



# *Mount Polley Project*

## Tailings Facility Summary

Mount Polley Mines



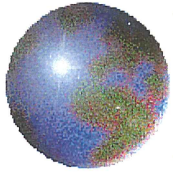
February 3, 2005

Knight Piesold ref #: 101-01/8

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MP00050

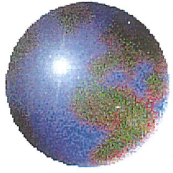




# *Overview of Presentation*

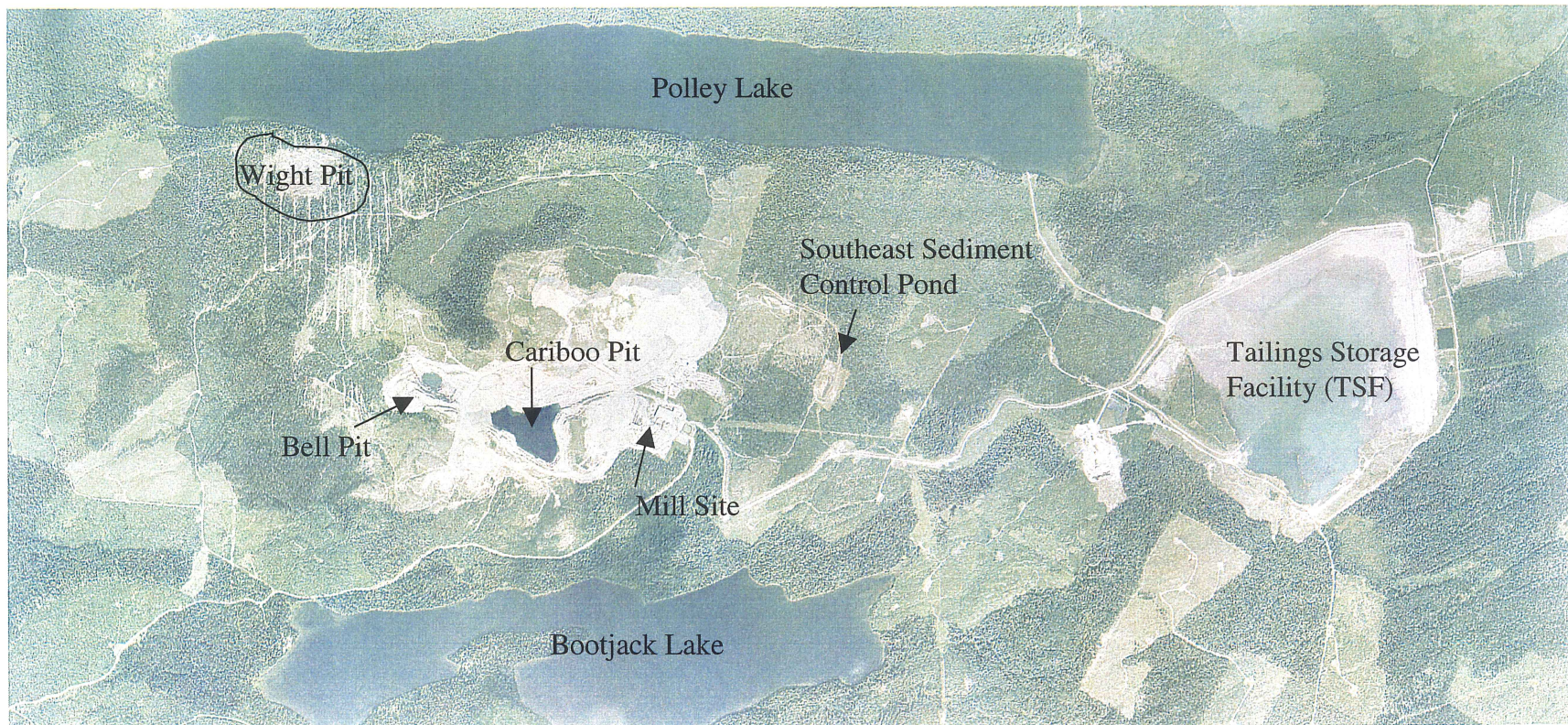
- ⊕ General information
- ⊕ Project background
- ⊕ Tailings Storage Facility
- ⊕ TSF - Ultimate Design





# General Information

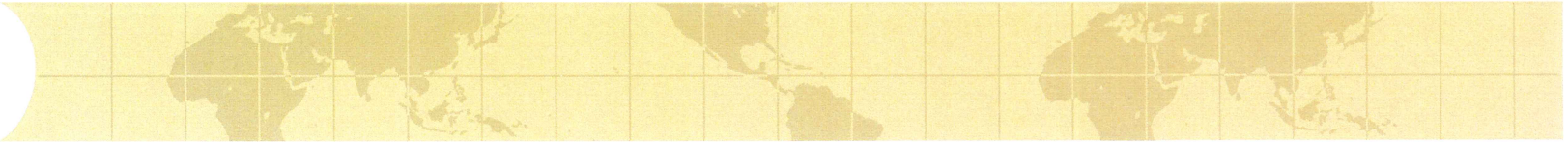
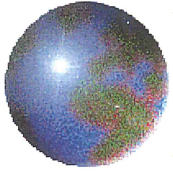
## ✦ Mount Polley Project, 2001 Air photo



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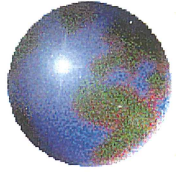




# *General Information*

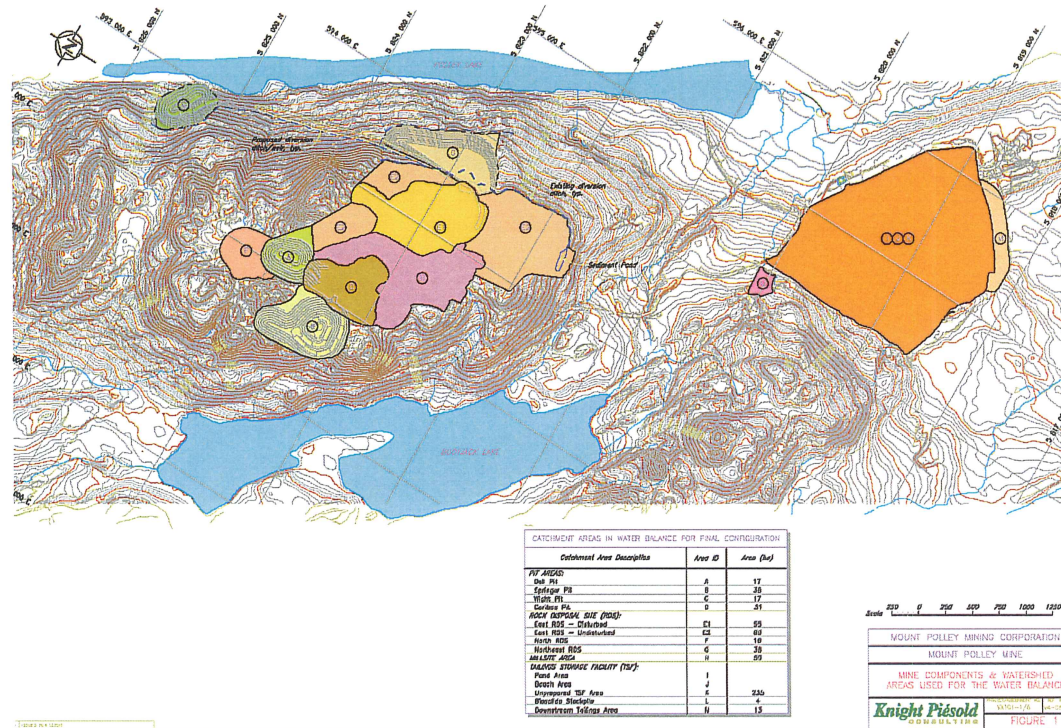
- ⊕ Production started June 1997
- ⊕ Care and Maintenance status October 2001 to present
- ⊕ Regular inspections
- ⊕ Start up scheduled for March 2005
- ⊕ Wight Pit included in current mine plan
- ⊕ Stage 3c Tailing Storage Facility (TSF) construction per existing permits from March 2004 to March 2005
- ⊕ Additional Mines Branch permits required for on-going expansion of TSF





# Project Background – Hydrometeorology

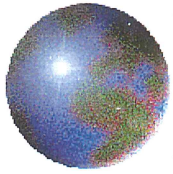
- Mean annual precipitation of 755mm at TSF
- Probable Maximum Precipitation (PMP) is 203mm





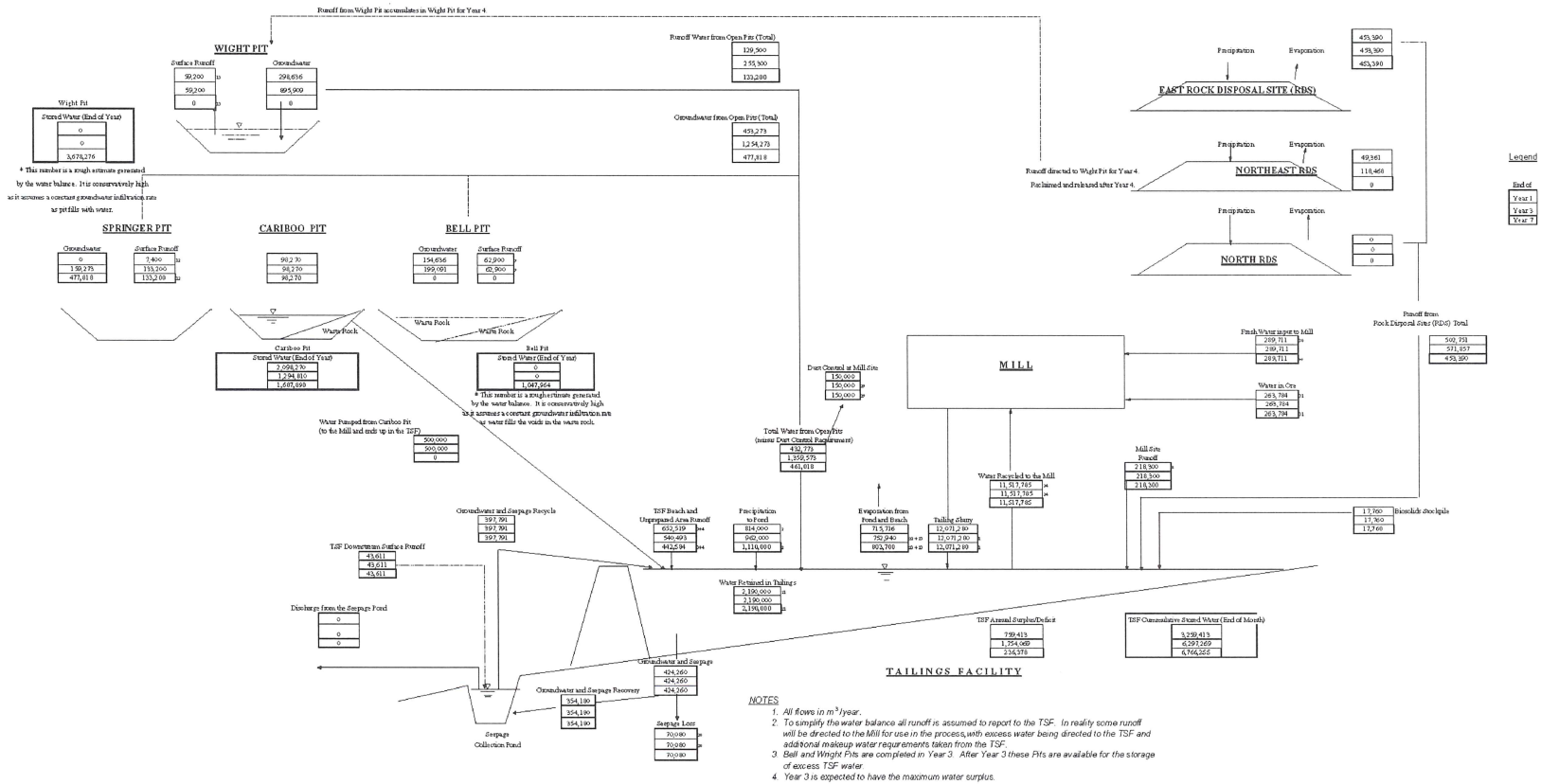




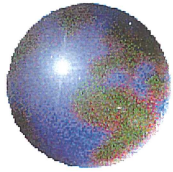


# Project Background – Water Balance

Typical water balance calculations for Wight Pit expansion:

