

Kennecott South Facilities Groundwater Remediation

ANNUAL PROGRESS REPORT 2005

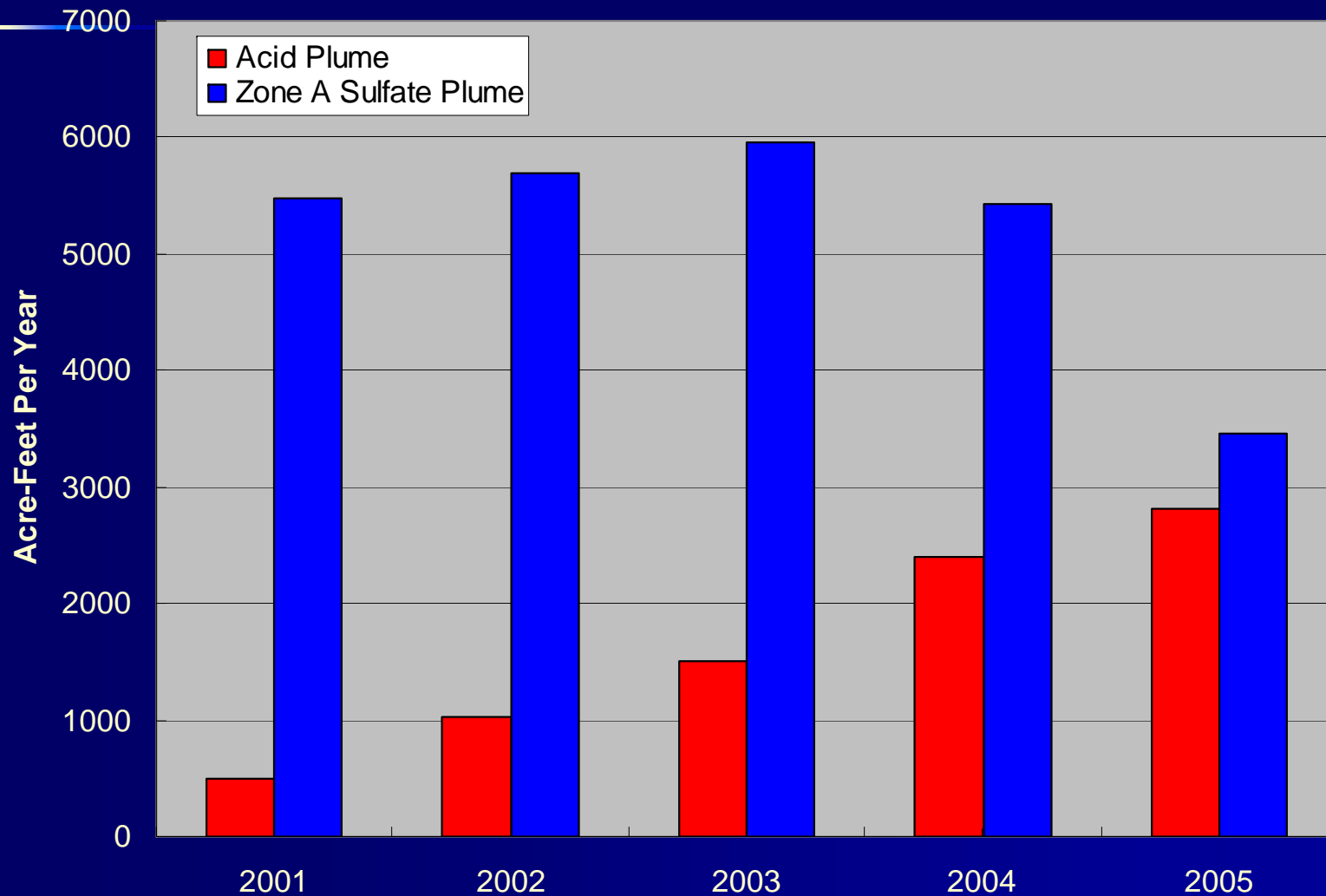
Kelly Payne, Kennecott Utah Copper
August 2, 2006

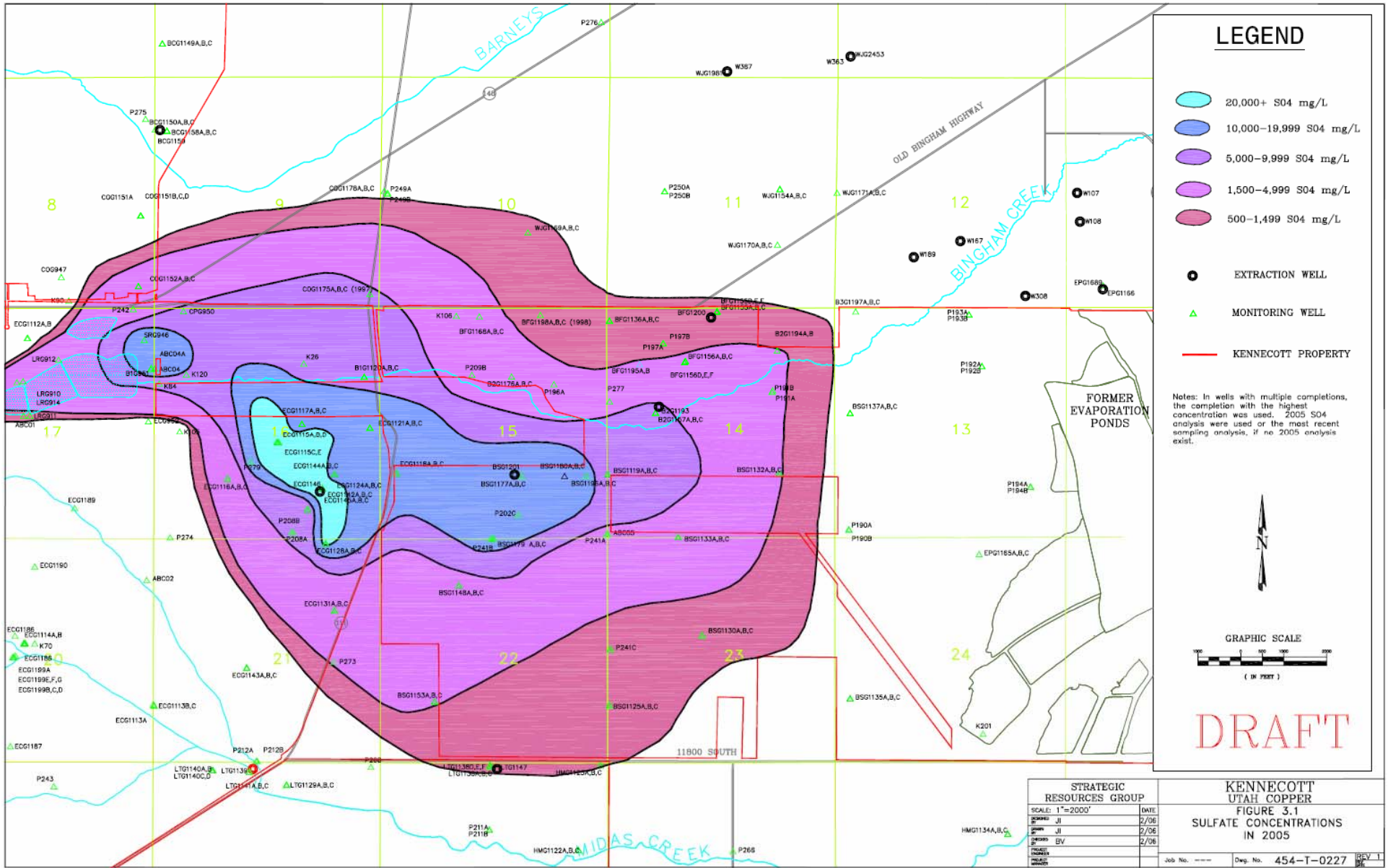
Tonight's Discussion

- Zone A Water Quality Monitoring
 - Sulfate
 - Aluminum
- Water Level Monitoring
- Subsidence Monitoring



