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Progress in metallurgical performance of the UG 2 concentrator

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PLATINUM LIMITED

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Introduction

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- MF 2 – concentrator @ 75 000 t / month
- Outokumpu tank cells
- PGM recovery not up to design
- Cr₂O₃ a problem during smelting

Parameter	Design	Actual
PGM recovery	85 %	80 %
Cr ₂ O ₃ in conc.	2.0 %	4.5 %

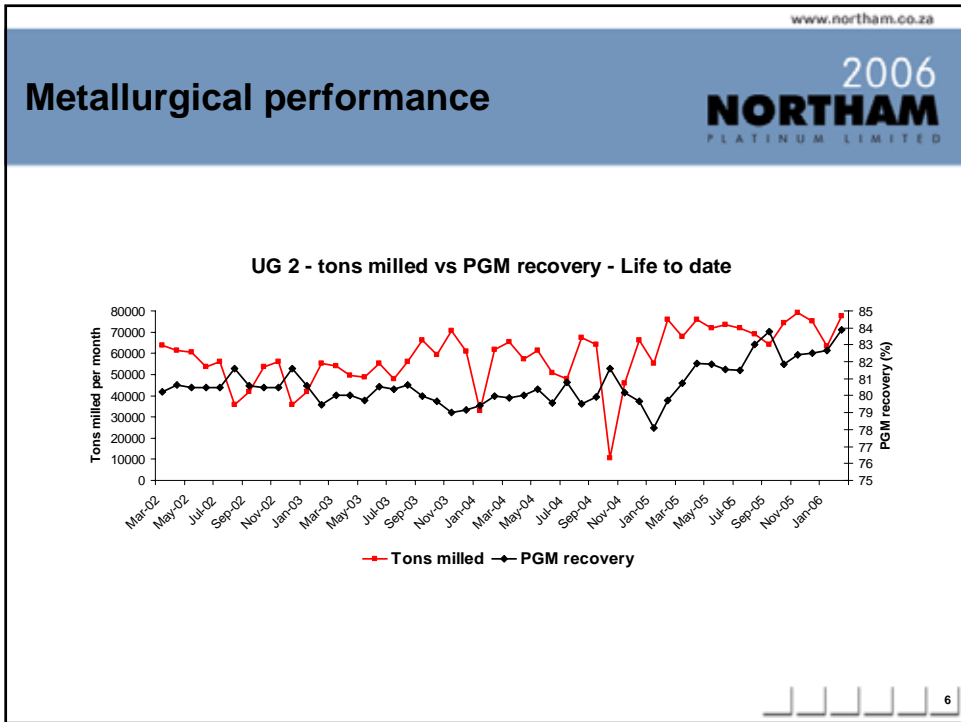
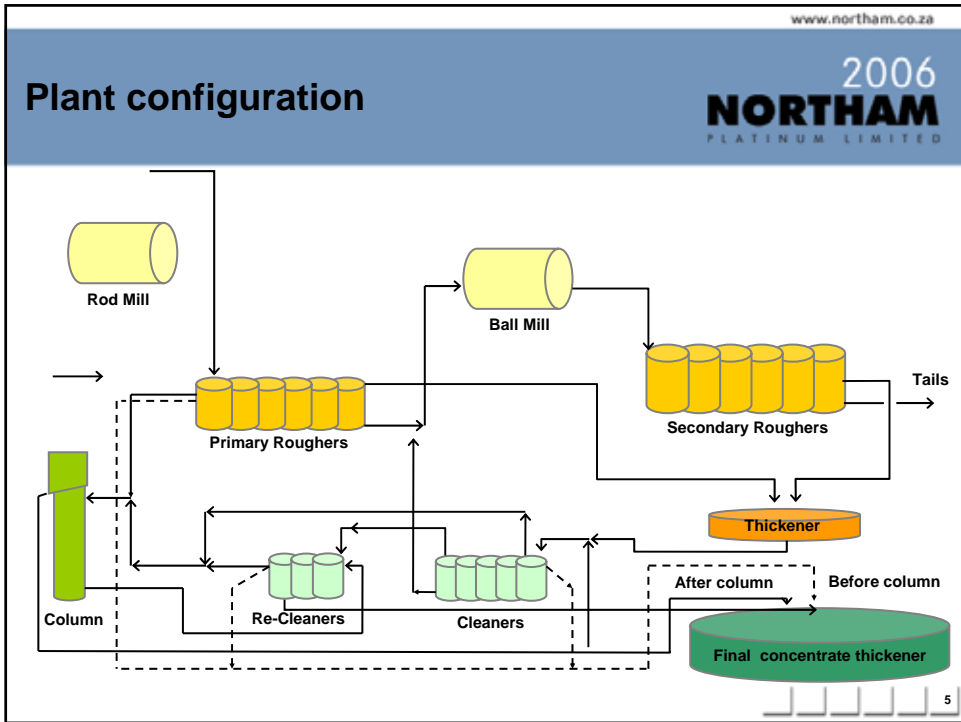
Introduction, cont'd