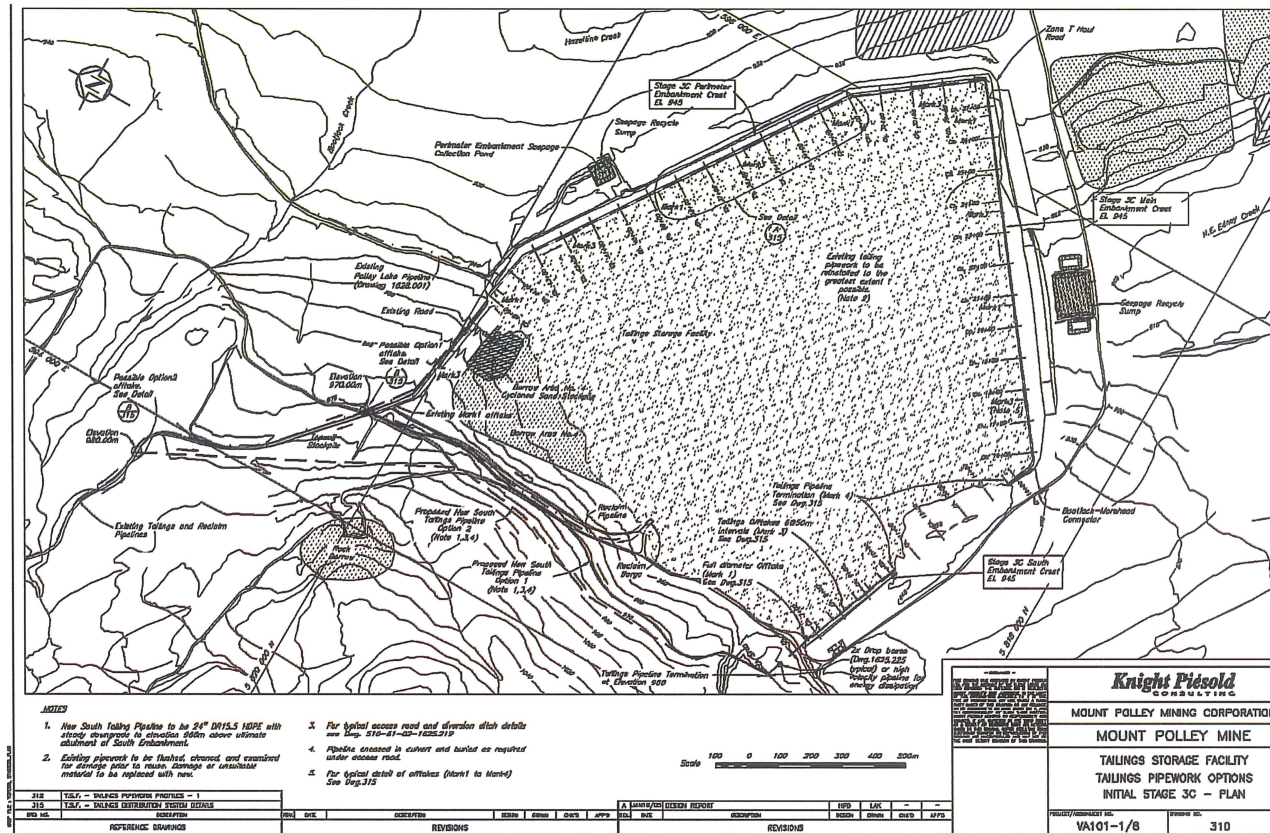






# Project Background – TSF Configuration

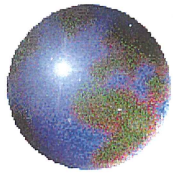
## General Plan



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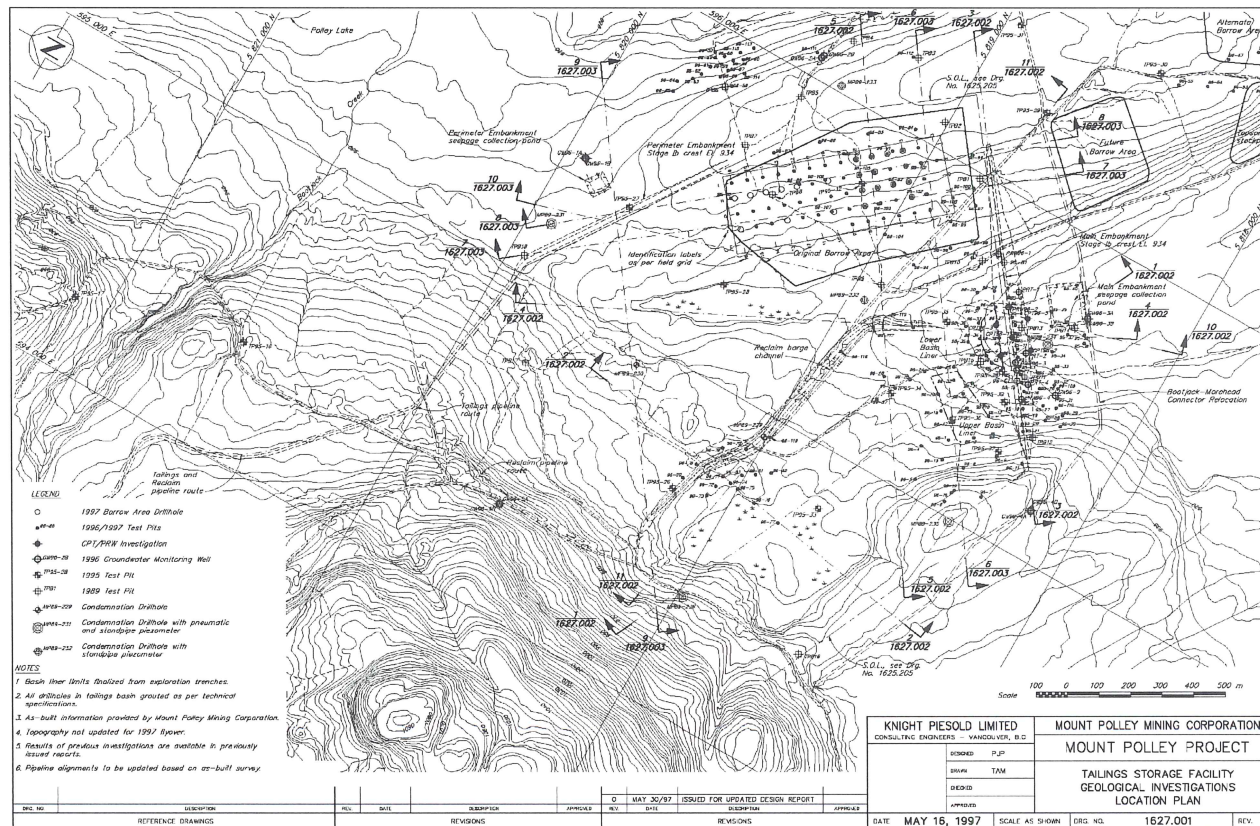
Knight Piesold ref #: 101-01/8



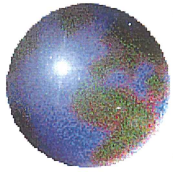


# Project Background – TSF Geology

- Previous investigation work from 1989 to 1999 included: testpits, drillholes, laboratory tests and Cone Penetration Tests.

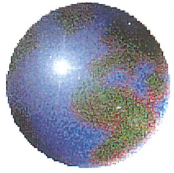






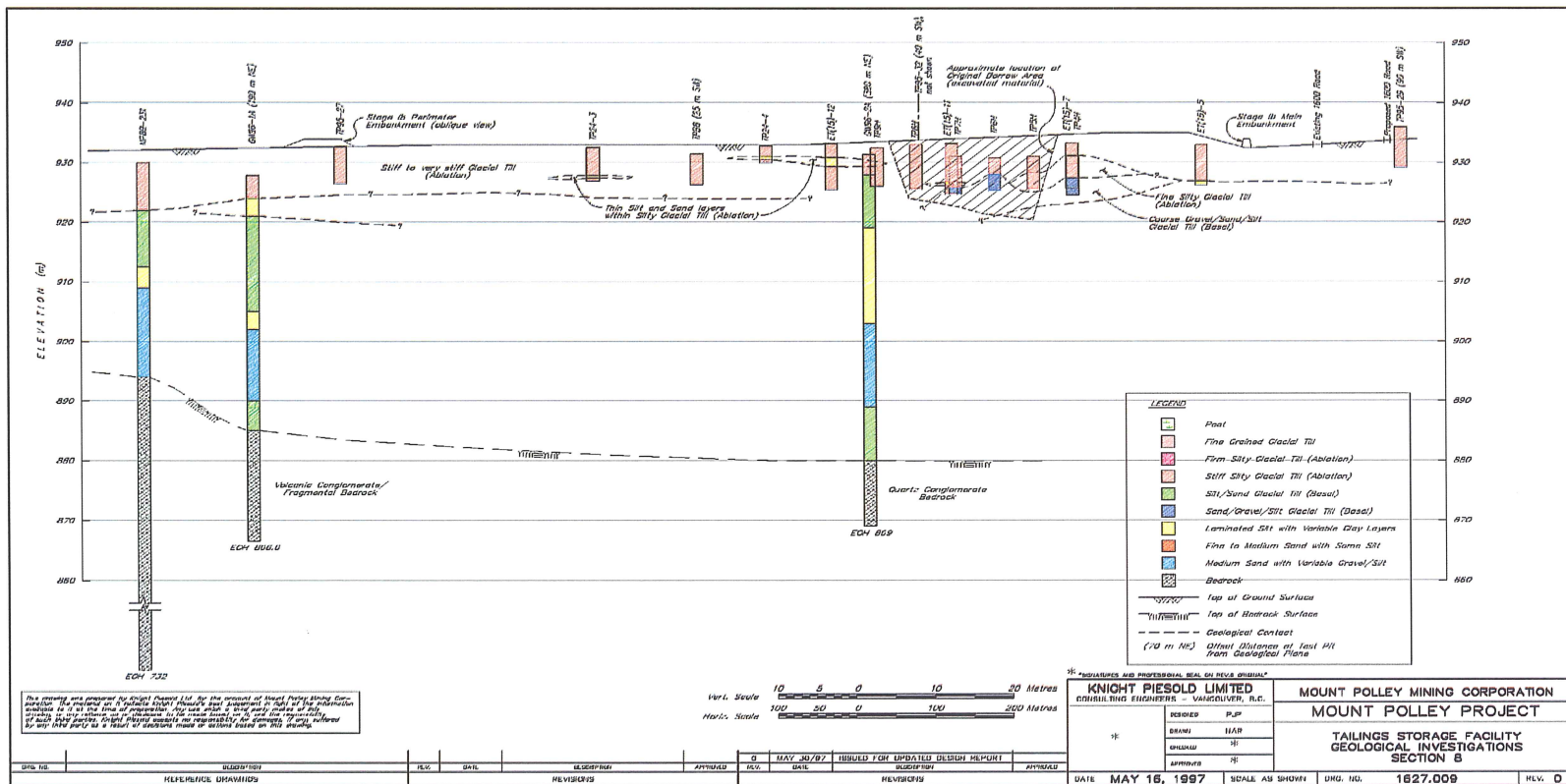
# *Project Background – TSF Geology*

- ✦ Major geological units in TSF:
  - ✦ Surficial Till
  - ✦ Glaciolacustrine / glaciofluvial sediments
  - ✦ Basal Till
  - ✦ Bedrock