Annual Groundwater Extraction

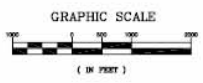




LEGEND

- 20,000+ S04 mg/L
- 10,000-19,999 S04 mg/L
- 5,000-9,999 S04 mg/L
- 1,500-4,999 S04 mg/L
- 500-1,499 S04 mg/L
- EXTRACTION WELL
- MONITORING WELL
- KENNECOTT PROPERTY

Notes: In wells with multiple completions, the completion with the highest concentration was used. 2005 S04 analysis were used or the most recent sampling analysis, if no 2005 analysis exist.



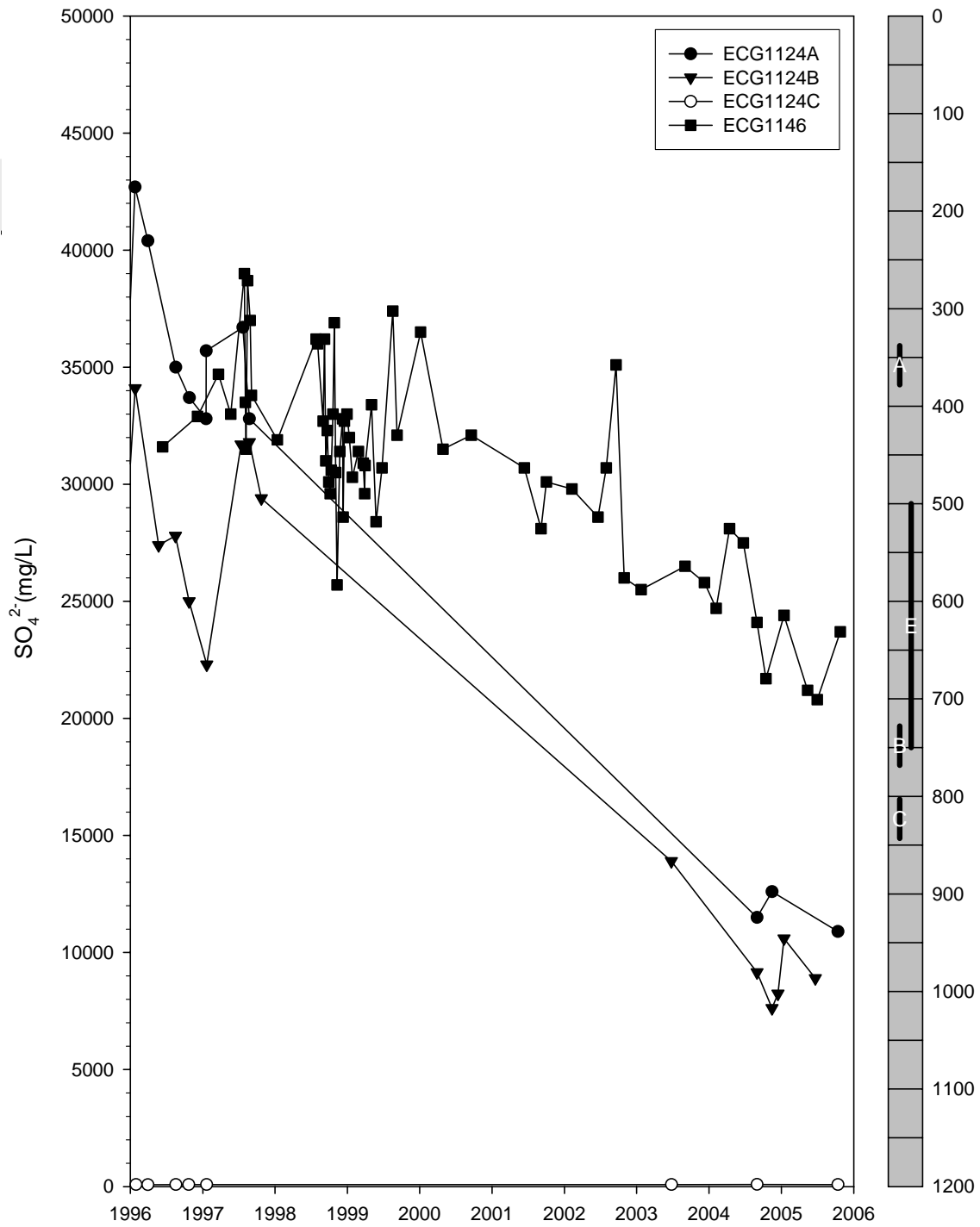
DRAFT

STRATEGIC RESOURCES GROUP		KENNECOTT UTAH COPPER	
SCALE: 1"=2000'	DATE:	FIGURE 3.1	
DRAWN: JI	2/06	SULFATE CONCENTRATIONS	
CHECKED: JI	2/06	IN 2005	
APPROVED: BV	2/06	Job No. ---	Dwg. No. 454-T-0227
REVISIONS:			REV 1

Sulfate: Plume Interior

- Continued decreases in sulfate concentrations
- Continued contraction of 20,000 and 10,000 mg/l isoconcentration contours
- Some expansion of 5,000 mg/l isoconcentration contour on east





