TITLE	**:**	**Annual Report on SCSR Monitoring in the South African mining industry for the period January – December 2003**
REQUESTED BY	**:**	**Department of Minerals and Energy**
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Executive Summary

This report was compiled by the Division of Mining Technology of the CSIR in terms of its appointment by the Chief Inspector of Mines as Accredited Testing Authority (ATA). It reviews the general status of self-contained self-rescuers (SCSRs) deployed in the South African mining industry for the period 1 January - 31 December 2003. The report also identifies the commitment levels of the different mines/shafts taking part in the ongoing monitoring programme, as well as their infrastructures, specifically with regard to maintenance levels, control, record keeping and user training. The mines/shafts are identified only in code and in descending order of merit. The level of compliance with legislation (Regulation/Chapter 16.2, 16.3 and 16.4 of the Mine Health and Safety Act) is indicated using a categorisation system (compliance levels 1 – 4). A summary of the findings follows below and an analysis of trends is given on page 12.

Compliance level 1

Of the 133 mines/shafts participating in the ongoing monitoring programme during 2003, fifty-six (42.2%) had **excellent infrastructures** for maintenance, control, record keeping and user training programmes in place. In general, these mines/shafts exceeded the requirements specified in legislation (Regulation/Chapter 16.2, 16.3 and 16.4).

Compliance level 2

Sixty-seven mines/shafts (50.3%) had **sufficient infrastructures** for maintenance, control, record keeping and user training programmes in place to satisfy legislation.

Compliance level 3

Nine (6,8%) mines/shafts had **insufficient infrastructures** for maintenance, control, record keeping and user training programmes in place to satisfy legislation. In addition, multi-shifting of units was prevalent in some instances (three mines).

Compliance level 4

One mine (0,7%) participated but on its own terms, i.e. where units were not selected by the ATA and, therefore, did not comply with legislation.

The general impression is that mine standards applicable to SCSR maintenance show constant improvement, especially with regard to the number of mines progressing from Compliance level 2 to Compliance level 1. A substantial increase, i.e. from 27% in 2002 to 42% in 2003, has been recorded. The number of mines which do not satisfy minimum standards, i.e. those categorised as Compliance levels 3 and 4, has remained static and is still too high.

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1 Introduction

The primary purpose of this report is to provide feedback to interested and affected parties on the functional status of all approved SCSRs currently deployed in the South African minerals industry in 2003. These units comprise

AfroxPac-30 (South African),

AfroxPac-35 (South African),

Draeger Oxyboks K (German),

MSA / Auer SSR 30/100 (German), and

Ocenco M 20 (American).

2 Methods

Sampling of SCSRs for evaluation was done on the basis of the Department of Minerals and Energy's (DME) legislation dated 1 September 2002. In terms of this legislation a sample of at least 1% of the total units deployed at a mine are withdrawn annually for evaluation.

Functional performance and structural testing of SCSRs is conducted according to the South African Bureau of Standards (SABS) Private Specification 839 (CKM) and additionally, since 1 September 2002, to South African National Standard (SANS) 1737 Specification.

Leak testing, which forms part of the structural assessment, is conducted by means of an electronic negative pressure detector at –70 mbar and –200mbar on an intact unit prior to opening the protective casing. The performance assessment is conducted using mechanical lung function simulators. The simulator test provides an objective, reproducible parallel to human breathing in that the breathing cycle is mechanically simulated with respect to tidal volume and breathing rate. The exhaled air is enriched with carbon dioxide, humidified and heated to body temperature (37°C). Structural testing consists of an evaluation of the mechanical soundness of selected SCSR components (protective casing, breathing tube, pressure relief valve and breathing bag).

For the purposes of the monitoring programme, the simulator tests are performed at a ventilation rate of 30 litres/minute and 35 litres/minute. The former ventilation rate is in accordance with the South African Bureau of Standards (SABS) Private Specification 839 (CKM) for the approval of SCSRs, published in June 1989, and the latter in accordance with SANS 1737 Specification.

Functional performance of units submitted for assessment was allocated to one of the following categories in accordance with the original Government Mining Engineer Guideline 16/2/9:

Category 1: where functional performance does not conform to compliance test specifications but nevertheless does not exceed rejection limits; in this respect the life-saving potential of such units is deemed to be essentially unimpaired, and

Category 2: where functional performance has deteriorated beyond the rejection limit and survival is deemed to be jeopardised should the unit be used in the normal escape mode.

3 Results and discussion

A total of 984 units were tested during the reporting period, with samples representative of the five approved SCSRs (i.e. Draeger, MSA/Auer, AfroxPac-30, AfroxPac-35 and Ocenco) being submitted. There was a further improvement in the number of participating mines. During the review period three more mines/shafts participated than in the previous year with 120 more SCSRs being tested. This is as a result of a significant number of new SCSRs (approximately 35 000 units) which were purchased during 2001 and 2002 by some mines, specifically by one of the major gold mining operators as well as in the platinum mining sector. The replacement of the old MSA (MK1) and Ocenco M20 units represents a further contribution. From a number of mines/shafts with SCSRs deployed in excess of six years, a larger sample size than the required 1% was taken for functional performance assessment. A synopsis of the units submitted for assessment is given in Tables 1 and 2.

Table 1

Distribution of SCSRs tested by manufacturer / trade name

Manufacturer	Tested (n)	% deployed on all mines for a period exceeding one year
AfroxPac-30 AfroxPac-35	371 28	1,3 *0,6
Draeger Oxyboks K (Mk2)	248	1,2
MSA (Mk2)	332	1,1
Ocenco M20	5	1,0

(*Percentage of SCSRs deployed underground for a period exceeding one year)

The SCSR units tested per commodity mined and the respective number of mines (in some instances defined as specific business units or shafts or, in other instances, as a group of shafts), were as follows:

Table 2

Distribution of SCSRs tested by commodity

Commodity	Units	Mines (n)
Gold	407(*38 000)	35
Coal	339 (*28 500)	60
Others, i.e. Cu, Mn, Cr	40 (*4 000)	6
Diamond	49 (*5 500)	6
Platinum	149 (*14 000)	26
TOTAL	**984 (*90 000)**	**133**

(* Approximate total number of SCSRs deployed underground for a period exceeding one year)

The findings of the report highlight three main areas for consideration, namely

- the present status of SCSRs approved for use on South African mines,
- the standards for SCSRs maintenance and control, and
- the efficacy of the monitoring programme.

On the basis of functional performance characteristics there is, once again, a further general improvement in the overall condition of the SCSRs. This appears to be as a result of better record keeping on mine level and, in turn, maintenance**.** An encouraging trend is the dramatic decrease in the number of MSA/AUER, Draeger and Afrox SCSRs exhibiting leakage of the protective casings. This will no doubt extend the functional lifetime of the units and will lead to significant cost savings for the industry in the long term.

The comments listed below are intended to briefly summarise the current status.

The MSA/AUER SSR 30/100 SCSR displays, in units older than four years premature and functional critical increases in breathing resistance levels due to excessive powderisation of the chemical inside the canister. This appears to be as a result of moisture penetration into the chemical. The main cause was identified to be the use of casing seals consisting of a material with inappropriate permeability characteristics. This led to gas/moisture ingress into the chemical over time and, subsequently, to an accelerated deterioration in functional performance. It was established that the manufacturer changed the material of their casing seal in the mid 1990s since units deployed prior to 1995 did not exhibit this problem. The supplier implemented a service programme in 2001 to change the casing seals of all the affected units (approximately 20 000 units). However, there were still a small number of units found during the monitoring programme in 2003 where the casing seals had not been replaced. A further cause of the accelerated deterioration in functional performance is that a large number of units, which were upgraded (new inner parts) over the last five years, still incorporate the original protective casings. In some instances these are in excess of sixteen years old and exhibit major deformations, making these units more prone to moisture diffusion and, ultimately, to functional performance deterioration.

The number of MSA (Mk2) units exhibiting leakage into the protective casing has decreased substantially when compared to previous findings.

The Draeger Oxyboks K (Mk2) displays in units older than seven years premature, but not critical increases, in breathing resistance after 25 minutes during breathing simulator tests. This can be attributed mainly to the more effective filter system incorporated in this unit to contain the chemical powder inside the canister. Although fairly innocuous at present, ongoing monitoring is essential.

The number of Draeger units exhibiting leakage into the protective casing has decreased substantially when compared to the previous findings.

The functional performance of the limited number of Ocenco M20 units subjected to an inspection service by the supplier during 1998/99 was satisfactory. Of great concern is that there still are a number of non-serviced units deployed, especially in small mining operations. In the majority of these units the inherent problem remains powderisation of lithium hydroxide.

This is serious since it could lead to faulty regulators and complete functional failure. The consequences of incompletely charged oxygen cylinders (due to leaking cylinder valves) are quite obvious. The DME issued a directive (Reference 24/4/8, dated 07 October 2002) that the Ocenco M20 units will from 01 January 2004 no longer be approved for use in the South African mining industry.

The majority of the AfroxPac-30 units tested performed satisfactorily. In original units deployed for more than six to seven years, a degree of material fatigue has been observed, as reported previously. The hard material used in the breathing tubes of these older units deforms and, possibly, leads to flow restrictions in the longer term. Chemical powderisation into the breathing bag has also been observed in an increasing number of units deployed for more than three years. This does affect the functional performance of the units to various degrees. In units deployed for more than four years a premature increase in carbon dioxide levels, as well as premature increases in breathing resistance, led to reduced functional duration. The observed failures in Afroxpac-30 SCSRs during 2003 were in some cases still attributed to broken breathing bags of units which, for one reason or another, were not included in the breathing bag replacement programme carried out by the supplier in 1997. In other instances, chemical powder spillage out of the breathing bag and onto the mouthpiece and breathing tubes resulted in complete functional failures. Furthermore, units with what appeared to be longstanding casing leakages also exhibited complete functional failure.

