2007 Annual Reports

Hecla
GREENS CREEK

Tailings

July 8, 2008

Presentation Outline

- Placement data
- Stability
  - Compaction
  - Inspections
- Water level data
- Precipitation and flow data
- Water quality at internal monitoring sites
- Snow sample results
- Sulfate Reduction Monitoring Program (SRMP) update
- ABA data
- General site management

Tailings Facility Sept. 2007

Table 2.1 Tailings Placement Data

	All Materials Annual	All Materials Cumulative	All Materials Annual	All Materials Cumulative	Prod Rock from Site 23	Other Materials	Tailings
	yd^3	yd^3	Tons	Tons	Tons	Tons	Tons
	Survey	*Survey*	*Calculated*	*Calculated*	*Truck Count*	*Truck Count*	*Calculated*
Totals 2006	**203,357**	**2,432,907**	**368,422**	**4,407,697**	**28,358**	**12,175**	**327,889**
Totals 2007	**215,575**	**2,648,482**	**390,557**	**4,798,255**	**39,425**	**16,285**	**334,847**
Tons calculated at 134.2 pounds per cubic foot for tailings.							
Remaining capacity 4,335,890 tons							

Tailings Facility Stability Compaction

Hecla MINING COMPANY

- High degree of achieving greater than 90% compaction
- Average dry density: 138 pcf
- Average Standard Proctor dry density: 140 pcf
- Average optimum percent moisture: 12.5%
- HGCMC on-site lab 1-point proctors
  - Average dry density: 146 pcf
  - Average percent moisture: 12.5%

Tailings Facility Stability - Inspections

- Results of operator, engineering, environmental department and regulatory inspections revealed no signs of instability
- No issues of non-compliance were noted in 32 USFS and 1 ADEC/ADNR regulatory inspections

Tailings Facility Monitoring Well and Piezometer Water Level Data

- Maximum saturated thickness 35 feet
- Toe foundations are well drained
- Water perches approximately 12 feet above the unsaturated underdrains

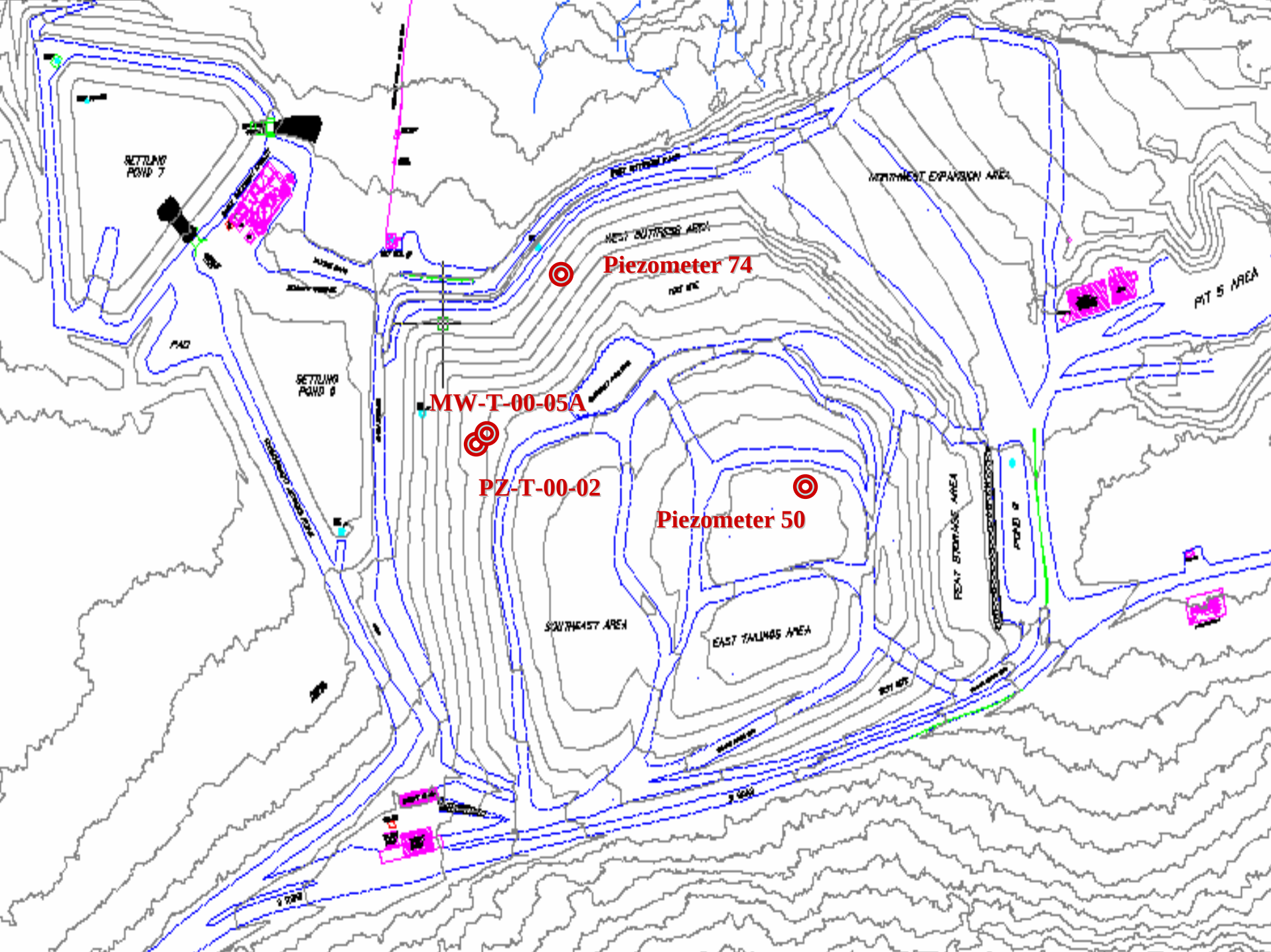
Piezometer 74
MW-T-00-05A
PZ-T-00-02
Piezometer 50
SETTLING POND 7
SETTLING POND 8
NORTHWEST EXPANSION AREA
PIT 5 AREA
SOUTHEAST AREA
EAST TAILINGS AREA
PEAT STORAGE AREA

