Poirier Reclamation Performance

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Poirier Reclamation Performance Outline

- History and setting
- Tailings HDPE Liner design and installation
- Performance
  - Water levels under the liner
  - Metal concentrations downstream
  - Site revegetation
- Next steps

Base Map Source: Her Majesty the Queen in Right of Canada, Natural Resources Canada © 2002.

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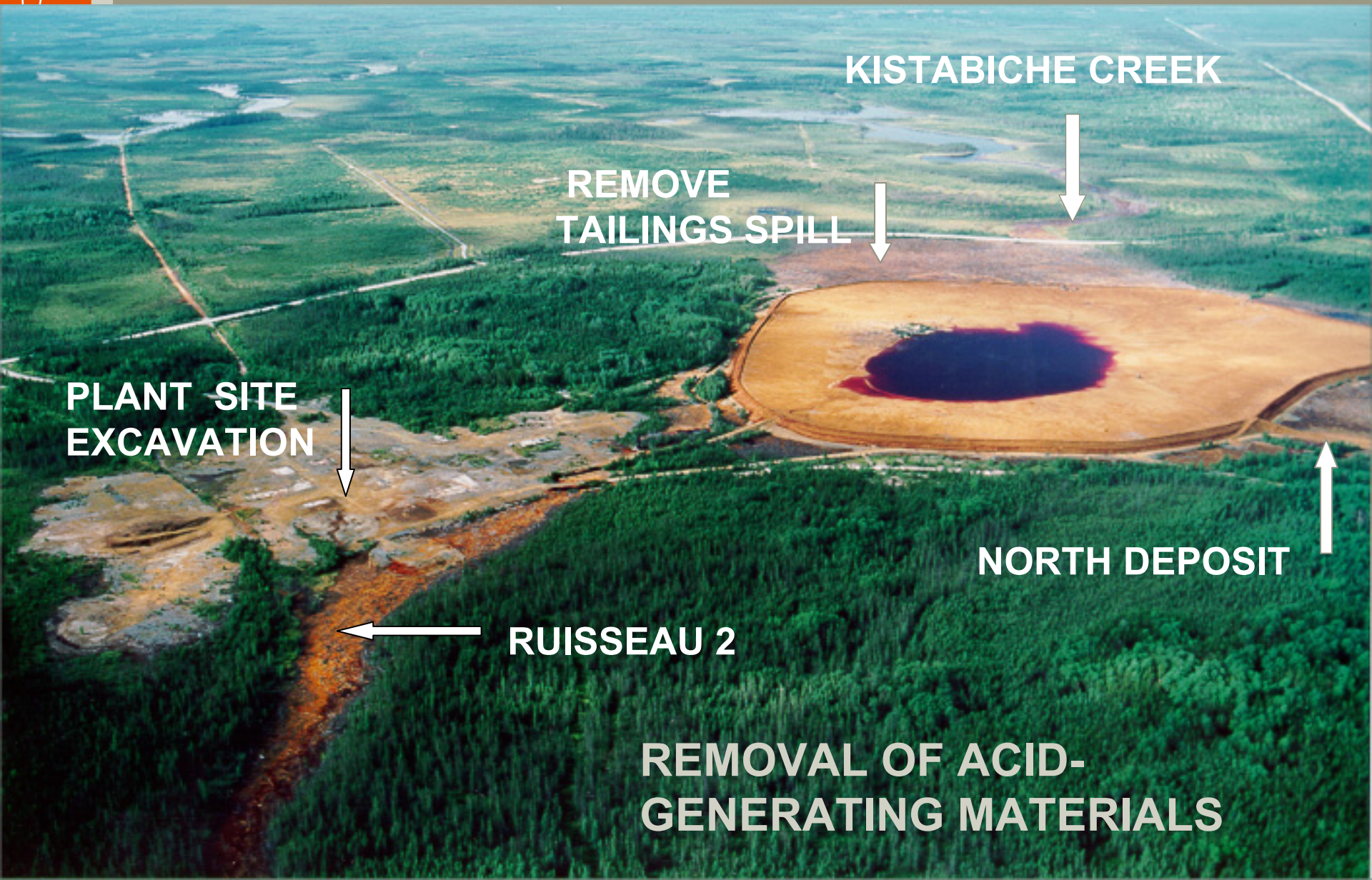
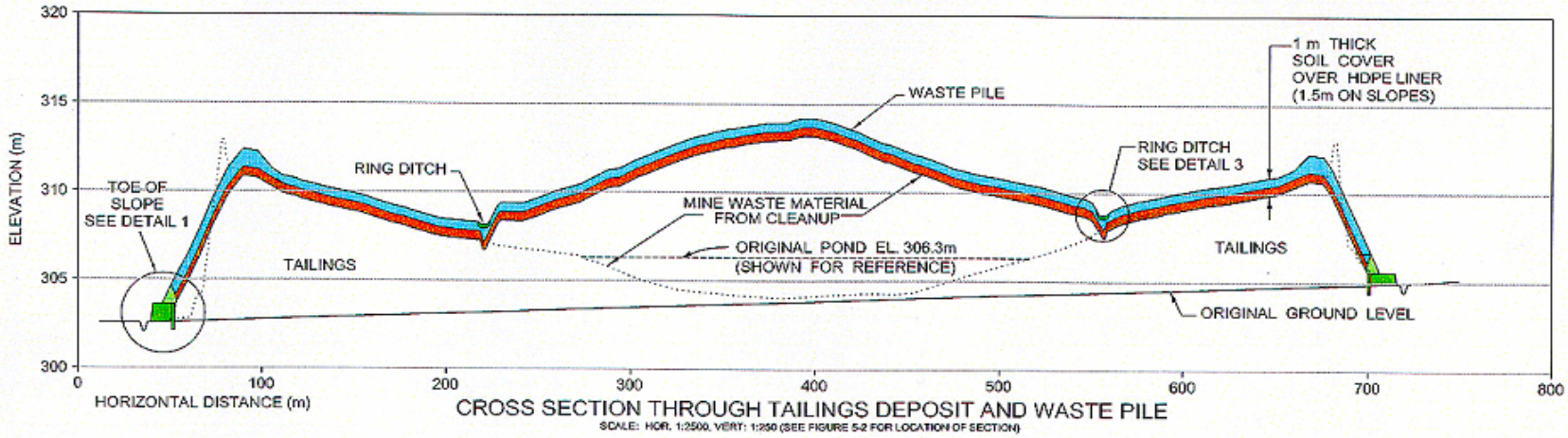
POIRIER SITE, 1997
Strategy to eliminate precipitation and runoff contacting waste