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Options investigated to reduce Cr₂O₃ :

- Depressant
- Frother
- Open circuit secondary mill
- Reduced mass pull
- Flotation column

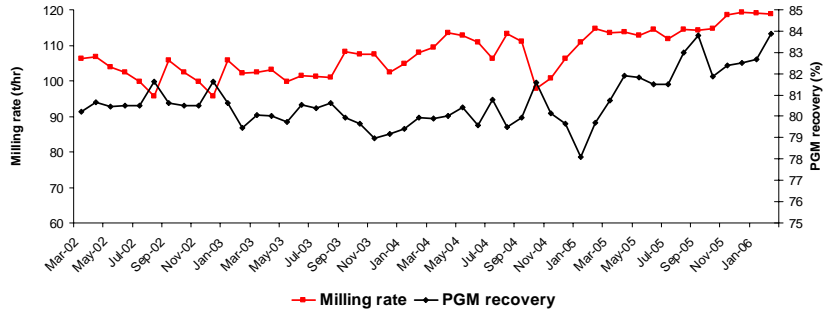




Metallurgical performance, cont'd



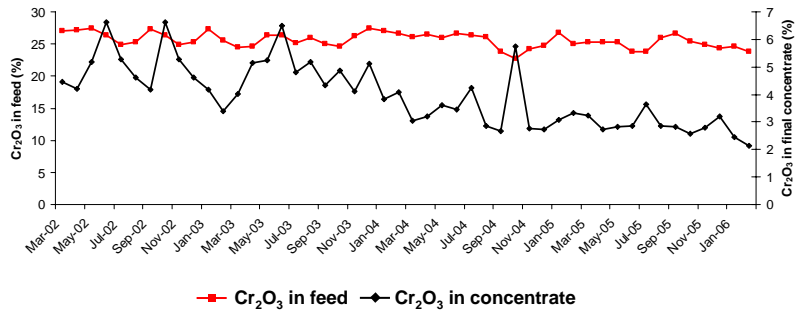
UG 2 - milling rate vs PGM recovery - Life to date



Metallurgical performance, cont'd



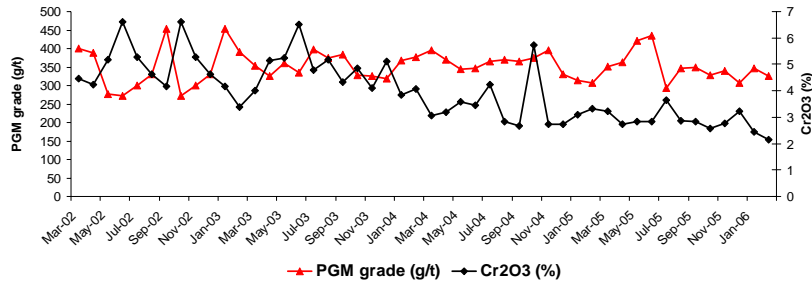
UG 2 - Cr₂O₃ in feed vs Cr₂O₃ in final concentrate - Life to date