The number of Afroxpac-30 units with leakage into the protective casing has substantially decreased when compared to the previous year.

The limited number of Afroxpac-35 units tested during 2003 performed satisfactorily and at present, hardly exhibits any functional performance deterioration. No leakages into the protective casings of the units were observed.

Participating mines were graded according to the categorisation system described at the outset. The results are summarised below (Table 3).

Table 3

Rating of mines in terms of compliance with Legislation

Compliance level	**Number of mines**	**Codes ***
1	56	**Will fill in the relevant code**
2	67	Remainder
3	9	**Will fill in the relevant codes**
4	1	**C18**

* The DME and the ATA are in possession of the complete list of mines.

For analysis, a database was established in 1996 in order to follow performance trends of the different units deployed in the South African mining industry. These trends are presented in Appendices 1 and 2.

4 Conclusion and recommendation

The potential merits of a co-ordinated, ongoing SCSR monitoring programme in the timely identification of adverse functional degeneration of units is obvious and appear to be well established. This report, as well as previous ones, has cited numerous examples of the importance of a pro-active programme of SCSR maintenance. Retrospective fault-finding exercises, quite clearly, would serve no useful purpose in the present context.

In addition to functional performance, the programme also includes an assessment of the structural integrity of SCSRs. During the visits of the ATA to mines an inspection is conducted on the general condition of the SCSRs deployed. Technical advice regarding functional performance trends of the units is provided and the mines' SCSR control and maintenance infrastructures are evaluated. However, auditing in respect of maintenance and record keeping should be carried out more regularly by the Department of Minerals and Energy with the assistance of the ATA.

In contravention with legislation, SCSR multi-shifting is still practised by some mines, although on a very small scale**.** The infrastructures required to cater for such a contingency, even if recognised as legitimate, are hopelessly inadequate. Quite obviously, the health and safety risk to employees is unacceptable.

A review of recent reports (Schreiber and Kielblock, 2000; 2001; 2002), including the current report, suggests that SCSR deployment in the South African mining industry has increased by approximately 30 000 units to a total number of 120 000 units in 2003.

It appears that the South African mining industry has been able to translate experience gained over the last seventeen years of SCSR deployment into improved maintenance standards. Using the rating/categorisation system as a parameter of general efficacy, the trend with respect to mines with Compliance levels 1 and 2, as given below, is a clear reflection of these improvements.

- Compliance level 1 ratings, expressed as a percentage, showed a consistent improvement over recent review periods, namely 9,8 (1999); 17,4 (2000); 18,4 (2001), 26,9 (2002) and 42,2 (2003).
- Adding Compliance level 1 to Compliance level 2 ratings to reflect 'generally acceptable compliance' reveals an overall rating exceeding 90%.
- Although unacceptable compliance ratings still exist, the trend shows improvement.

There can be little doubt that any improvements in compliance ratings must, in the first instance, be attributed to commitment at mine level. In this respect, the confidence of the mines towards the deployment of SCSRs has strengthened and the mines are able to build on their cumulative experience base.

The compliance ratings provide an excellent measure of the efficacy of mines' risk management process which, in this respect, applies to the life-saving potential of SCSRs. However, of fundamental importance is the quality of the input information or feedback, as provided by SCSR monitoring, a programme under tripartite jurisdiction, i.e. the DME, as well as employer (Industry) and employee (union) representation. In addition, albeit only indirectly, manufacturers and suppliers also fulfil a key function.

Against the above background, it should be quite obvious that, in having attained a relatively high level of SCSRs maintenance standards, there has been substantial reliance on a rather complex interaction between various parties. It is likely that further improvements, as well as the avoidance of complacency, will depend largely on the extent to which clear lines of communication can be maintained or even improved. A previous recommendation, namely that the Tripartite Technical Committee gives consideration to this as a possible issue, is reiterated.

Finally, it should be noted that as in previous years, a number of emergencies occurred in the South African mining industry in 2003 where irrespirable atmosphere developed due to underground fires. In these emergencies approximately 250 persons donned and used their SCSRs to escape successfully out of danger into safe areas.

5 References

Schreiber W.L., Kielblock A.J. (2003), Annual Report of the 2002 SCSR Monitoring Programme, Report No. EC-03-0236, CSIR. Mining Technology, Johannesburg.

Schreiber W.L., Kielblock A.J. (2002), Annual Report of the 2001 SCSR Monitoring Programme, Report No. ESH 02-0272, CSIR. Mining Technology, Johannesburg.

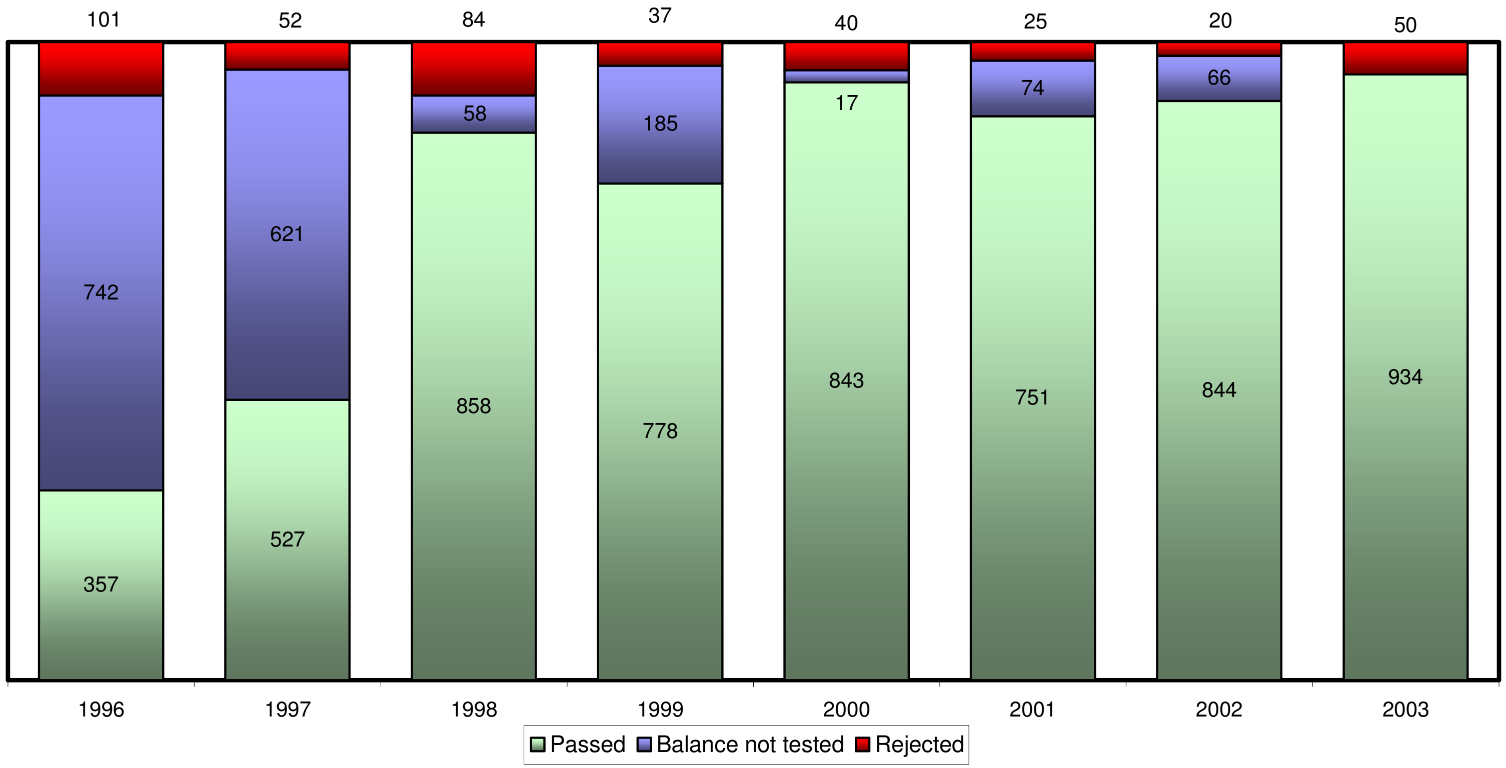
Schreiber W.L., Kielblock A.J. (2001), Annual Report of the 2000 SCSR Monitoring Programme, Report No. ESH 00-0159, CSIR. Mining Technology, Johannesburg.

Schreiber W.L., Kielblock A.J. (2000), Annual Report of the 1999 SCSR Monitoring Programme, Report No. ESH 00-0133, CSIR. Mining Technology, Johannesburg.