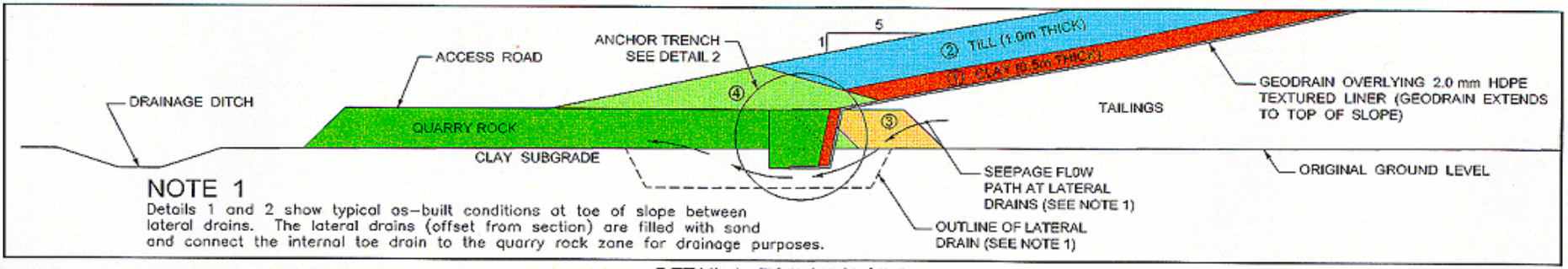


THE ENGINEERED COVER
DETAILS OF LINER ANCHORING AND SOIL COVER



CROSS SECTION THROUGH TAILINGS DEPOSIT AND WASTE PILE

SCALE: HOR. 1:2500, VERT: 1:250 (SEE FIGURE 5-2 FOR LOCATION OF SECTION)

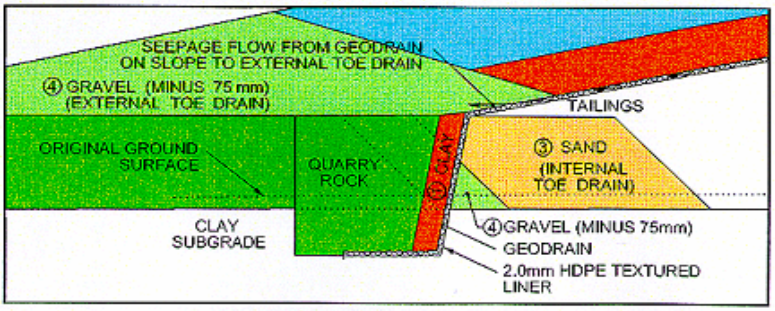


NOTE 1

Details 1 and 2 show typical as-built conditions at toe of slope between lateral drains. The lateral drains (offset from section) are filled with sand and connect the internal toe drain to the quarry rock zone for drainage purposes.

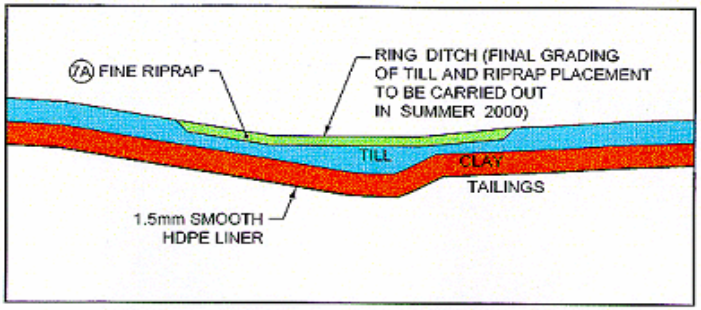
DETAIL 1 - TOE OF SLOPE

SCALE: 1:100



DETAIL 2 - ANCHOR TRENCH

SCALE: 1:50



DETAIL 3 - RING DITCH

SCALE: 1:100

Poirier 1998-2001

Unique solution using existing liner technology

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INSTALLATION OF THE TEXTURIZED LINER ON THE 5H:1V SLOPES

PLACEMENT OF SOIL COVER OVER THE GEODRAIN

EXCAVATION OF SPILLED TAILINGS WITH STOCKPILING IN WINDROWS

Instrumentation

- MONITORING WELLS ON TOP OF THE COVERED TAILINGS MONITOR THE WATER TABLE DRAWDOWN IN TAILINGS
- PIEZOMETERS AT THE TOE OF THE TAILINGS BASIN TO MONITOR THE EFFICIENCY OF THE INTERNAL DRAIN
- BENCH MARKS TO MEASURE THE SETTLEMENT OF THE WASTE PILE AT THE CENTER OF THE TAILINGS BASIN
- PROBES UNDERNEATH THE LINER TO MONITOR THE VARIATIONS OF TEMPERATURE, AND MOISTURE AND IN THE COVERED TAILINGS
- WEIRS INSTALLED AT SELECTED WATER SAMPLING STATIONS TO MEASURE FLOWS AND CHEMICAL LOADINGS

