

GOLD FIELDS



GOLD FIELDS

BEATRIX GOLD MINE

Carbon Breakage Investigation

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A Health, Productive & a Safe Future for ALL

Khuseleka "Be Protected"



AGENDA

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1. Introduction



Reasons for Concern:

- Increased gold in residue
- Increased carbon consumption
- Blocked strainers within the Elution column

Factors causing Carbon Breakage

- Mechanical Operations
- Thermal Regeneration

Investigated possible Solutions

We will be the leading Metallurgical Division within Gold Fields

2. Process Description



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- Fresh and Acid treated carbon
- Counter – current flow relative to slurry
- Continuous pumping to loaded carbon screen
- Elution stripping
- Regeneration and Acid treatment



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3. Methodology



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3.1 Sample campaign:

- ◇ Carbon-In-Leach tanks
 - ◇ 500 μm sieve
 - ◇ Interval of 1.5 hours
- ◇ Elution and Regeneration
 - ◇ Per carbon batch

3.2 Sampling analysis:

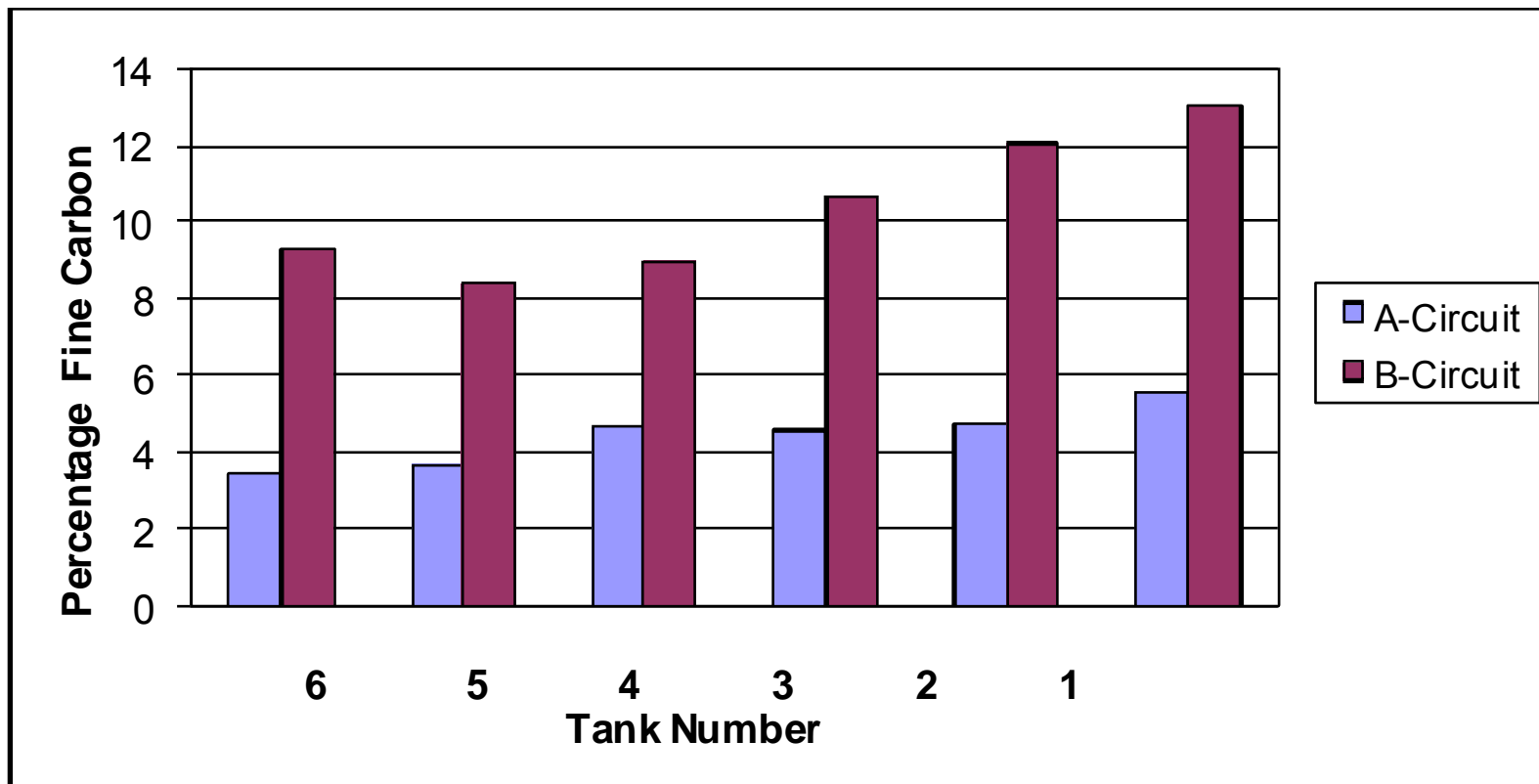
- 850 μm laboratory sieves

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4. Results



4.1 Carbon – In – Leach circuit



Report Sub-Standard Work Practices

4. Results



a. Factors affecting breakage on C.I.L



Interstage carbon transfer pumps are used with chipped impeller edges

Broken and worn – out impeller on head tank agitators



Report Sub-Standard Work Practices

3.2 Elution and Regeneration operations

stream	Eluted (%)	Regeneration (%)	Acid treated (%)
A - Circuit	2.28	8.03	0.81
B - Circuit	3.32	7.17	0.68

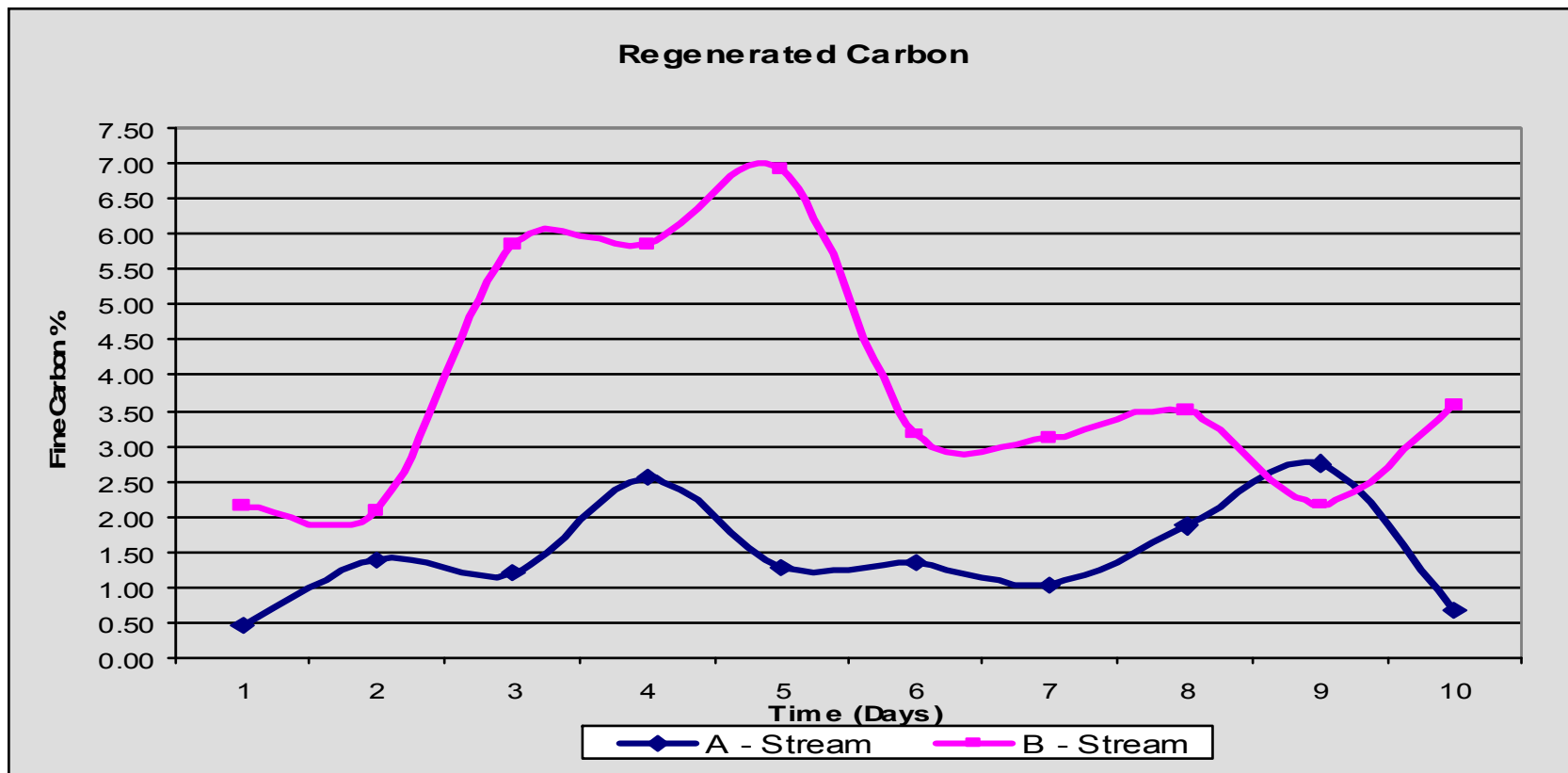
Protect your lungs from dust, prevent dust at source

