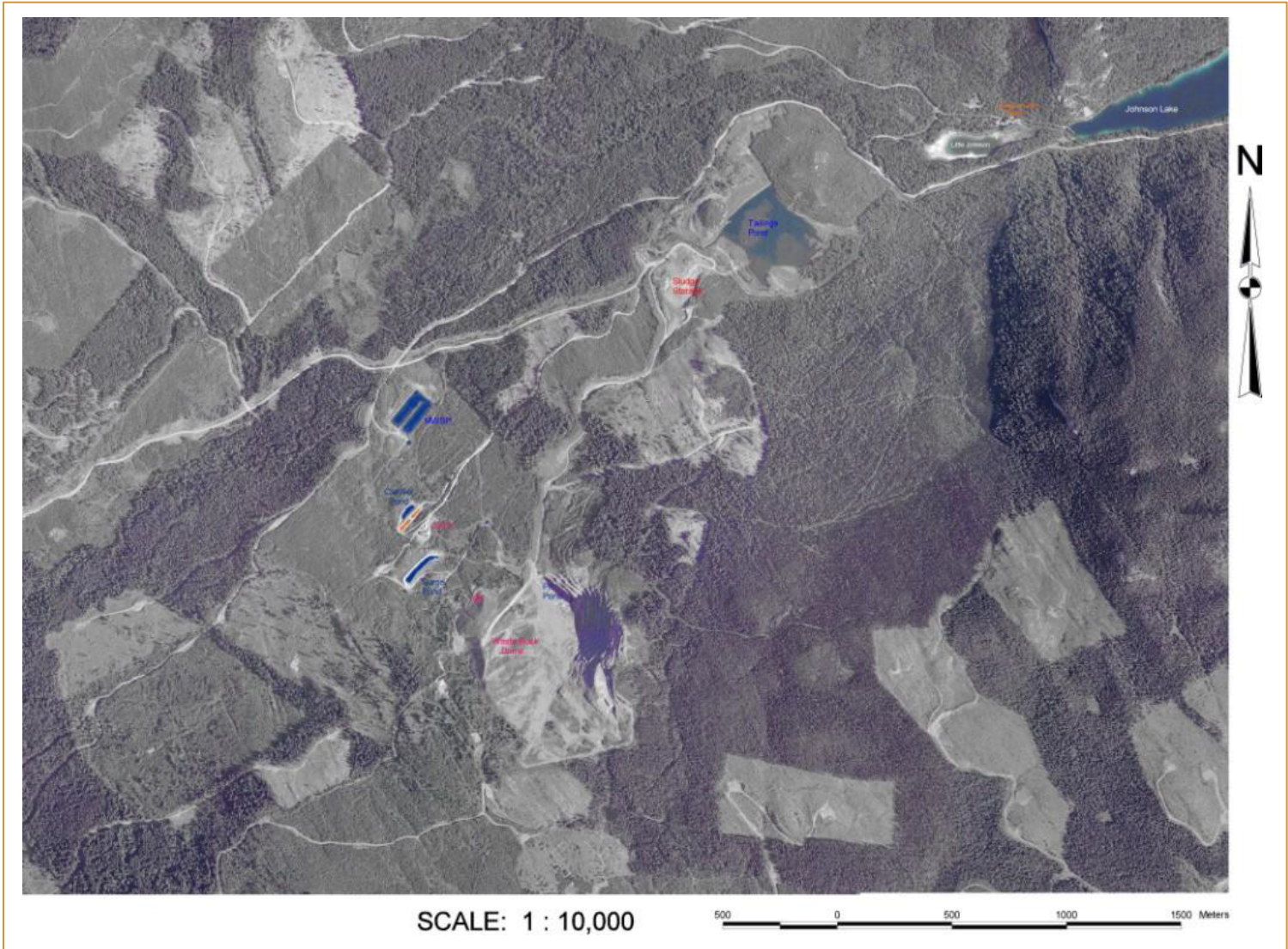


- Located in the interior of British Columbia, 20 kilometers from Barriere
- Silver-copper-zinc open pit and underground mine
- Operated for three years and closed in 1992
- Produced 600,000 tonnes of ore and eight million tonnes of waste
- Successful water cover over tailings
- Unsuccessful layered waste rock dumps
  - Waste rock drainage requires perpetual treatment
  - HDS water treatment plant constructed in 1998
  - Waste rock slope re-contoured in 2007