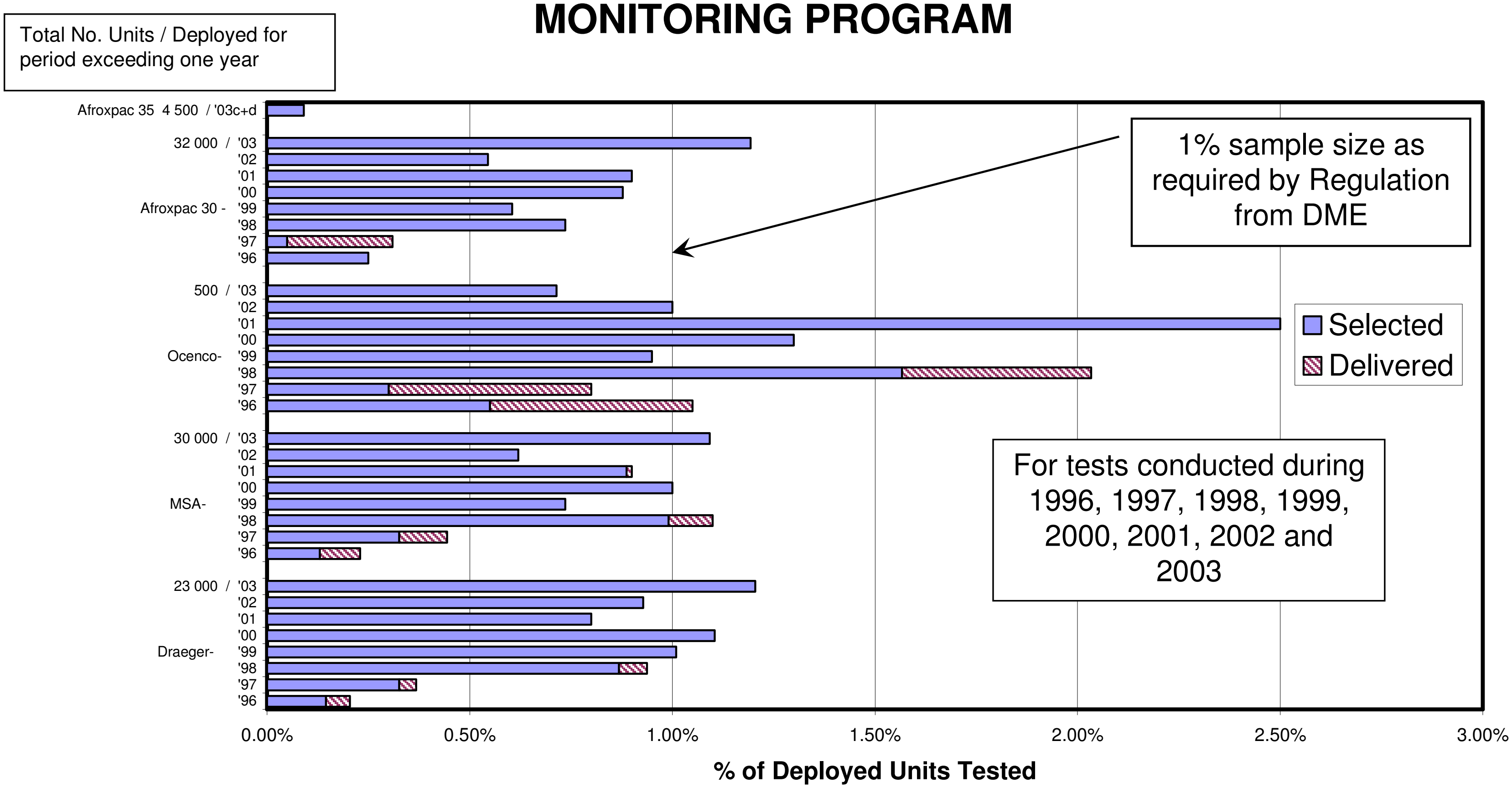
Appendix 1

Performance graphs for SCSRs since 1996

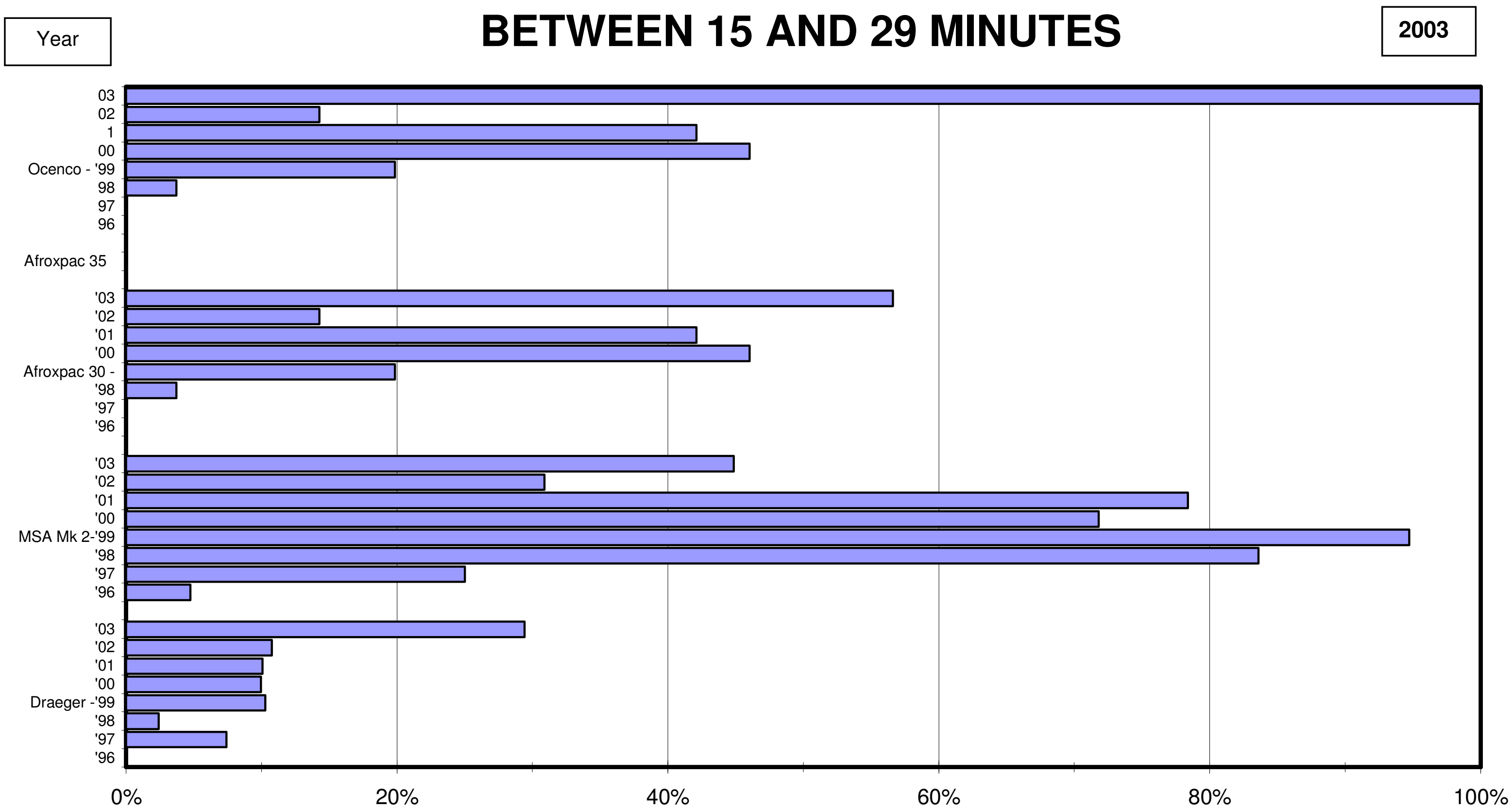
PROPORTION OF UNITS TESTED IN ONGOING PERFORMANCE MONITORING PROGRAMME