Sulfate: KUCC Deep Well Field

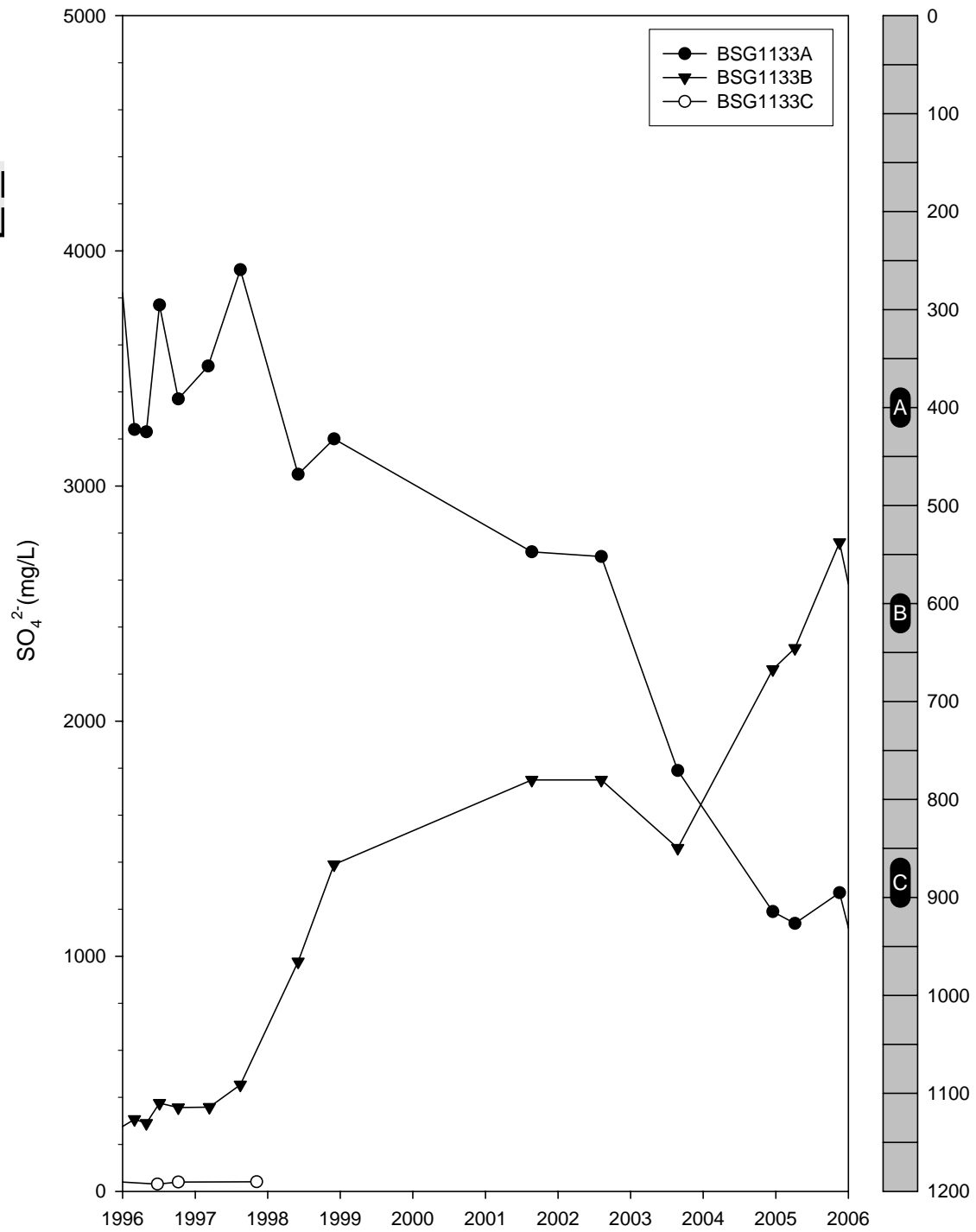
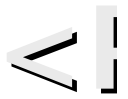
- Extraction well sulfate essentially constant
- Steady to increasing sulfate concentrations adjacent to extraction wells
- Steady to decreasing sulfate concentrations in surrounding wells

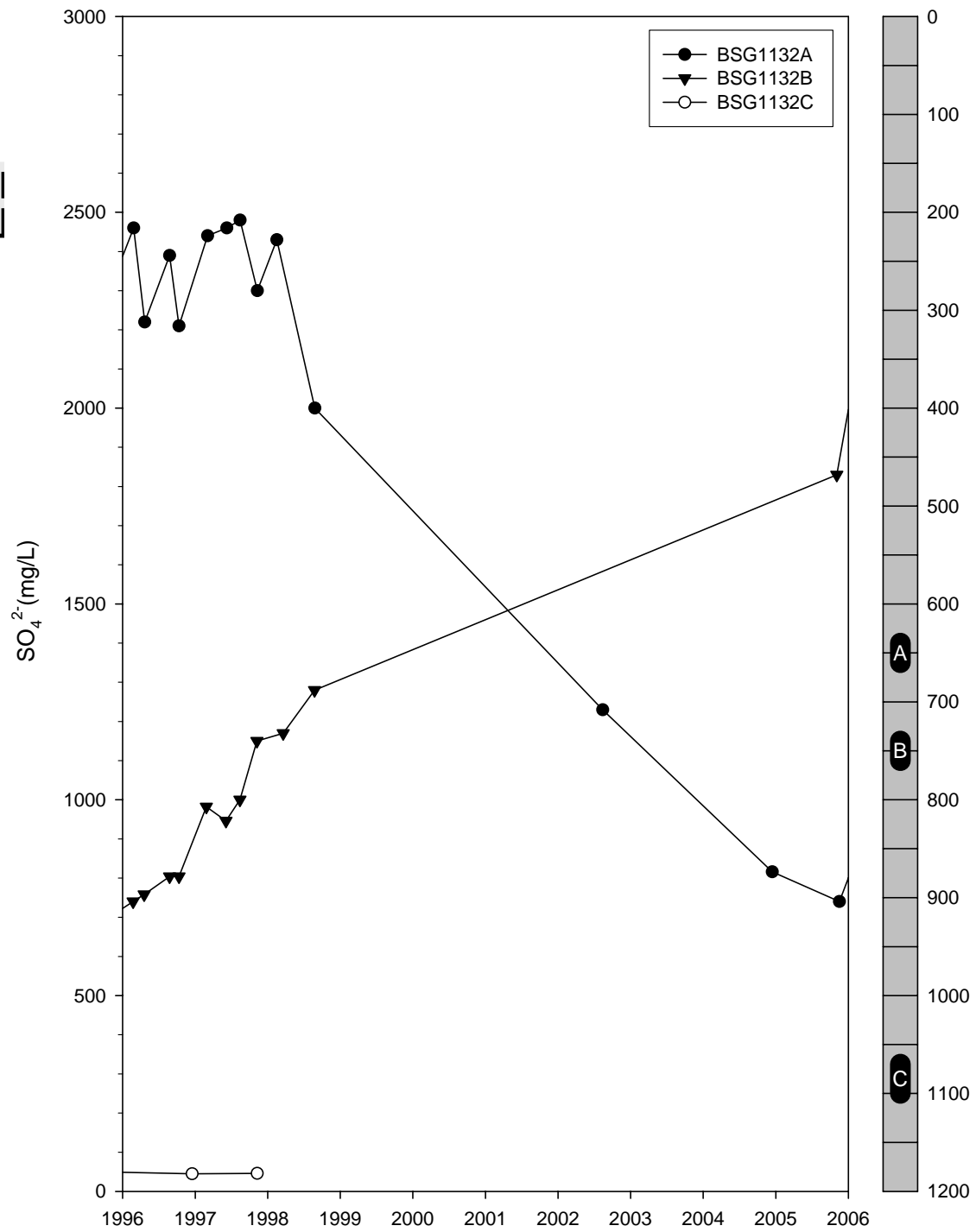
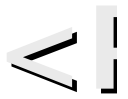


Southeast Margin

- Sulfate concentrations increasing in wells adjacent to plume interior
- Wells on outer margin have essentially steady sulfate concentrations
- Modelling suggests some water with elevated sulfate may not be captured by existing barrier well network