Figure 2.6 Water Level Data for Piezometer 50

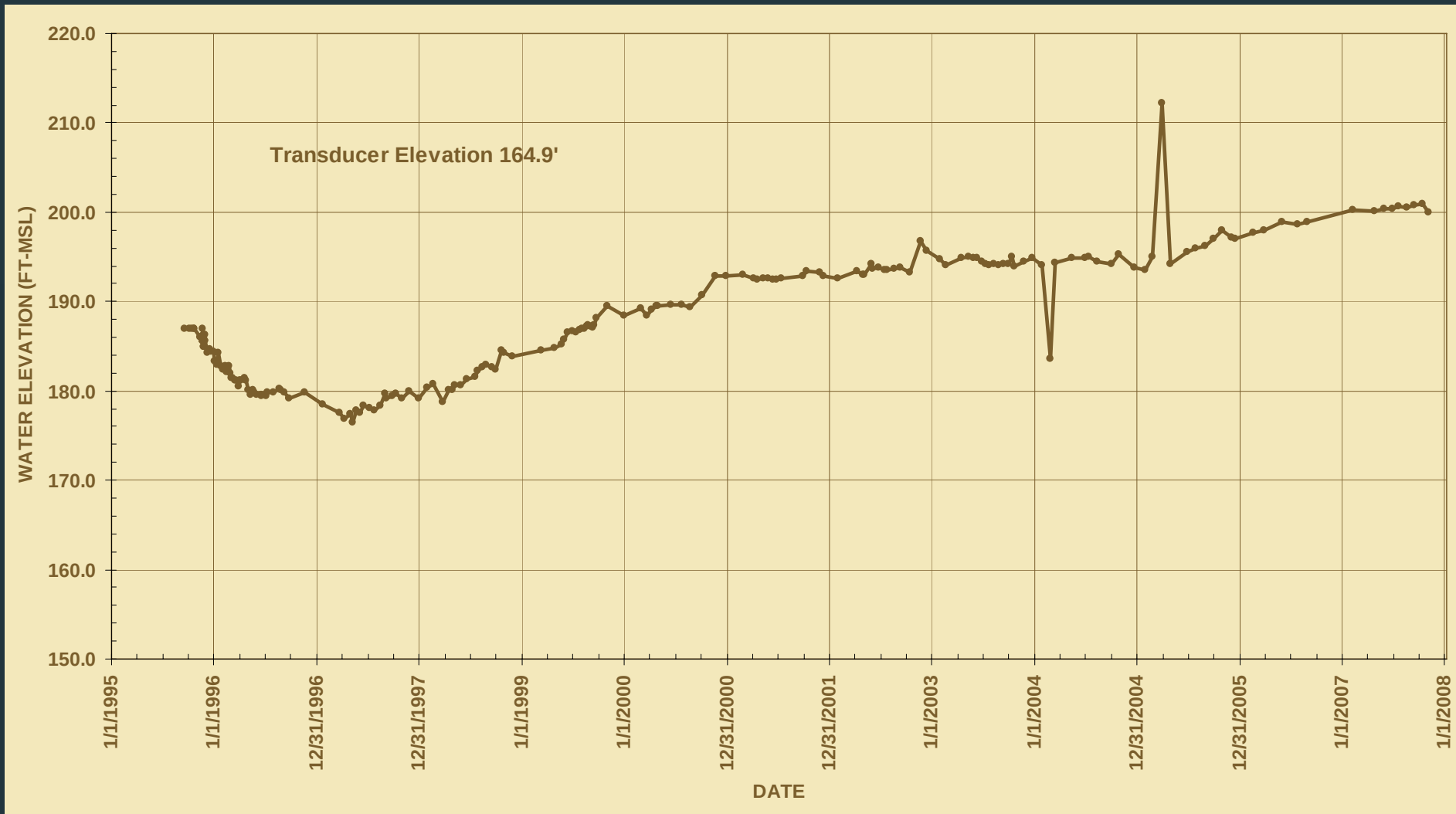

Figure 2.14 Water Level Data for Well MW-T-00-05A

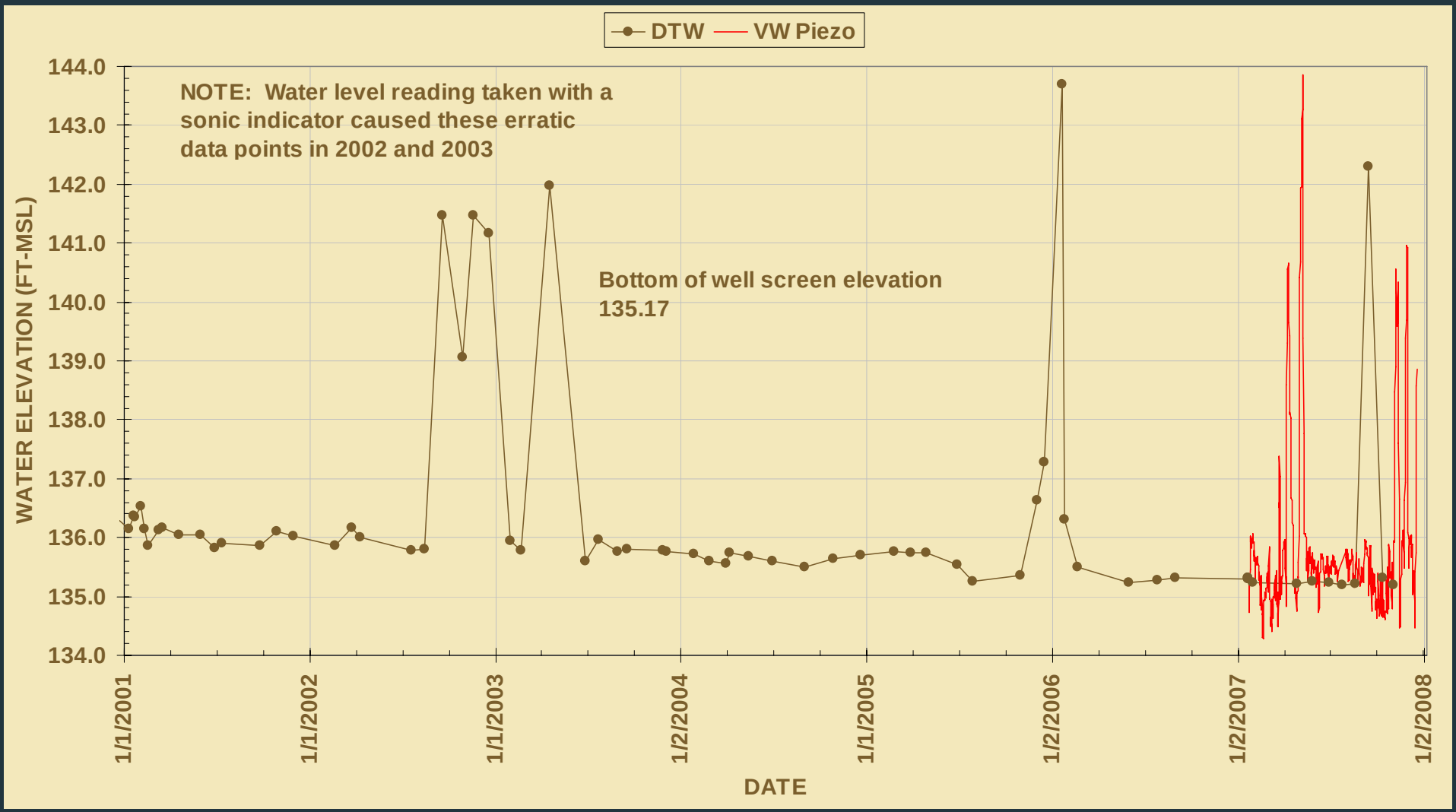

Figure 2.12 Water Level Data for Piezometer PZ-T-00-02

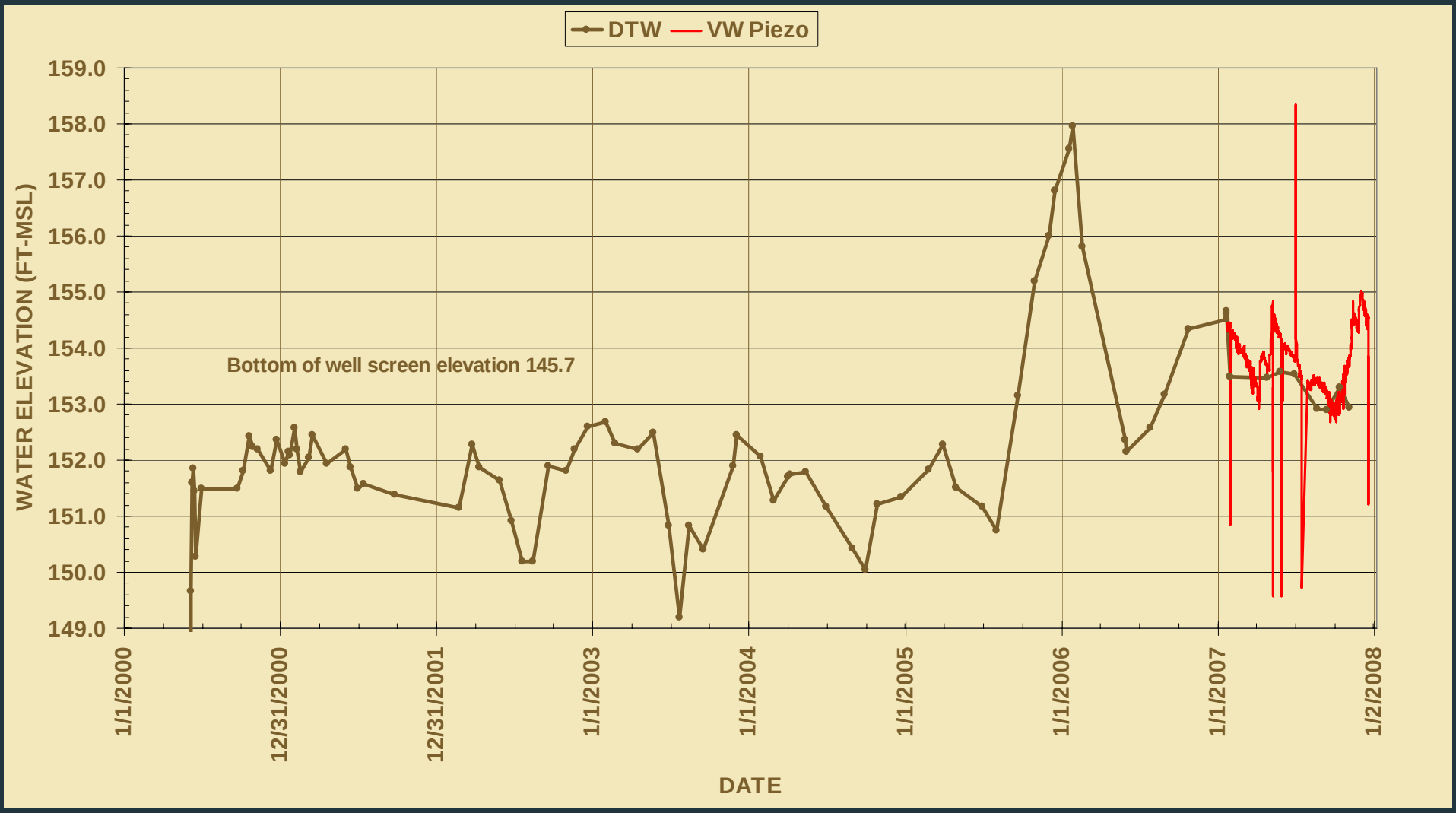

Figure 2.8 Water Level Data for Piezometer 74

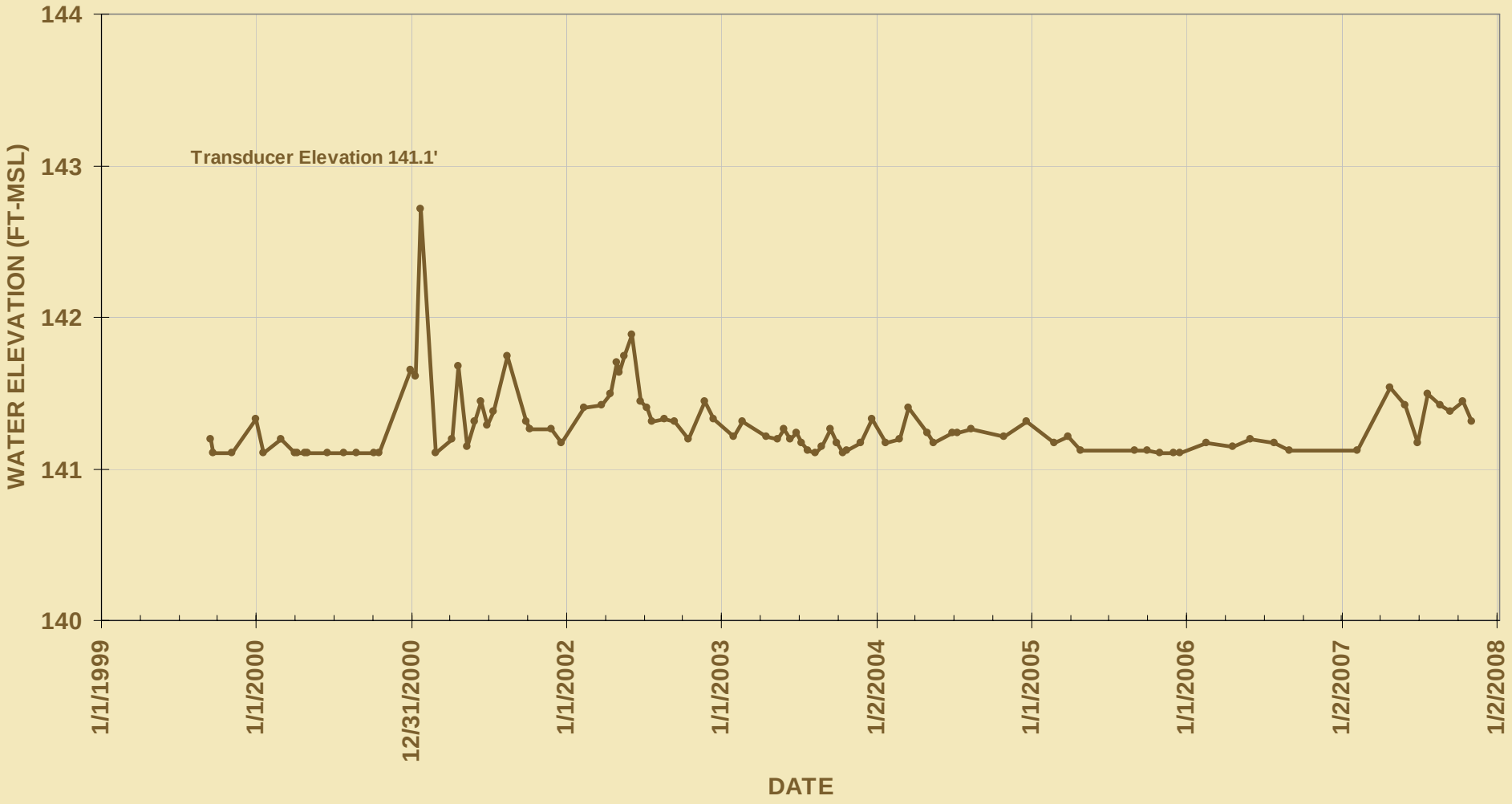

Table 2.4 Monthly Summary of Tailings Area Climate Data

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Month	Avg. Temp (°C)	Precipitation (inches)
January	-2.04	6.15
February	-4.32	2.74
March	-3.23	11.73
April	2.19	8.24
May	6.01	3.33
June	10.43	2.64
July	12.26	6.58
August	12.68	2.65
September	8.69	9.42
October	3.67	11.76
November	0.43	3.31
December	-3.45	4.3
2007	3.61	72.85