# Samatosum location



# Samatosum aerial view



# Samatosum chronology



- 1988 – 1989 SEIA, Operation/Reclamation Permits, Construction
- 1989 -1992 Operated
- 1992-1995 dismantling, contouring, revegetation
- 1994 - 1995 Tailings re-contoured
- 1995 Tailings flooded
- 1995 – 1998 Waste rock drainage treated with lime in small ponds
- 1998 HDS plant constructed
- 2001 Surge pond expanded by an order of magnitude
- 2007 Waste rock re-contour ensures long-term stability

# Samatosum risks



- Tailings impoundment
  - High risk dam
  - Sulphide tailings
- Waste rock dumps stability
  - Acid generating and metal leaching
  - At angle of repose (above the HDS plant)
- Mine drainage and water management
  - limited storage capacity
  - trout creek in valley and salmon fishery downstream
- Open pit water quality and high wall stability
  - Diverting and managing runoff



# Samatosum site activities: what do you do there?



## Rehabilitation activities

- Site management, OMS, monitoring, oversight, reporting
- Waste rock re-vegetation of re-sloped area

## Safety activities

- Emergency response training drills (table top)
- Emergency communication partnering with community

## Community activities

- TSM, reclamation and emergency communication

## Reporting activities

- Annual sustainability report
- TSM report

# Samatosum mine waste management systems

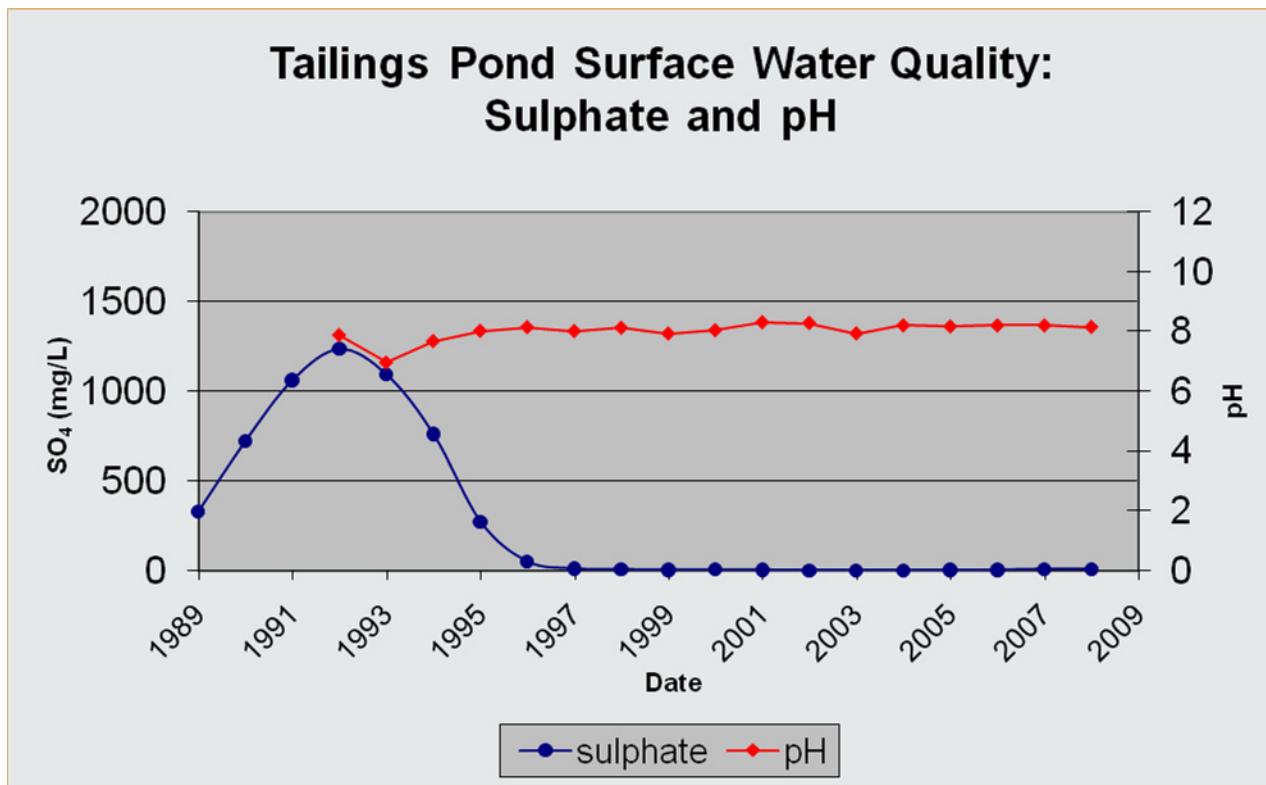
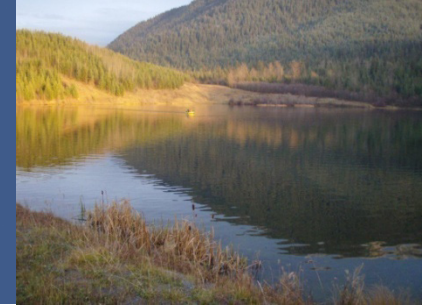
- Tailings
  - OMS
  - Emergency training scenarios
- Waste rock
  - OMS
  - Environmental Management Procedures Manual (EMPM)
- Sludge
  - EMPM