Southeast Margin Response

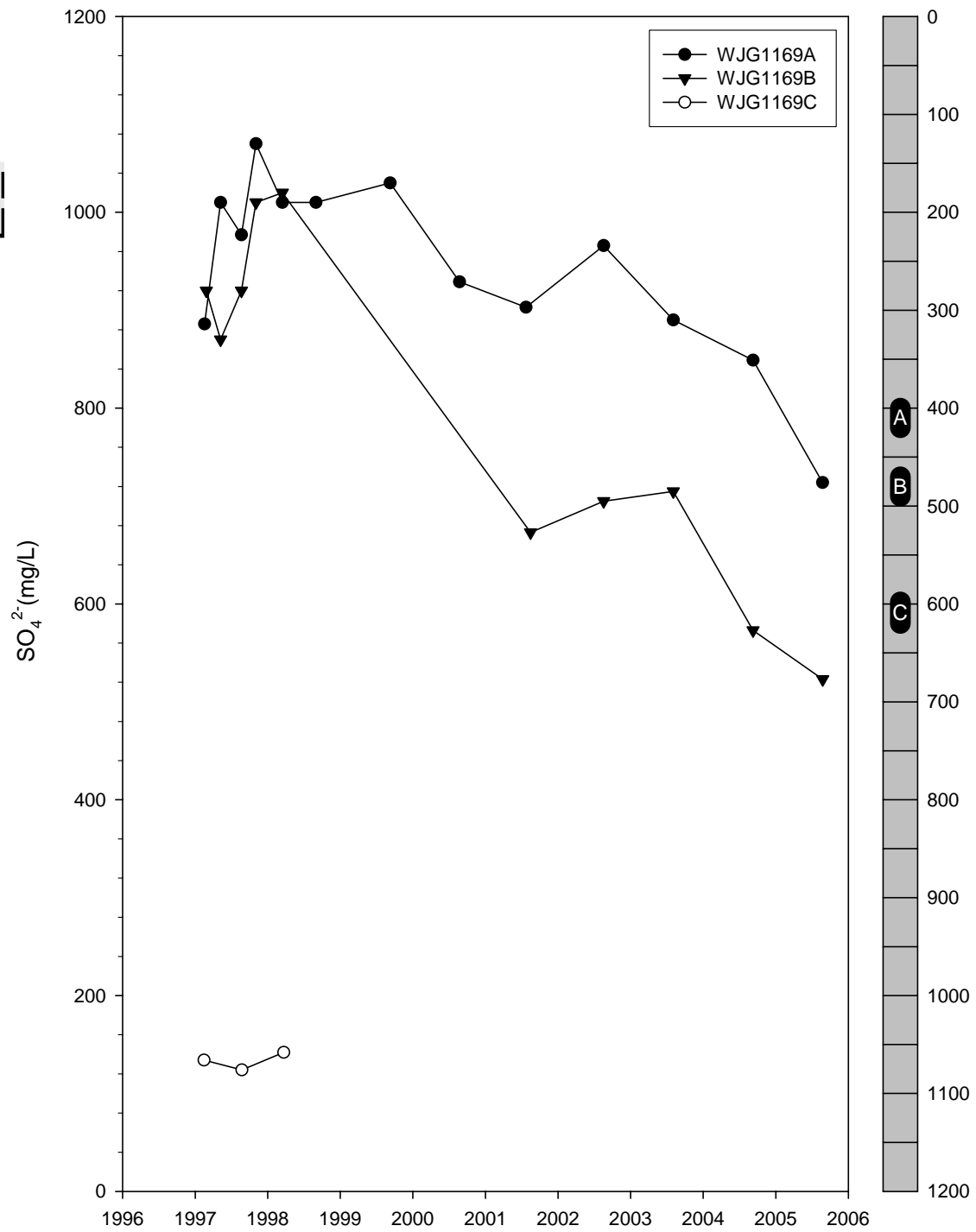
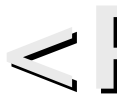
- Better understanding
 - Geophysics
 - Additional Monitoring Wells
 - Update flow and transport models
- Possible Mitigation
 - New acid well
 - New barrier well
 - Natural Attenuation