Tailings Facility Internal Monitoring Sites: Water Quality Data

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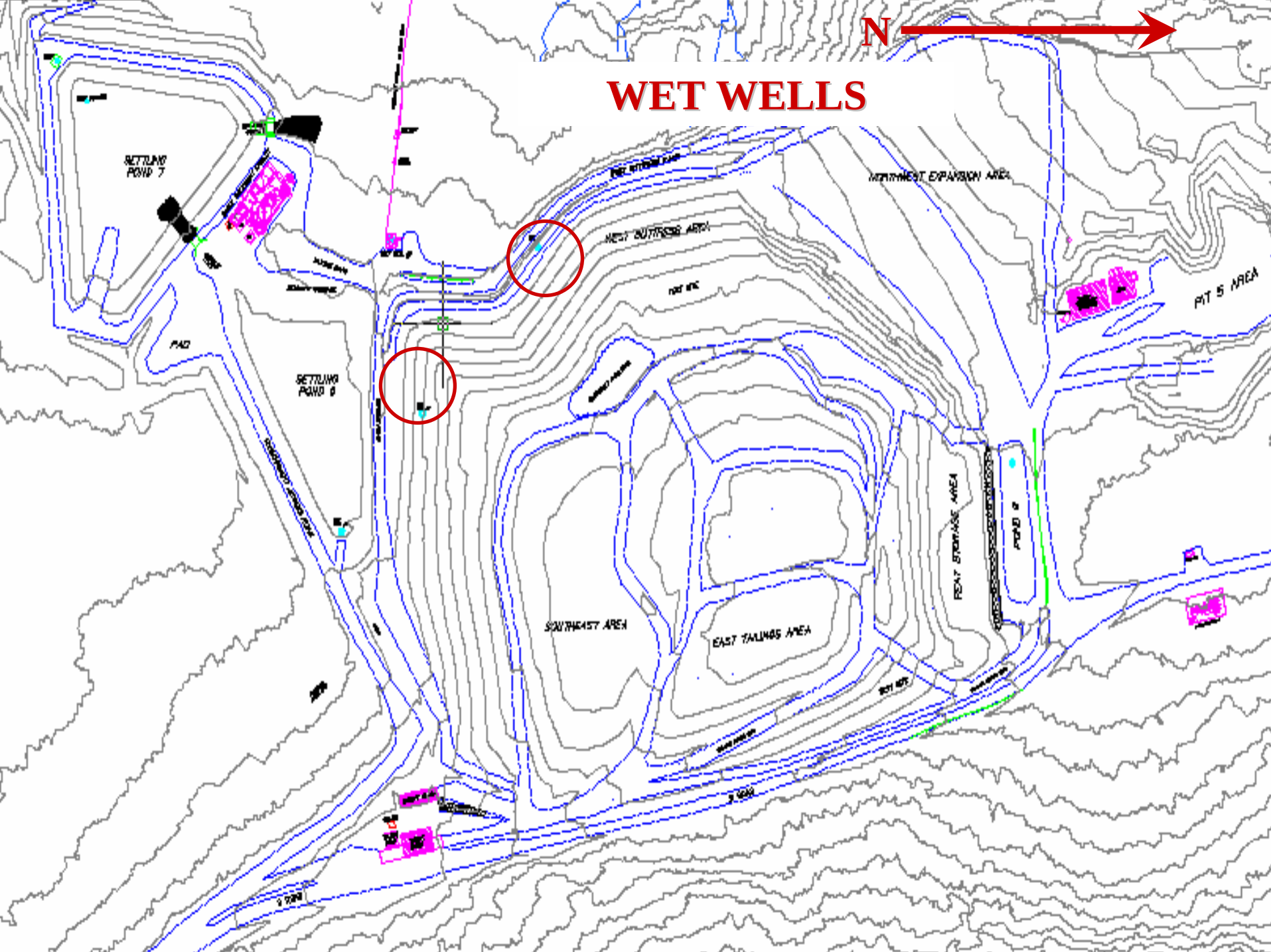
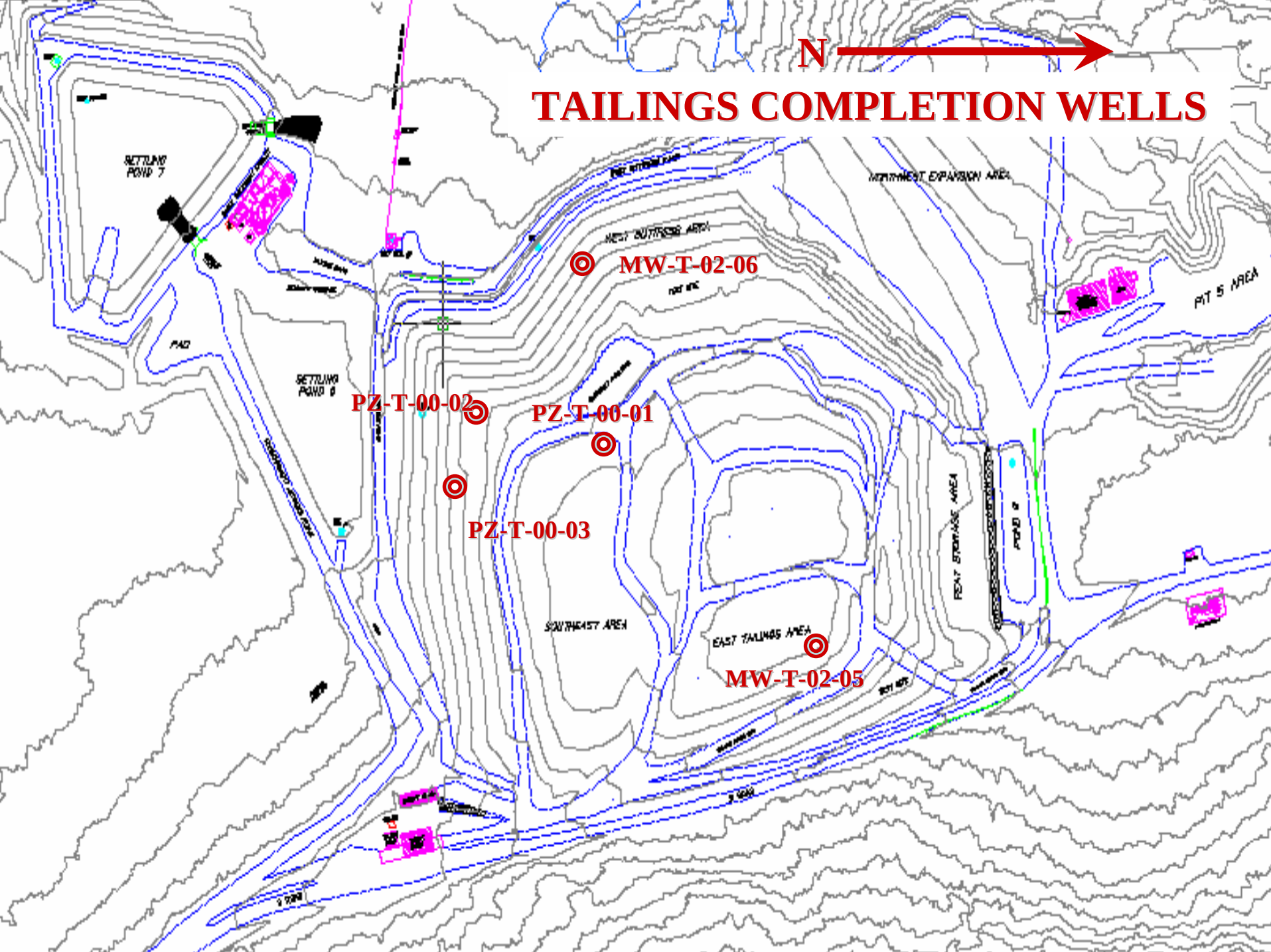
- Internal site waters captured, treated and discharged per NPDES permit
- pH between 6.0 and 8.5: Alkalinity 250 to 600 mg/L
- Conductivity in wet wells and tailings completion wells ranged from 1446 to 3710 umho/cm
- Conductivity in suction lysimeters ranged from 1398 to 6610 umho/cm
- Sulfate and hardness correlate with conductivity


N
WET WELLS
SETTLING POND 7
SETTLING POND 8
PAD
WEST OUTSIDE AREA
NORTHWEST EXPANSION AREA
PIT 5 AREA
PEAT STORAGE AREA
POND 9
SOUTHEAST AREA
EAST TAILINGS AREA


N
TAILINGS COMPLETION WELLS
MW-T-02-06
PZ-T-00-02
PZ-T-00-01
PZ-T-00-03
MW-T-02-05
SETTLING POND 7
SETTLING POND 8
PAD
NORTHWEST EXPANSION AREA
PIT 5 AREA
SOUTHEAST AREA
EAST TAILINGS AREA
PEAT STORAGE AREA