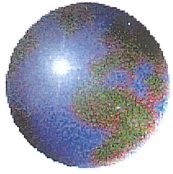


# Project Background

## Perimeter Geological X-sections

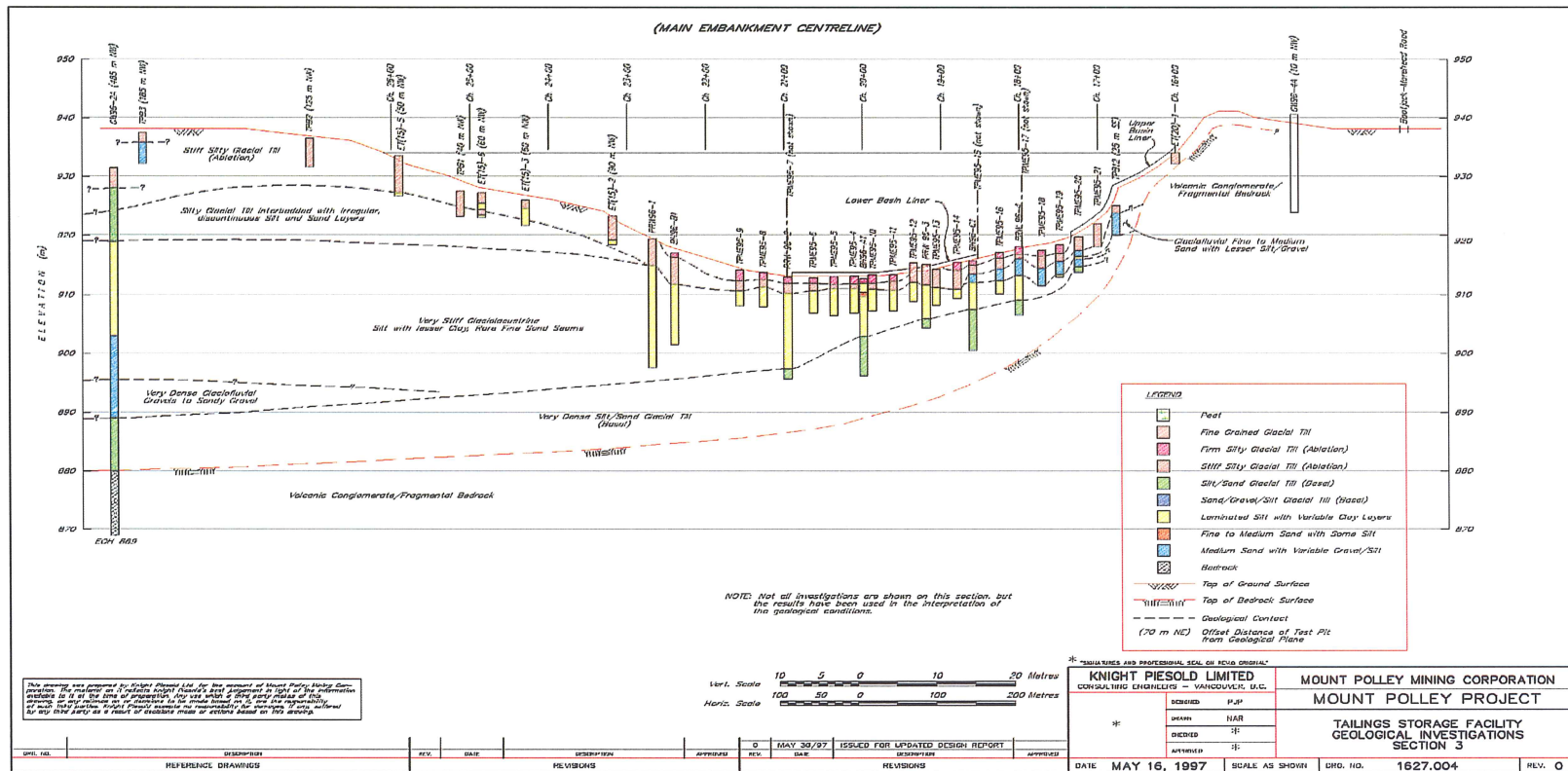


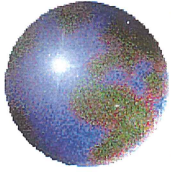




# Project Background

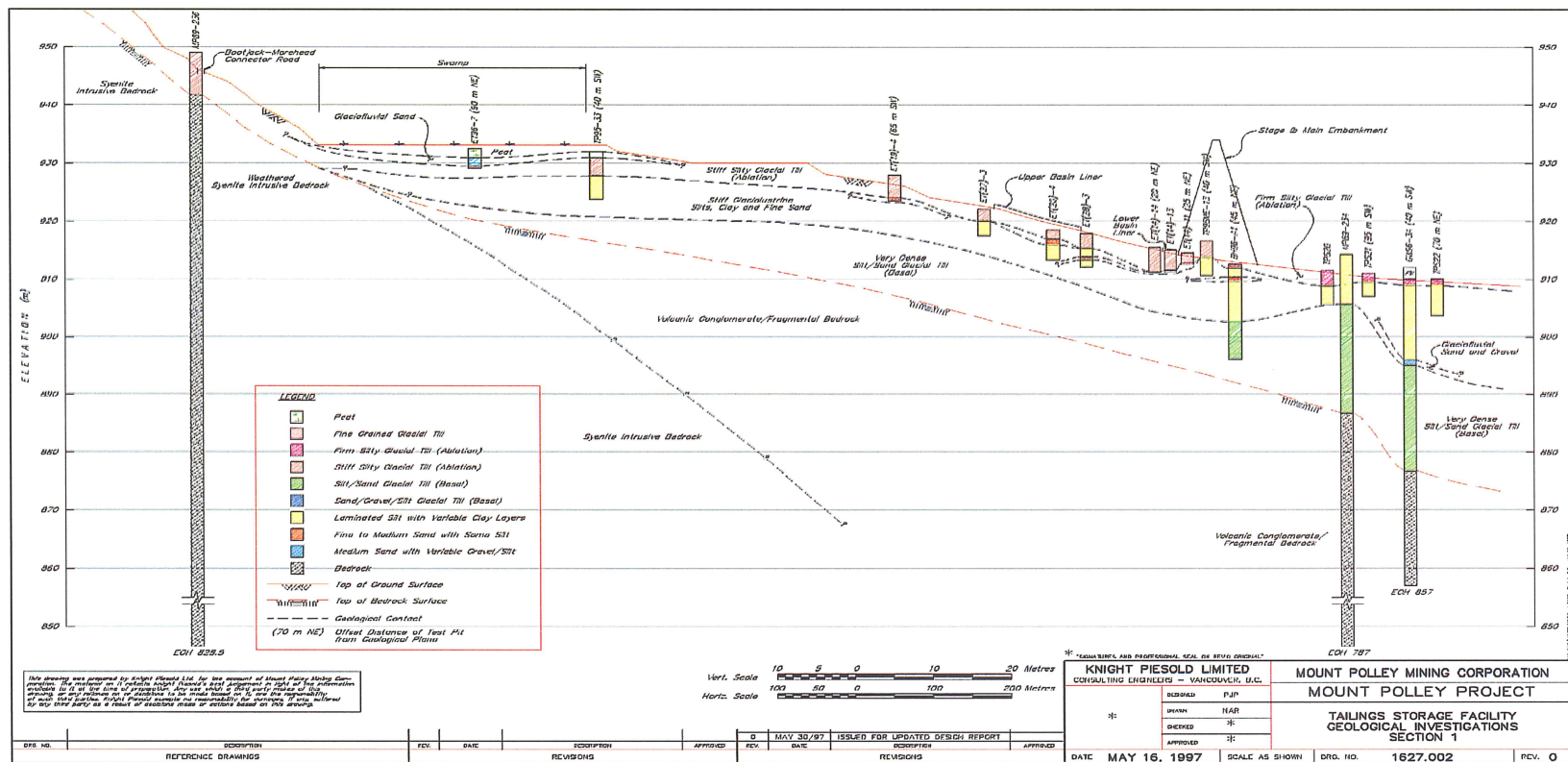
## Main Geological X-sections





# Project Background

## South Geological X-sections

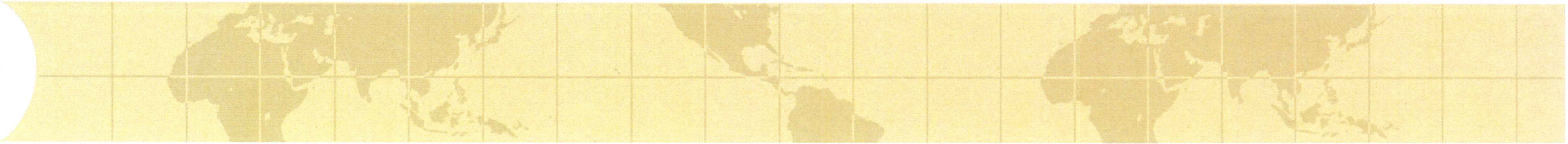
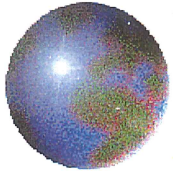


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# *Project Background – Tailings Properties*

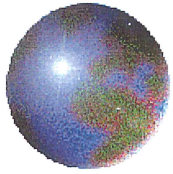
## ✚ Tailings Slurry:

- ✚ Solid throughput: **20,000 tonnes per day**
- ✚ Percent solids: **25 – 30%**
- ✚ Solid Specific Gravity: **2.70**
- ✚ In situ density: **1.44 tonne/m<sup>3</sup>**
- ✚ Geochemical characteristics:



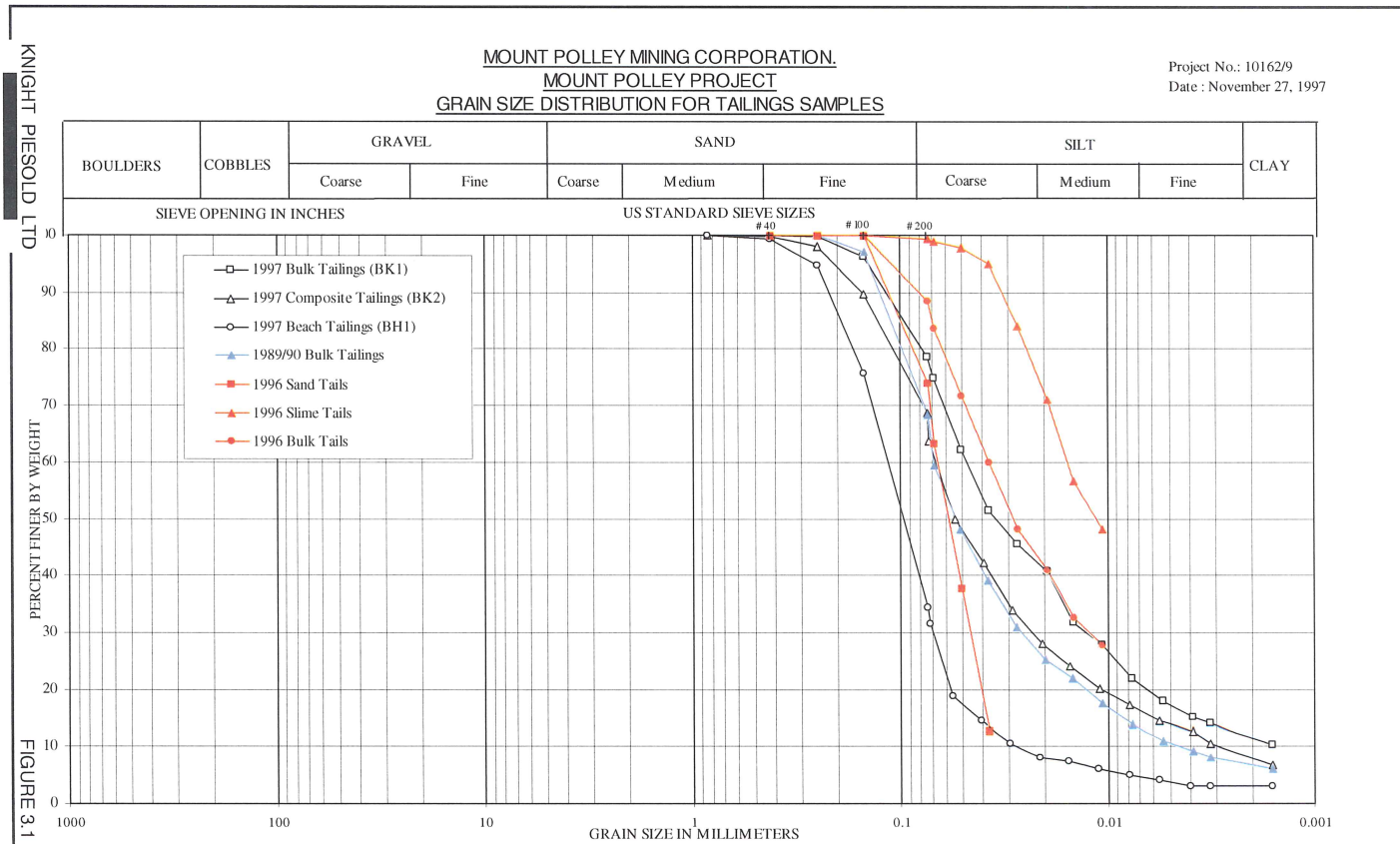
Sulphur (percent)	Paste pH	Acid Potential (kg CaCO <sub>3</sub> /t)	Neutralization Potential (kg CaCO <sub>3</sub> /t)	Net Neutralization Potential (kg CaCO <sub>3</sub> /t)
0.02	8.22	0.6	24.6	24.0

- ✚ Seepage water quality: **Ron Martel**
- ✚ Supernatant water quality: **Ron Martel**



# Project Background – Tailings Properties

## ✚ Tailings PSA summary :

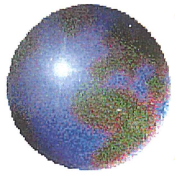


February 3, 2005

Knight Piesold ref #: 101-01/8

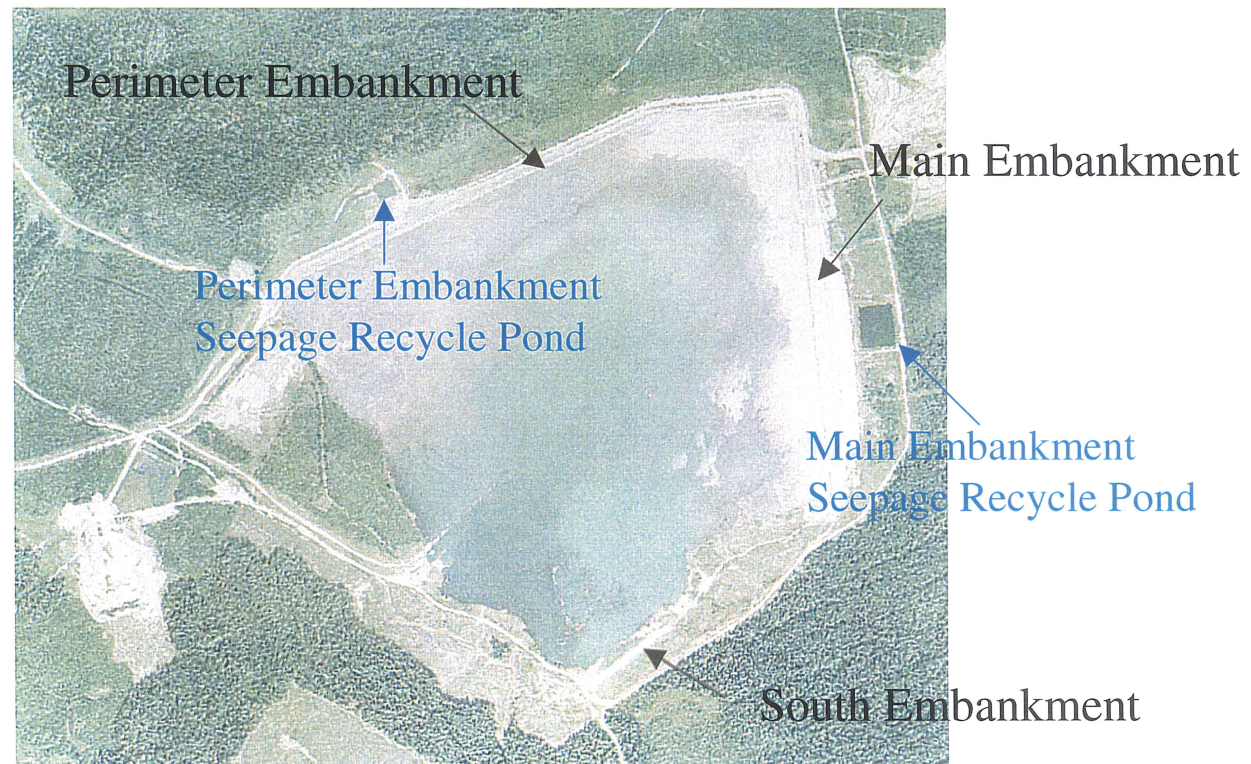
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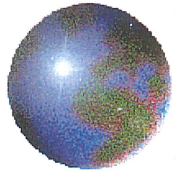