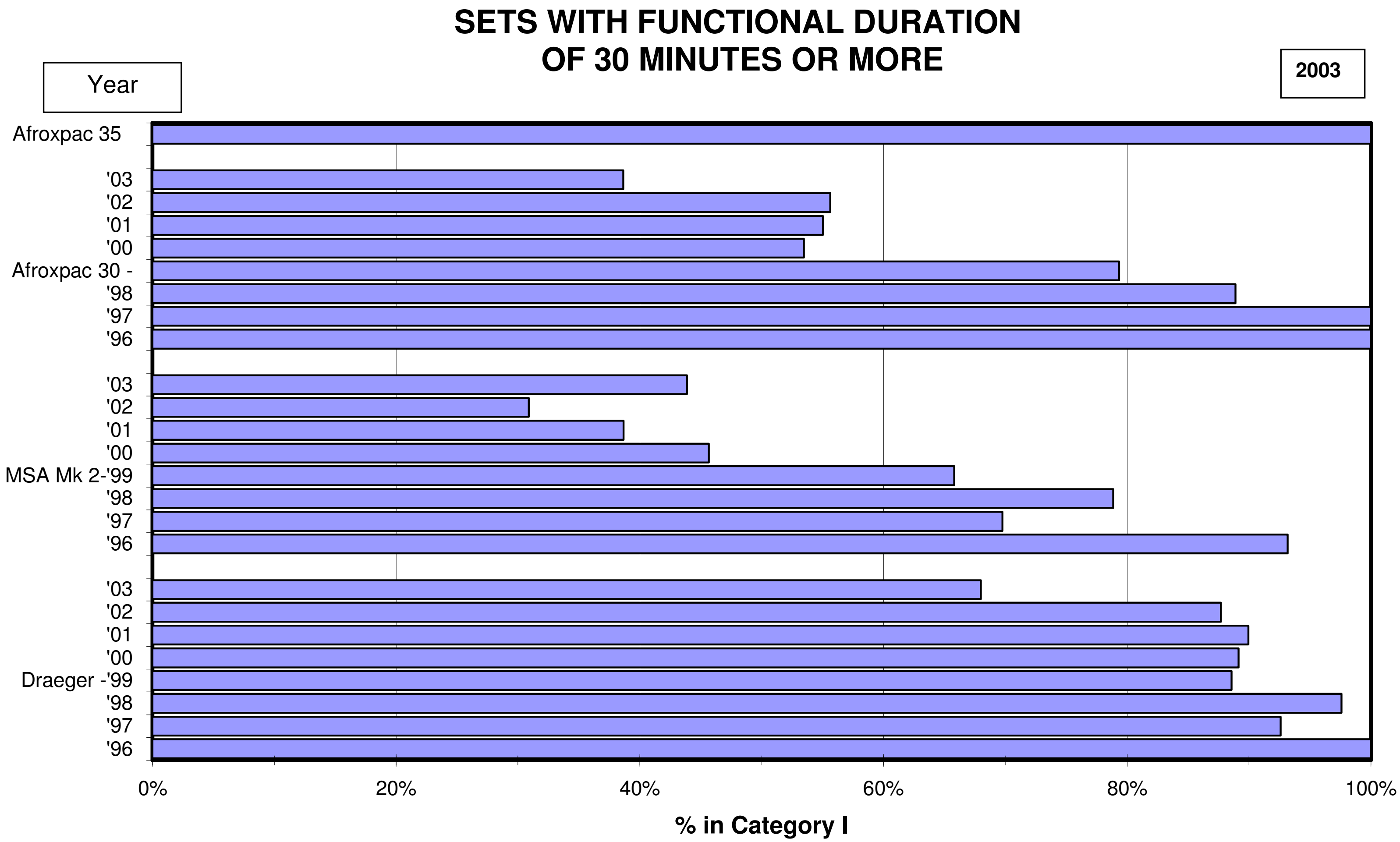


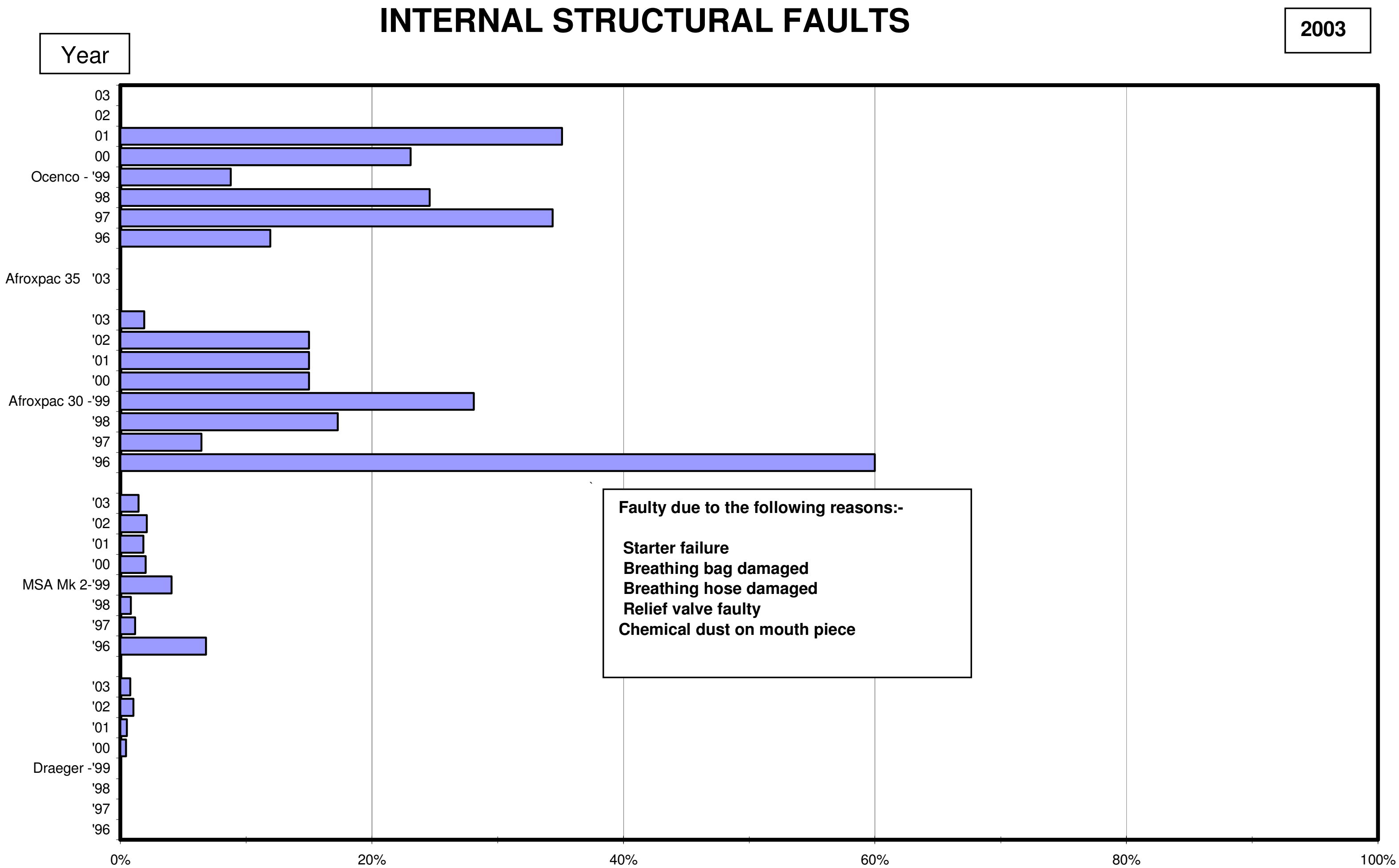
PROPORTION OF UNITS TESTED IN ONGOING PERFORMANCE MONITORING PROGRAM



SETS WITH FUNCTIONAL DURATION BETWEEN 15 AND 29 MINUTES

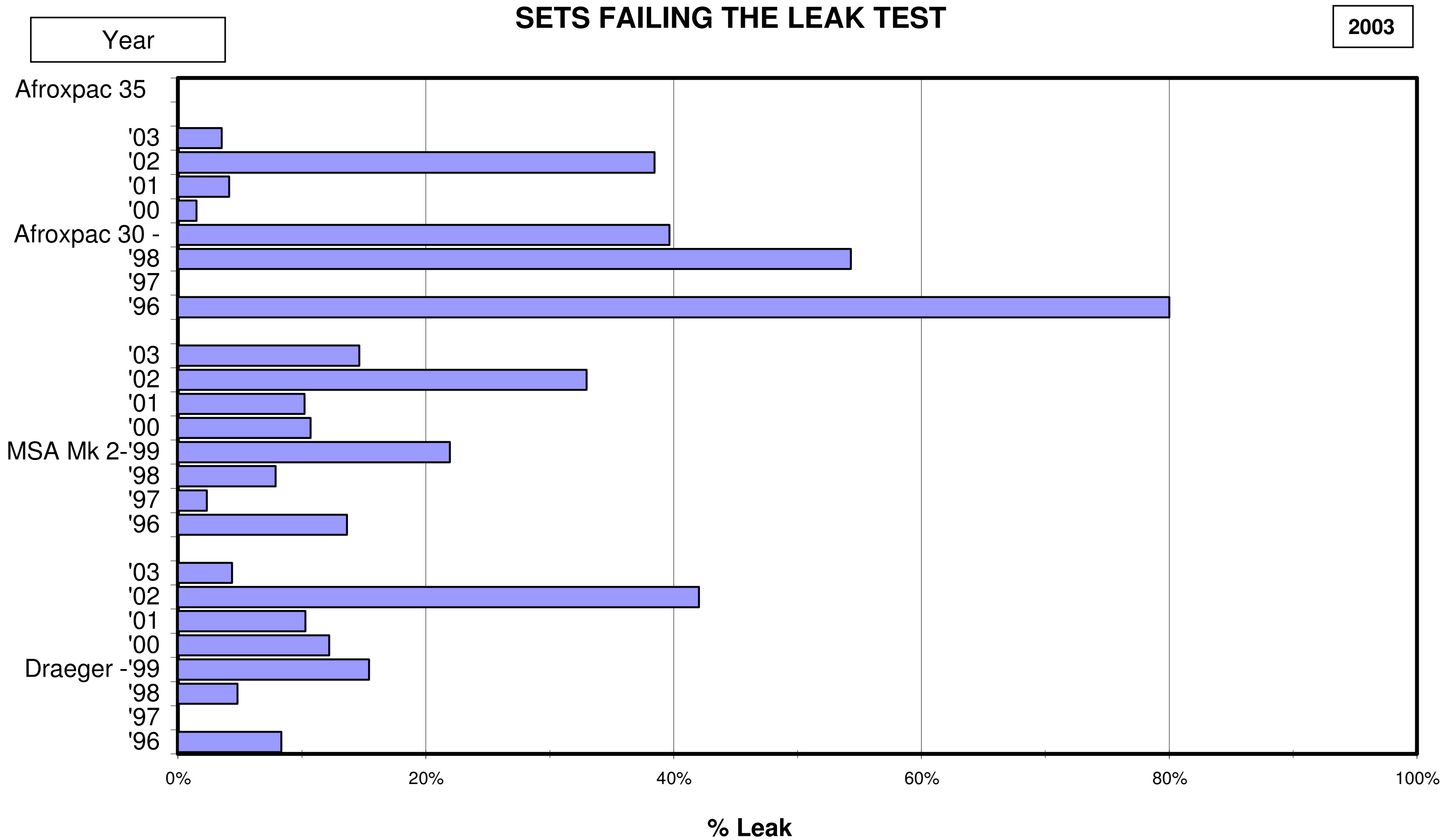



SETS WITH FUNCTIONAL DURATION
OF 30 MINUTES OR MORE
Year
2003
Afroxpac 35
'03
'02
'01
'00
Afroxpac 30 -
'98
'97
'96
'03
'02
'01
'00
MSA Mk 2-'99
'98
'97
'96
'03
'02
'01
'00
Draeger -'99
'98
'97
'96
0%
20%
40%
60%
80%
100%
% in Category I