4. Results



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3.2 Elution and Regeneration operations



Believe and promote

4. Results



a. Factors contributing to breakage on regeneration process



Regeneration kiln holed on feed – point without seal.

Damaged seal ring and holed discharge point



Strive for Injury free performance – Work safely, eliminate hazards

4. Results



b. New Kiln installation



New kiln purchased and assembled

Kiln installed



Do not accept non-compliance

5. Financial Calculations



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Description	Unit	Value
Carbon Consumption	tons	378.53
Fine Carbon Recovered	tons	358.39
Fine Carbon not Recovered	tons	20.14
Average Au loading on Fine carbon	g/t	205
Gold Loading on Fine Carbon	Kg	73.4260
Recovery @ Rand Refinery	%	88.48
Gold Recovered	Kg	64.9690
Unrecovered Au @ Rand Refinery	Kg	8.4570
Gold Content in Fine Carbon	Kg	4.1250
Total Gold lost to the Residue(incl RR)	Kg	12.5820

Believe and promote

5. Financial Calculations



Description	Units	Value
1. Carbon Consumption	tons	378.53
Cost of replacing lost Carbon (@ R13. 52/ Kg)	R	5 117 726
2. Value Gold Lost to Residues	Kg	12.582
Estimated Gold Price @ 190 000/ Kg	R	2 390 580
3. Refining fees	R	1 755 993
Estimated Expenses incurred to treat Fine Carbon	R	9 264 299

For a 50% improvement, a capital of R 4.6 Million is available

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6. Conclusion



- ✓ An investigation on carbon breakage was done at Beatrix No.1 Plant
- ✓ Two sources of breakage were identified:
 - ❖ Mechanical in the CIL
 - ❖ Thermal in the regeneration process
- ✓ A new Kiln was installed to remedy the thermal breakage
- ✓ More work still to be done on mechanical breakage

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7. Recommendations



Rubber – lined 150 mm diameter impeller	R	80 000
200 mm diameter piping @ R500 / m	R	100 000
Pressurized Transport tanks	R	200 000
Glass Fibers Seal for A - Kiln	R	8 000
Purchase B - Kiln	R	1.7 Million
Sub - Total	R	2 088 000
50% Contingency	R	1 044 000
Total CAPEX required	R	3 132 000

CAPEX REQUIRED IS WELL BELOW CAPEX AVAILABLE



Questions?

&

Comments!



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