Metallurgical performance, cont'd



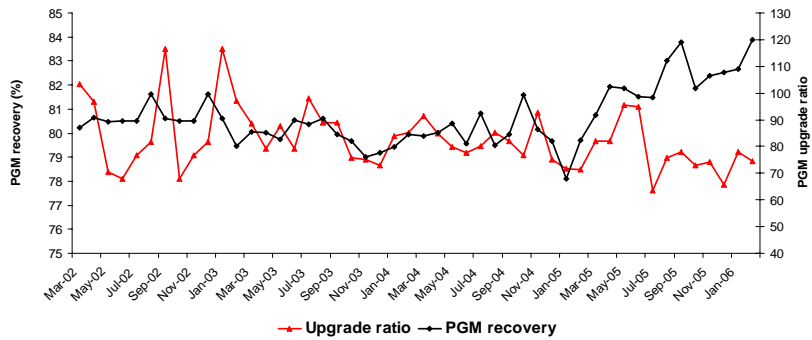
UG 2 final concentrate - Life to date



Metallurgical performance, cont'd



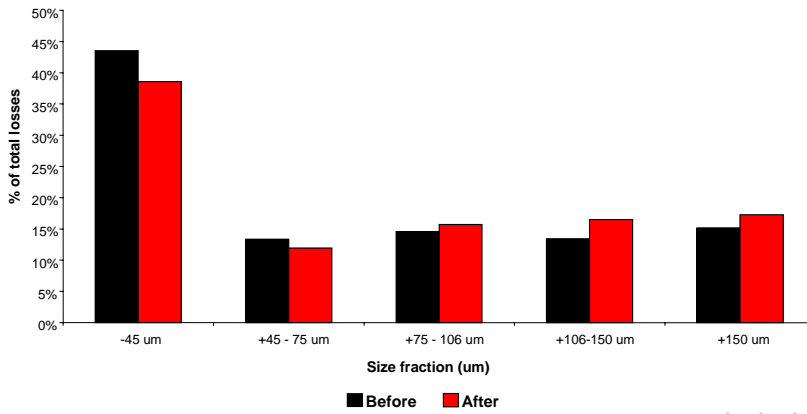
UG 2 - PGM recovery vs upgrade ratio - Life to date



Metallurgical performance, cont'd

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UG 2 - Tails PGM distribution