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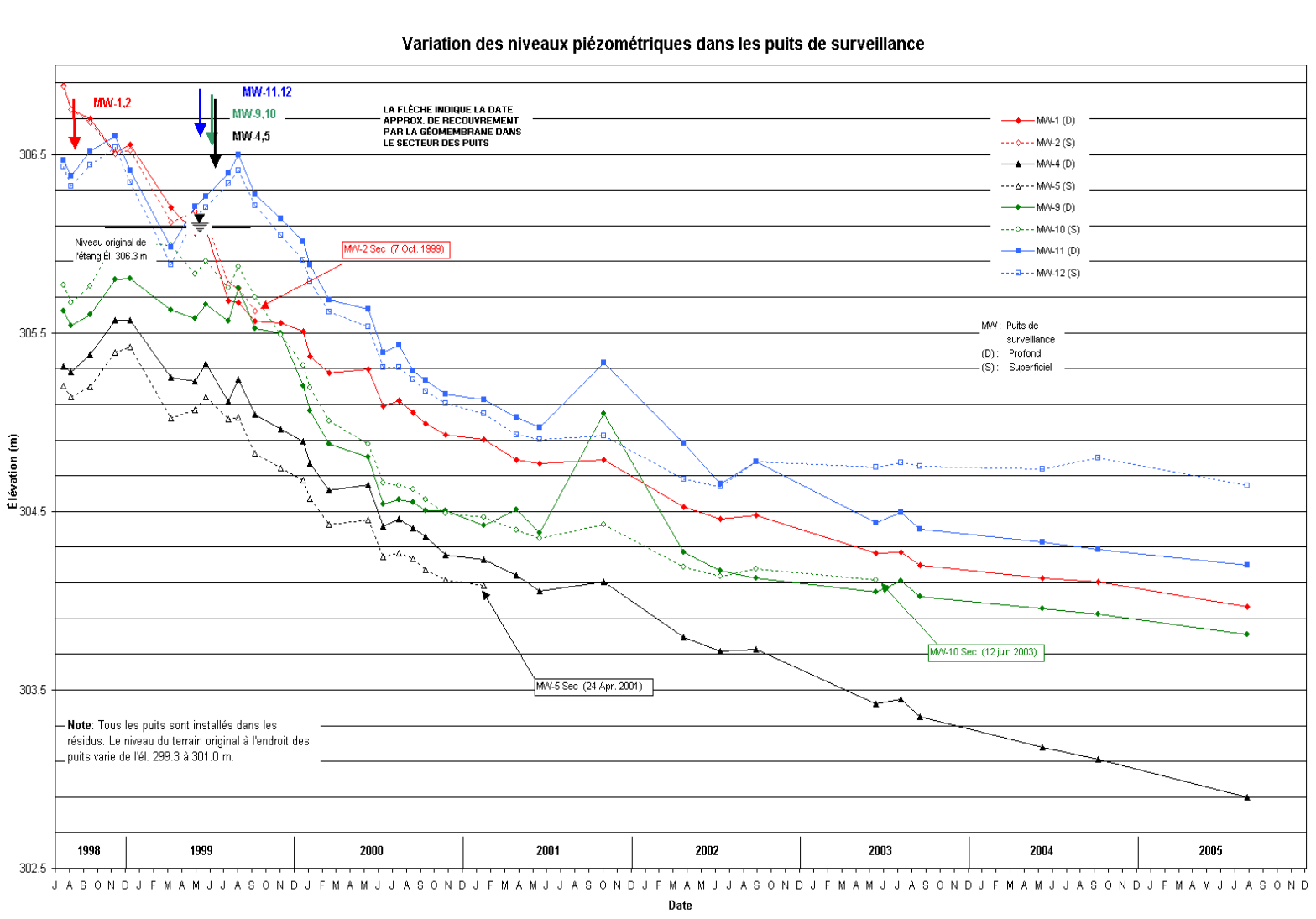
Water Level Decline in Tailings Under the Liner



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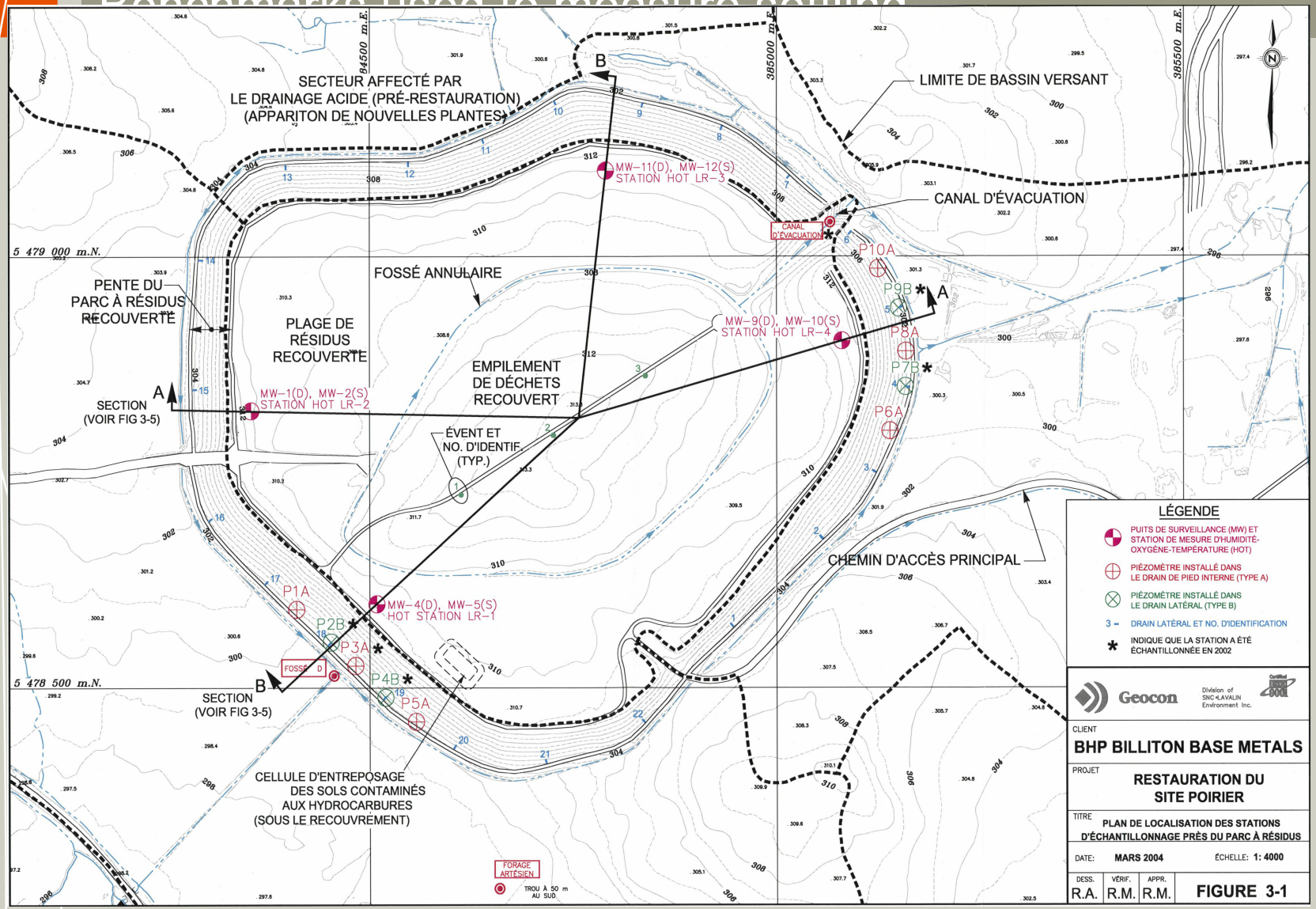
Benchmarks used to measure settling



