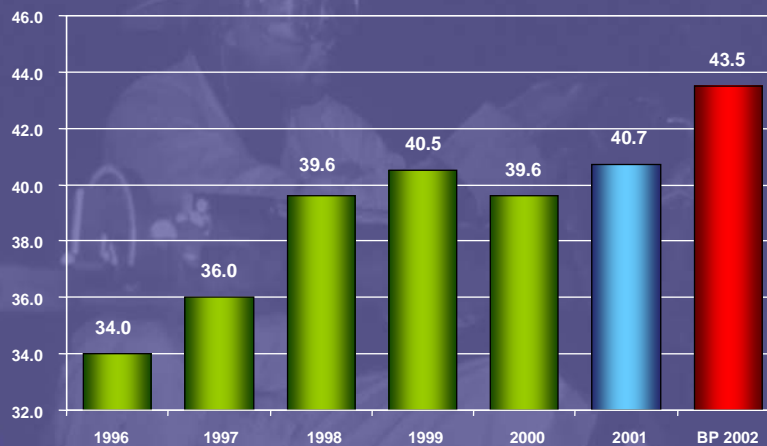




**Efficiencies – Pieter Anderson**



## Stopping – Centares per panel man



## Efficiency highlights

- ❖ Excellent production efficiencies with room for improvement
- ❖ Highest ever stopping efficiencies achieved by Impala.
- ❖ Outstanding shaft performances:
  - ❖ Two shafts achieved more than 56 centares per panel man
  - ❖ 12 # produced 577 centares per panel team in FY2001.



## Efficiency highlights

- ❖ 4 # improved from 31 centares per panel man to current performance of 43 over the last few months (39%)
- ❖ Top 20 performing stoping teams
  - ❖ Constant efficiency achievement of 70 centares per panel man in 2001
  - ❖ Teams averaged 685 centares per panel team per month with a 23 metres face advance (100% of potential)



## Top performing crew captain

### Oupanyana Molefe (VA1D)

- ❖ 81 centares per panel man
- ❖ 722 centares per month
- ❖ 9 man team
- ❖ Sep '01 performance:
  - ❖ 101 centares per panel man
  - ❖ 1 043 centares produced
  - ❖ 10 employess at work



## Soaring to new heights – our potential

- ❖ Current stoping face advance of 17 metres per team per month vs a 23 metre potential
- ❖ A 36% improvement on stoping face advances is not a dream
- ❖ One additional blast (one metre) per team per month equals R400 million turnover per annum
- ❖ Additional six metres per team per month potential still available
- ❖ Development efficiencies have the most room for improvement (50% to potential)

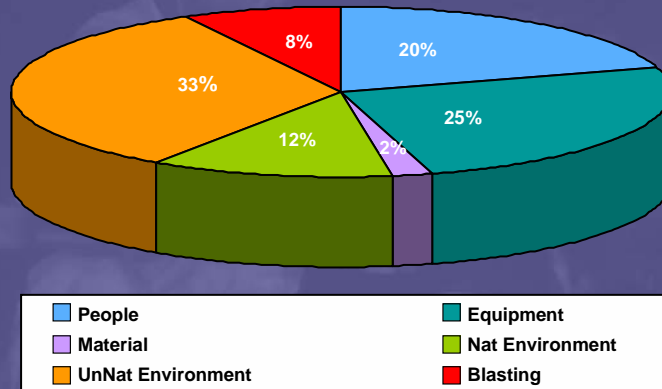
## Our first step – Daily Production System

- ❖ Implemented a Daily Production System (DPS) on all our shafts
  - ❖ This provides mining operations with detailed daily information on reasons for non-production, achieved and planned production per production team amongst other things
  - ❖ This is most useful in identifying trends and problem areas quickly
  - ❖ Our objective is a proactive approach towards utilising the system and its information



## Our lost blast problem

### Lost blast distribution - Stoping



## “Re-energised” Fixco process

- ❖ Joint effort between the mining operations and FIXCO initiatives
- ❖ Under the management of dedicated “FIXCO champions”
- ❖ Focussing to improve identified problem areas



## Daily reporting – “Smartie box”

- ❖ Our goal is a Safe, Quality, Daily Blast
- ❖ Keep it simple by creating pictures (Tell the story)
- ❖ Identify trends easily (Don't flash info)
- ❖ Information available per team per day
- ❖ Focus on lost blast and low blast
- ❖ Face advance per blast
- ❖ Focus more on potential and revenue