# Samatosum performance

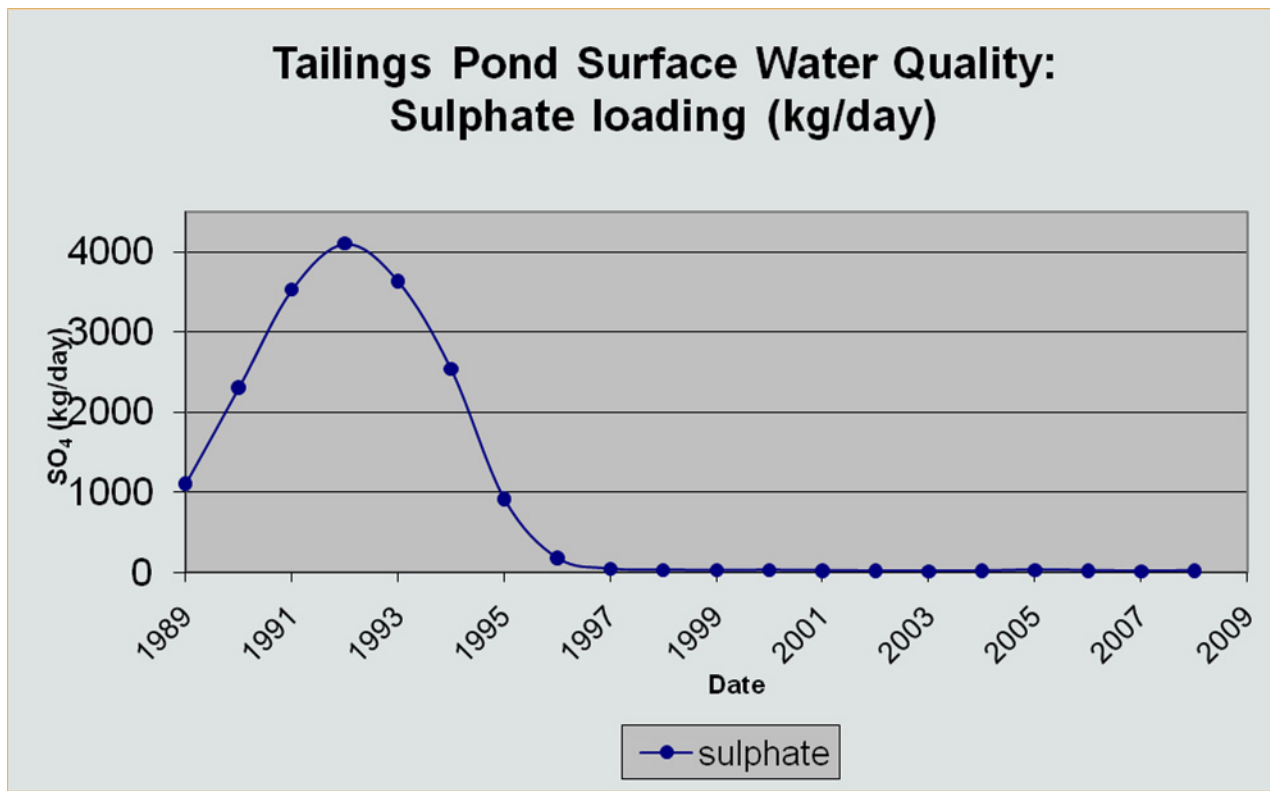
- Tailings water quality