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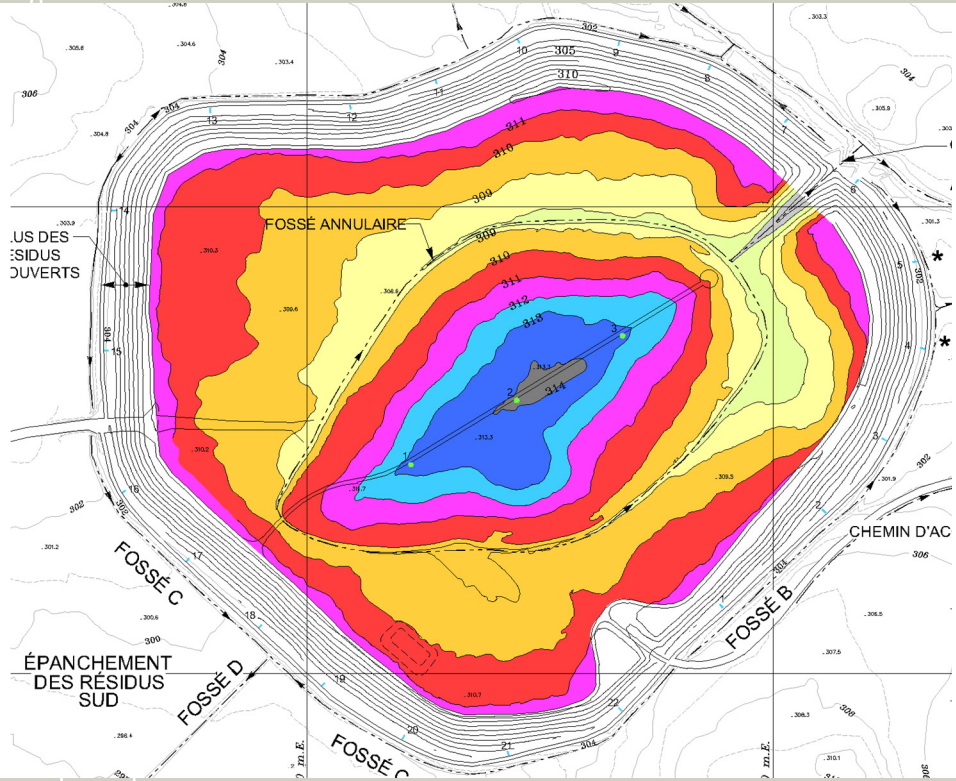
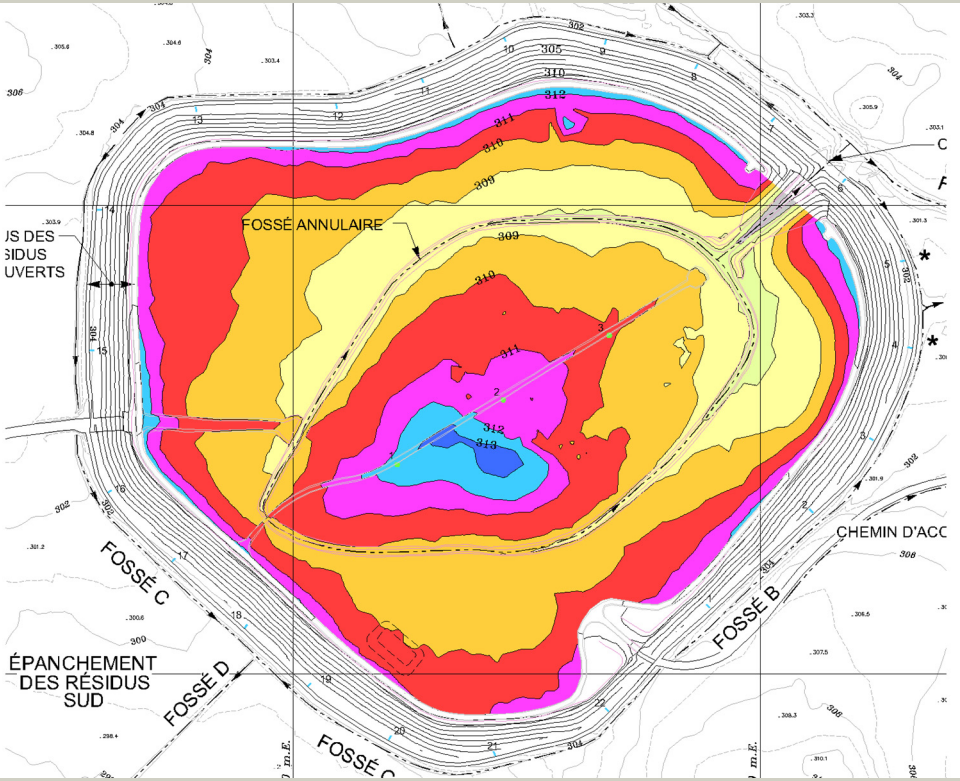
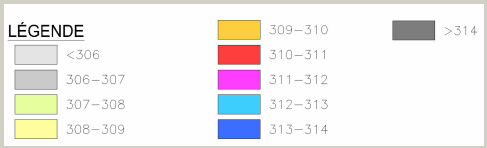
Settling Measurements on the Tailings Pile
SNC-Lavalin, 2005