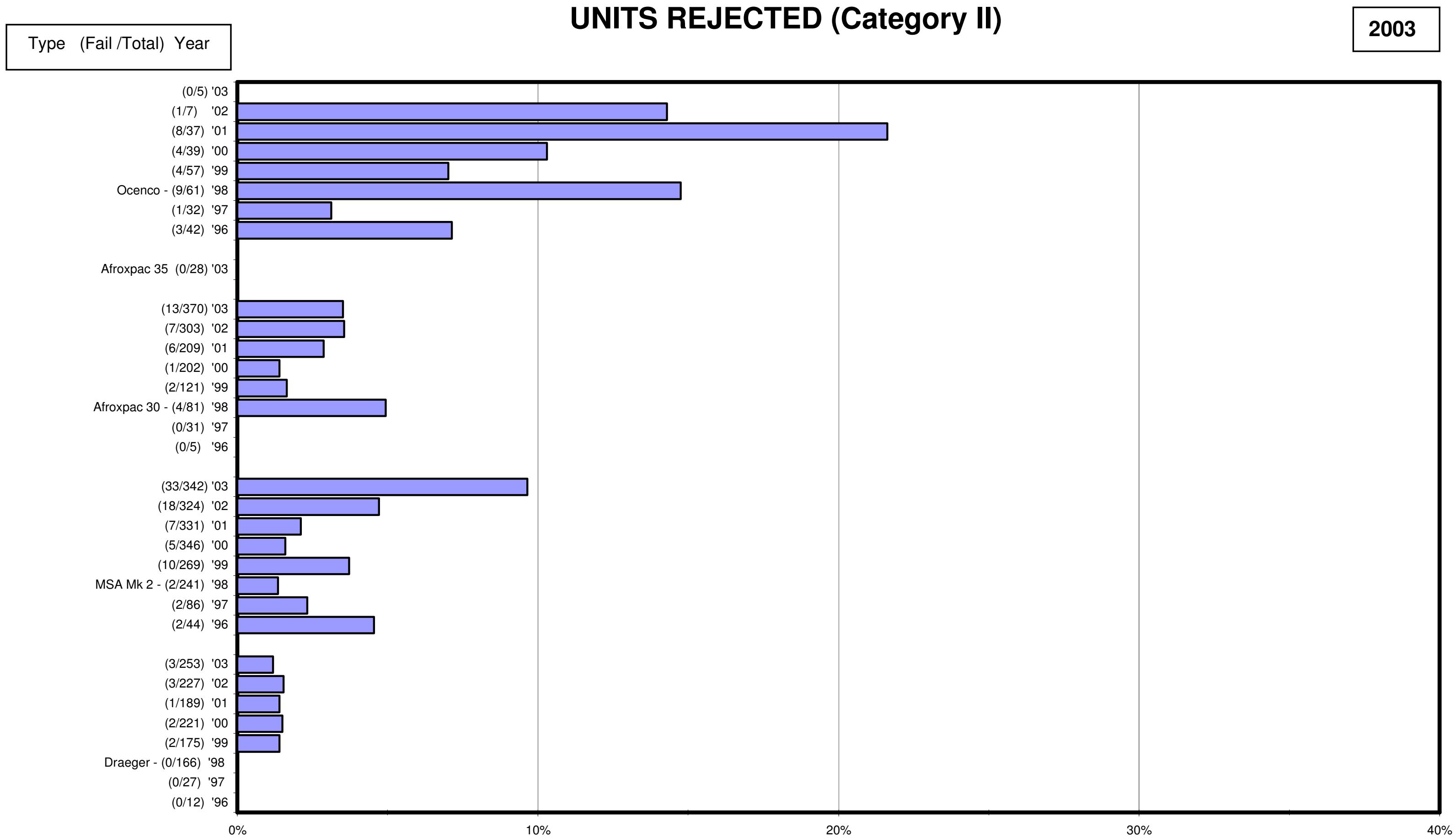


INTERNAL STRUCTURAL FAULTS
2003
Year
03
02
01
00
Ocenco - '99
98
97
96
Afroxpac 35 '03
'03
'02
'01
'00
Afroxpac 30 -'99
'98
'97
'96
'03
'02
'01
'00
MSA Mk 2-'99
'98
'97
'96
'03
'02
'01
'00
Draeger -'99
'98
'97
'96
0%
20%
40%
60%
80%
100%
Faulty due to the following reasons:-
Starter failure
Breathing bag damaged
Breathing hose damaged
Relief valve faulty
Chemical dust on mouth piece

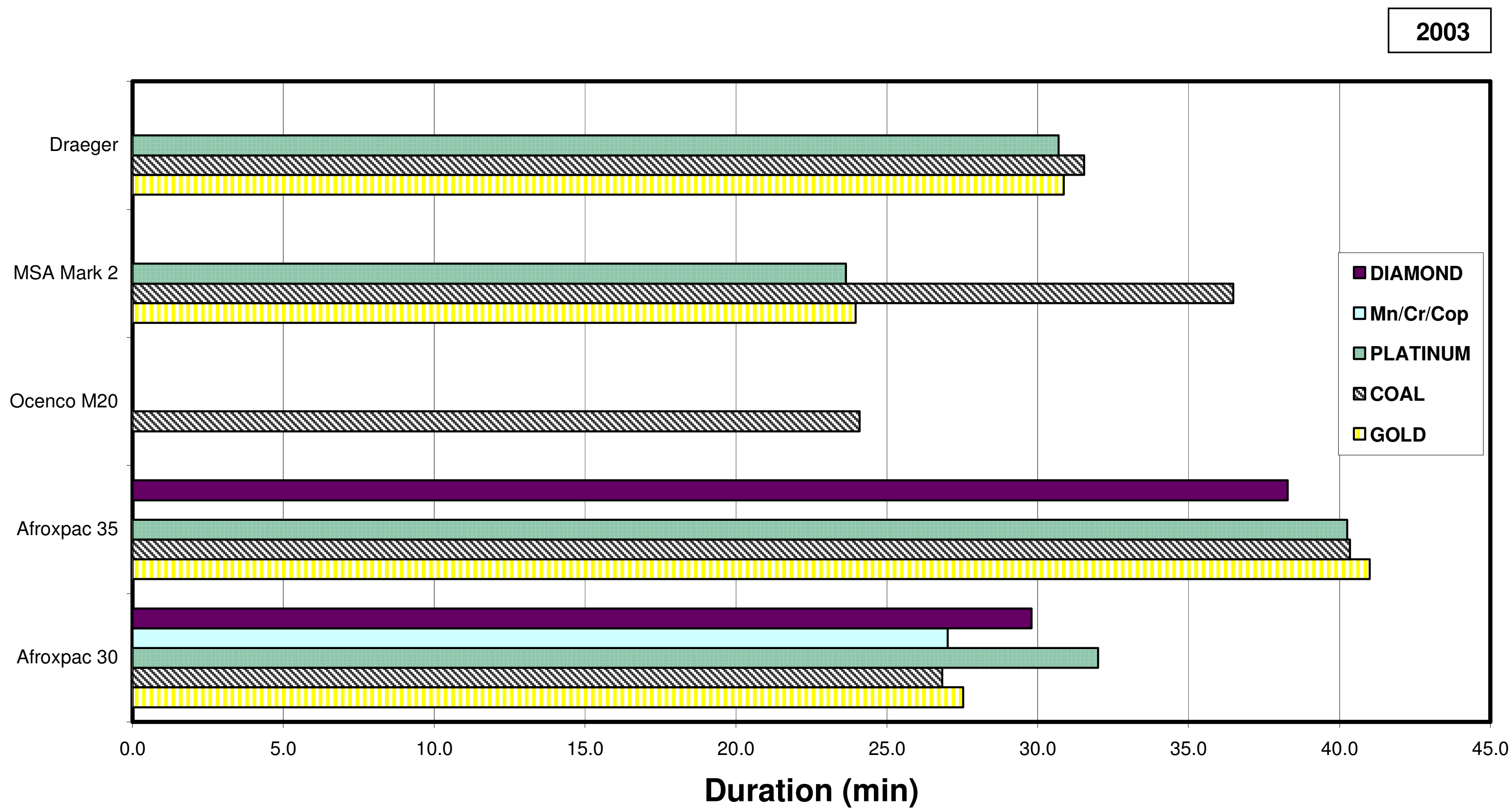
SETS FAILING THE LEAK TEST



UNITS REJECTED (Category II)