performance



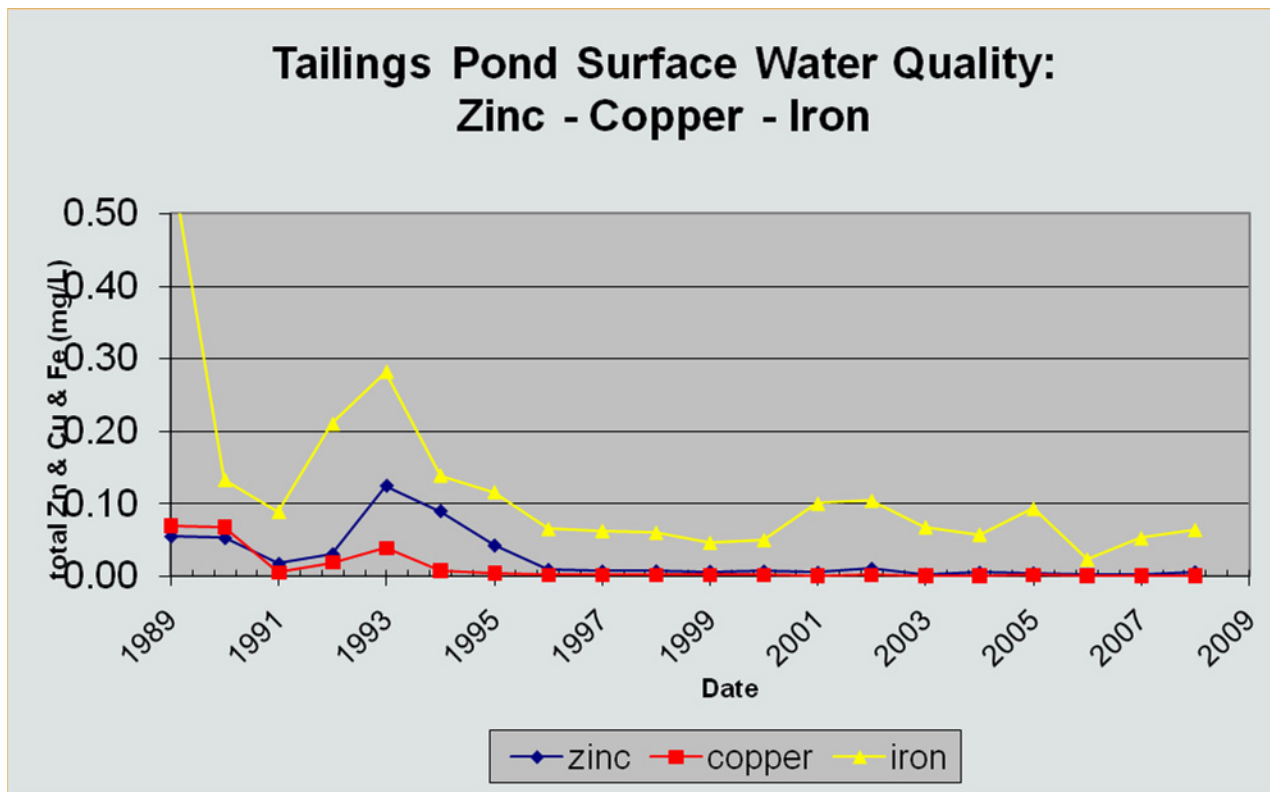
# Samatosum performance (2)