SURFACE DU PARC RECOUVERT
EN OCTOBRE 1999



SURFACE DU PARC RECOUVERT
EN JUIN 2005



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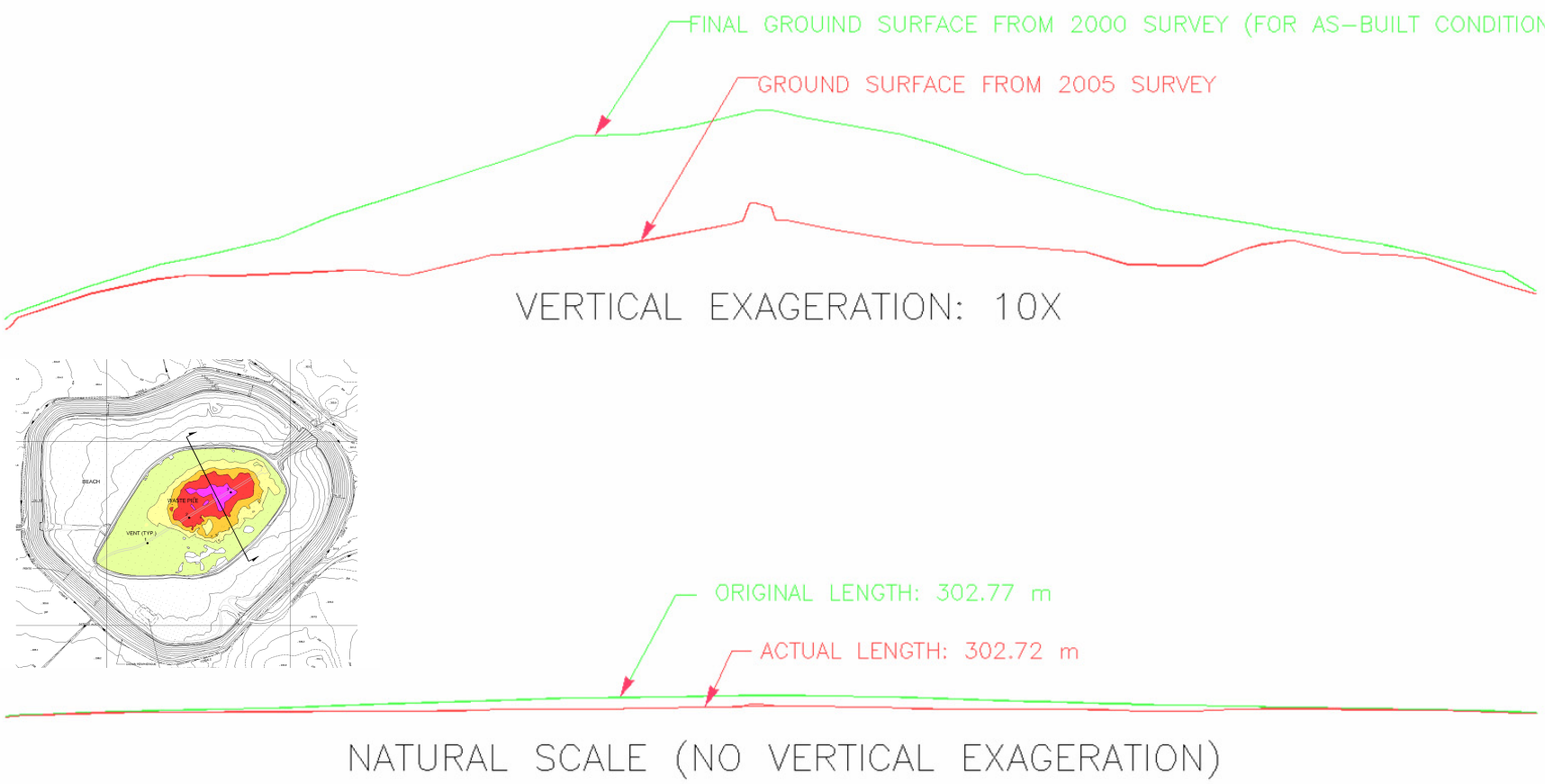
SETTLING MEASUREMENTS AT THE WASTE PILE (SNC Lavalin, 05) ILLUSTRATION OF IMPACT ON THE GEOMEMBRANE



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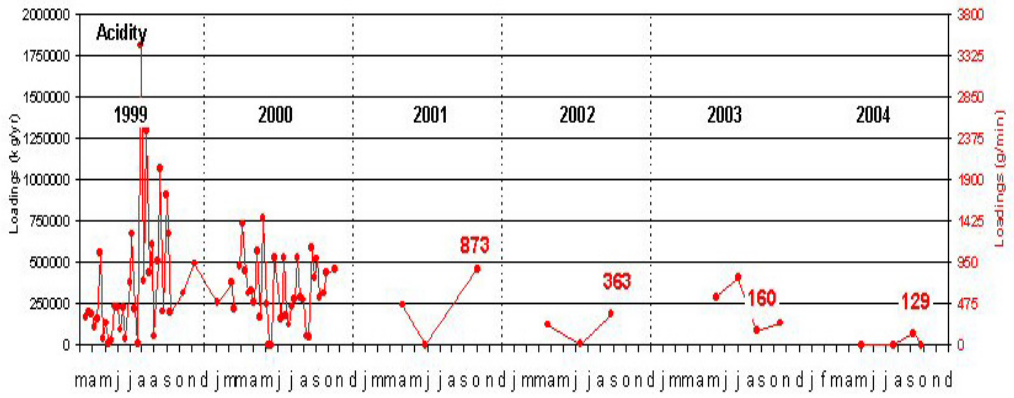