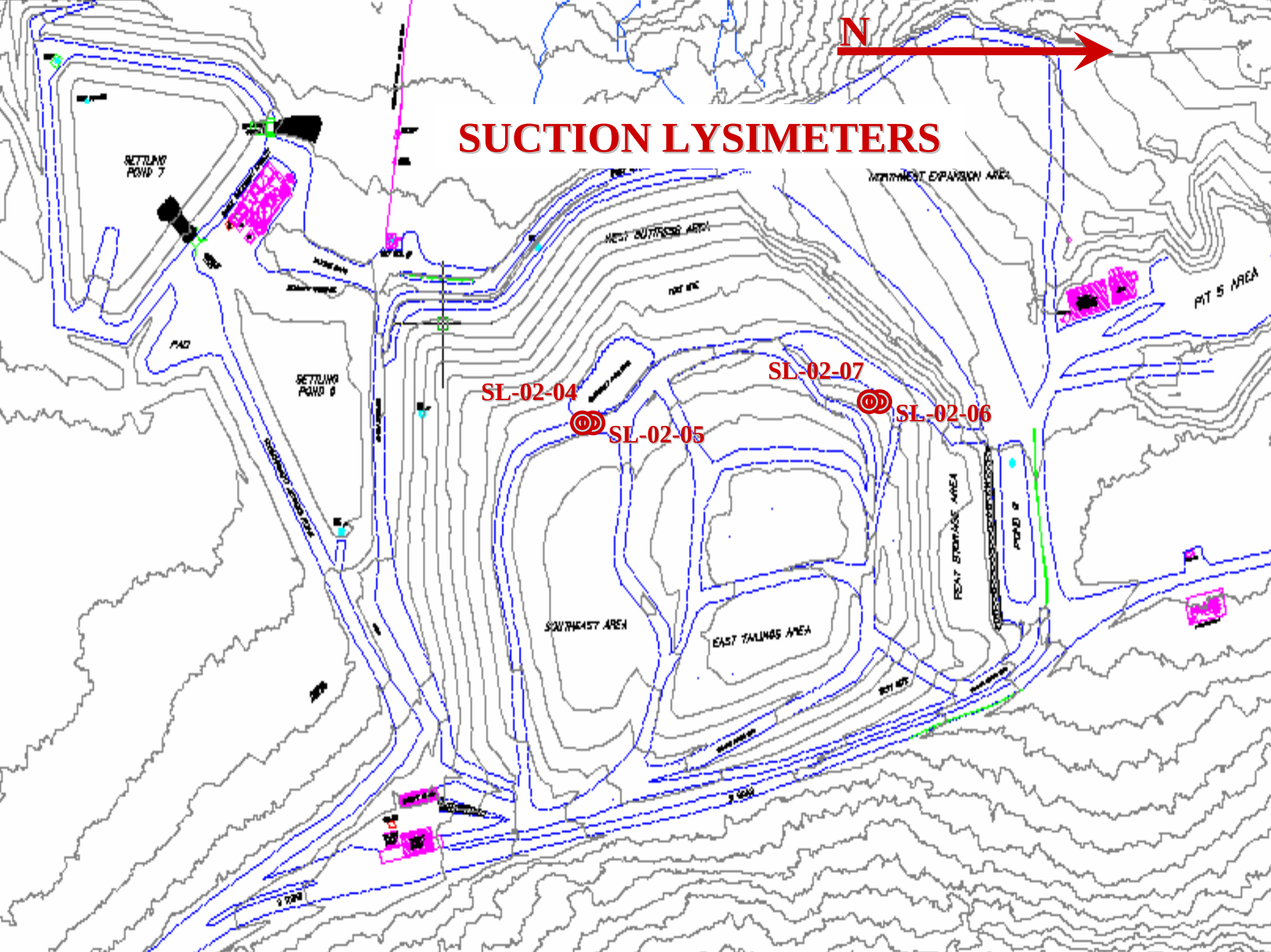

N
SUCTION LYSIMETERS
SETTLING POND 7
SETTLING POND 8
NORTHWEST EXPANSION AREA
WEST OUTSIDE AREA
PIT 5 AREA
PEAT STORAGE AREA
SOUTHEAST AREA
EAST TAILINGS AREA
SL-02-04
SL-02-05
SL-02-06
SL-02-07