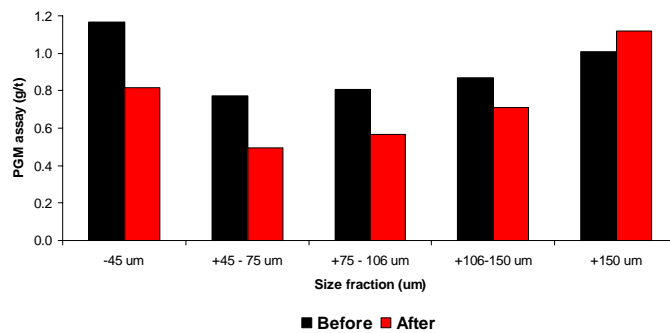


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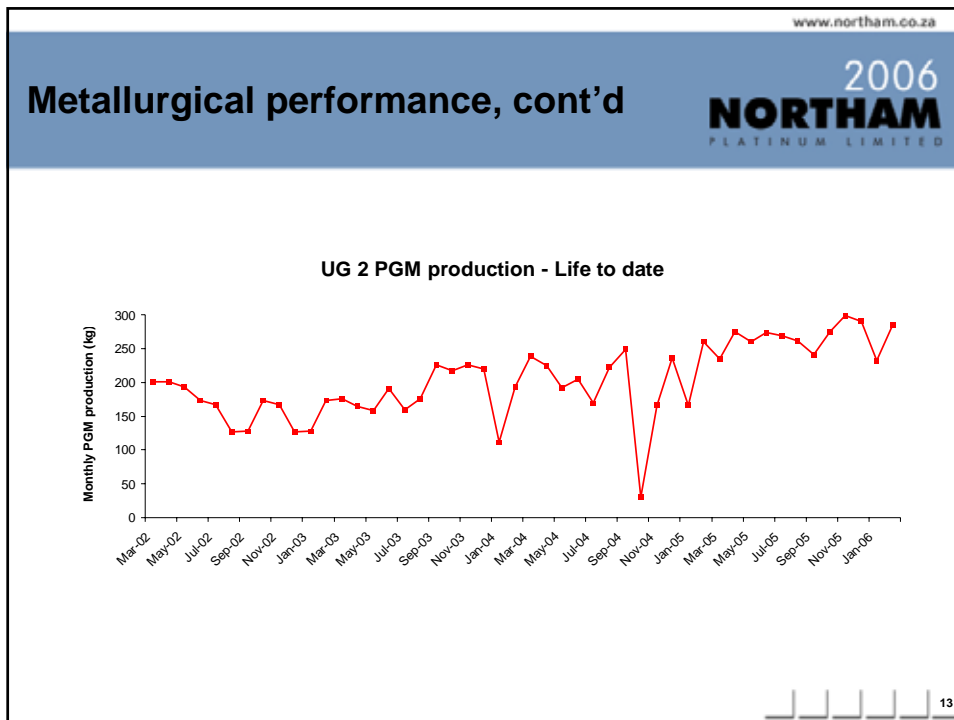
Metallurgical performance, cont'd

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UG 2 - Tails PGM assay per fraction



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Metallurgical performance, cont'd

Last semester compared to before

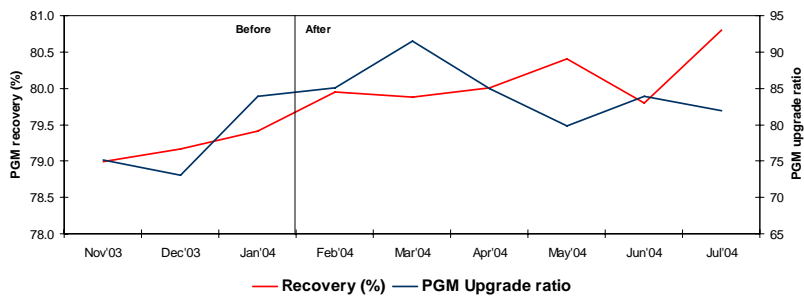
▪ PGM recovery :	+ 2.2 %
▪ PGM upgrade ratio :	- 5.6 %
▪ Cr ₂ O ₃ in conc. :	- 41.4 %
▪ PGM / Cr ₂ O ₃ ratio :	+78.0 %
▪ Plant throughput/month:	+40.7 %
▪ PGM's produced/month :	+60.3 %

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Installation of flotation column PGM recovery & PGM upgrade ratio

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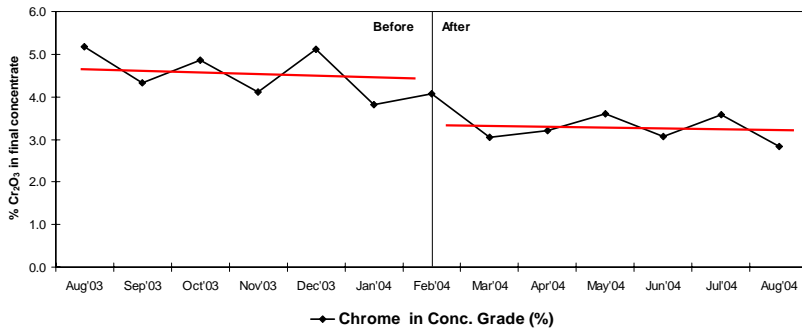
UG 2 - Plant PGM recovery against PGM upgrade ratio