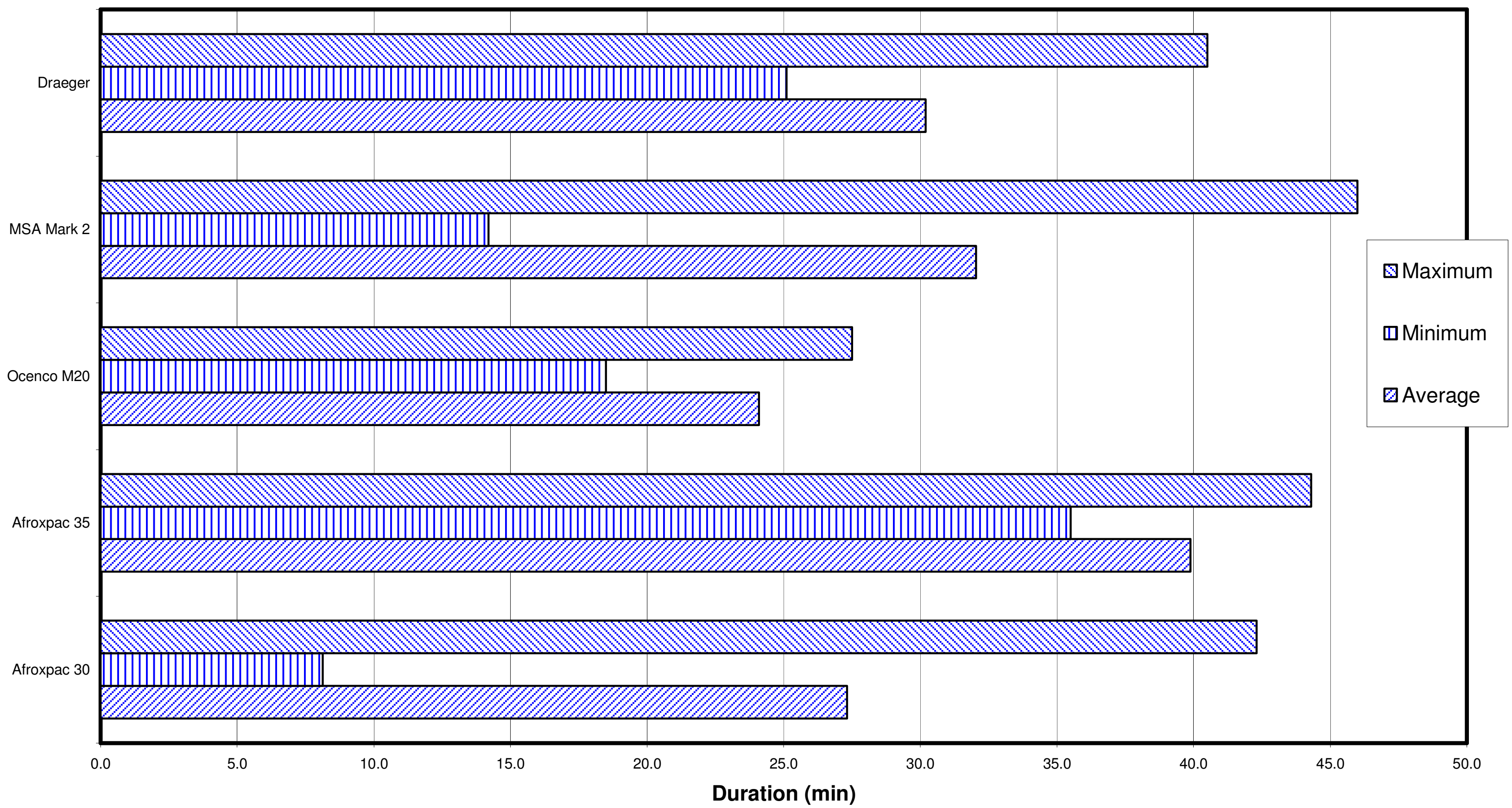


INDUSTRY WIDE AVERAGE DURATION OF SCSRs PER COMMODITY GROUP

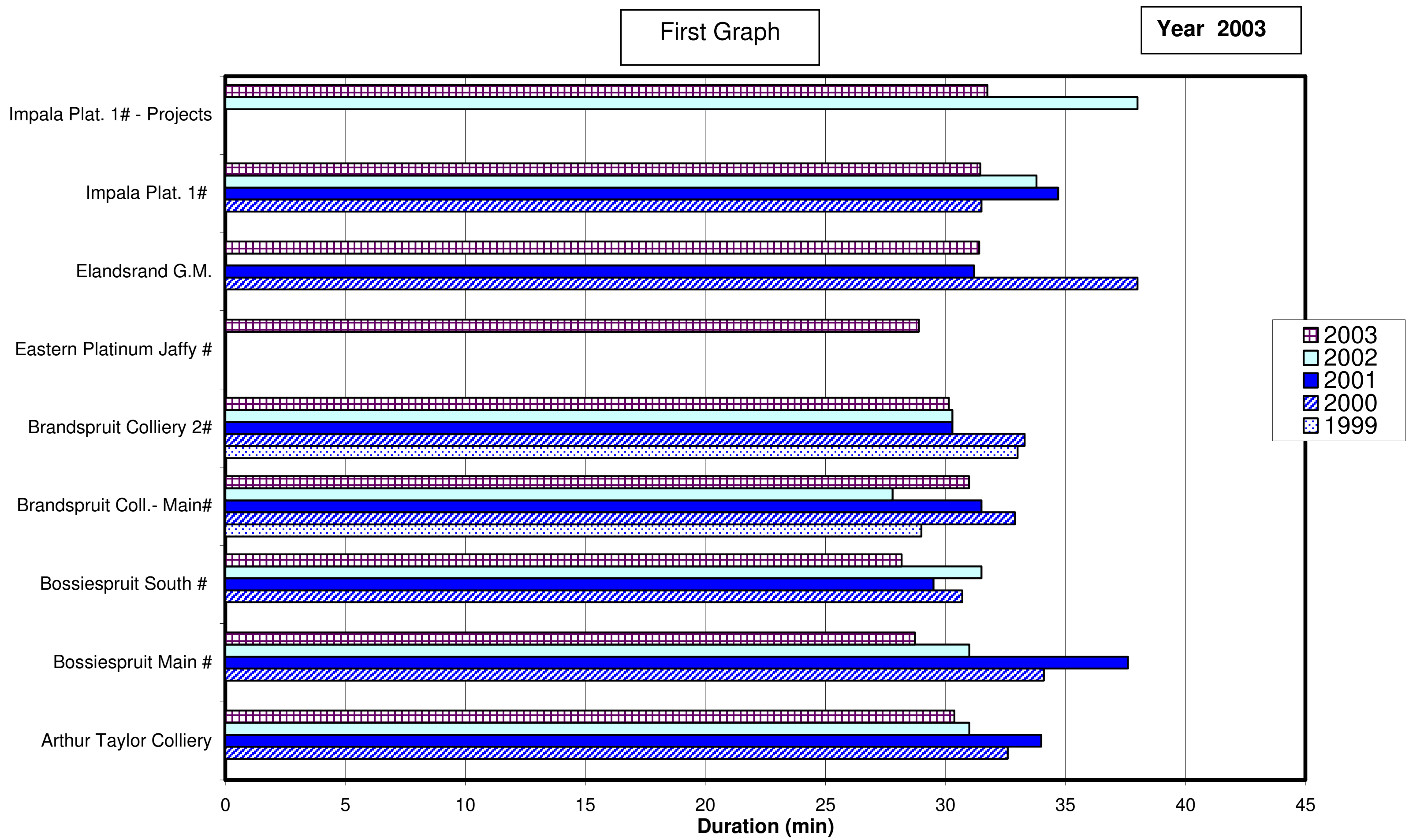


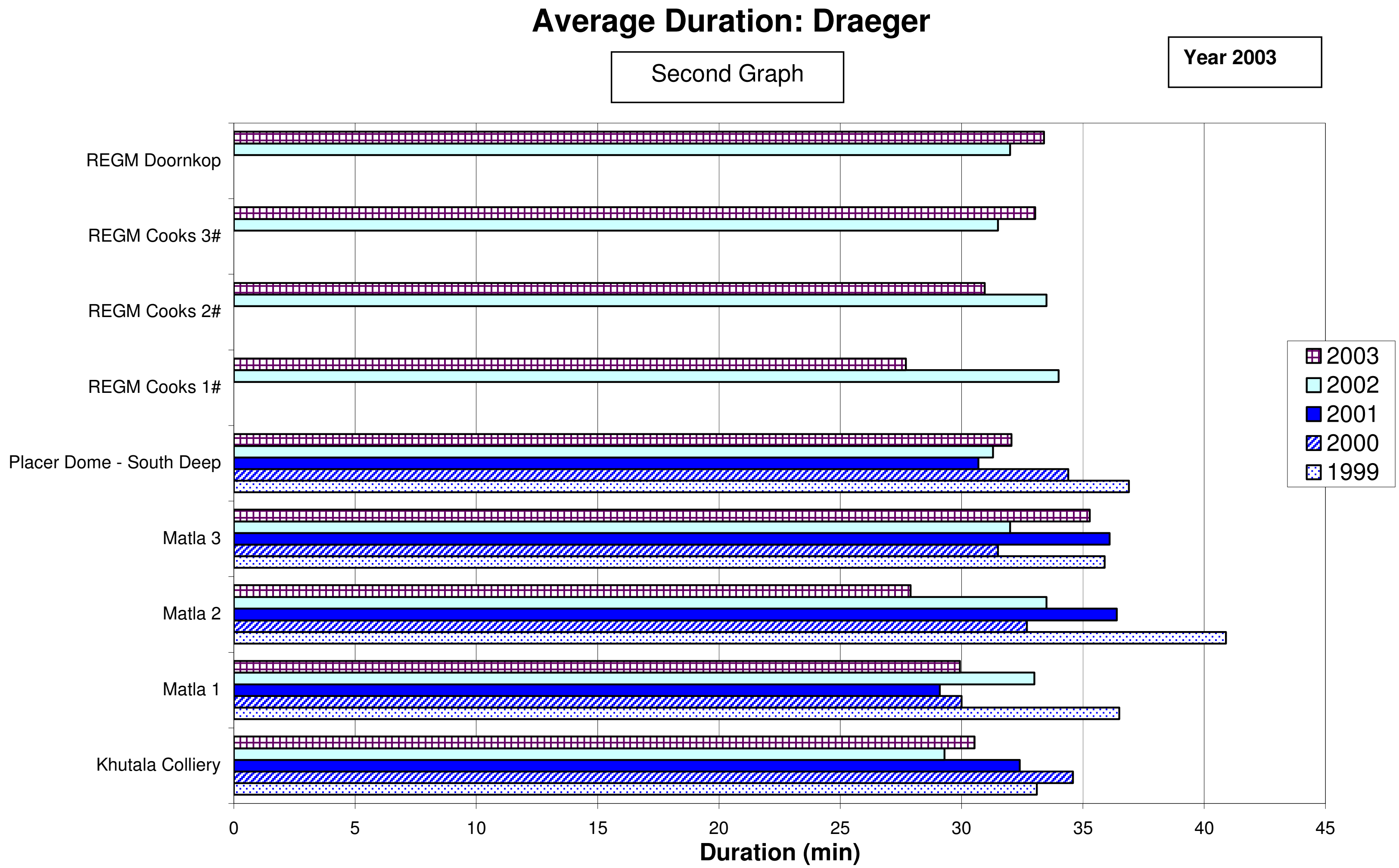
INDUSTRY WIDE STATISTICS PER MAKE OF SCSR