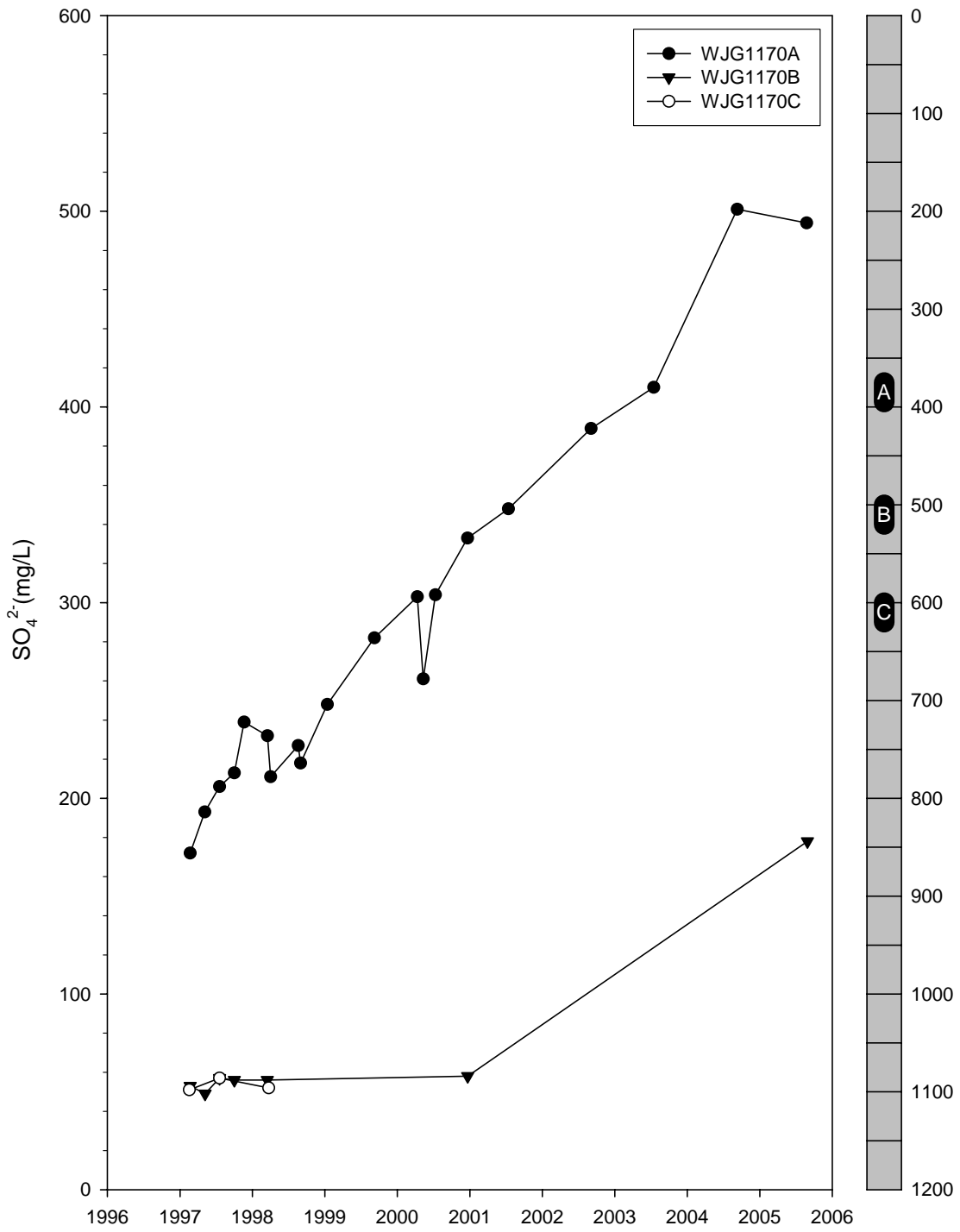


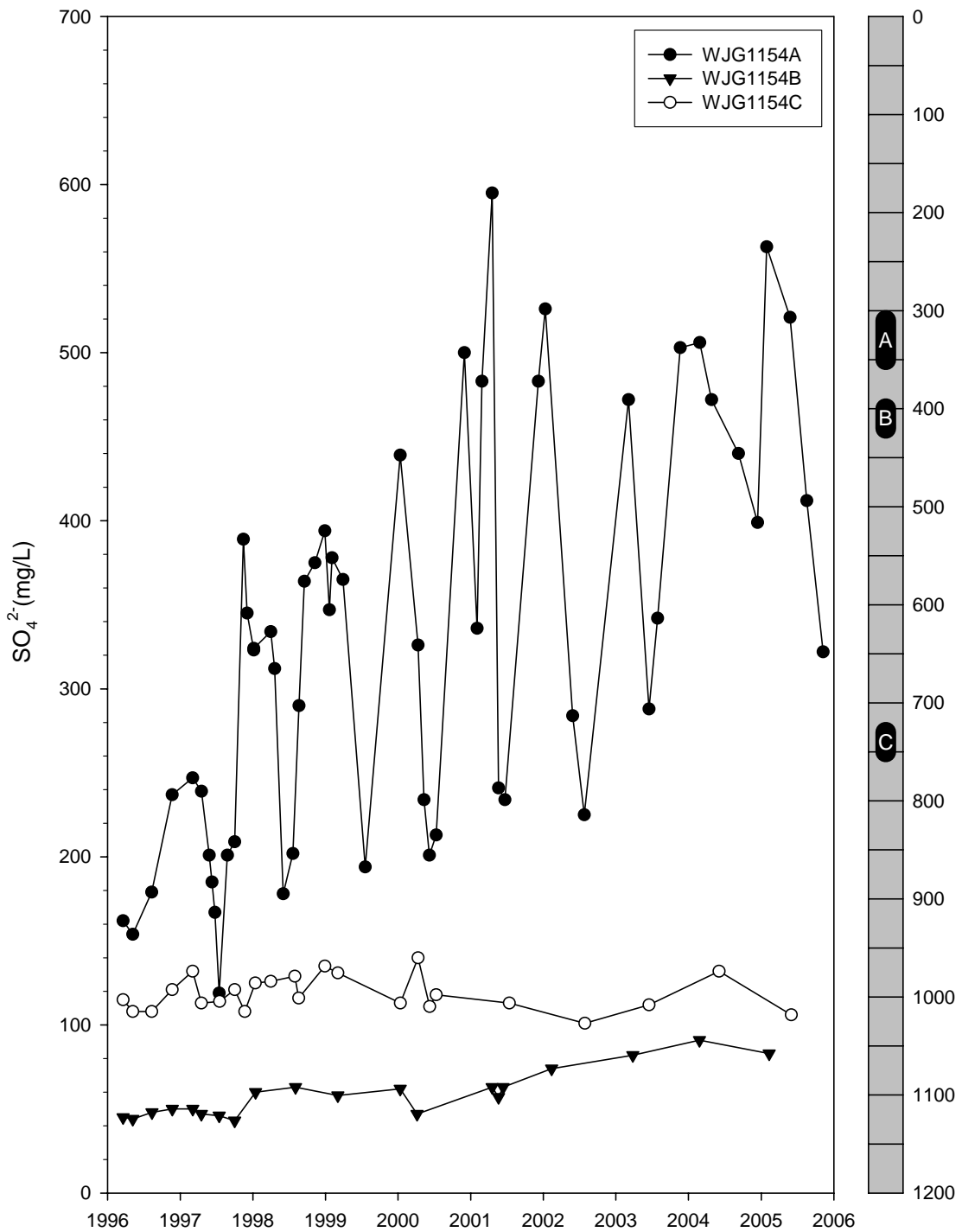
Sulfate: West Jordan Well Field

- Steady to decreasing sulfate concentrations in monitor wells
- Overall concentration in West Jordan Production well W363 appears to be decreasing