Installation of flotation column, cont'd Final concentrate % Cr₂O₃

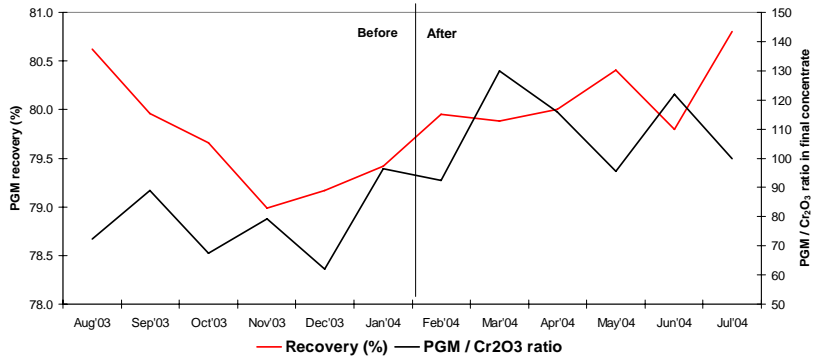
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UG 2 - Final concentrate % Cr₂O₃



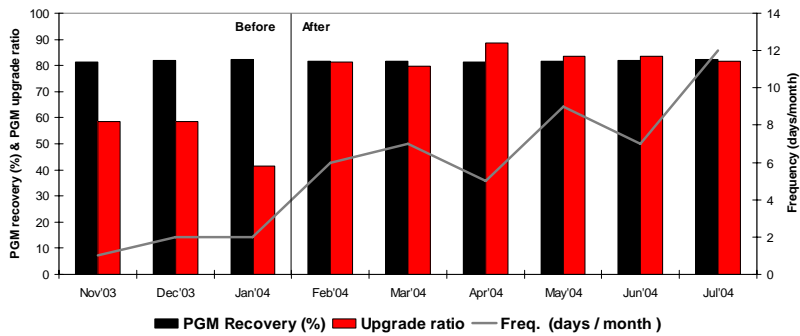
Installation of flotation column, cont'd PGM / Cr₂O₃ ratio

UG 2 - PGM recovery against PGM / Cr₂O₃ - ratio in final concentrate



Installation of flotation column, cont'd PGM recovery & upgrade ratio vs frequency

UG 2 - Plant recovery > 81 % against PGM upgrade ratio & Frequency

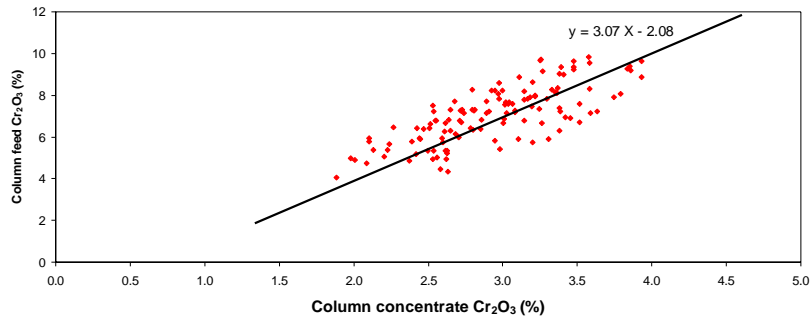


Installation of flotation column, cont'd

Column Cr₂O₃ reduction

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UG 2 - column feed %Cr₂O₃ against column concentrate %Cr₂O₃



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Installation of flotation column, cont'd

Plant metallurgical performance - after

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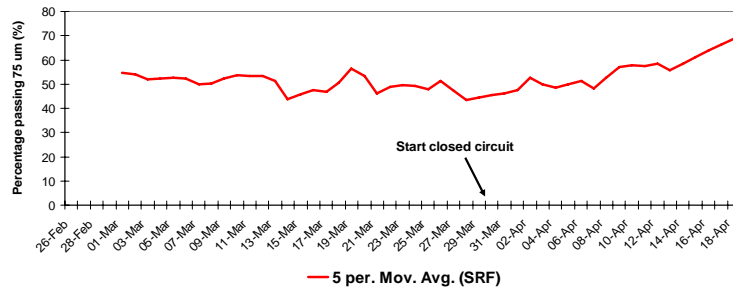
- PGM recovery : + 2.0 %
- PGM upgrade ratio : + 9.0 %
- Cr₂O₃ in conc. : - 37.8 %
- PGM / Cr₂O₃ ratio : +76.3 %
- Plant throughput / hr : + 9.5 %