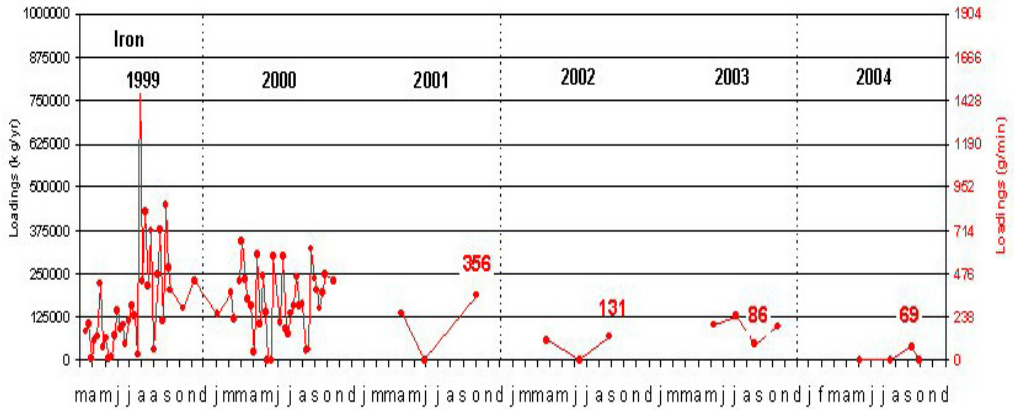

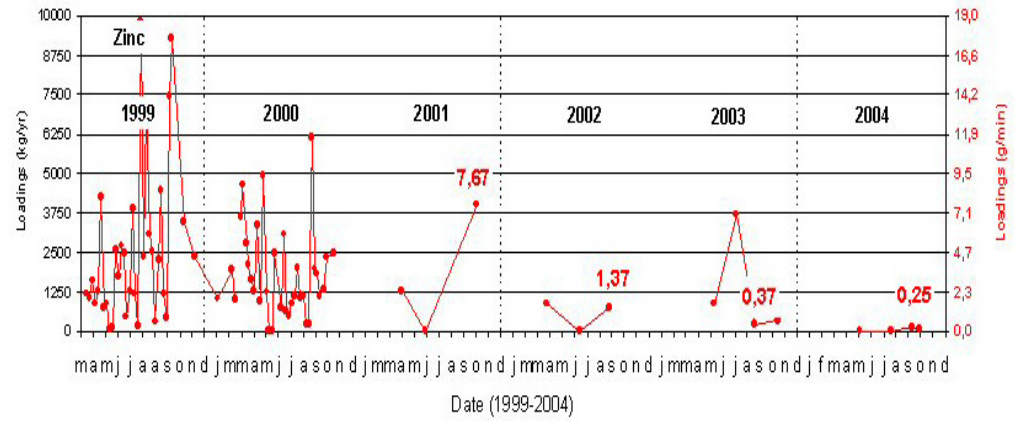

- VARIATION OF LOADINGS AT STATION C
- MEASURES LOADING SOUTH to KISTABICHE RIVER

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Poirier
Remedial works carried out in August 2004:
Ditch slope stabilization and seeding at former plant site

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Poirier tailings cover vegetated, looking south 2005

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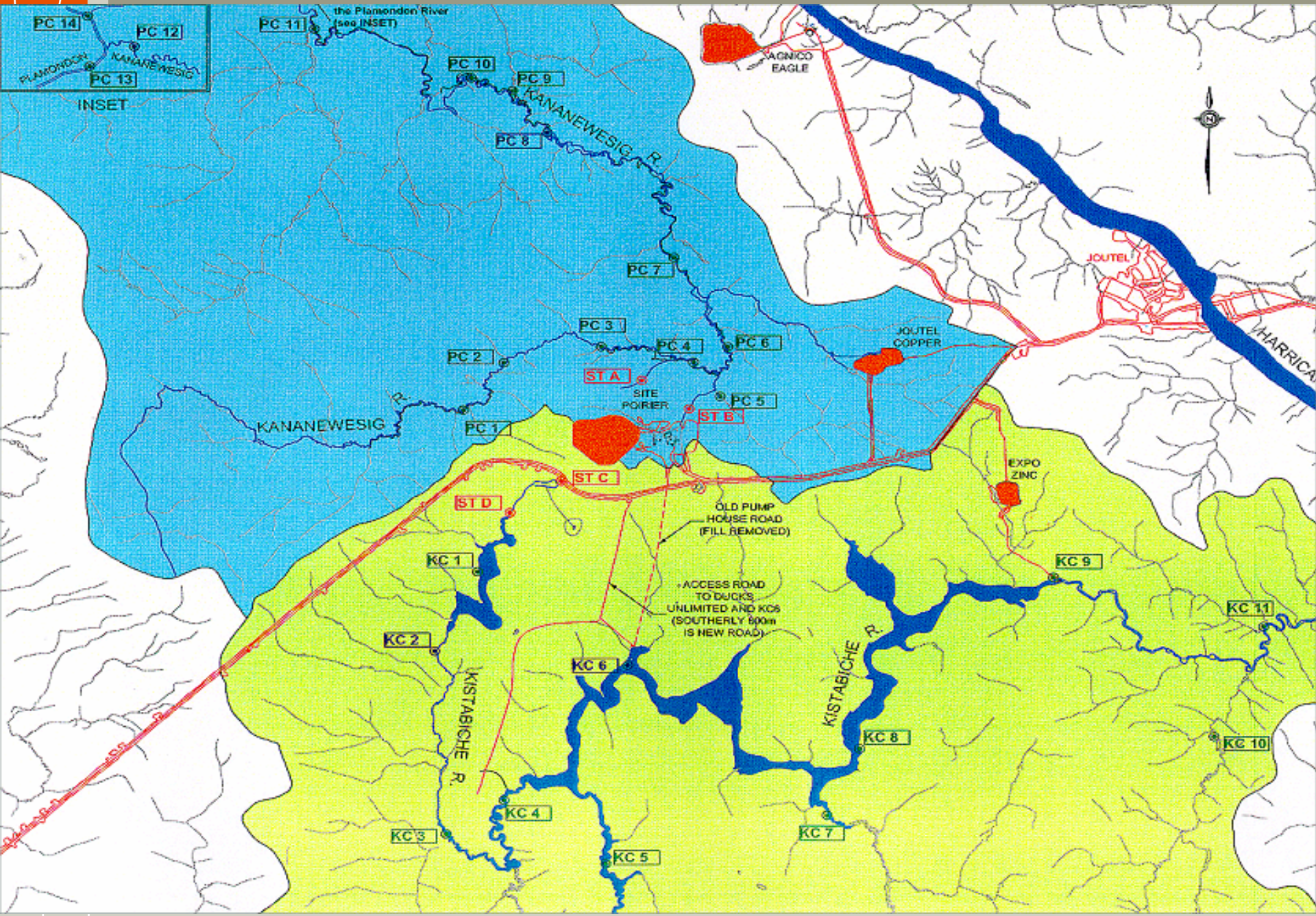
AERIAL VIEW OF THE TAILINGS BASIN AFTER THE REHABILITATION WORKS (2002)