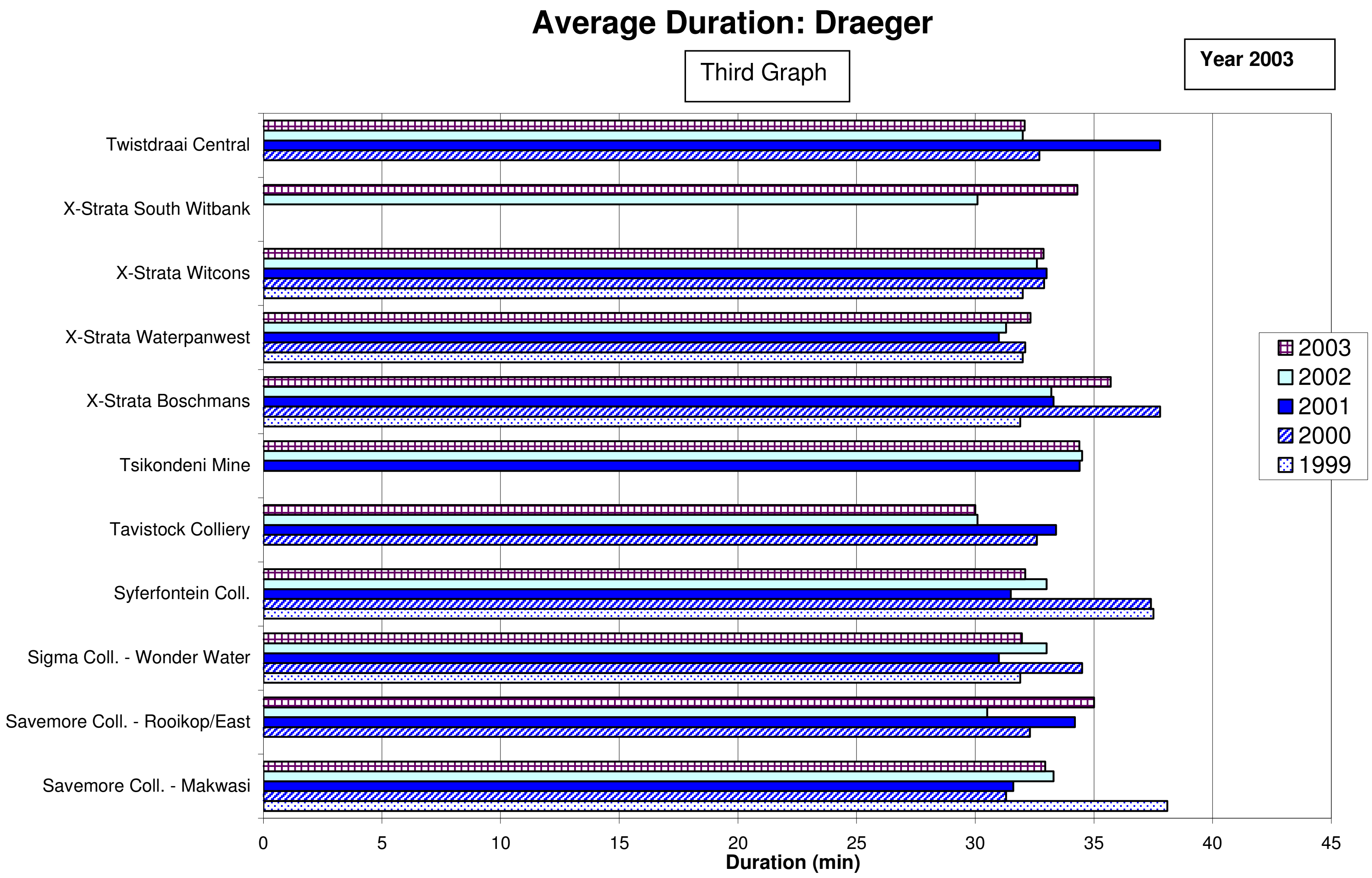
2003



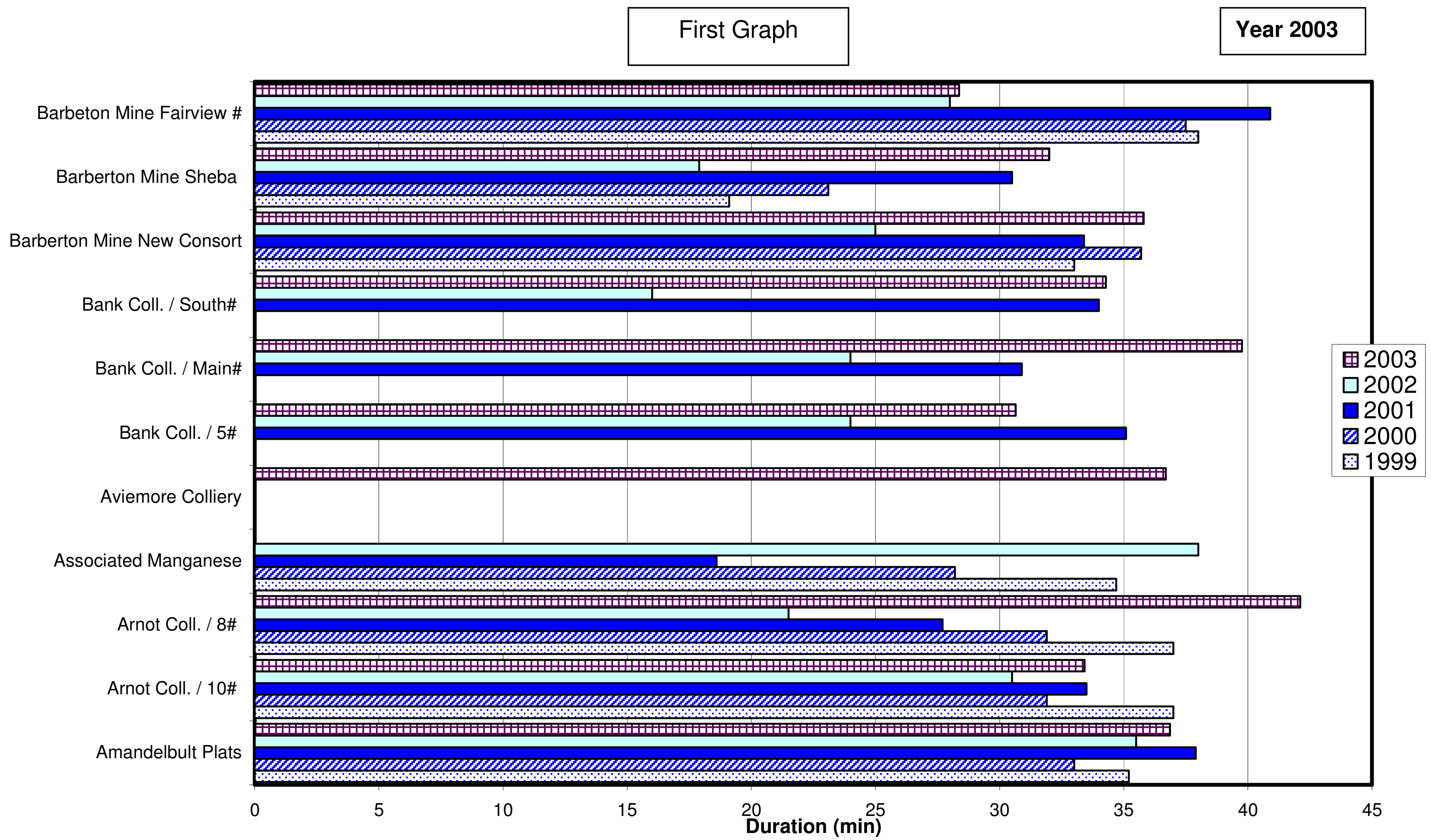
Average Duration: Draeger



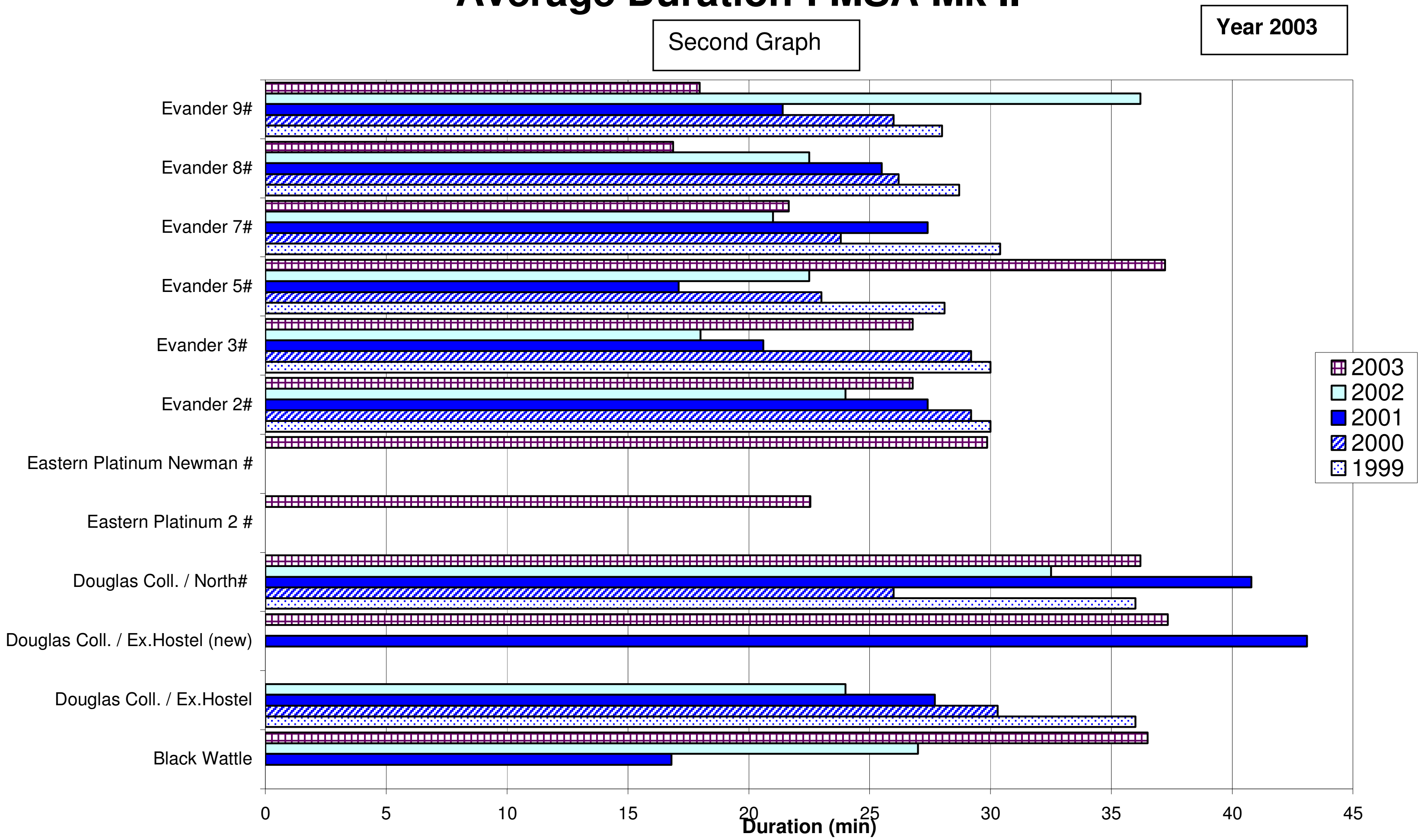

Average Duration: Draeger
Second Graph
Year 2003
REGM Doornkop
REGM Cooks 3#
REGM Cooks 2#
REGM Cooks 1#
Placer Dome - South Deep
Matla 3
Matla 2
Matla 1
Khutala Colliery
0
5
10
15
20
25
30
35
40
45
Duration (min)
2003
2002
2001
2000
1999

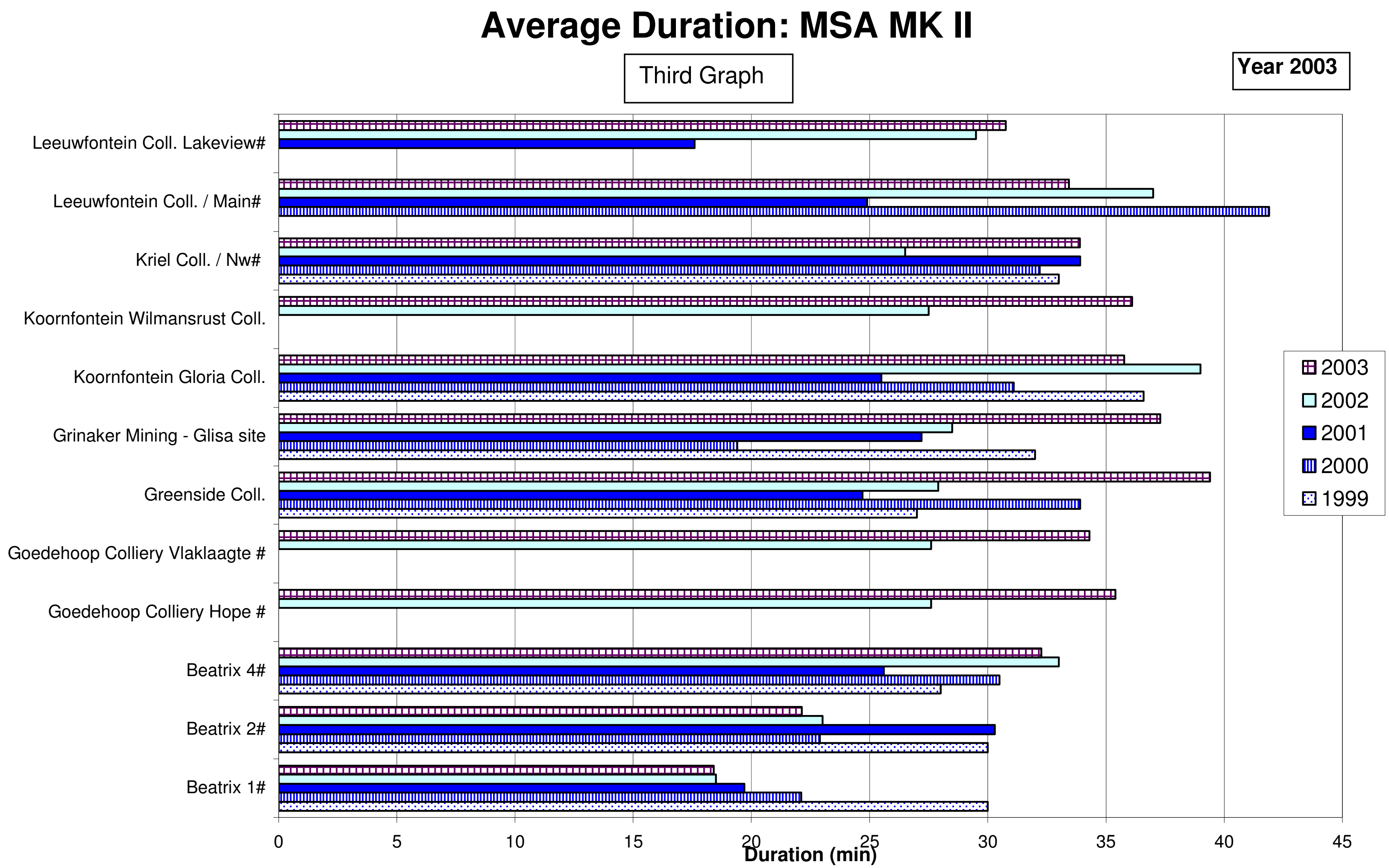