Figure 2.20a Tailings Area Internal Sites - pH

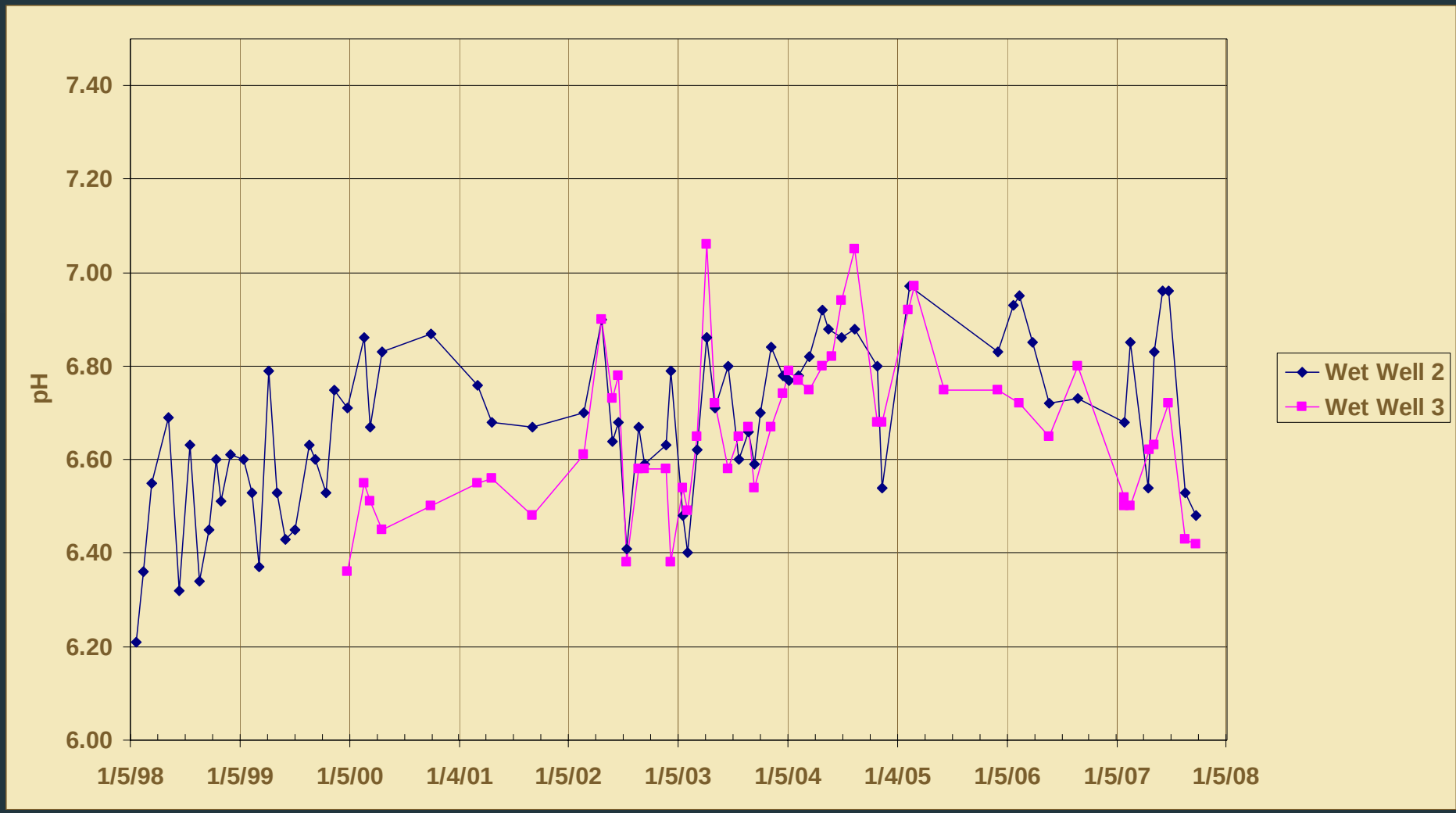


Figure 2.21a Tailings Area Internal Sites - Alkalinity

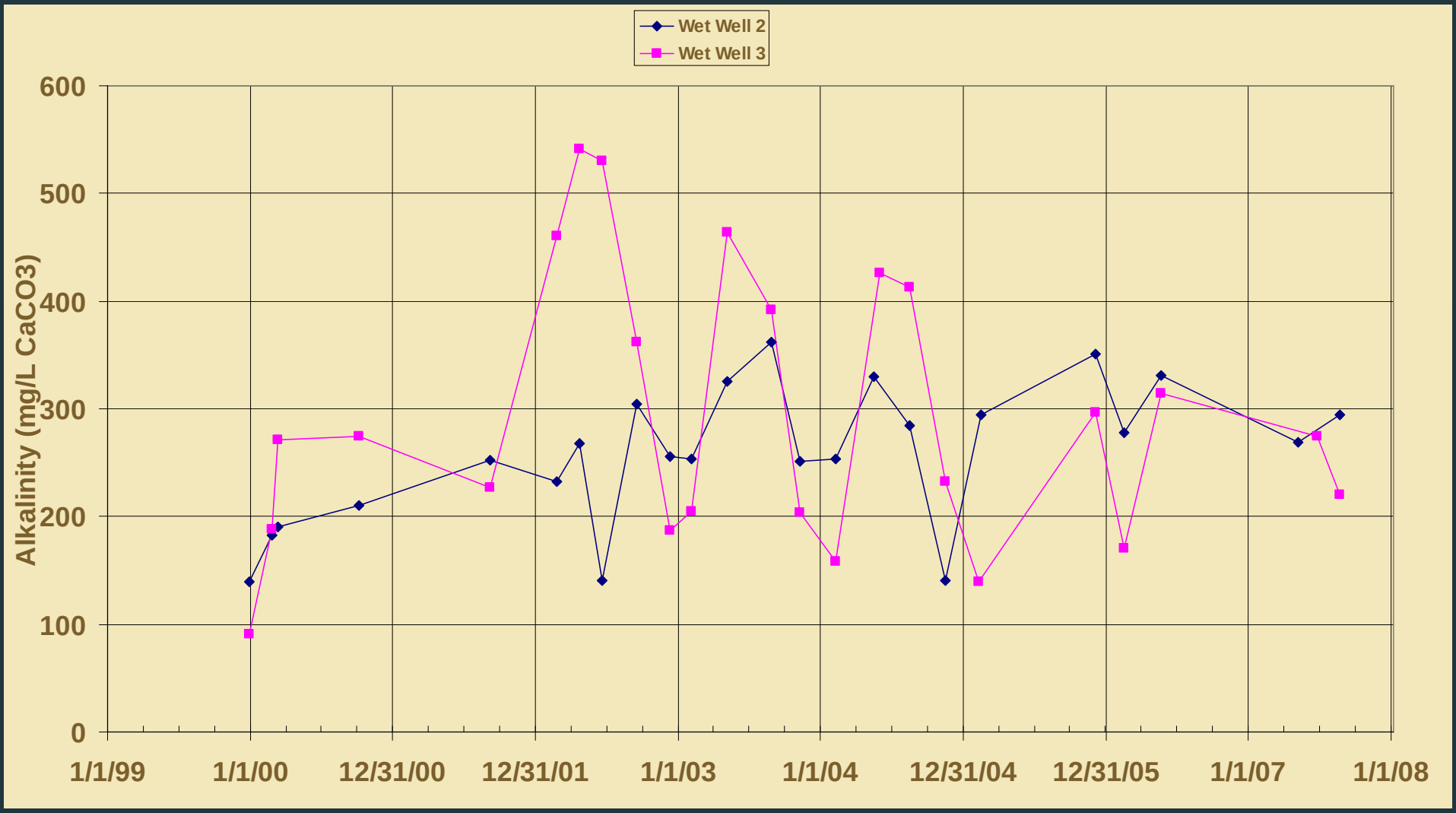


Figure 2.22a Tailings Area Internal Sites - Conductivity

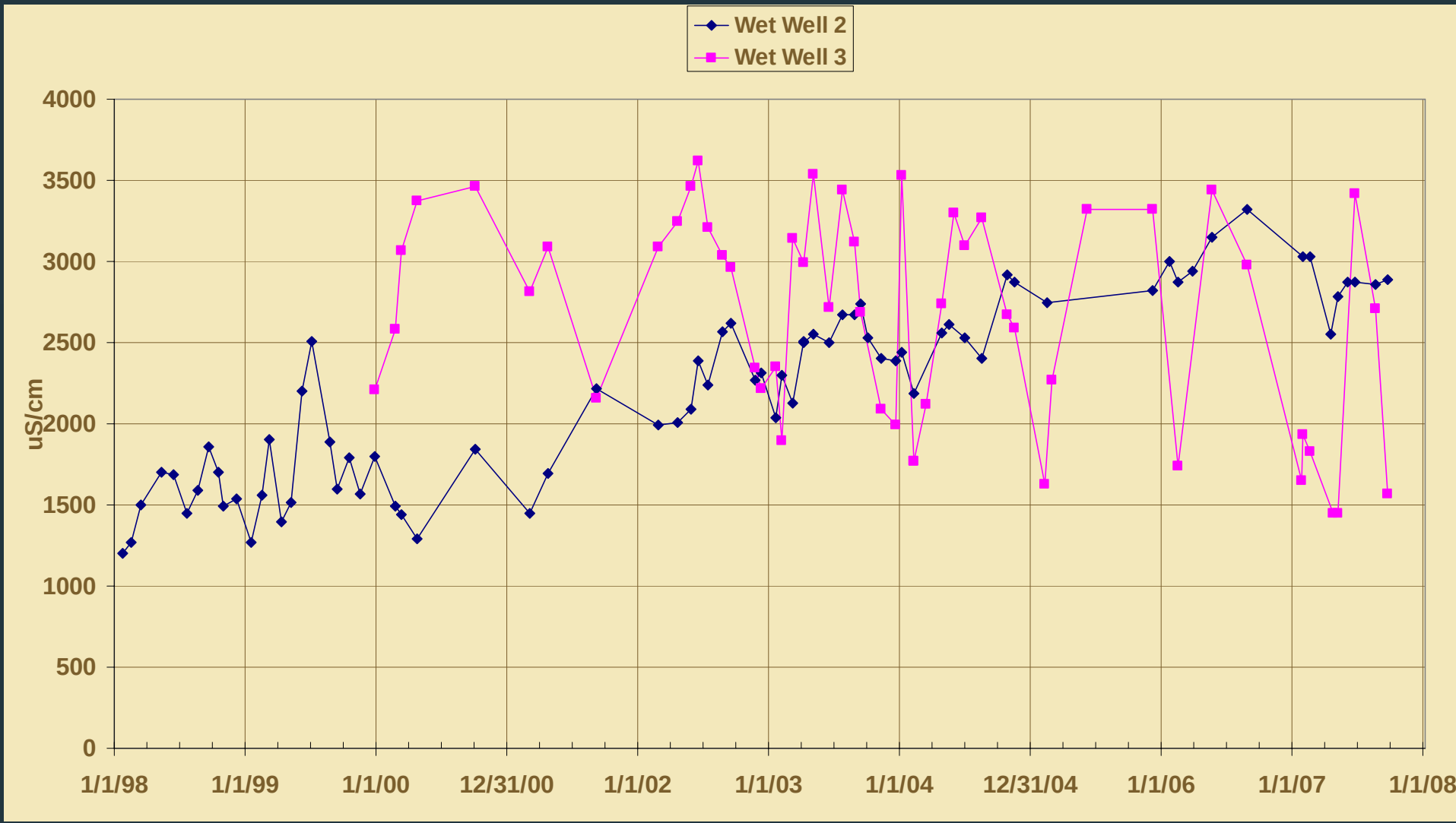


Figure 2.22b Tailings Area Internal Sites - Conductivity

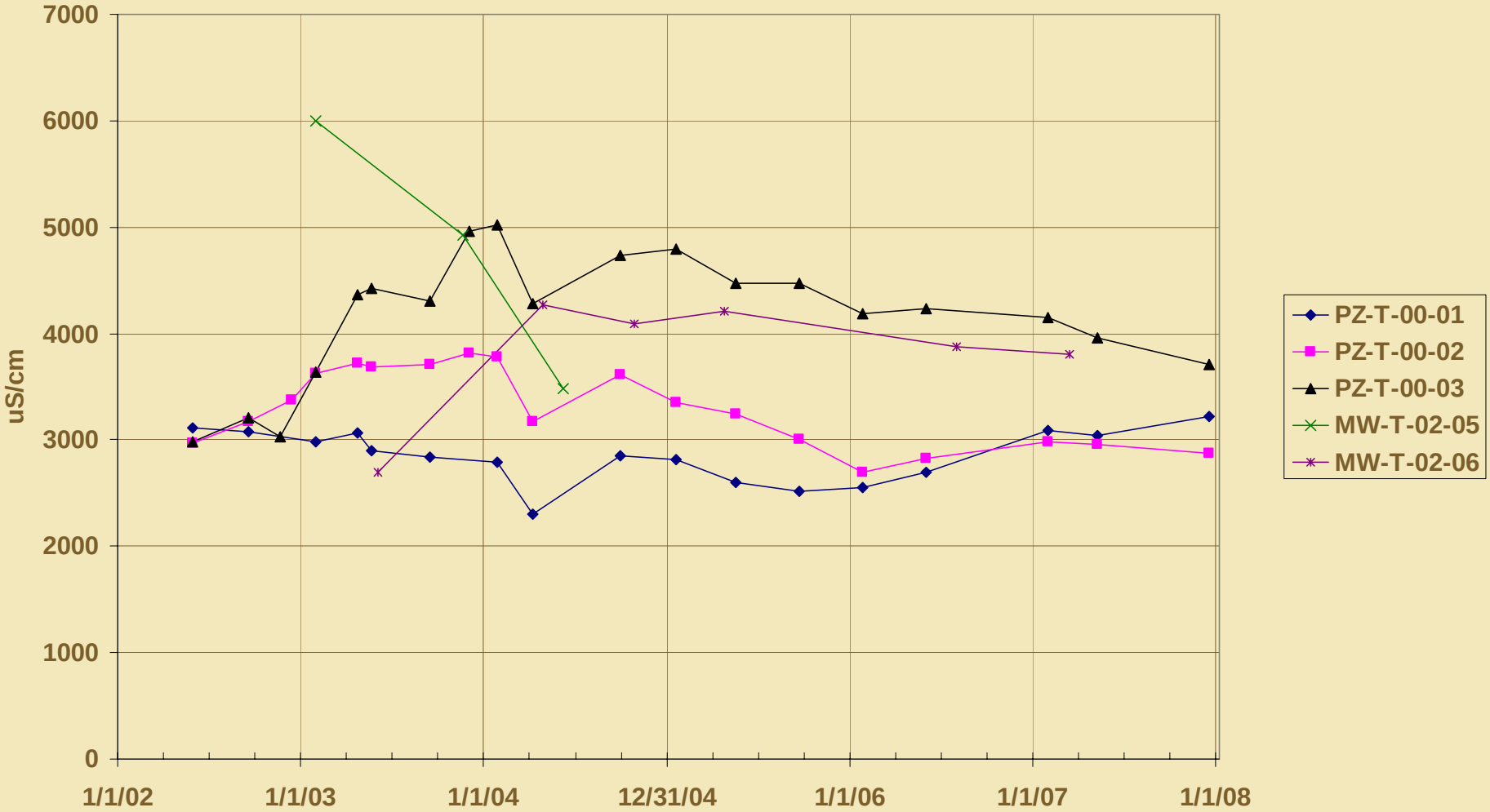
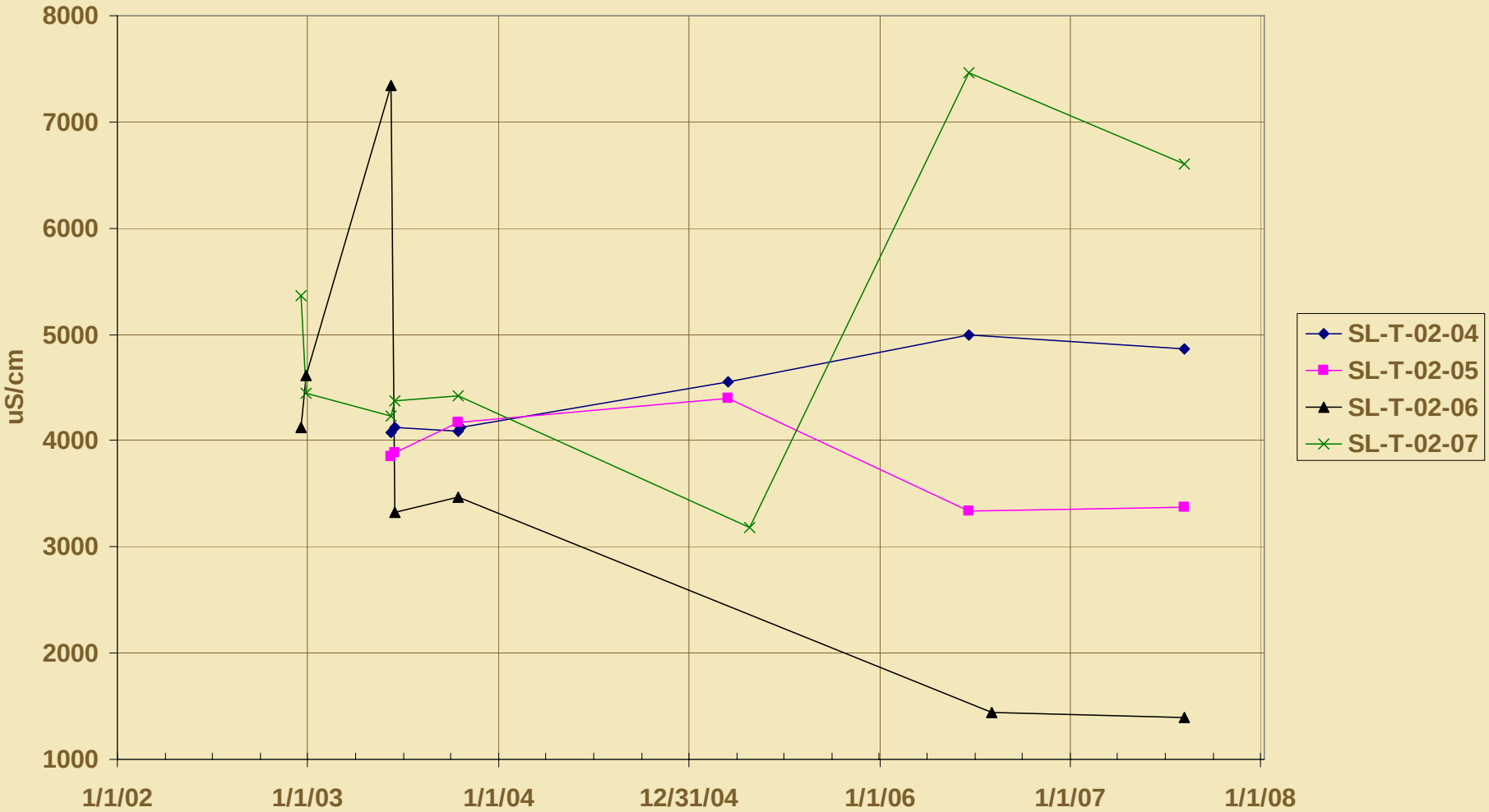