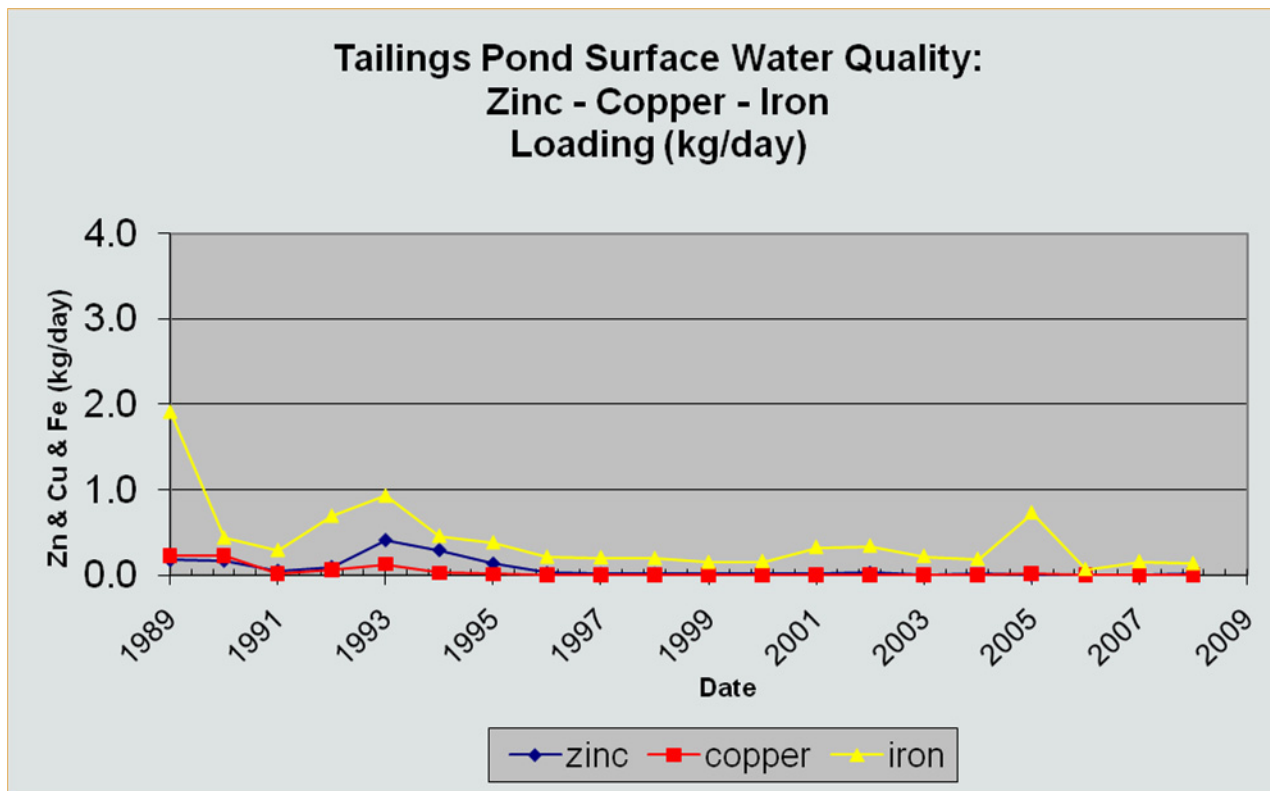
# Samatosum performance (3)