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Process flow modifications Closed circuit secondary mill

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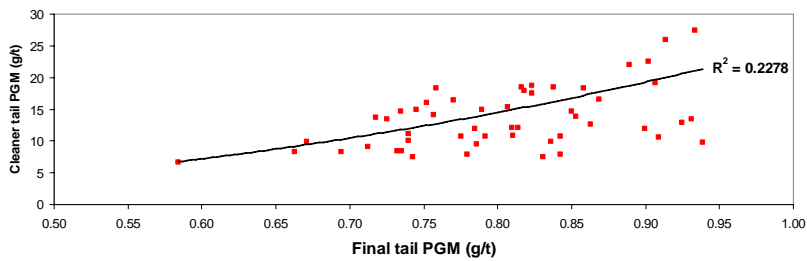
UG 2 Open vs closed circuit comparison : Secondary rougher feed -75 um



Process flow modifications, cont'd Cleaner tails to secondary circuit

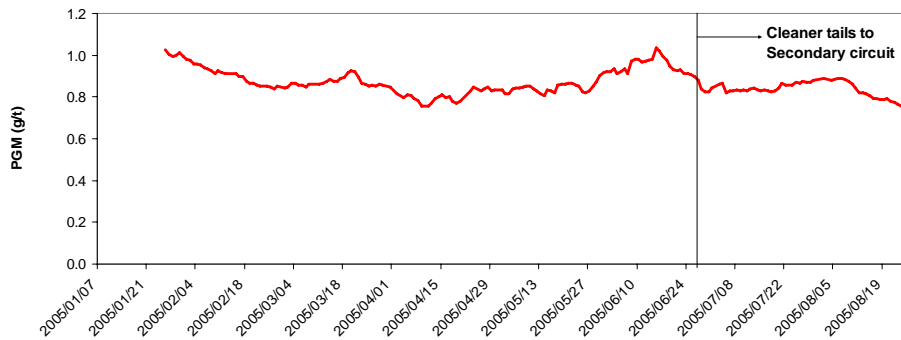
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UG 2 cleaner tail vs final tail



Process flow modifications, cont'd Cleaner tails to secondary circuit, cont'd

UG 2 - Rougher tail PGM grade



Reagent suite

- Oil based frother replaced with water soluble
- Depressant dosage reduced by 40 %
- DTP collector introduced in cleaner circuit



Other factors

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- Increased power input to cleaner scavenger
- Installation of internal launders on above



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Future

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- Primary mill feed size reduction
- High intensity flotation cells
- Reagents



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Cost savings - UG 2

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Base : 70 000 t per month
Basket price : R 150 000 / kg
Smelting cost : R 450 / t concentrate

	Before	After	Unit	Difference
Head grade	4.5	4.5	g/t	
PGM recovery	80.23	82.51	%	
Conc. Grade	351	327	g/t	
Conc. Cr2O3	4.83	2.98	%	
PGM's produced	252.7	259.9	kg	1 076 485
Tons conc.	721.0	794.4	t	
Smelting cost	324464	357466	R	-33 002
Tons Cr2O3	34.8	23.7	t	
Penalty	50000	16100	/ t Cr2O3	
	1739718	381425	R	1 358 293
			R	2 401 776

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Cost savings - Merensky

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Base: 125000 t per month

Reagent	Dosage (g/t)		Monthly consumption (kg)		Price (R/kg)	Monthly cost (R)	
	Before	After	Before	After		Before	After
Sasfroth 2004	200	0	25000	0	8.60	215 099	0
Sasfroth 200	0	38	0	4750	13.00	0	61 750
SibX	155	155	19375	19375	9.17	177 599	177 599
Sascol 61	75	56	9375	7000	8.64	81 044	60 513
Sascol 105	0	17	0	2125	6.95	0	14 769
KU 47	0	32	0	4000	11.10	0	44 400
CuSO4	54	54	6750	6750	9.44	63 731	63 731
						537 472	422 761
						Saving R	114 711

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