Microsoft Excel - Book5

Production Month: Y2002

### Daily Production System - Smartie Box

No 4 Shaft - ICU Teams

Stopping	Planned Shifts	Face Length	Planned Prod	12-Sep	13-Sep	14-Sep	15-Sep	17-Sep	18-Sep	19-Sep	20-Sep	21-Sep	25-Sep	26-Sep	27-Sep	28-Sep	29-Sep	01-Oct	02-Oct	MTD Prod	MTD Plan	MTI Var		
4.06US VgC2ID	23	25	15	15	15	10	15	15	10	UVS	15	15	15	15	15	15	15	15	15	195	236	(41.4)		
4.06US VgC1SD	23	26	15	15	15	10	15	15	10	UVS	15	PCC	15	15	15	15	15	PCC	170	236	(68.3)			
4.06UN VgC1CD	23	25	15	18	UVS	18	18	18	18	18	18	18	18	18	18	18	18	PSS	PSS	ESG	18	208	243	(35.2)
4.07UN VgS4ID	23	30	18	15	18	ESG	18	20	20	ESG	20	18	18	18	18	18	18	20	18	20	20	205	270	(65.0)
4.07US VgB24D	23	25	17	20	UVS	20	15	15	15	20	20	20	20	20	20	20	20	20	20	15	15	230	261	(30.8)
4.06US VgB26D	23	26	18	15	15	15	15	15	15	15	15	15	15	15	15	15	15	20	20	220	271	(51.2)		
4.10US VgV44D	23	28	28	15	15	15	15	15	15	15	15	15	15	15	15	15	15	10	10	10	10	185	261	(86.0)
4.10US VgV42D	23	28	28	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	195	261	(66.0)
16 Daily Actual Production	184	213	138	48	80	68	113	118	118	98	108	118	103	118	95	110	95	95	113	1588	2,040	(452.1)		
17 Daily Planned Production				44.75	98.22	98.22	138.38	138.38	138.38	138.38	138.38	138.38	138.38	138.38	138.38	138.38	138.38	138.38	138.38	138.38	138.38	138.38		
18 Daily Variance				3.25	(19.22)	(19.22)	(25.38)	(20.38)	(20.38)	(40.38)	(30.38)	(20.38)	(35.38)	(20.38)	(43.38)	(28.38)	(43.38)	(43.38)	(43.38)	(25.38)				
19 Prog. Actual Production				48	128	196	309	427	545	643	751	869	972	1,090	1,185	1,295	1,380	1,475	1,588					
20 Prog. Potential Blasting %				38%	50%	54%	63%	70%	75%	75%	77%	78%	79%	80%	80%	82%	82%	81%	80%					