# Samatosum performance (4)



# Samatosum performance (5)





# Samatosum performance (6): risk assessment and control (ERM)

**ACTIVE - ERM Items - management system(s) addressing.**

Samatosum Division											
ERM Reference ID #	Criteria					Relative Risk Rank (1-10)	Comment	Risk Management Recommendation	Action Plan	Assigned To / Responsibility	
	Facility	Component	Potential Failure Modes	Initiating Event	Consequences						
6	Tailings Impoundment	Dam	Dam failure	Earthquake greater than 3,000 year event	P: Extensive rehab downstream S: Possible safety impacts E: Release of tailings to environment C: Impact to community	P: 6 S: 4 E: 6 C: 6	6	No change in Environmental value from ERA	Continue monitoring and inspection as per OMS, EMPM	Ensure Dam Safety Inspection and Review are completed as per OMS	Brent Hamblin - ensure OMS inspections completed, verify DSR requirement date
14	Wastewater Treatment and Handling	Mine water sediment pond	Embankment failure	Earthquake greater than a 1,000 year event	P: will cost \$ S: may have safety consequence E: will affect environment C: likely to affect communities	P: 2 S: 2 E: 5 C: 2	3	Good water quality. Erosion and siltation in creek.	Continue monitoring and inspection. Include the structure in any third-party reviews.	Ensure Dam Safety Inspection and Review are completed as per OMS	Brent Hamblin - ensure OMS inspections completed, verify DSR requirement date
15	Tailings Impoundment	Dam	Overtopping (crest of dam) with significant erosion	Flood larger than 200 year event	P: will cost \$ S: may have safety consequence E: will affect environment C: likely to affect communities	P: 2 S: 2 E: 3 C: 2	2	High flow and erosion of crest should be of limited impact during this high runoff event due to natural elevated flow.	Continue to inspect and maintain the spillway as per the OMS and EMPM.	Ensure Dam Safety Inspection and Review are completed as per OMS	Brent Hamblin - ensure OMS inspections completed, verify DSR requirement date
27	Wastewater Treatment and Handling	Mine water sediment pond	Overtopping	Storm greater than the 200 year, 24 hour event	P: will cost \$ S: unusual condition increases risk E: elevated TSS to creek C: possible	P: 2 S: 2 E: 6 C: 3	3	Trigger unlikely, however some systems available to protect the berm from overtopping (pump, siphon, stop logs)	Continue to monitor and inspect the system.	Ensure Dam Safety Inspection and Review are completed as per OMS	Brent Hamblin - ensure OMS inspections completed, verify DSR requirement date
32	Open Pit	Pit dike	Sudden failure of waste rock storage area into the pit lake	Spring runoff greater than 100 year event	P: could cost \$ S: safety risk possible E: poor water quality to creek possible C: may affect community (perception)	P: 3 S: 2 E: 3 C: 2	3	Movement continues to be regularly monitored and assessed by third party. No significant acceleration of movement observed.	Continue monitoring and keep pit pond level as low as possible.	Ensure Geotechnical Inspection and Review are completed as per OMS	Brent Hamblin - ensure OMS inspections completed, verify DSR requirement date
46	Open Pit	Pit dike	Dam failure	Earthquake exceeding 1,000 return event	P: likely repair/rehab \$ with failure S: possible with staff on site E: certain clean up \$ with failure C: impacts related to creek and water	P: 3 S: 3 E: 6 C: 3	4	As in the 2001 ERA the PFM and consequence may be low but the revised risk ranking criteria have Variables 2 and 3 at a High level.	Continue inspection and verify the stability of the dam.	Ensure inspection and Review are completed as per OMS / EMPM - Document	Brent Hamblin - ensure OMS inspections completed/document, verify DSR requirement date
47	Open Pit	Pit dike	Overtopping	Flooding in excess of 100 year event	P: S: E: C:	P: 2 S: 2 E: 2 C: 1	2	Unlikely and systems in place to manage.	Continue to monitor and inspect the pit water level, pit dyke.	Jim Lewko - Ensure regular bi-monthly inspection completed and inspect at WTP startup/shutdown.	Jim Lewko - compile bi-monthly inspection checklist
48	Waste Dump	WD-face	WD Failure - slide with staff onsite	Time - continued precipitation of sediments and continued retrogression of 6B area slump	P: SP and WTP repair costs S: Possible injury/loss of life E: Release of untreated water C: Impact to community	P: 10 S: 10 E: 10 C: 10	10	Retrogression of the 6B area over the past three to four years has decreased the FOS of the waste dump from 1.22 to 1.19. Continued retrogression will increase the risk	Continue with frequent inspection and contact Inmet and consultant with any changes. Complete the waste dump stability assessment and rehabilitation option evaluation for an AFE and	Continue inspections as per SOP, Rehabilitation Budgeted for 2006	Brent Hamblin - setup RFP & Contract for 2006
49	Waste Dump	WD-face	WD Failure - slide with staff NOT onsite	Time - continued precipitation of sediments and continued retrogression of 6B area slump	P: SP and WTP repair costs S: remote possibility of injury E: Release of untreated water C: Impact to community	P: 10 S: 5 E: 10 C: 10	9	Retrogression of the 6B area over the past three to four years has decreased the FOS of the waste dump from 1.22 to 1.19. Continued retrogression will increase the risk	Continue with frequent inspection and contact Inmet and consultant with any changes. Complete the waste dump stability assessment and option evaluation for an	Continue inspections as per SOP, Rehabilitation Budgeted for 2006	Brent Hamblin - setup RFP & contract for 2006