# Tailings Storage Facility

- ✦ Tailings Storage Facility (TSF) layout:





# *Tailings Storage Facility*

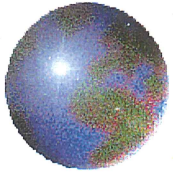
## ✦ Currently Permitted:

- ✦ Stage 1a/1b constructed to El. 934m in 1996/1997 – reviewed by Fred Match
- ✦ Stage 2a/2b constructed to El. 937m in 1998 – reviewed by Chuck Brawner
- ✦ Stage 3a/3b constructed to El. 942.5m in 2000/2001 – reviewed by Chris Carr
- ✦ Stage 3c constructed to El. 945m in 2004/2005 – reviewed by Chris Carr

## ✦ Pending Permits:

- ✦ Stage 4 construct to El. 948m on embankments in summer of 2005
- ✦ On-going expansions to El. 965m embankments to 2012

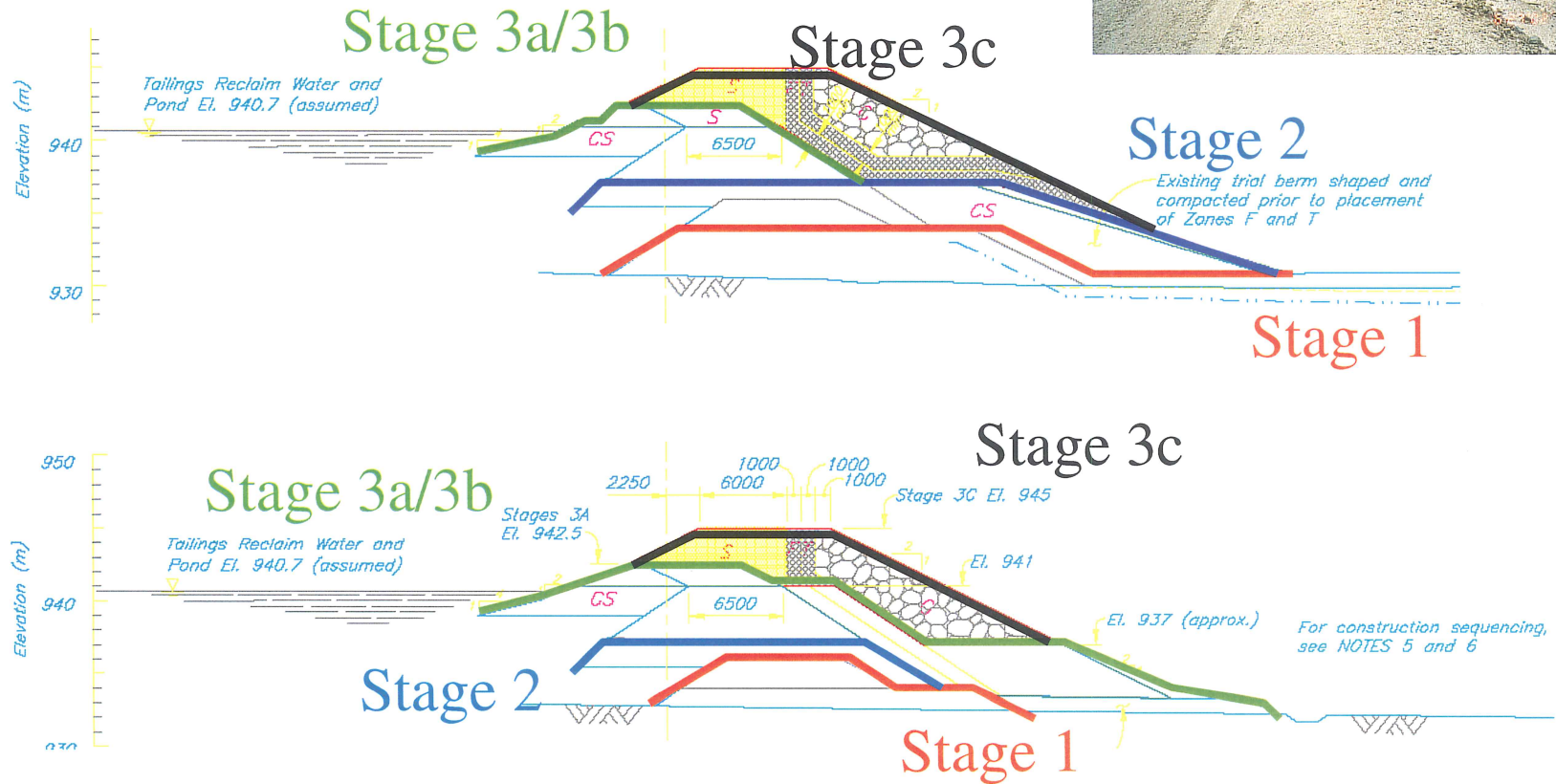


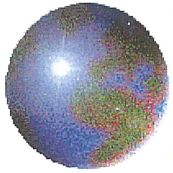


# Tailings Storage Facility



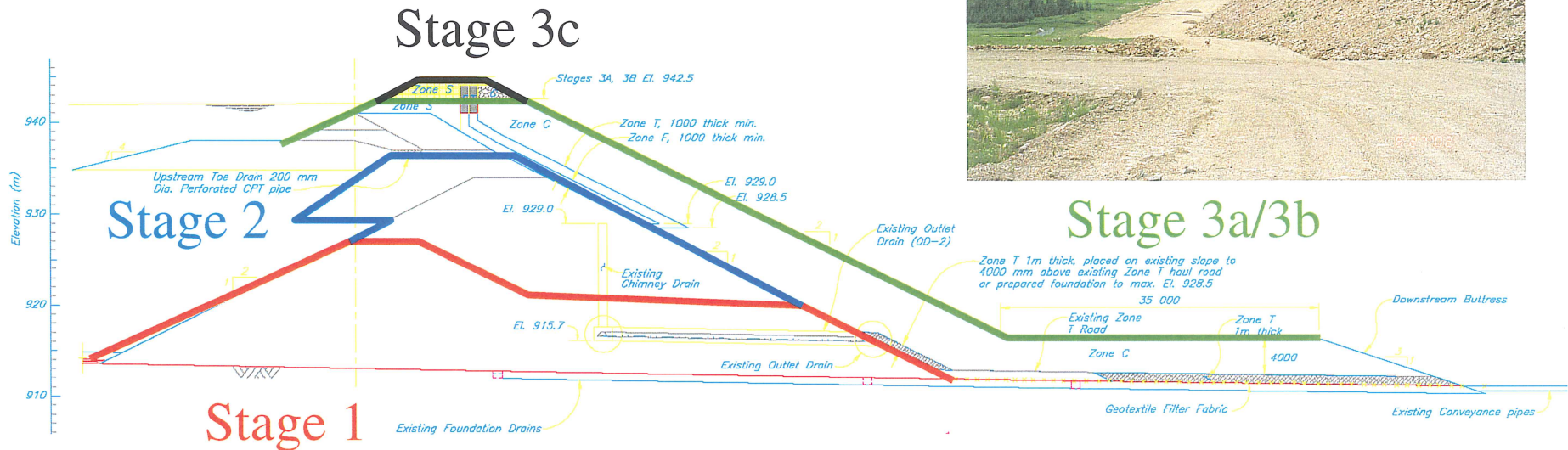
## Perimeter Embankment X-section:



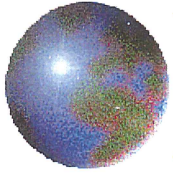


# Tailings Storage Facility

## Main Embankment X-section

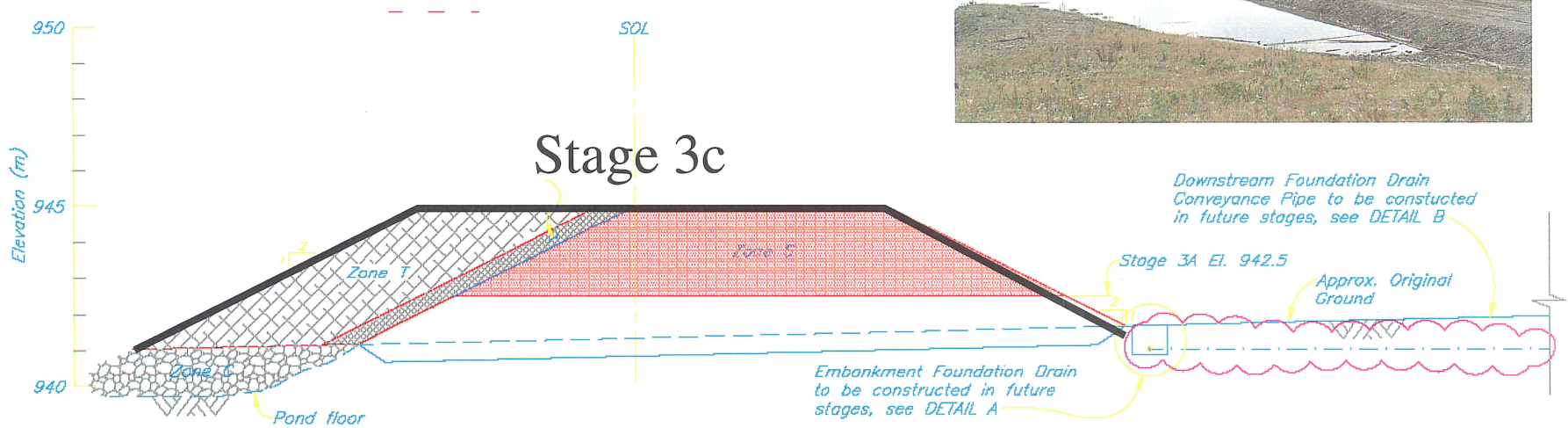


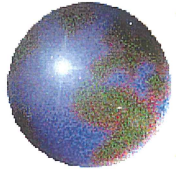




# Tailings Storage Facility

## ⊕ South Embankment X-section:

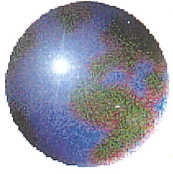




## *TSF – Ultimate Design*

- ✦ Design Criteria
- ✦ Geotechnical Model
- ✦ Proposed Expansions
- ✦ Water Management
- ✦ Construction Quality Assurance
- ✦ Monitoring
- ✦ Closure
- ✦ Schedule