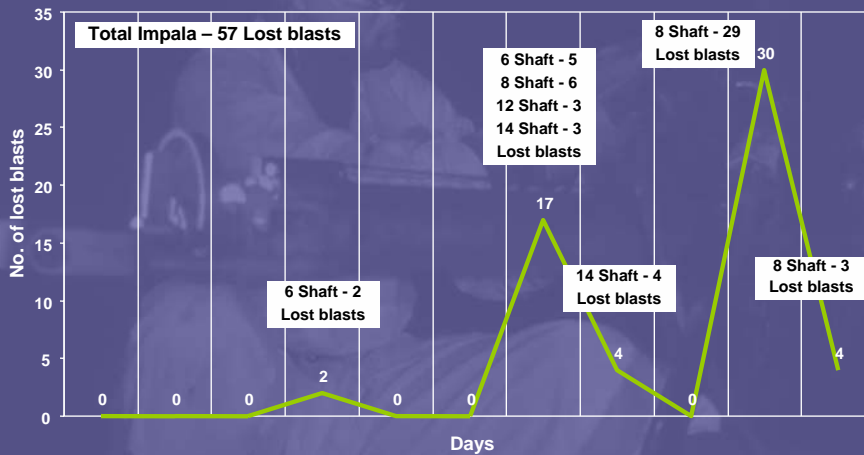
Main Development	Planned Shifts	MTD Prod	Planned Prod	12-Sep	13-Sep	14-Sep	15-Sep	17-Sep	18-Sep	19-Sep	20-Sep	21-Sep	25-Sep	26-Sep	27-Sep	28-Sep	29-Sep	01-Oct	02-Oct	MTD Prod	MTD Plan	MTI Var		
4.06US VgC2ID	23	6.5	0.86	0.5	0.5	0.5	0.5	0.5	0.5	UVS	0.5	UCO	0.5	0.5	UCO	0.5	0.5	0.5	0.5	6.5	14	(7.26)		
4.06US VgC6ID	23	6.5	0.86	EDT	EDT	EDT	EDT	0.5	0.5	UVS	0.5	UPS	0.5	0.5	PCC	0.5	0.5	0.5	0.5	4.8	10	(5.80)		
4.06US VgC3ID	23	4	0.86	EDT	EDT	0.5	0.5	0.5	0.5	UVS	0.5	UCO	0.5	0.5	UCO	0.5	0.5	0.5	0.5	4	14	(9.76)		
4.06US VgC5ID	23	11.2	0.86	EEM	EEM	EEM	EEM	1	1	1	1	1	1	1	1	1	1	1	1	11.2	13	(1.70)		
4.12MS VgD44D	23	7.7	0.91												EMT	PTR	1.2	0.5	7.7	10	(2.31)			
4.12UN VgV18C	0	0																				0	0.00	
4.12US VgV46D	23	3	1.04																			1	3	(10.6)
34 Daily Actual Production	138	44.9	5.18	0.5	0.5	1.0	2.0	3.5	3.0	1.0	3.0	2.0	4.0	4.5	3.0	3.5	3.5	3.5	5.7	42.9	74	(29.4)		
35 Daily Planned Production				2.37	3.23	3.23	4.27	4.27	5.18	5.18	5.18	5.18	5.18	5.18	5.18	5.18	5.18	5.18	5.18	5.18	5.18	5.18		
36 Daily Variance				(1.87)	(2.73)	(2.23)	(2.27)	(0.77)	(2.18)	(4.18)	(2.18)	(3.18)	(1.18)	(0.68)	(2.18)	(1.68)	(1.68)	(1.68)	(1.68)	(0.38)				
37 Prog. Actual Production				0.5	1.0	2.0	4.0	7.5	10.5	11.5	14.5	16.5	20.5	25.0	28.0	31.5	35.0	40.7	44.9					
38 Prog. Potential Blasting %				14%	14%	19%	25%	34%	38%	35%	38%	37%	40%	44%	44%	46%	48%	50%	54%					

Re/Pre-Dev	Planned Shifts	MTD Prod	Planned Prod	12-Sep	13-Sep	14-Sep	15-Sep	17-Sep	18-Sep	19-Sep	20-Sep	21-Sep	25-Sep	26-Sep	27-Sep	28-Sep	29-Sep	01-Oct	02-Oct	MTD Prod	MTD Plan	MTI Var		
4.06US VgC4HD	23	2	0.86	0.5	0.5	EVE	EVE	EVE	EVE	EVE	EVE	EVE	EVE	EVE	EVE	EVE	EVE	EVE	EVE	0.5	0.5	2	14	(11.78)
4.06US VgC6ID	23	6.5	0.86	0.5	0.5	0.5	0.5	0.5	0.5	UVS	0.5	UPS	0.5	0.5	0.5	0.5	0.5	0.5	0.5	6.5	14	(7.26)		
4.06US VgC1CD	23	11	0.86	0.8	0.8	0.8	0.8	1	1.2	0.8			0.8	0.8	PRD	0.8	0.8	0.8	0.8	11	14	(2.78)		
4.06US VgC2CD	23	7	0.86	0.8	0.8	0.8	0.8	1	1.2	0.8	PvP	PvP	PvP	PvP	PvP	PvP	PvP	PvP	PvP	7	14	(6.76)		

## Trends and analysis - Spotlight

### Lost blast due to Power Failure



## A new production bonus – July 01

- ❖ Same effort same pay (Mining methods and occupations)
- ❖ Cut off points introduced (Minimum requirements).
- ❖ Focus on production outputs (advance) per team without sacrificing labour productivity
- ❖ “Pot” - concept introduced for development teams
- ❖ Additional face advance bonus to Crew Captains up to R2 000 per team