Figure 2.22c Tailings Area Internal Sites - Conductivity



Tailings Facility Internal Monitoring Sites: Water Quality Data

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- Fluctuations in saturated zone thickness and associated redox conditions influence arsenic and iron concentrations
- Zinc is considerably more mobile than other metals
- Microbial sulfate reduction and base metal sulfide precipitation produces low metal concentrations in most saturated zone wells
- Shallow unsaturated zone and WW3 have higher metal concentrations
- Iron and manganese concentrations are elevated in wet wells, groundwater, and most of the suction lysimeters due to oxidation/reduction and buffering reactions

Figure 2.26a Tailings Area Internal Sites - Zinc

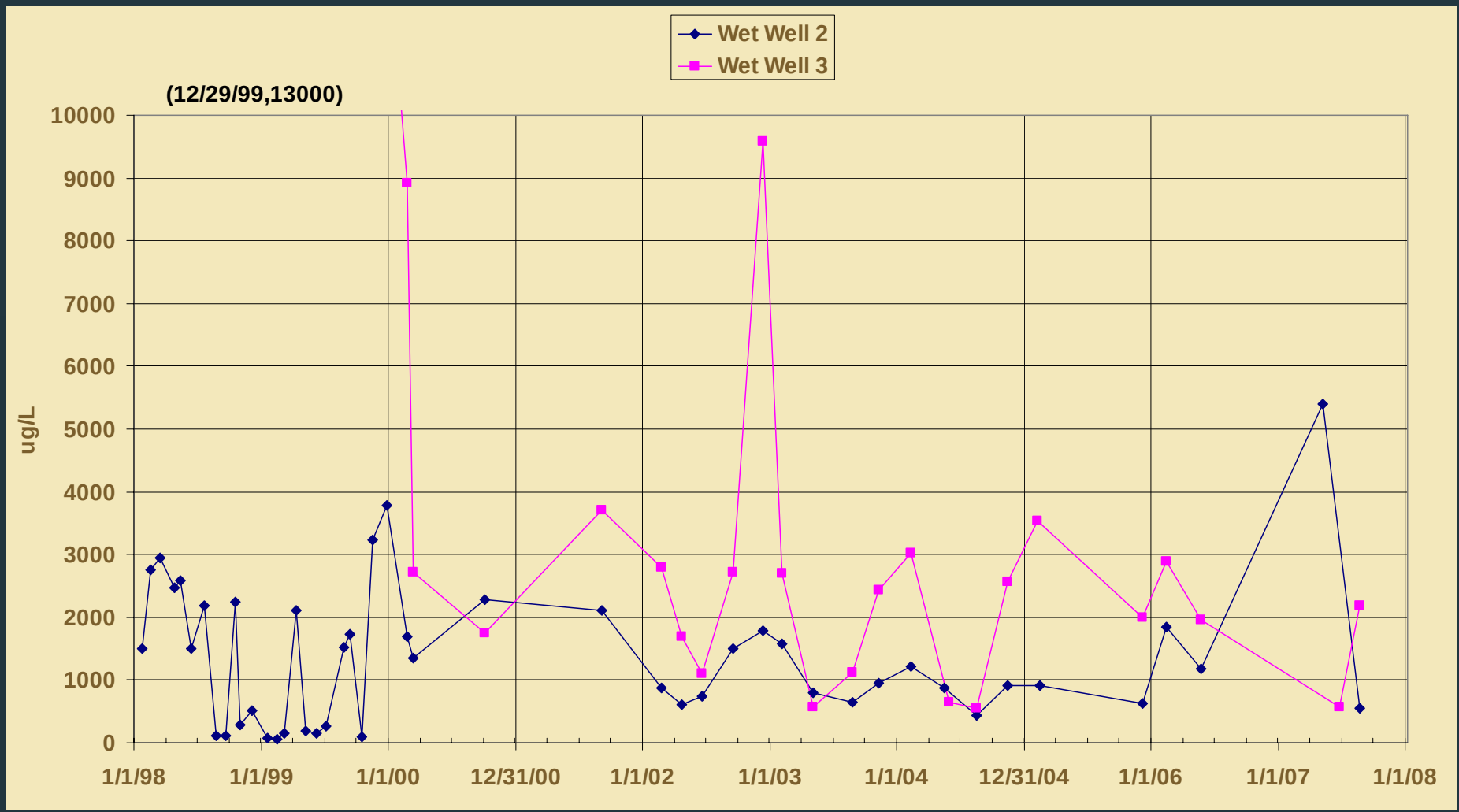


Figure 2.26b Tailings Area Internal Sites - Zinc

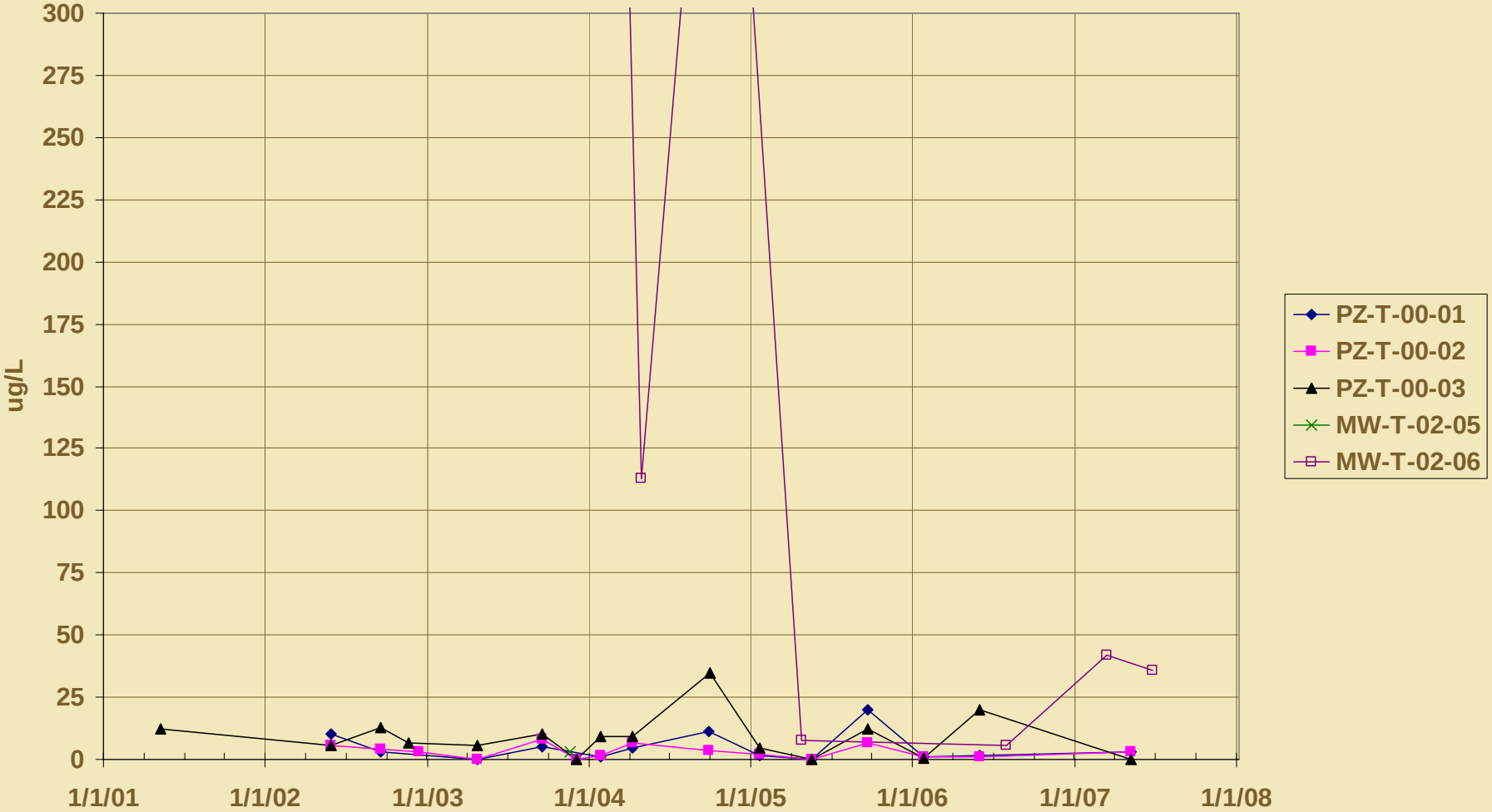
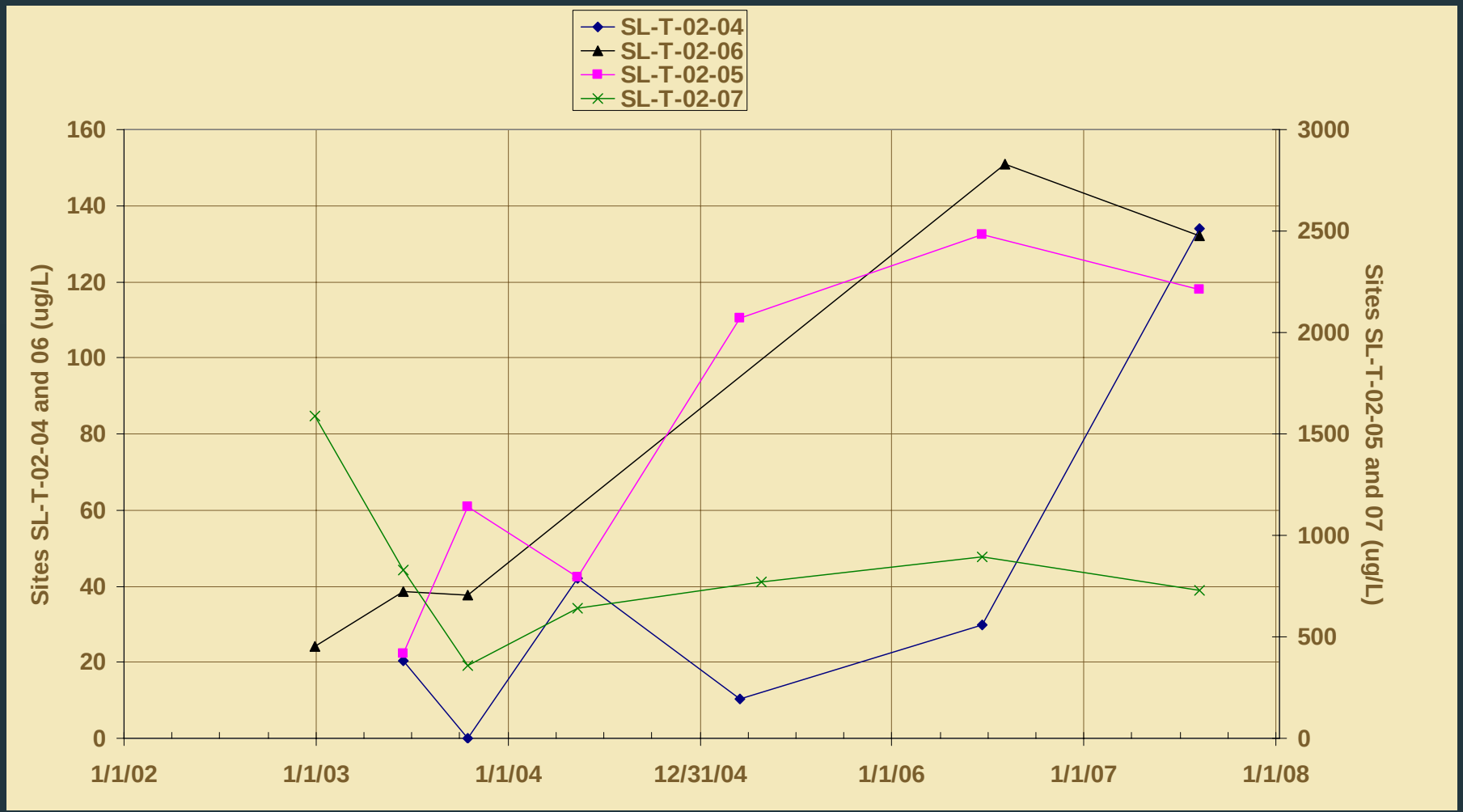