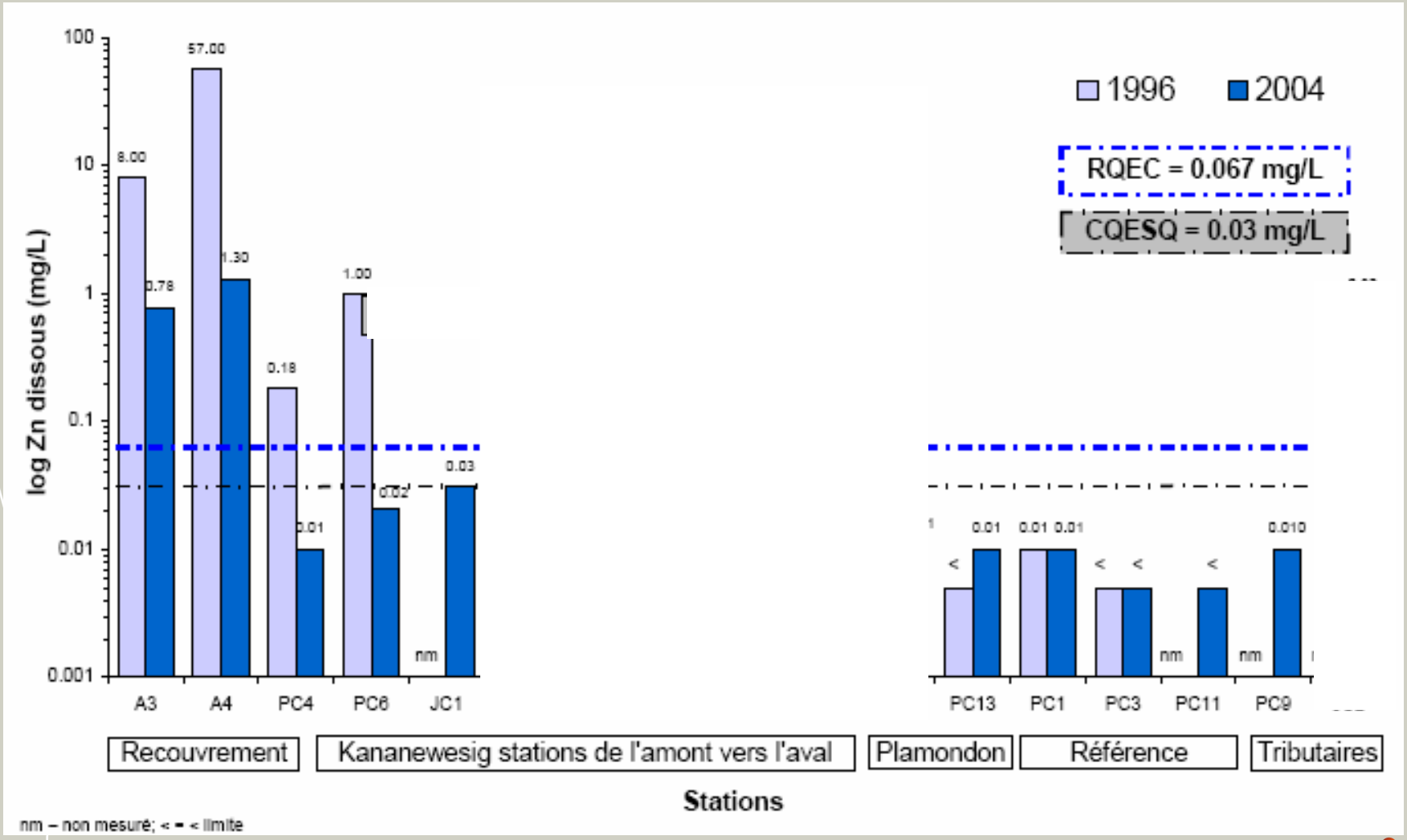
Areas remaining to do in 2006

Poirier Vegetation Trial Results

- To completely vegetate the site, will focus on indigenous plants, hardy for northern zone (1A)
- Alder and tamarack are recommended based on growth trials last year
- Will inoculate alder with bacterium mycorhizes to improve the plant resistance to the extreme conditions at the site (acidity, dryness, low level of nutrients)
- Tamaracks are tolerant of the wet, acidic conditions, indigenous and hardy for the region.


