SHORT COURSE: MINE WATER TREATMENT TECHNOLOGIES, CASE STUDIES, AND COSTS

WATER TREATMENT COSTS- CAPITAL AND OPERATING

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COST CONSIDERATIONS

TECHNOLOGY COST CONSIDERATIONS

- As flow rates increase, CapEx & OpEx increase; look for opportunities to decrease flow (upstream diversions, side-stream treatment).
- In general, as effluent concentration requirements fall, treatment costs rise.
- Water treatment is a matter of separating and concentrating. Costs associated with managing constituents in their final form must be taken into account.
- Life-cycle cost comparison (CapEx, OpEx, IRR) of alternative technologies is fundamental in choosing a treatment process for your particular project.

TECHNOLOGY COST CONSIDERATIONS

- If translating cost analyses found in case studies to your particular project, account for differences in:
  - Effluent requirements
  - Raw water chemistry
  - Flow rates
  - Proximity to equipment manufacturers/suppliers
  - Labor, chemical and energy unit costs
  - Availability of adequately trained operators

DEVELOPING COST ESTIMATES

- Life cycle costs comprised of:
  - Capital costs (CapEx)
  - Annual operating and maintenance costs (OpEx)
  - May or may not consider time value money for future expenditures on O&M

DEVELOPING COST ESTIMATES

- Varying degrees of accuracy (+/- %) in cost estimates determined by stage of project development
- Various organizations publish cost estimating guidelines, for instance:
  - AACE International
  - ASTM
- Many companies utilize their own costing guidelines (BHP, Anglo, Codelco)

DEVELOPING COST ESTIMATES

- As an example, AACE (AACE 2011) utilizes the following cost guidelines:

COST ESTIMATE CLASSIFICATION MATRIX FOR THE PROCESS INDUSTRIES

	Primary Characteristic	*Secondary Characteristic*		
ESTIMATE CLASS	MATURITY LEVEL OF PROJECT DEFINITION DELIVERABLES Expressed as % of complete definition	END USAGE Typical purpose of estimate	METHODOLOGY Typical estimating method	EXPECTED ACCURACY RANGE Typical variation in low and high ranges [a]
Class 5	0% to 2%	Concept screening	Capacity factored, parametric models, judgment, or analogy	L: -20% to -50% H: +30% to +100%
Class 4	1% to 15%	Study or feasibility	Equipment factored or parametric models	L: -15% to -30% H: +20% to +50%
Class 3	10% to 40%	Budget authorization or control	Semi-detailed unit costs with assembly level line items	L: -10% to -20% H: +10% to +30%
Class 2	30% to 75%	Control or bid/tender	Detailed unit cost with forced detailed take-off	L: -5% to -15% H: +5% to +20%
Class 1	65% to 100%	Check estimate or bid/tender	Detailed unit cost with detailed take-off	L: -3% to -10% H: +3% to +15%

Notes: [a] The state of process technology, availability of applicable reference cost data, and many other risks affect the range markedly. The +/- value represents typical percentage variation of actual costs from the cost estimate after application of contingency (typically at a 50% level of confidence) for given scope.