## Production bonus

### Effort Scale – Zero to 100%

	30%	40%	50%	60%	70%	80%	90%	100%
Stoping	Ave efficiency per team	18 21	25	32	38 42	44 50	53	57 63
	Ave advance per team	170	240	300	360 402	420 475	480	540 600
		1.8 2	2.3	2.9	3.5 3.8	4.1 4.5	4.7	5.2 5.75
Off Reef	Ave efficiency per team	14	18 22	24	28	32 36	37	41 46
	Ave advance per team	3.1 3.4	4.2 4.6	5.2	6.2	7.3 8	8.3	9.3 10.4
		12	16.1 17	21	25	29 32	33	37 41.4
On Reef	Ave efficiency per team	6	8.3 8.5	10.5	12.5	14 15	16	18 20.7
	Ave advance per team	12	16 17	21	25	29 30	33	37 41.4
		12	16 17	21	25	29 30	33	37 41.4
Re/Pre	Ave efficiency per team	12	16 17	21	25	29 30	33	37 41.4
	Ave advance per team	12	16 17	21	25	29 30	33	37 41.4
		12	16 17	21	25	29 30	33	37 41.4



Legend			
Cut - Off	Current average	Reality	Potential

## What else did we do?

- ❖ Centralised blasting system implemented on all shafts to reduce the number of lost blasts due to misfires
- ❖ Daily lost blast committee meetings focus on reasons for lost blasts have proved to be a success
- ❖ Exception reporting and focusing on problem areas



IMPLATS



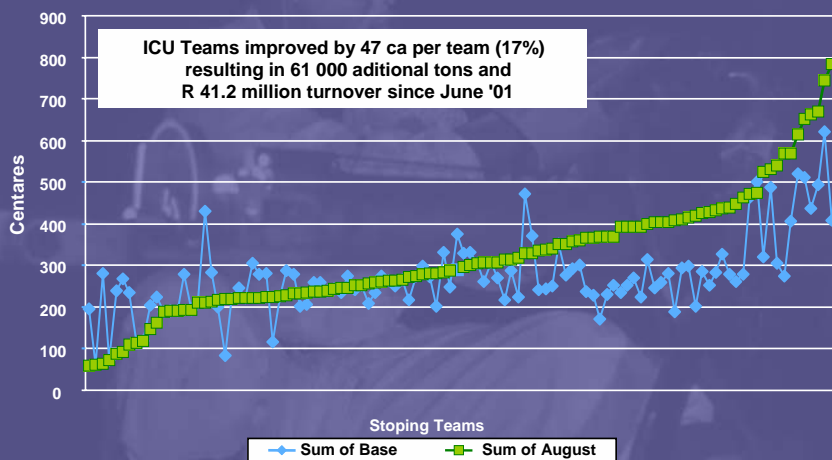
## “Intensive Care Unit” approach

- ❖ 120 stoping ICU teams identified
- ❖ 40% of total lost blast problem in these teams
- ❖ If we increase the ICU team’s productivity by 30%
  - ❖ 520 000 Additional tons pa
  - ❖ Potential 2 100 kg pa (R260 million turnover)
- ❖ These teams improved over last three months:
  - ❖ 17% increase in productivity
  - ❖ 61 000 additional tons
  - ❖ R41.2 million extra turnover