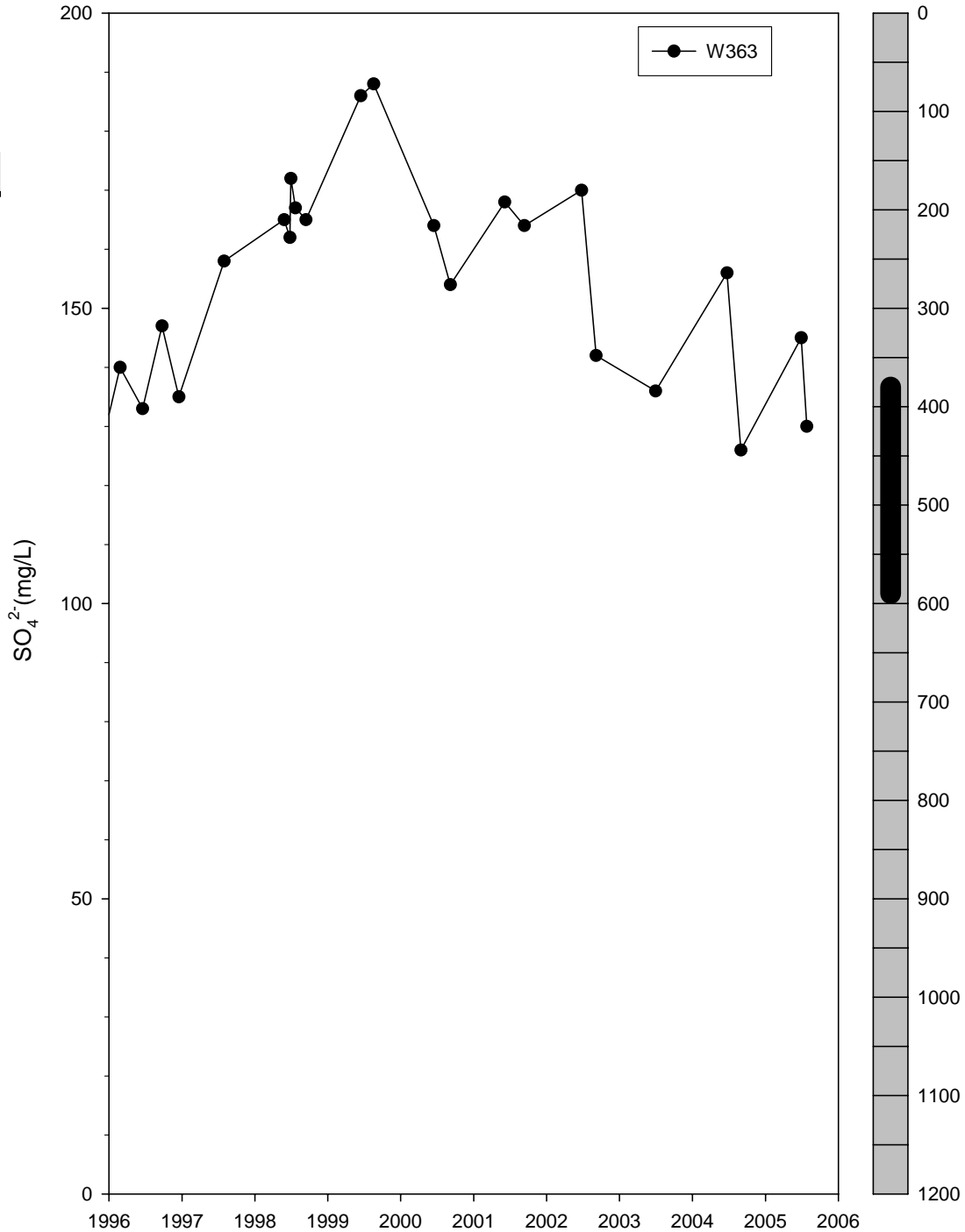








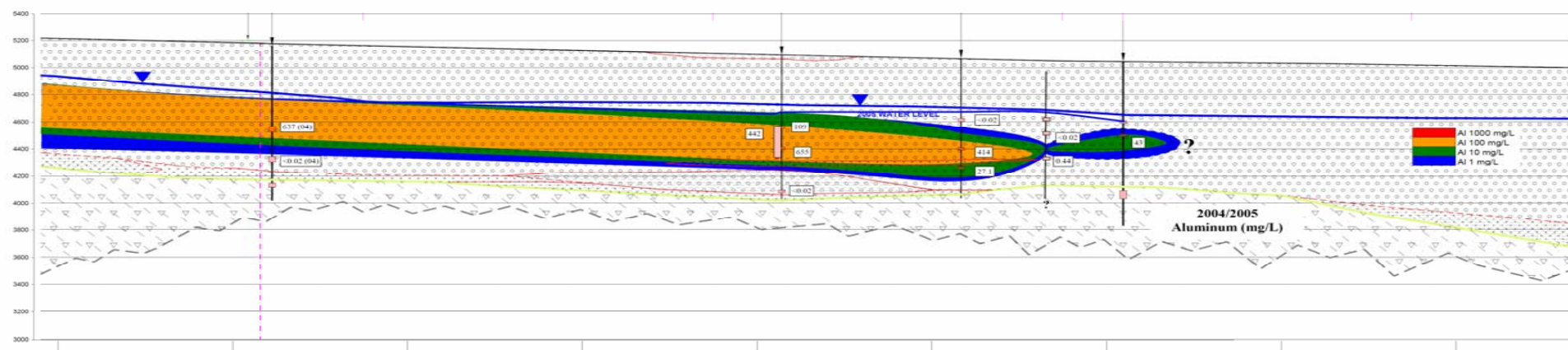
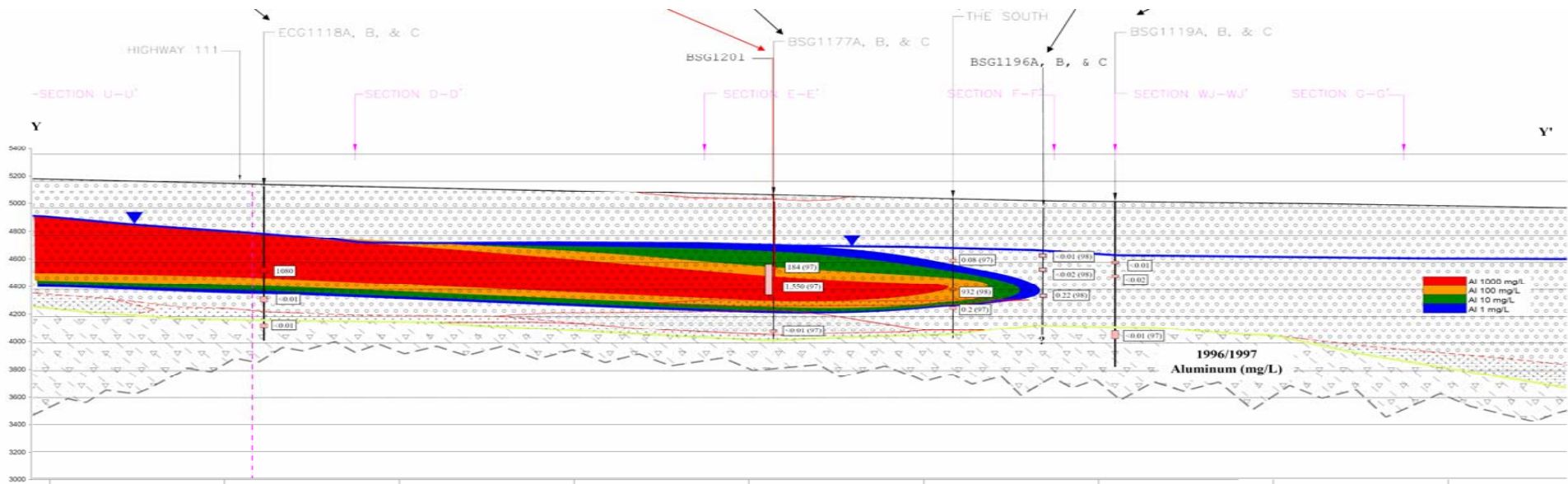