Figure 2.26c Tailings Area Internal Sites - Zinc



Tailings Facility Additional Monitoring

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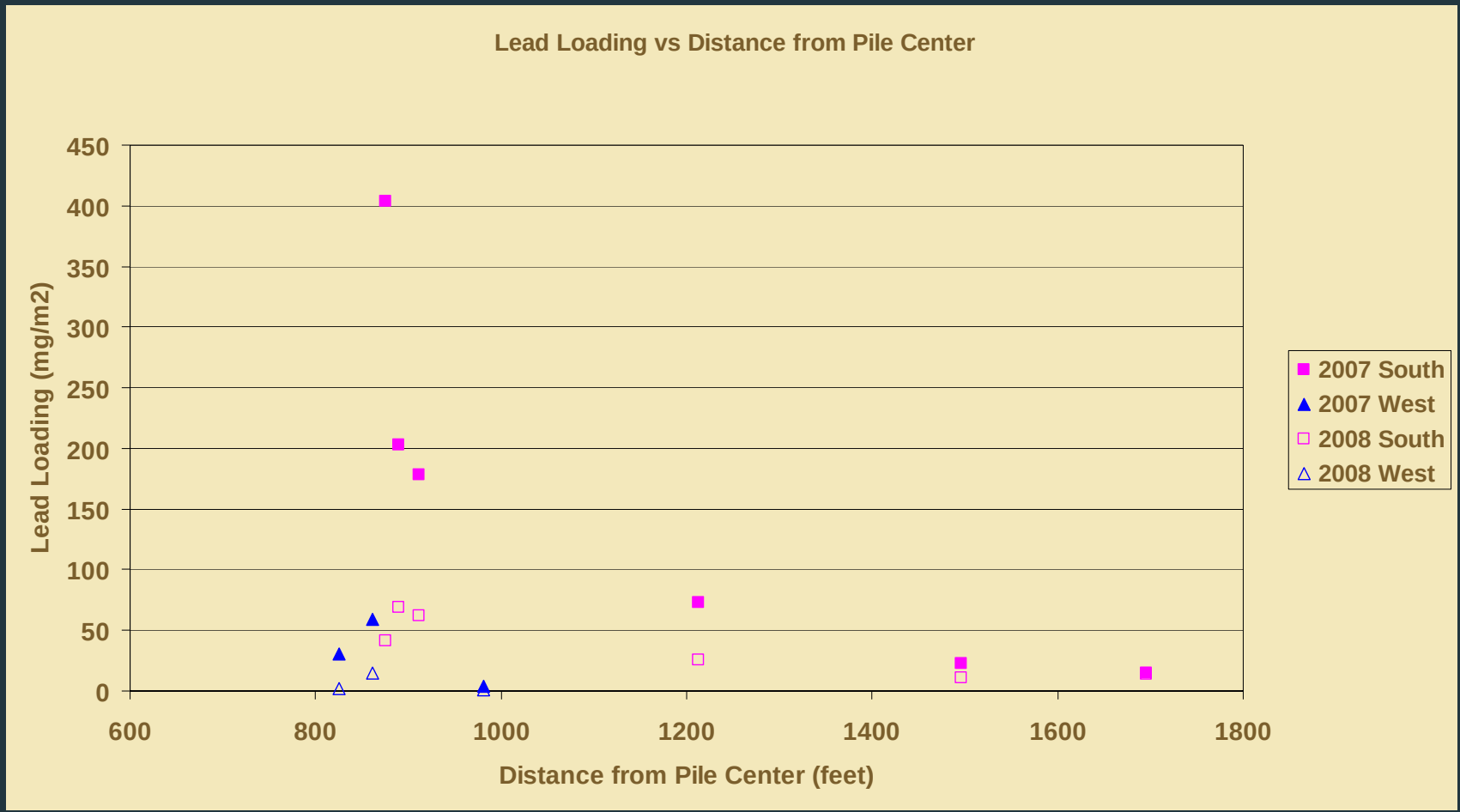
- Perimeter wells exhibit chemistry comparable to background waters
- Pyritic rock used locally for access roads produced acidic drainage in two areas (The pyritic rock was removed from both locations)
  - Water quality shows improvement in response to remediation efforts
- Residual sulfate and metal concentrations are very low relative to contact waters but higher than background levels in localized areas
- Continued monitoring will determine the effects of other efforts to minimize loading (e.g. lined bedrock areas, improved truck wash, covering exposed slopes with rock and ditch sediments)

Tails Snow Dust Sampling

- Mitigation
  - Snow Fences
  - Eco Blocks
  - Snow removal only in active placement area
- Lead levels in water do not directly correlate to lead loading values
- Observable up to approximately 1700 feet away

Figure 2.35 Snow Survey Analysis



Sulfate Reduction Monitoring Program (SRMP) Update

Hecla MINING COMPANY

- Tailings Expansion EIS ROD required 30 month study to determine if long term sulfate reduction is achievable and will meet closure needs; evaluate existing and additional carbon sources and application methods
- SRMP objectives and action plan developed and implemented: Project team includes GCMC, University of Waterloo, Environmental Design Engineering, Whitlock and Associates
- Seven field test plots (5 carbon amendments; 2 controls) constructed and instrumented (suction lysimeters, tensiometers, moisture access probes)

Sulfate Reduction Monitoring Program

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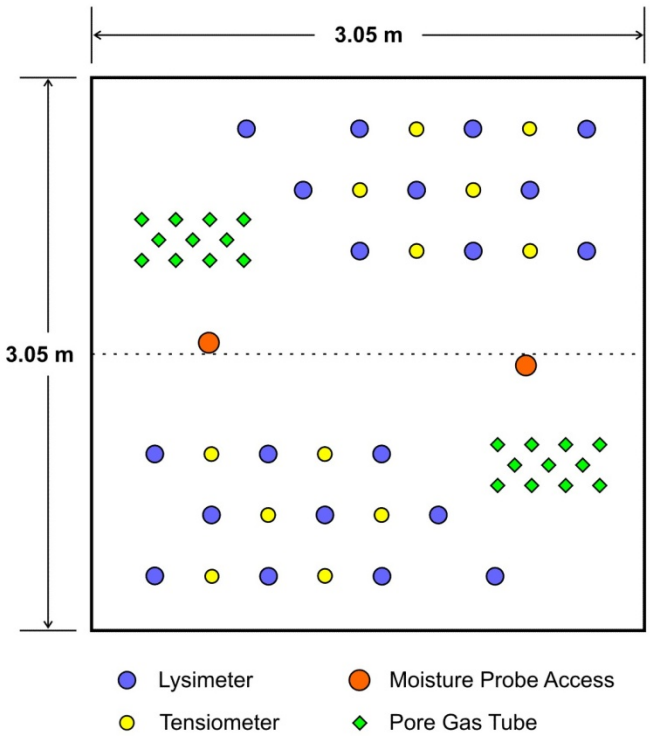
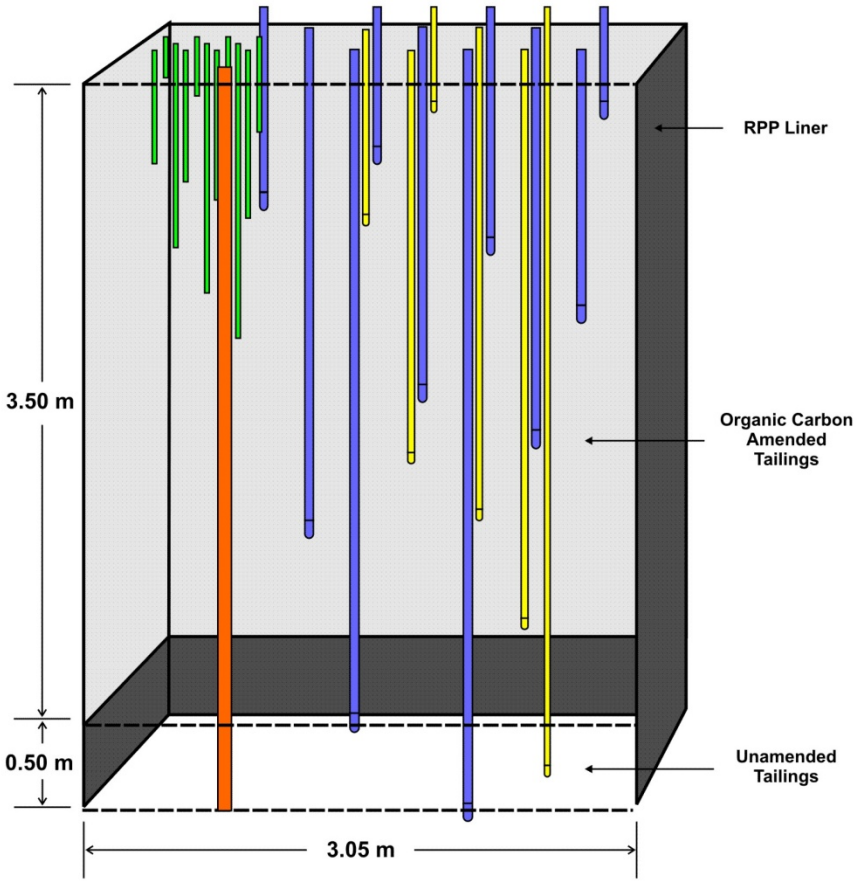
Field Test Cell Amendment Mixtures

	Tailings (vol %)	Peat (vol %)	Brewery Waste (vol %)	Sewage Sludge (vol %)	
Cell 1	100	0	0	0	Unexcavated
Cell 2	100	0	0	0	Excavated
Cell 3	95	5	0	0	Amended
Cell 4	95	2.5	2.5	0	Amended
Cell 5	95	2.5	0	2.5	Amended
Cell 6	95	2.5	1.25	1.25	Amended
Cell 7	90	5	2.5	2.5	Amended