PC 14
PC 12
PC 13
PLAMONDON
KANANEWESIG
INSET
PC 11
the Plamondon River
(see INSET)
PC 10
PC 9
KANANEWESIG R.
PC 8
PC 7
PC 3
PC 4
PC 6
PC 2
ST A
SITE
POIRIER
PC 5
ST B
KANANEWESIG R.
PC 1
AGNICO
EAGLE
JOUTEL
JOUTEL
COPPER
HARRICA
ST C
ST D
OLD PUMP
HOUSE ROAD
(FILL REMOVED)
EXPO
ZINC
KC 1
ACCESS ROAD
TO DUCKS
UNLIMITED AND KC6
(SOUTHERLY 600m
IS NEW ROAD)
KC 9
KC 11
KC 2
KC 6
KISTABICHE R.
KISTABICHE R.
KC 8
KC 10
KC 4
KC 3
KC 7
KC 5

Poirier Aquatic Monitoring Study
DISTRIBUTION DU ZINC – R. KANANEWESIG



nm – non mesuré; < = < limite

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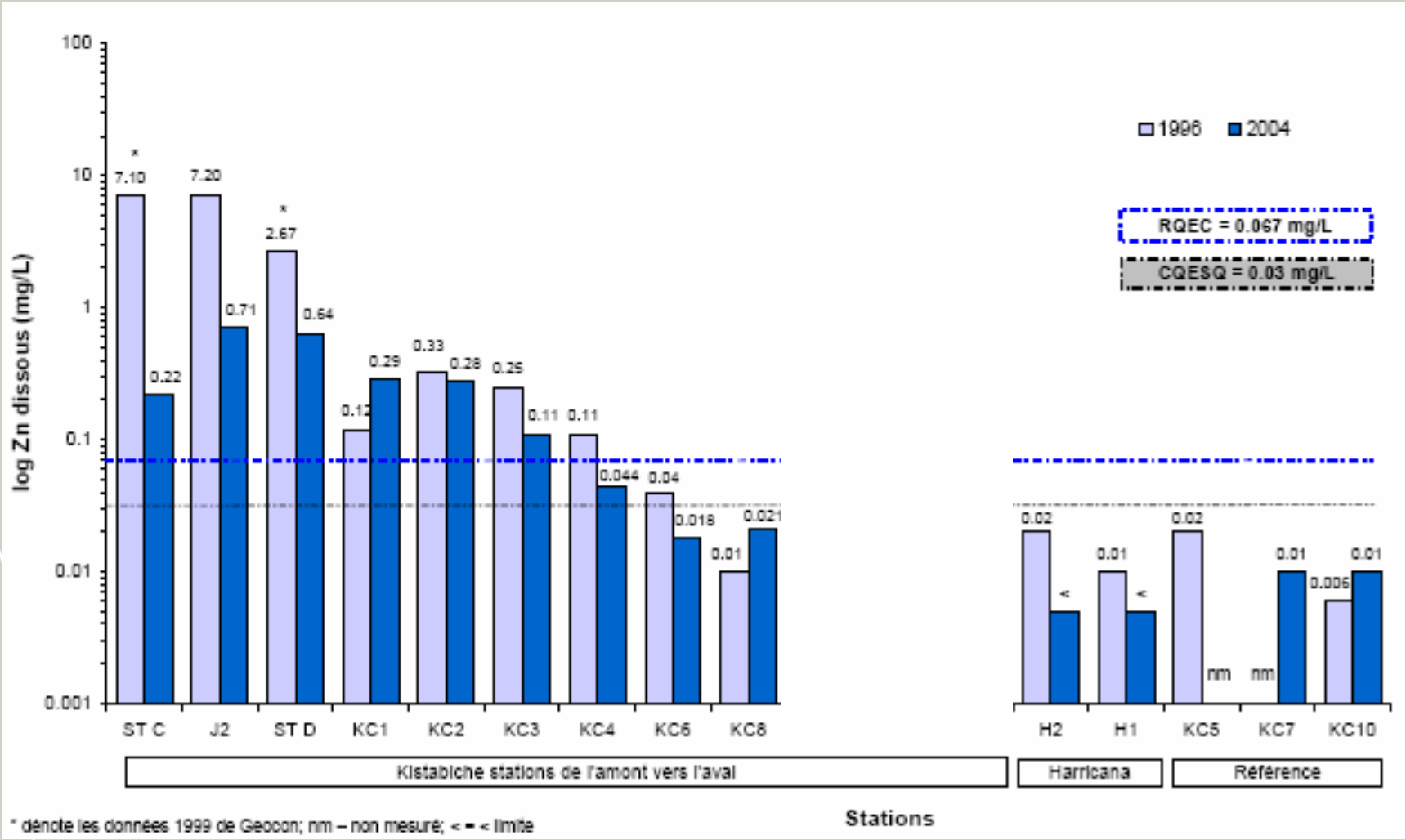
Aquatic Monitoring - Surface Water Quality
ZINC in Kistabiche River



* dénote les données 1999 de Geocon; nm – non mesuré; < = < limite

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Conclusions – biological monitoring in the Kananewesig and Kistabishe Creeks:

- Significantly reduced chemical loadings to both watersheds and improved water quality, particularly close to the cap
- Improvement in sediment quality in most cases but not as rapid
- Improvement in benthic invertebrate communities and re-establishment of fisheries
- Improvement is more profound in the Kananewesig
- Design objectives of the cap are being met
  - Significantly reduced metal loading and increasing pH
- In general, current metal concentrations in water are at or below predicted levels in both creeks

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Poirier site in 2002
Next steps in 2006-2010 to complete bare areas and ensure sustaining vegetative cover over lined tailings

Continue monitoring beneath the liner, at key locations leaving the site and in receiving waters

Next Aquatic Surveys in 2007 and 2011

Ensure vegetation becomes self-sustaining in all areas

Completion report in 2012

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