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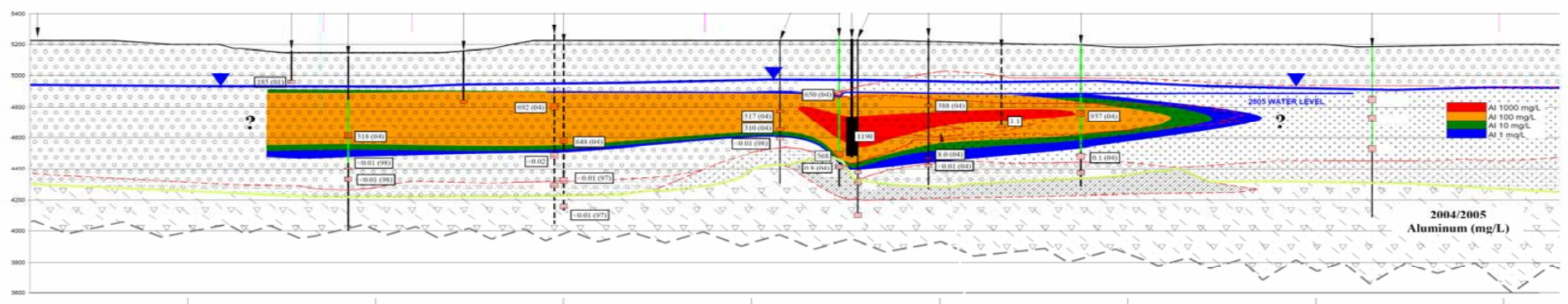
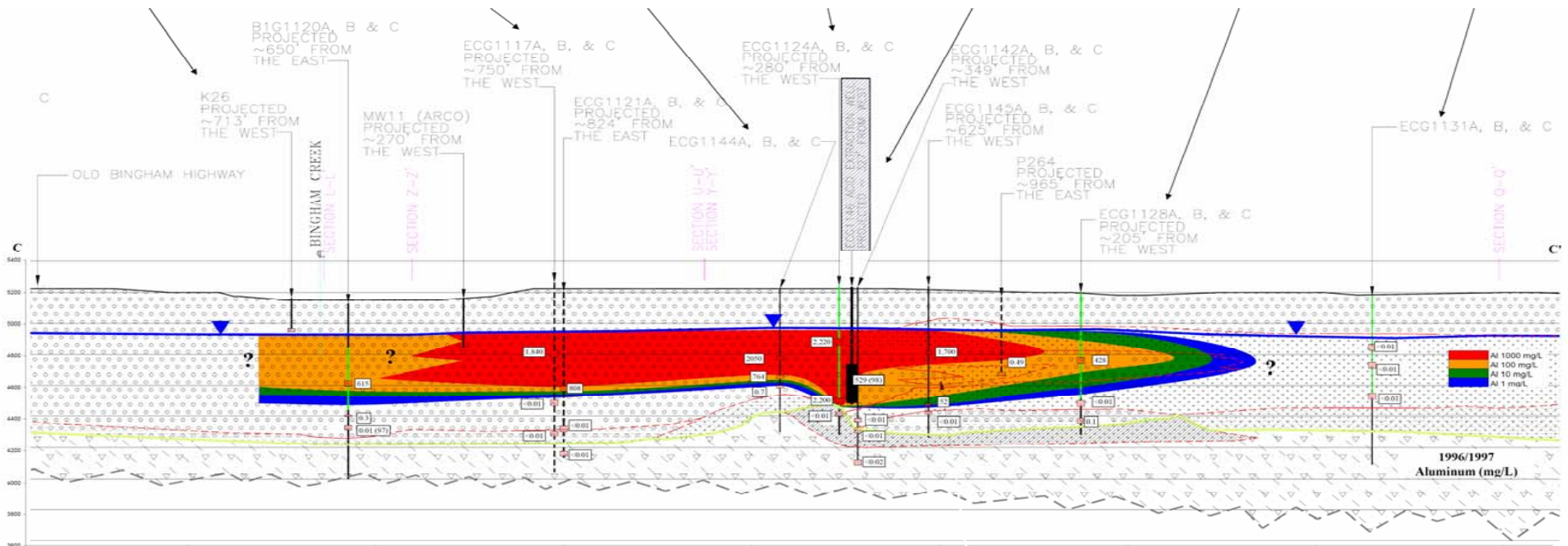