Sulfate Reduction Monitoring Program





Sulfate Reduction Monitoring Program (SRMP) Update

Hecla MINING COMPANY

- Initial Conditions (November 2004)

  -Pore water chemistry

  - ➢Near neutral pH (average 8.17)
  - ➢Elevated dissolved SO_4 (211-2980 mg/L)
  - ➢Thiosulfate (381-3510 mg/L)
  - ➢Trace metals (Al, Ag, Cd, Cu, Mn, Mo, Ni, Pb, Se, Sb, Tl, V, Zn)

  -Microbial enumeration of core samples

  - ➢Presence of sulfate and iron reducing bacteria
  - ➢Presence of sulfur oxidizing bacteria

Sulfate Reduction Monitoring Program (SRMP) Update

Hecla MINING COMPANY

- Suction Lysimeter Sampling Results (October 2005)
  - Conditions favorable to sulfate reduction have developed in some carbon amended test cells
    - Populations of sulfate reducing bacteria have increased significantly – oxygen deficient conditions
    - Increases in dissolved Mn, Fe and ammonia suggest reduction reactions are occurring
    - Concentrations of dissolved Ag, Cd, Cu, Sb, Se, Pb and Tl generally decreased from November 2004 – 2005
    - Concentrations of As, Ni and Zn increased
    - Pore-water concentrations of SO_4 and thiosulfate decreased in some cells; however, additional investigation is required to determine controlling mechanisms

Sulfate Reduction Monitoring Program (SRMP) Update

Hecla MINING COMPANY

- Performance report distributed Oct. 2007
  - Microbially mediated sulfate reduction in cells 4-7
    - Lower sulfate: higher alkalinity, depletion of 13C in dissolved inorganic carbon, and enrichments of 34S in pore water sulfate
  - No evidence of reduction in control cells or peat-amended cell
  - Precipitation of metal sulfides also contributing
  - Increase in iron reducers
  - Pile characterization
  - Hydrology of pore water transport

- Future work planned
  - Laboratory test program and potential geotechnical study in 2008
  - Scheduled completion extended to 2008
  - Additional performance sampling beyond 2008

Tailings Facility Acid Base Accounting Analyses

Hecla MINING COMPANY

- Tailings have the potential to generate acidic drainage if the buffering capacity of the tailings is consumed
- High carbonate content supports a long lag time for depletion of buffering capacity
- Long lag time (decades) allows time for construction and closure of the facility, including construction of an oxygen-inhibiting composite soil cover

Figure 2.32 Monthly Tailings Acid Base Accounting Data

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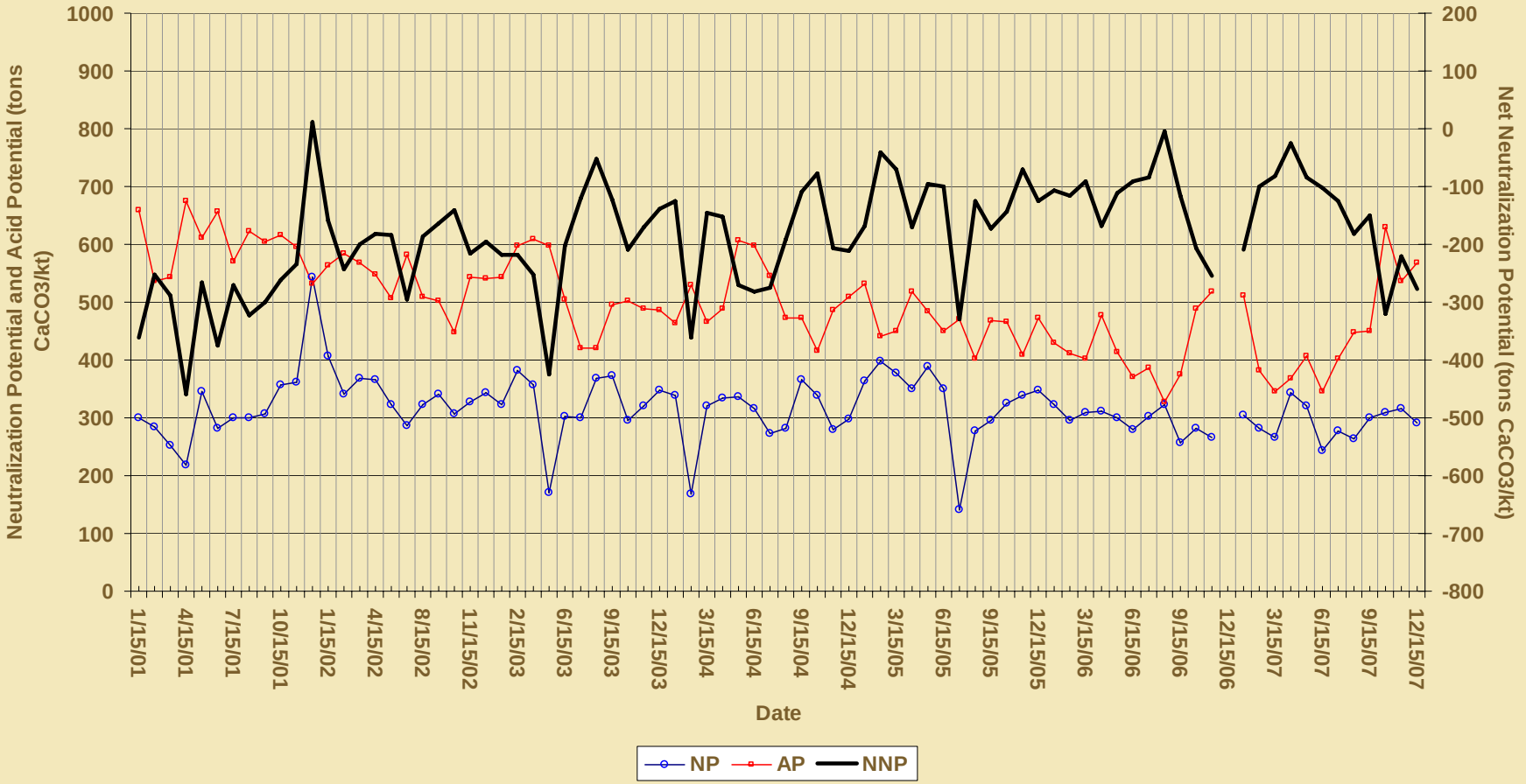
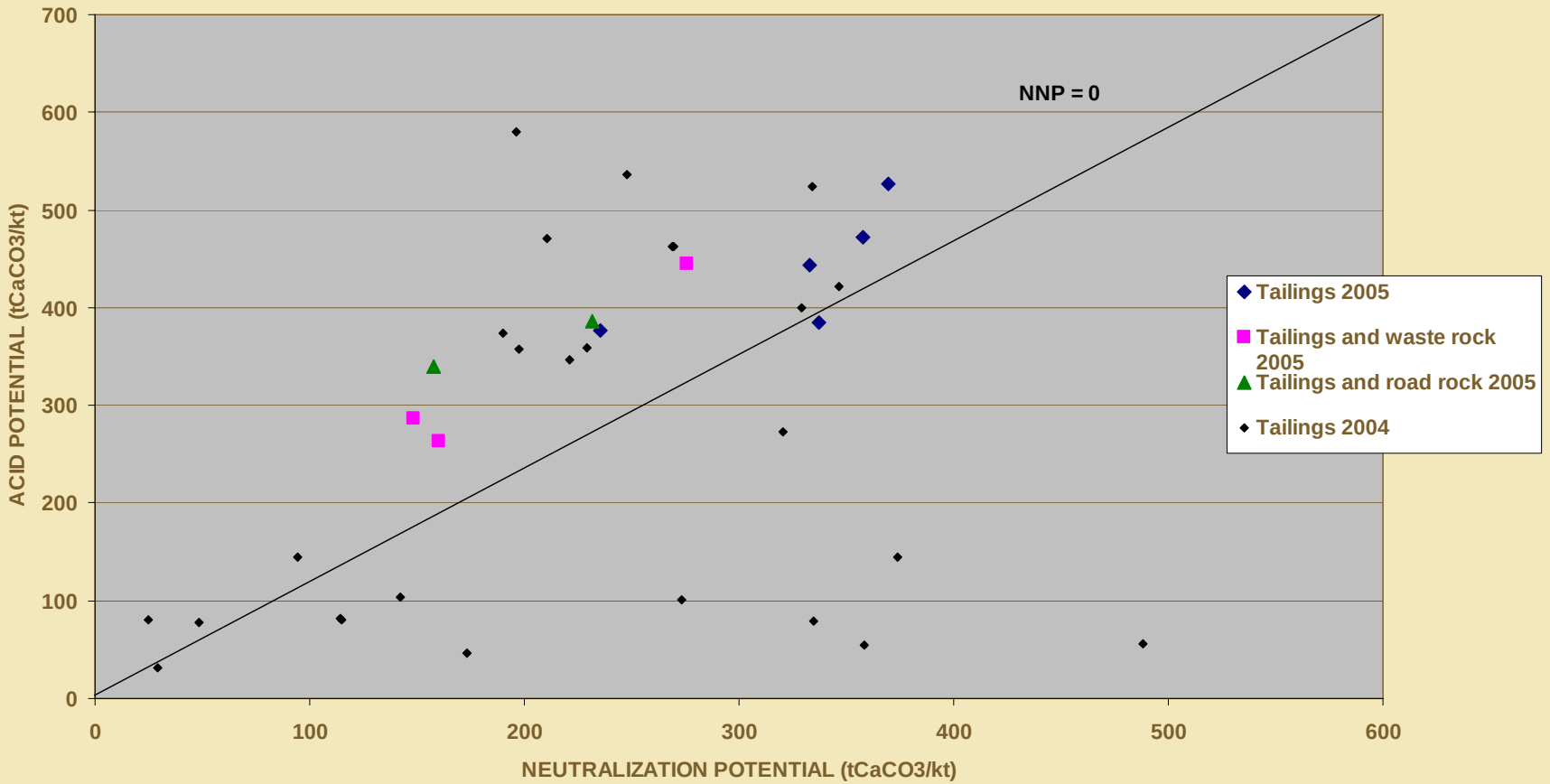


Figure 2.33 Tailings Facility AP vs NP (tCaCO3/kt)



Tailings Facility General Site Management

- Operations per GPO Appendix 3 and Waste Disposal Permit
- Main placement areas were East and Southeast areas
  - –Began placing in Northwest expansion area
- Tailings facility expansion project accomplishments in 2007
  - –Pond 9 constructed and commissioned
  - –Northwest tailings area excavation continued
  - –127,000 cy of material relocated to SE II and top of Tailings pile from northwest corner

Tailings Facility General Site Management

- Tailings and production rock co-disposal geotechnical studies complete
- Tailings and production rock co-disposal geochemical studies
  - Field weathering columns constructed
  - Sampling of columns in 2007

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