# Samatosum performance (7)

- Classification, stability, erosion control, gopher tracking and management



# Samatosum performance (8)



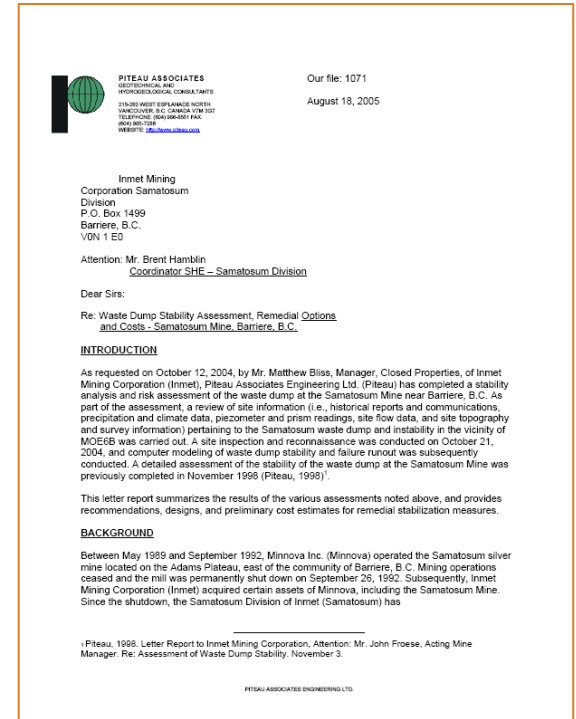
- Mine waste management
  - Quarterly geotechnical inspections - Samatosum
  - Annual third-party data review or inspection - Piteau
  - 2004 dam safety inspection and classification - SNC
  - 2006 OMS review - SNC
- TSM performance – verified (2007)
- 2008 Participation at the Inmet General Manager's Meeting
- 2008 President's Award of Excellence for Safety
- 2008 BC Jake MacDonald Mine Reclamation award