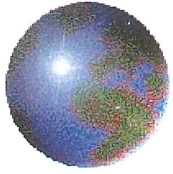




# TSF – Ultimate Design

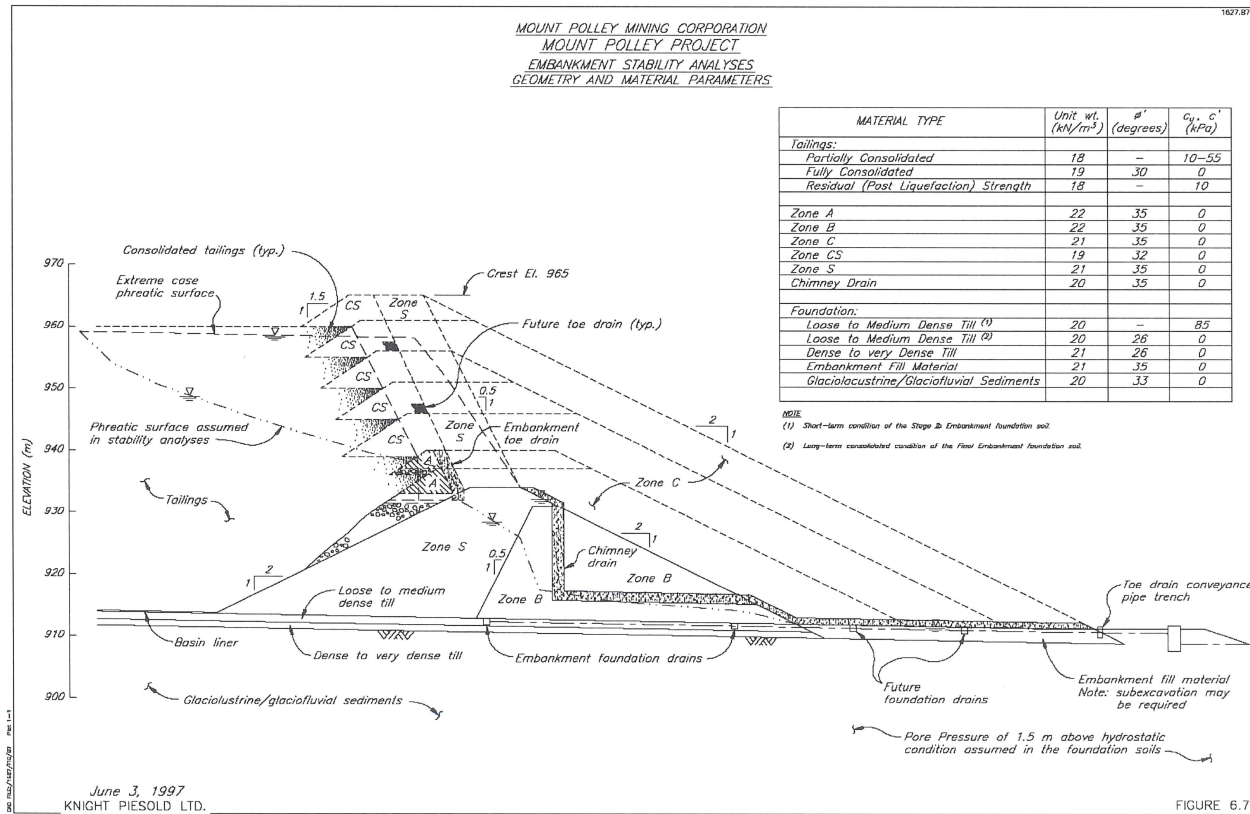
## ✦ Design Criteria

<b>Design Operation Life</b>	7 years
<b>Hazard rating:</b>	During Operations After Closure
	LOW by CDA Consequence Classification HIGH by CDA Consequence Classification
<b>Design Earthquakes:</b>	<i>Operations</i> DBE MDE <i>After Closure</i> MCE
	1 in 475 year event ( $M = 6.5, A_{max} = 0.37 g$ ) 50% of the 1 in 2000 year event or MCE ( $M = 6.5, A_{max} = 0.065 g$ ) 1 in 2000 year event
<b>Embankment Crest Width:</b> (Final Width)	9 m
<b>Design Tonnage</b>	7,300,000 tpy (20,000 tpd)
<b>Freeboard:</b>	Operations Closure
	24 hour PMP event (679,000 m <sup>3</sup> ) plus 1.0 m wave run Sufficient to provide routing of PMF plus wave run-up
<b>Storage Capacity:</b>	76,000,000 tonnes

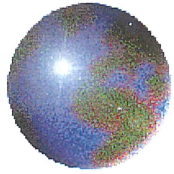


# TSF – Ultimate Design

## Generic Geotechnical Model

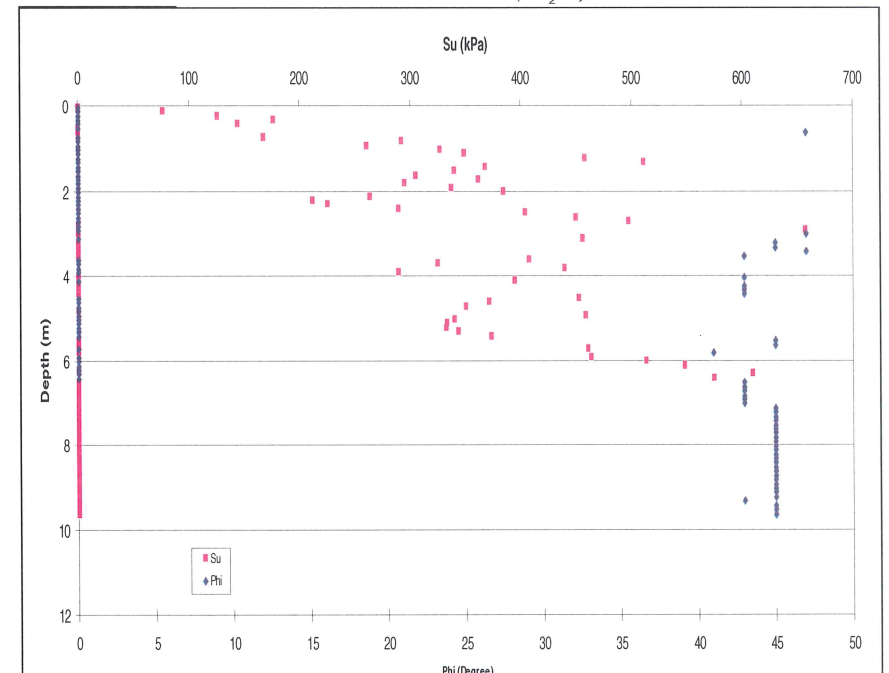
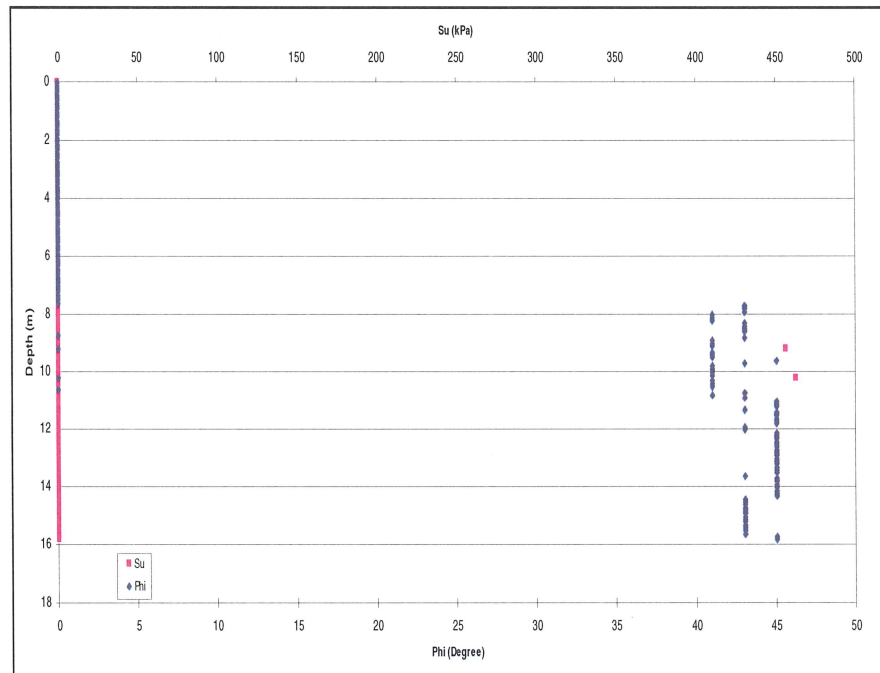
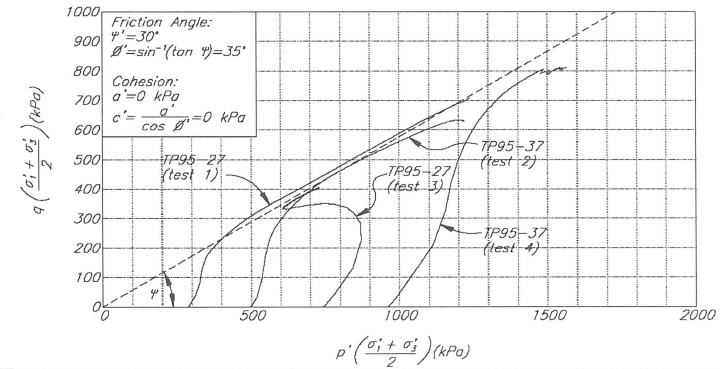




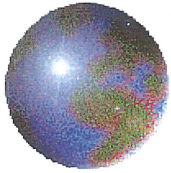


# TSF – Ultimate Design

## Generic Geotechnical Model



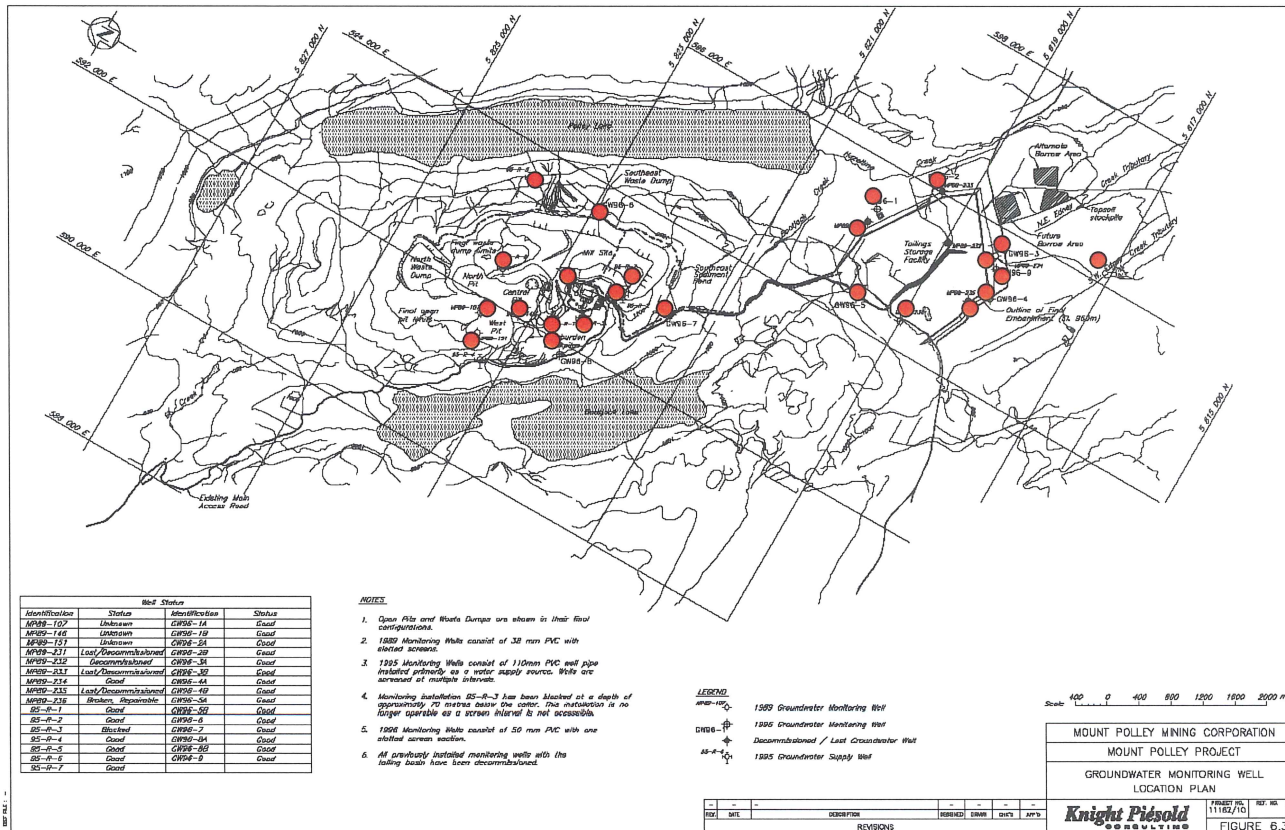
Designs based on conservative lower bound numbers:  $\phi' = 35^\circ$ ,  $S_u = 0 \text{ kPa}$