Aluminum

- Overall decrease in aluminum concentration in core of plume
- Aluminum mass balance calculations indicate substantial progress







Aluminum Mass Removal

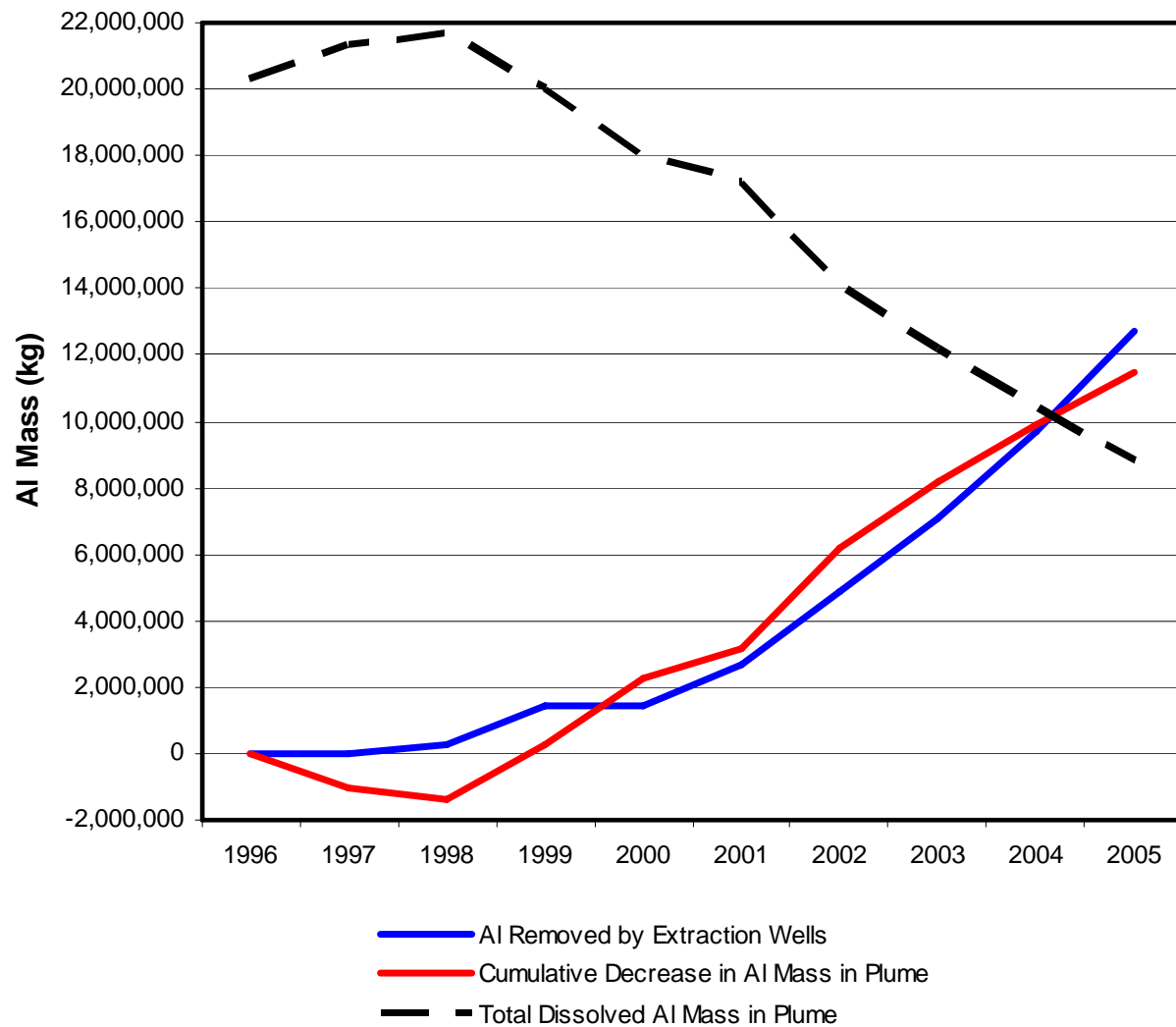
Modeled Mass and Volume Estimates

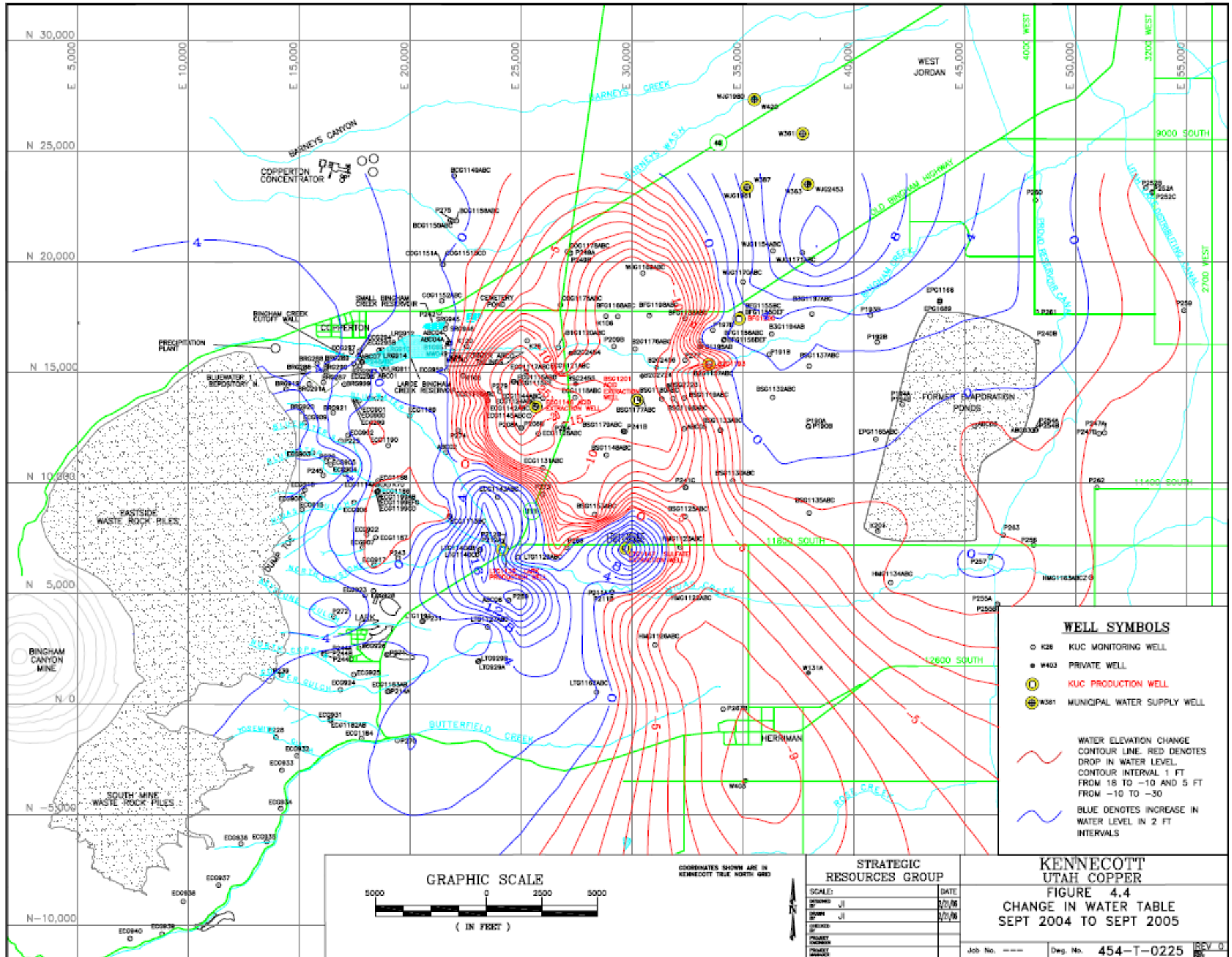
Year	Soil Volume (cubic feet)	Annual change	Chemical Mass* (kg)	Annual change
1996	13,166,000,000		20,293,000	
1997	13,249,000,000	0.6%	21,324,000	5.1%
1998	13,931,000,000	5.1%	21,643,000	1.5%
1999	14,285,000,000	2.5%	19,995,000	-7.6%
2000	13,774,000,000	-3.6%	18,018,000	-9.9%
2001	13,753,000,000	-0.2%	17,157,000	-4.8%
2002	13,935,000,000	1.3%	14,097,000	-18%
2003	13,194,000,000	-5.3%	12,149,000	-14%
2004	12,867,000,000	-2.5%	10,392,000	-14%
2005	12,444,000,000	-3.3%	8,810,000	-15%
Total	-722,000,000	-5.5%	-11,483,000	-57%

- Pumping data indicate 12.5 million kg aluminum removed 1996-2005



Aluminum Mass Removal



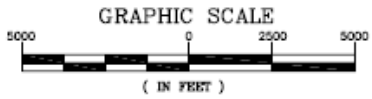


WELL SYMBOLS

- K28 KUC MONITORING WELL
- W403 PRIVATE WELL
- Ⓚ KUC PRODUCTION WELL
- ⊙ W361 MUNICIPAL WATER SUPPLY WELL

WATER ELEVATION CHANGE
 CONTOUR LINE. RED DENOTES
 DROP IN WATER LEVEL.
 CONTOUR INTERVAL 1 FT
 FROM 18 TO -10 AND 5 FT
 FROM -10 TO -30

 BLUE DENOTES INCREASE IN
 WATER LEVEL IN 2 FT
 INTERVALS



COORDINATES SHOWN ARE IN
KENNECOTT TRUE NORTH GRID

STRATEGIC RESOURCES GROUP		DATE
DESIGNED BY	JL	3/2/06
DRAWN BY	JL	3/2/06
CHECKED BY		
PROJECT NUMBER		
PROJECT NAME		

KENNECOTT UTAH COPPER
FIGURE 4.4
CHANGE IN WATER TABLE
SEPT 2004 TO SEPT 2005

Subsidence

Subsidence Survey Data (Elevation Feet AMSL)					
Survey Site	12/19/02 Survey	3/11/04 Survey	4/5/05 Survey	2002-04 Difference (ft)	2004-05 Difference (ft)
ECG1116	5318.519	5318.518	5318.593	-0.001	0.075
ECG1124	5250.985	5250.969	5251.076	-0.016	0.107
BSG1137	4941.591	4941.549	4941.624	-0.041	0.075
BFG1156A	4997.262	4997.275	4997.344	0.013	0.069
WJG1170	4968.166	4968.016	4968.119	-0.15	0.103
BSG1180	5078.004	5078.01	5078.032	0.005	0.022
K105	5341.95	5341.996	5342.09	0.046	0.094
1973 West	---	5205.333	5205.428	---	0.095
1/4 Section 13/14	---	4943.947	4944.013	---	0.066