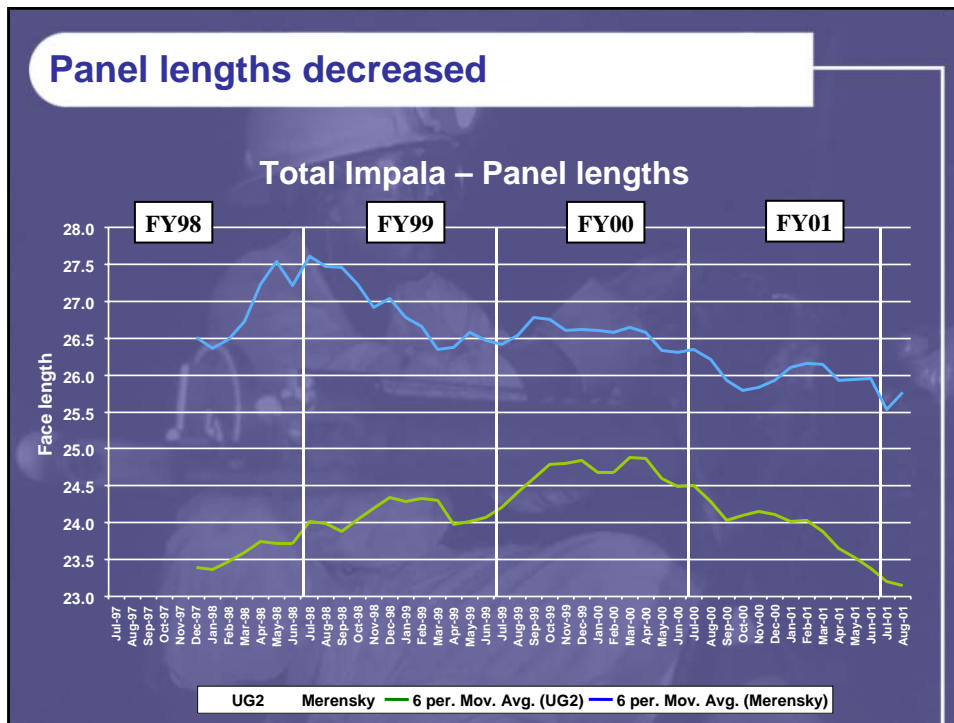


## “Intensive Care Unit” approach

### Focus on 20% stoping ICU Teams



## Panel lengths decreased



## What-if scenario – Increased panel lengths

- ❖ An average of 1.5 m panel length more per team
  - ❖ Equals 200 000 centares pa
  - ❖ Increase total face length by 1 500 m
  - ❖ Equals 800 000 channel tons pa
  - ❖ Potential 3 360 kg (R420 million turnover)
  - ❖ Grade improvement
  - ❖ Increase in efficiency



## Development and optimisation

- ❖ Re/pre development ratio vs stoping production
- ❖ Increase in development team sizes to gain better advances per team
- ❖ Optimisation
  - ❖ Fixco initiative concerned with optimisation of raise lines to gain maximum efficiencies on half level production
  - ❖ Looking at processes to ease operations



## Optimisation & Re/Pre Development

UG2 (Jun '01 - Aug '01 Ave)

	41	42	43	44	45	46	11C	47	48	49	50	51	52	
922	320	352			243		1,978					646	411	1,056
38,747	16,850	15,925			5,972		69,469					12,828	17,894	30,722
49.8	15.1	18.5			16.1		125.4					73.4	2.2	75.6
2,269			493	1,116	669		4,638	269	432	611	493	474	30	2,369
52,540			23,495	19,590	9,545		123,979	12,700	10,610	5,395	12,902	14,626	15,266	71,439
93.9			23.0	63.2	7.7		246.0	2.3	30.5	16.8	25.3	77.2	0.0	152.1
1,174				926		249	1,383					209		209
25,600				14,600		11,000	38,319				12,719			12,719
78.6				47.5		31.1	112.6				34.0			34.0
1,918			662	376	266	614	3,590	646	641	385				1,672
46,170			22,790	11,050	5,420	7,000	84,132	11,337	11,735	14,890				37,962
132.7			40.9	66.2	25.6	0.0	230.8	33.1	22.2	42.8				98.1
414				414	0		824		47	364				411
20,230				16,660	3,570		53,658		16,088	17,340				33,428
96.5				44.3	52.2		118.5		0.0	22.0				22.0
19					0	19	724	298	241	165				794
35,000					21,000	14,000	75,360	2,810	17,625	19,925				40,360
134.6					17.2	117.5	227.6	16.5	62.4	14.1				93.0
359					2	357	1,963	808	587	209				1,604
34,200					15,800	18,400	71,575	11,900	9,225	16,250				37,375
87.4					9.4	78.0	175.5	44.7	40.4	3.0				88.1
7,075	328	352	1,155	2,831	1,171	1,239	15,100	2,020	1,948	1,943	493	1,120	501	8,025
252,487	16,850	15,925	46,195	61,810	61,307	50,400	516,492	38,747	65,283	86,459	12,902	27,454	33,160	264,005
673.5	15.1	18.5	63.9	221.2	128.2	226.6	1,236.4	96.5	155.6	132.7	25.3	150.6	2.2	562.9

## The way forward

- ❖ Improving people skills
- ❖ Focus on revenue output without sacrificing labour efficiencies
- ❖ Other key drivers:
  - ❖ Advance per team
  - ❖ Advance per blast
  - ❖ Team sizes
  - ❖ Panel lengths
  - ❖ ICU team training



## The way forward

- ❖ Reconciling and one version of the truth
- ❖ Proactive approach
  - ❖ Collection of lost blast information before 08h00
  - ❖ Services departments take action and assist same morning to prevent possible lost blast
- ❖ Ongoing process of converting data into management information to assist in formulating action plans
- ❖ Computers planned for all Mine Overseers.



## New technology

### Technology advancement prediction