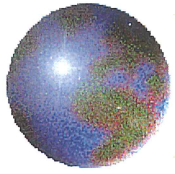
# TSF – Ultimate Design

## Hydrogeology

 = Groundwater well

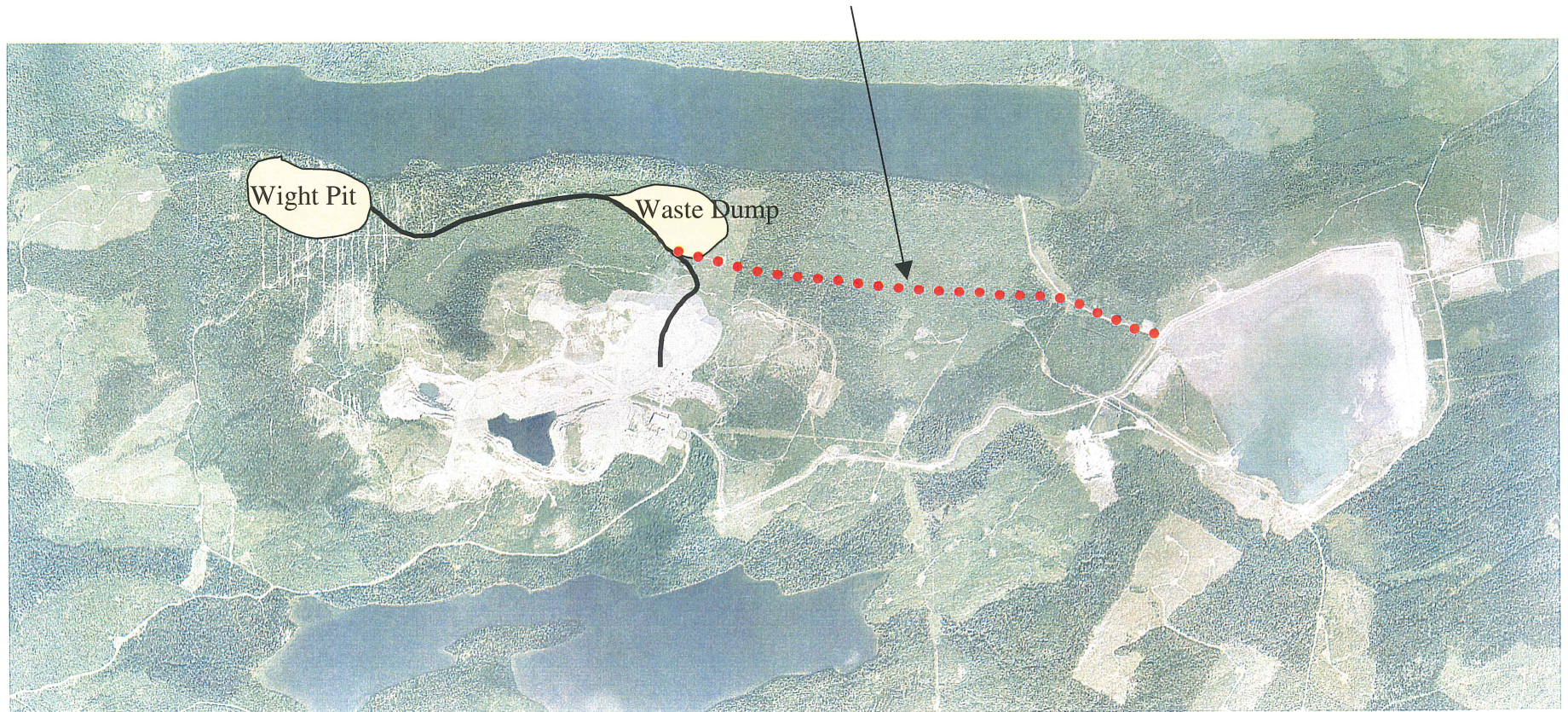






# *TSF – Ultimate Design*

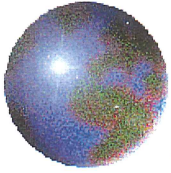
- ✦ Proposed waste rock dump and haul road.





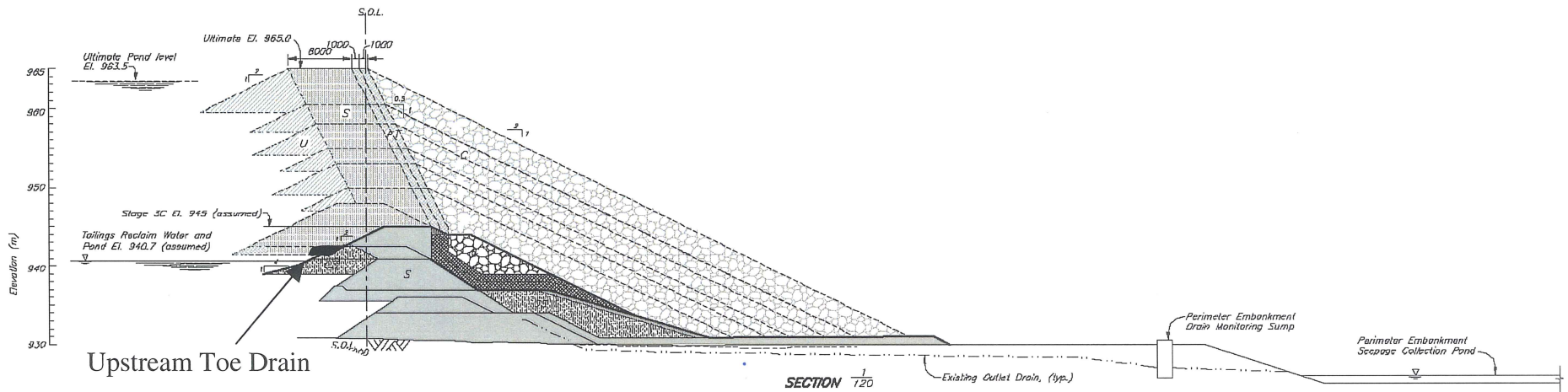


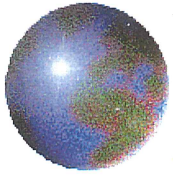




# TSF – Ultimate Design

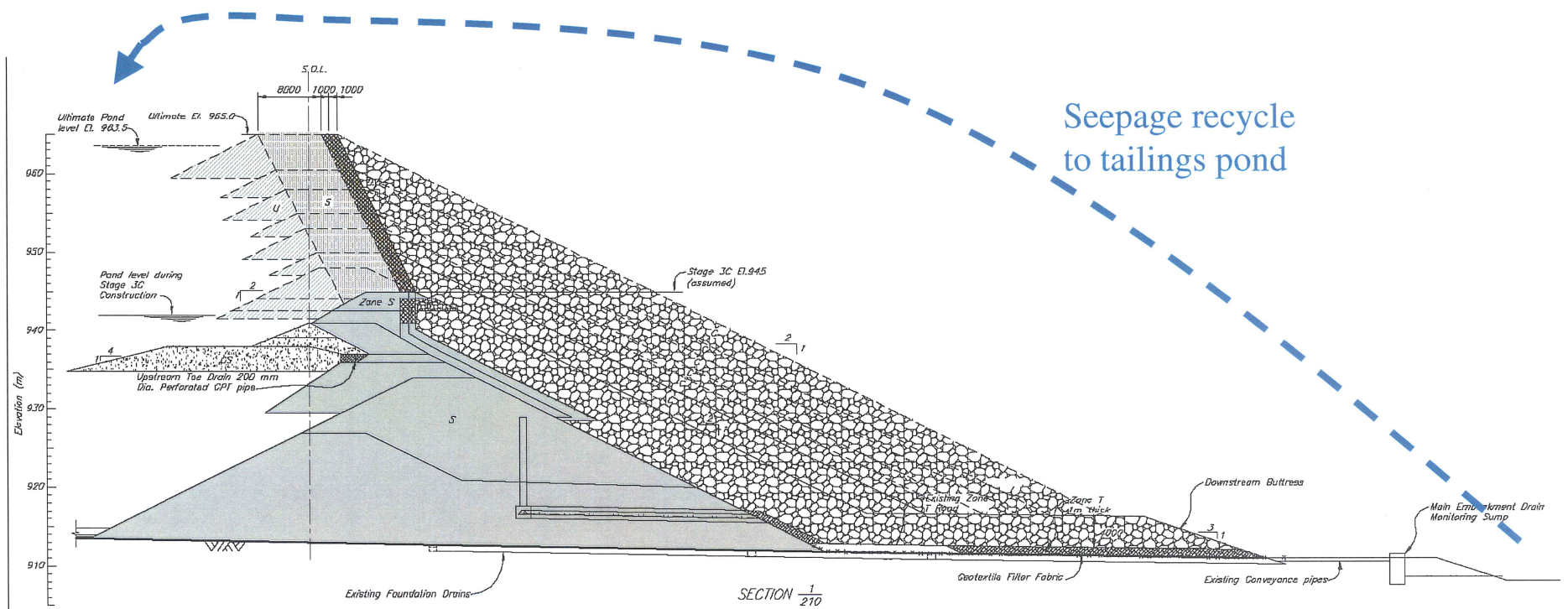
## ✦ Draft Perimeter Embankment X-section