# Samatosum performance (9)



## Geotechnical inspections and reviews – 2007 Annual Geotechnical Report

- Biennial Dam Safety Site Inspection by consultant with data review for alternate years.
- Includes – tailings impoundment, open pit, waste dump, surge pond and related facilities.
- With the exception of 6B Area of Waste Dump there were no indications of instability. Re-sloping of Waste Dump was completed in 2008.



# Samatosum performance (10)



## Biological surveys - Receiving Environment Monitoring Program – 2007

- All values were below the Canadian guidelines for the protection of aquatic life
- No adverse effects of elevated sulphate or metal levels were indicated
- Trout abundance was fairly high and appeared to be unaffected by the mine effluent.
- Results obtained in 2007 demonstrated that environmental controls at Samatosum remain effective at minimizing any impacts on the receiving environment.



### SAMATOSUM MINE RECEIVING ENVIRONMENT MONITORING PROGRAM - 2007

Report prepared for:

INMET MINING CORPORATION  
Samatosum Division  
Barriere, B.C.

Report prepared by:

ECOMETRIX INCORPORATED  
6900 Campbell Road  
Mississauga, Ontario  
L5N 2L8

Ref. 07-1476  
December 2007

# INMET

MINING

# Samatosum next steps

- 2010 dam safety review budgeted
- SECA Standards implementation
- High Consequence Protocols implemented
- OMS, EMPM and risk assessment reviews
- Participate in the inaugural Inmet SECA workshop

Samatosum Dam Safety Review												
Item	Facility	Component	Potential Failure Mode	Existing Issues	Consequences	Priority	Start	End	Comments	Responsible	Status	Notes
8	Dam	Dam Safety	Failure of dam structure	Structural integrity	High	1	2010	2011	Review dam safety	Samatosum	Completed	2010 dam safety review completed
14	Dam	Dam Safety	Failure of dam structure	Structural integrity	High	1	2010	2011	Review dam safety	Samatosum	Completed	2010 dam safety review completed
15	Dam	Dam Safety	Failure of dam structure	Structural integrity	High	1	2010	2011	Review dam safety	Samatosum	Completed	2010 dam safety review completed
27	Dam	Dam Safety	Failure of dam structure	Structural integrity	High	1	2010	2011	Review dam safety	Samatosum	Completed	2010 dam safety review completed
32	Dam	Dam Safety	Failure of dam structure	Structural integrity	High	1	2010	2011	Review dam safety	Samatosum	Completed	2010 dam safety review completed
45	Dam	Dam Safety	Failure of dam structure	Structural integrity	High	1	2010	2011	Review dam safety	Samatosum	Completed	2010 dam safety review completed
47	Dam	Dam Safety	Failure of dam structure	Structural integrity	High	1	2010	2011	Review dam safety	Samatosum	Completed	2010 dam safety review completed
48	Dam	Dam Safety	Failure of dam structure	Structural integrity	High	1	2010	2011	Review dam safety	Samatosum	Completed	2010 dam safety review completed
49	Dam	Dam Safety	Failure of dam structure	Structural integrity	High	1	2010	2011	Review dam safety	Samatosum	Completed	2010 dam safety review completed

The logo for INMET MINING is centered on a grey background featuring a world map composed of small white squares. The word "INMET" is written in a large, bold, white, sans-serif font. Below it, the word "MINING" is written in a smaller, white, sans-serif font. There are several small colored squares (yellow, green, blue, orange) scattered across the map background.

**INMET**

MINING

**“To grow responsibly as a base metal mining company, providing superior returns to shareholders.”**