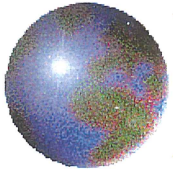


# TSF – Ultimate Design

## ✚ Draft Main Embankment X-section

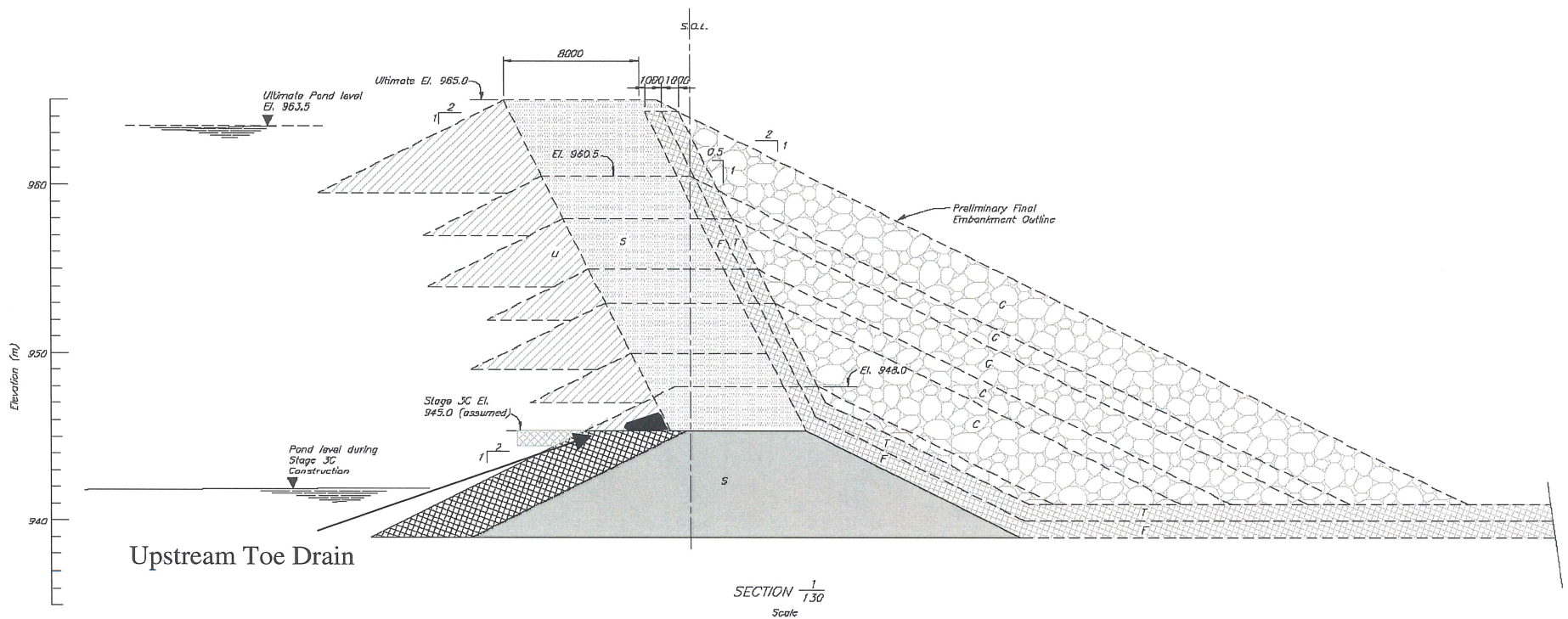






# TSF – Ultimate Design

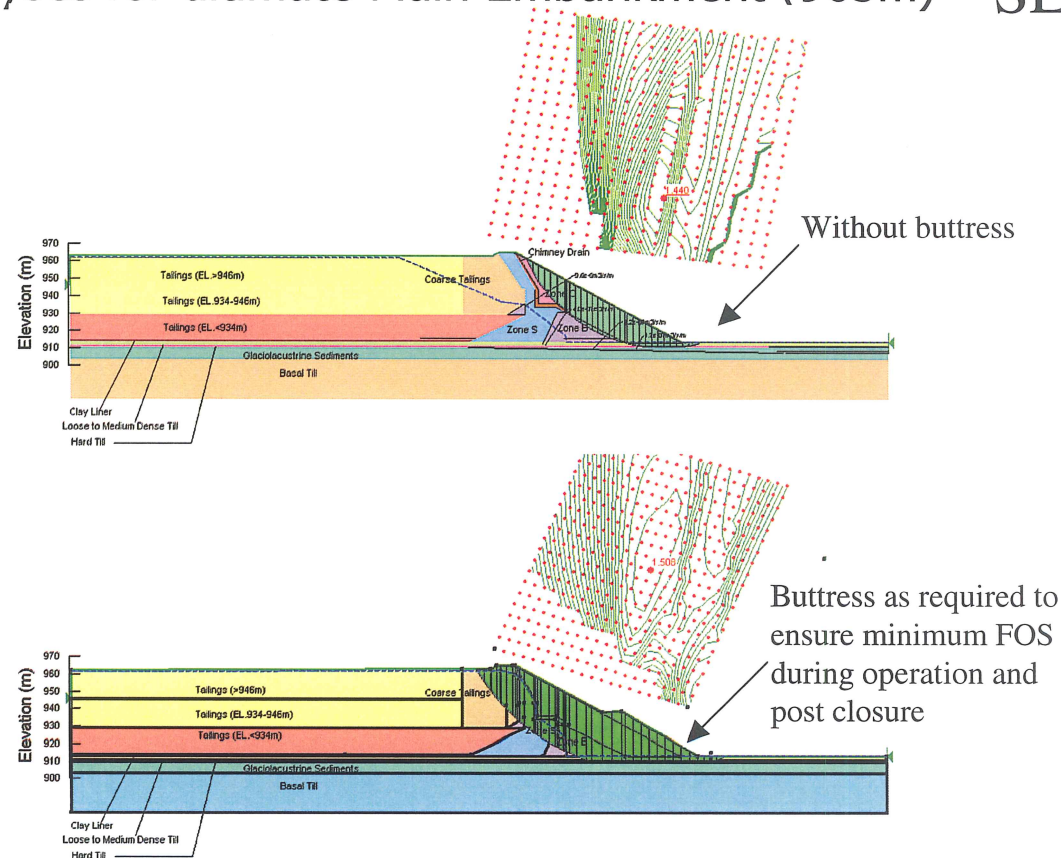
## Draft South Embankment X-section



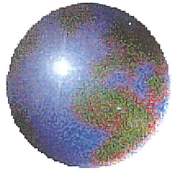


# TSF – Ultimate Design

- Typical analyses for ultimate Main Embankment (965m) SLOPE/W

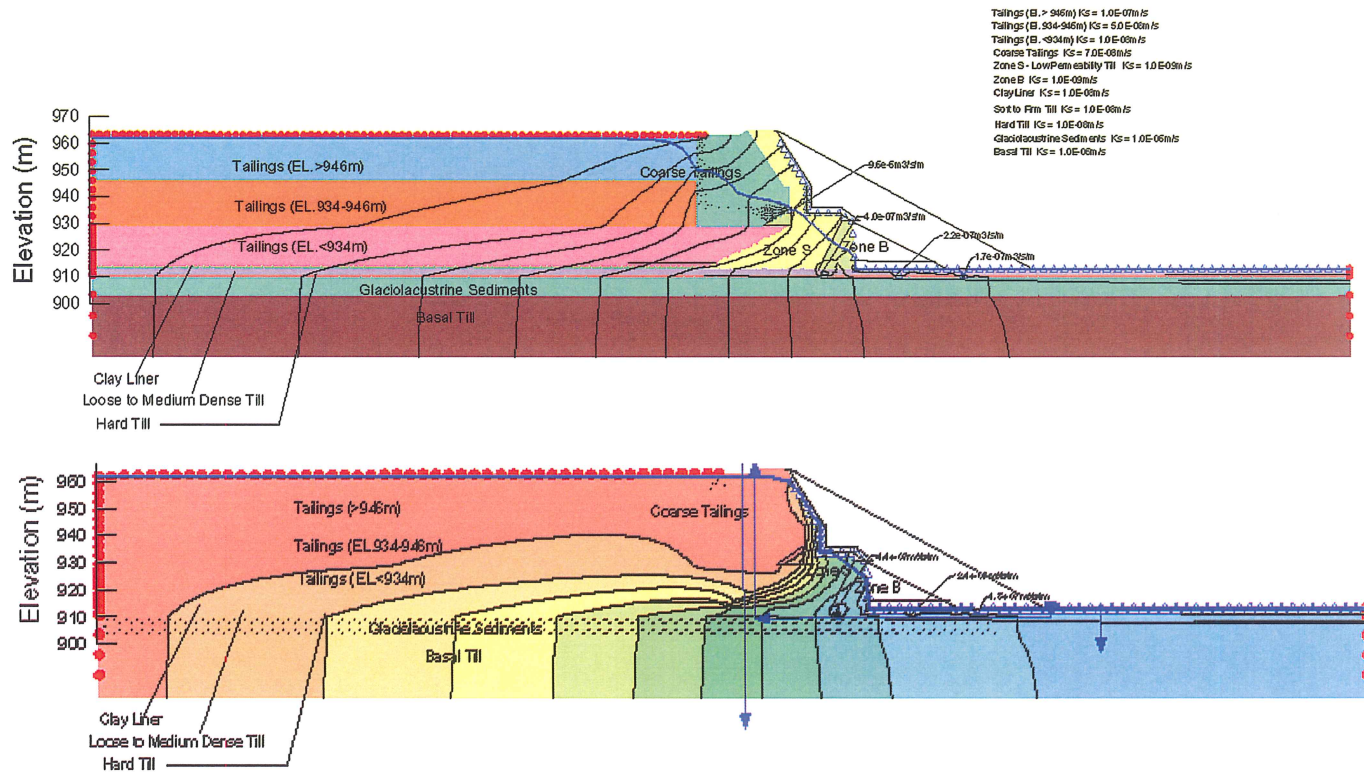






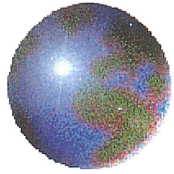
# TSF – Ultimate Design

Typical analyses for ultimate Main Embankment (965m) SEEP/W



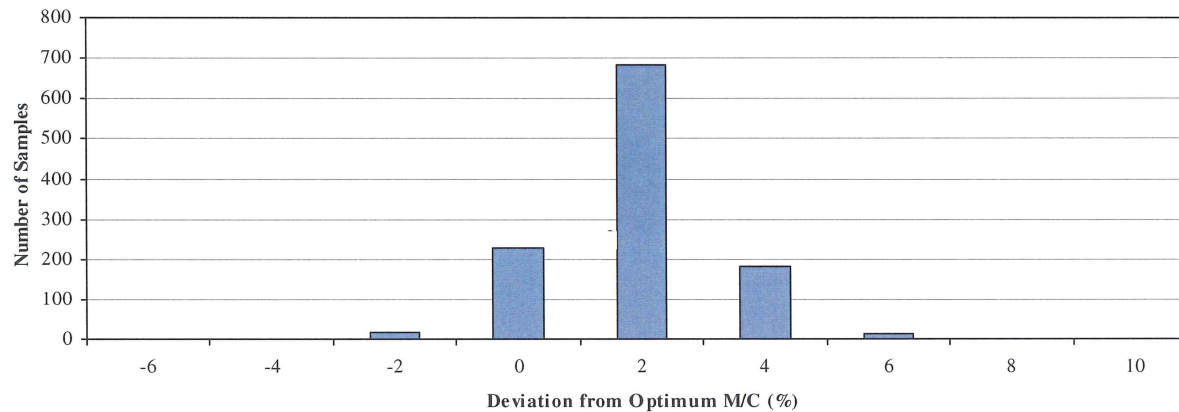
Base case with upstream toe drain

Case without upstream toe drain

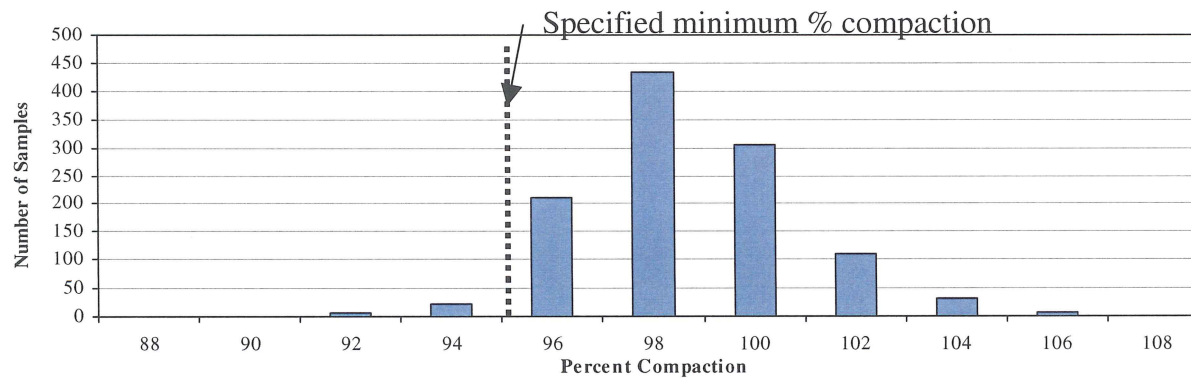


# TSF – Ultimate Design

## Field Supervision (Current/Previous compliance)

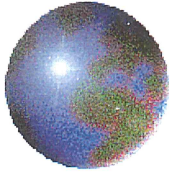


Typical Deviation from optimum moisture content for Zone S



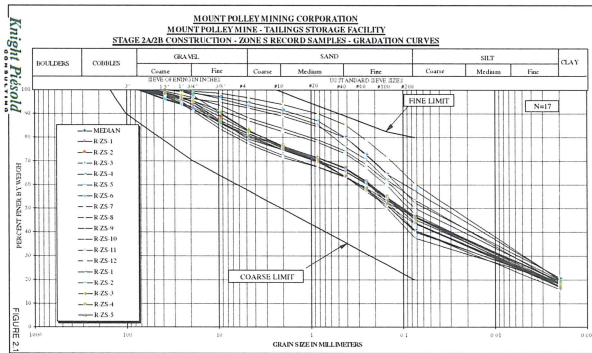
Typical Percentage Compaction from Zone S



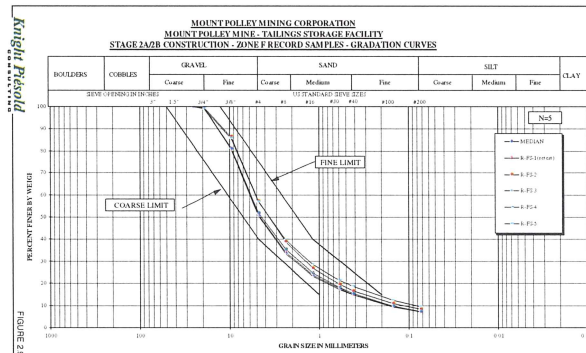


# TSF – Ultimate Design

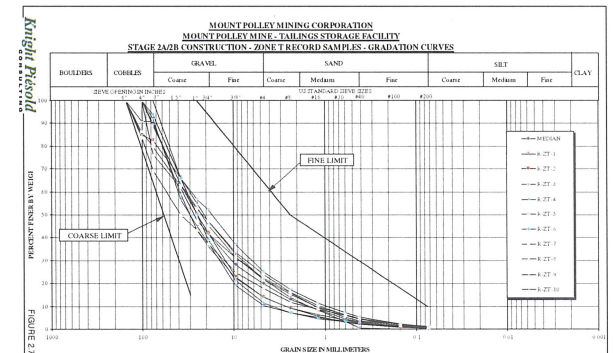
## Typical PSA Record Tests (Current/Previous compliance)



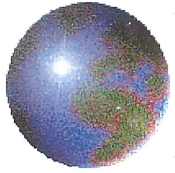
Zone S PSA



Zone F PSA

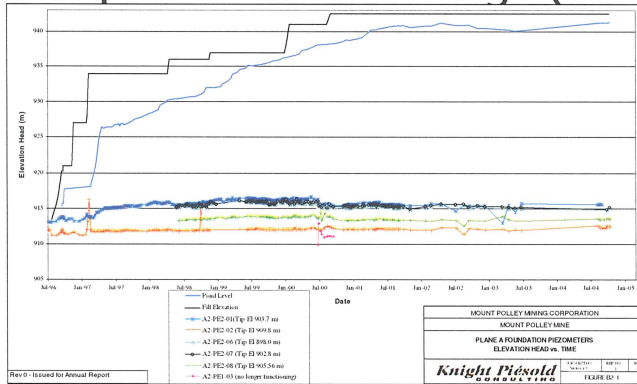
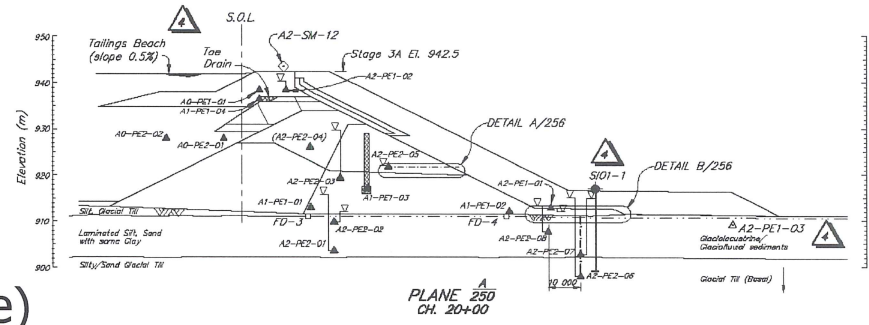


Zone T PSA

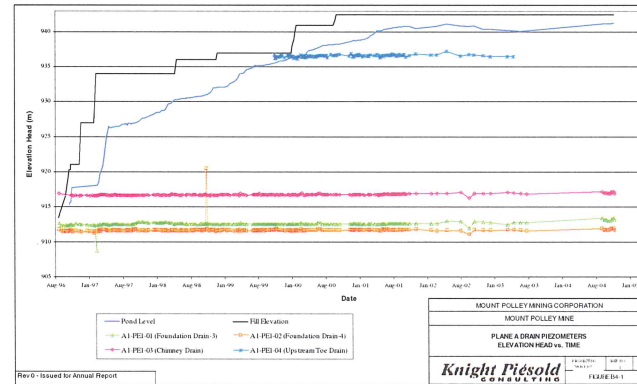


# TSF – Ultimate Design

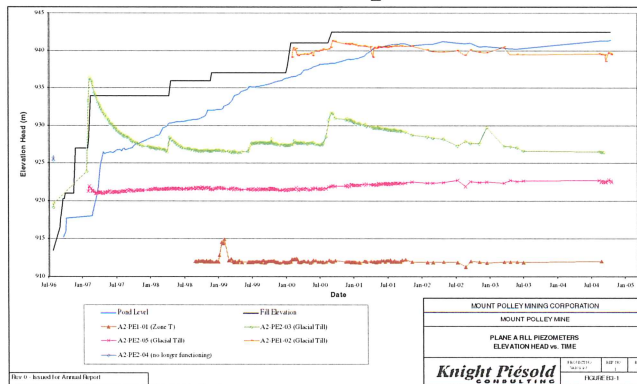
Typical piezometer readings (to date)



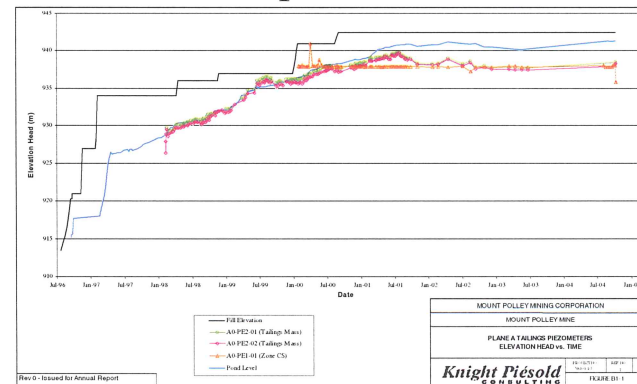
Plane A foundation piezometer



Plane A drain piezometer

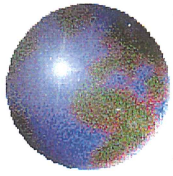


Plane A fill piezometer



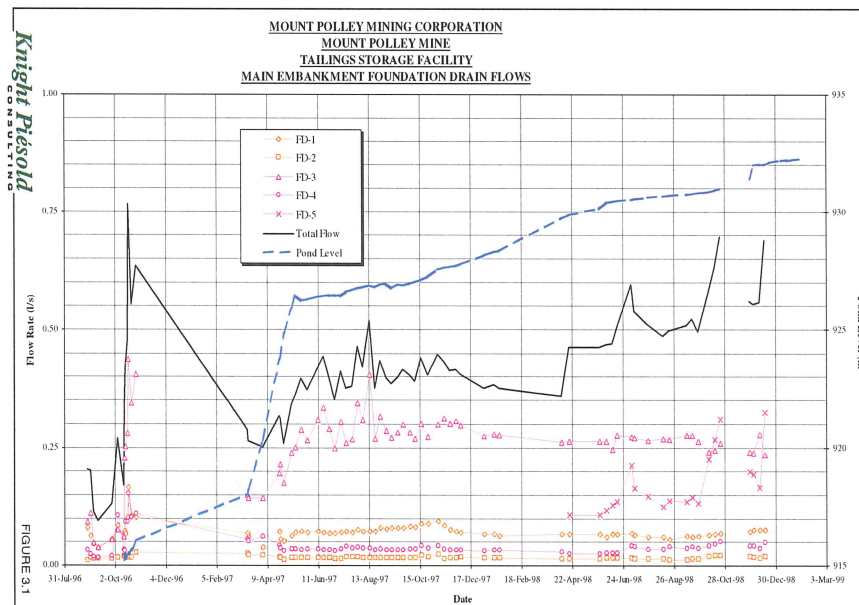
Plane A tailings piezometer



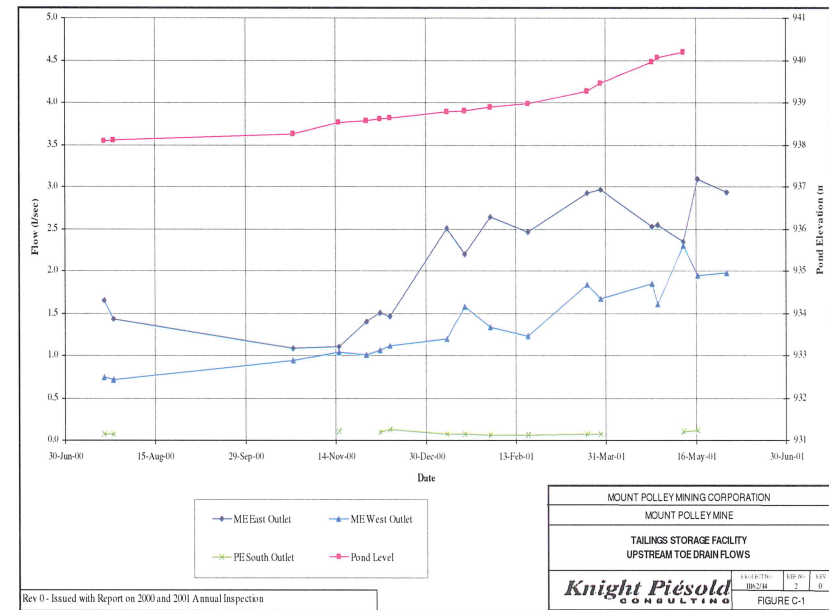


# TSF – Ultimate Design

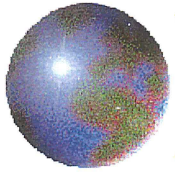
## Drain Flow Readings



Typical foundation drain flow readings

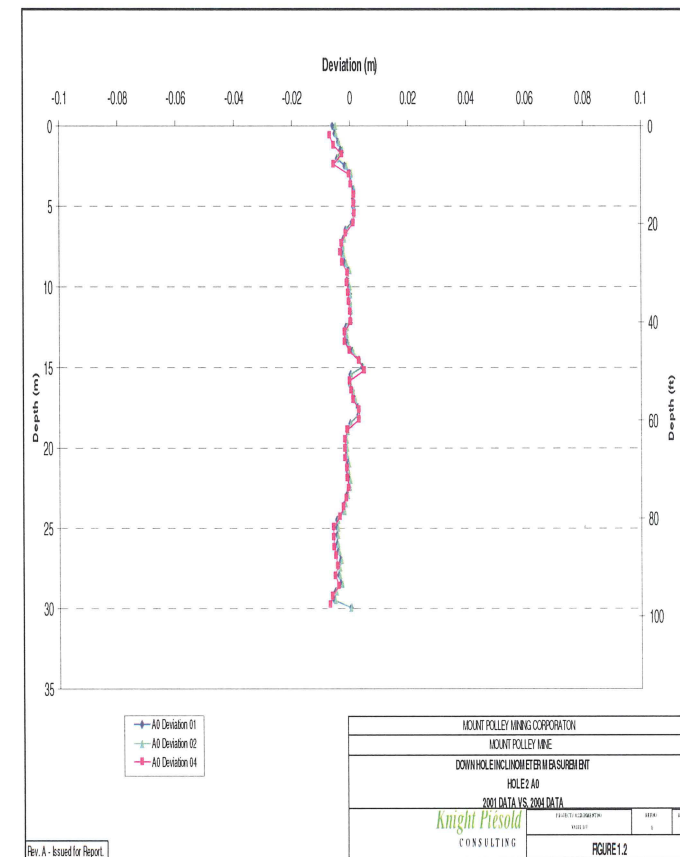


Typical upstream toe drain flow readings



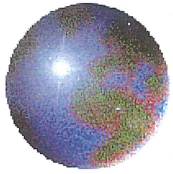
# TSF – Ultimate Design

## Inclinometer readings



Typical inclinometer reading



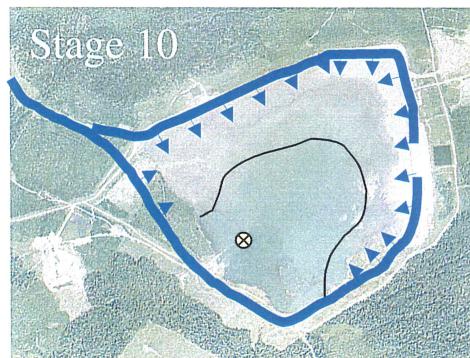
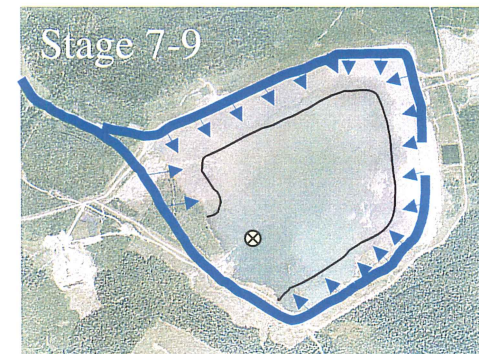
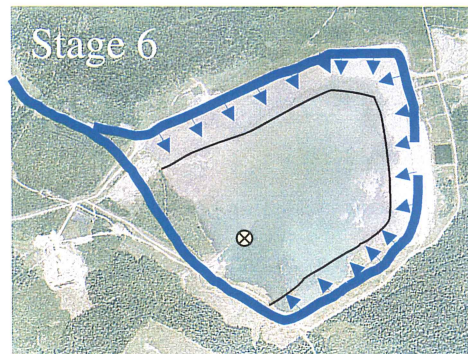
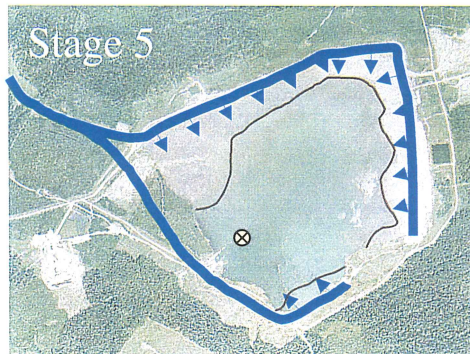


# TSF – Ultimate Design

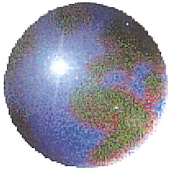
## Water Management

### Tailings Deposition Strategy

⊗ = Pump



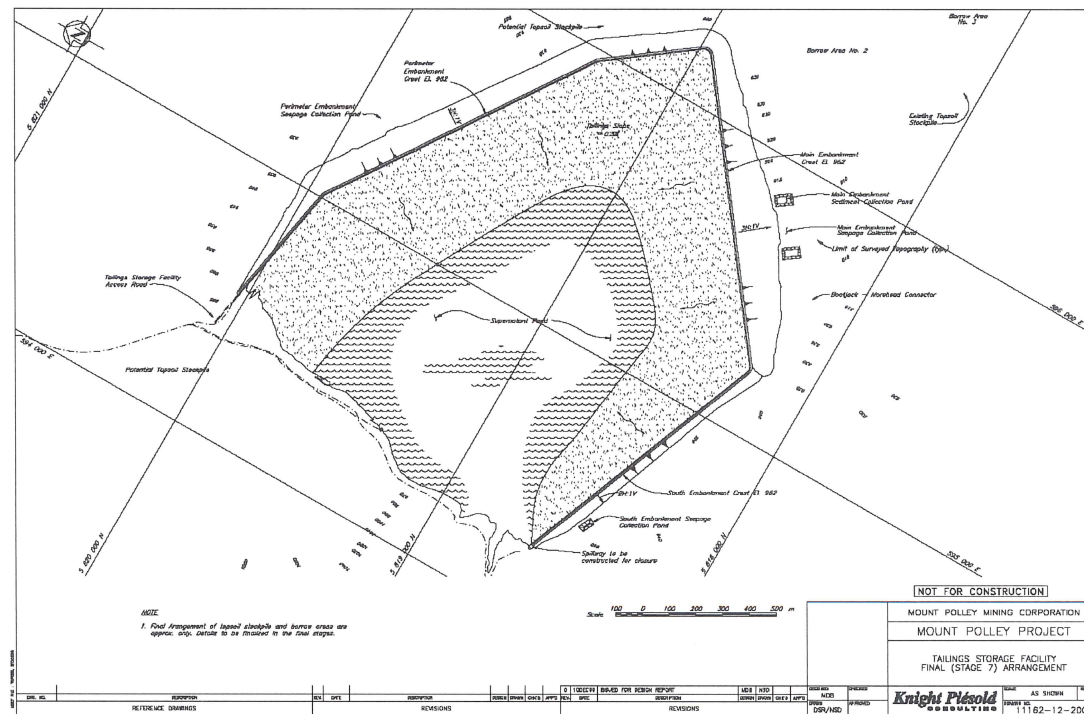
- Seepage from Main Embankment Seepage Recycle Pond pumped into tailings pond
- Tailings supernatant pond volume increases over life of mine
- Freeboard maintained for containment of PMP runoff plus 1m for wave run-up



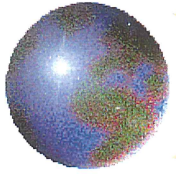
# TSF – Ultimate Design

## Proposed Closure Plan

- From Report on Cycloned sand Construction of Stage 3 and On-going Stages of The Tailings Storage Facility, 1999







# *TSF – Ultimate Design*

## ✦ Proposed Schedule

- ✦ Design Report by March 1, 2005
- ✦ Agency review and approval by May 1, 2005
- ✦ Stage 4 construction commences May 1, 2005