Average Duration: Draeger
Third Graph
Year 2003
Twistdraai Central
X-Strata South Witbank
X-Strata Witcons
X-Strata Waterpanwest
X-Strata Boschmans
Tsikondeni Mine
Tavistock Colliery
Syferfontein Coll.
Sigma Coll. - Wonder Water
Savemore Coll. - Rooikop/East
Savemore Coll. - Makwasi
2003
2002
2001
2000
1999
0
5
10
15
20
25
30
35
40
45
Duration (min)

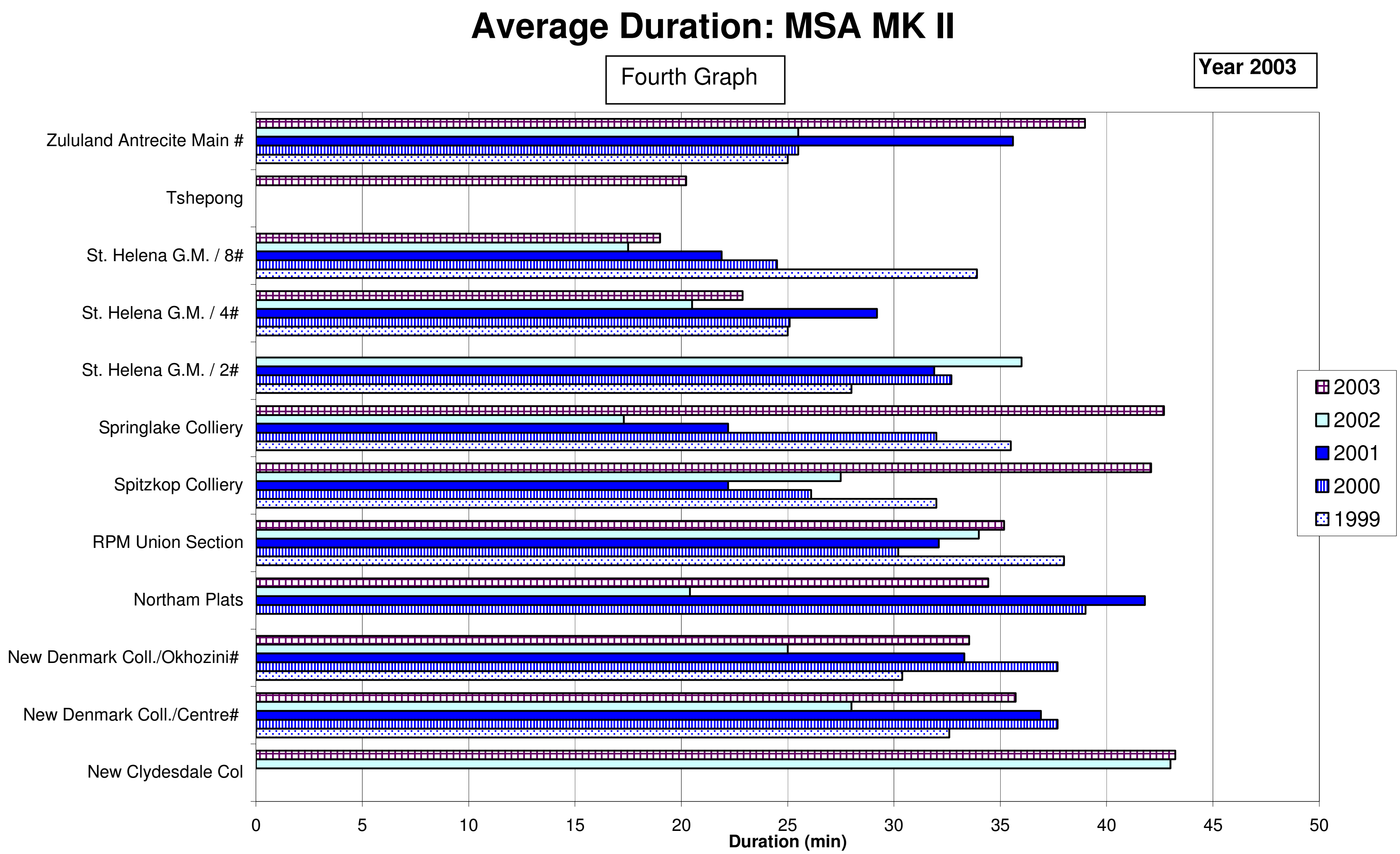
Average Duration: MSA MK II



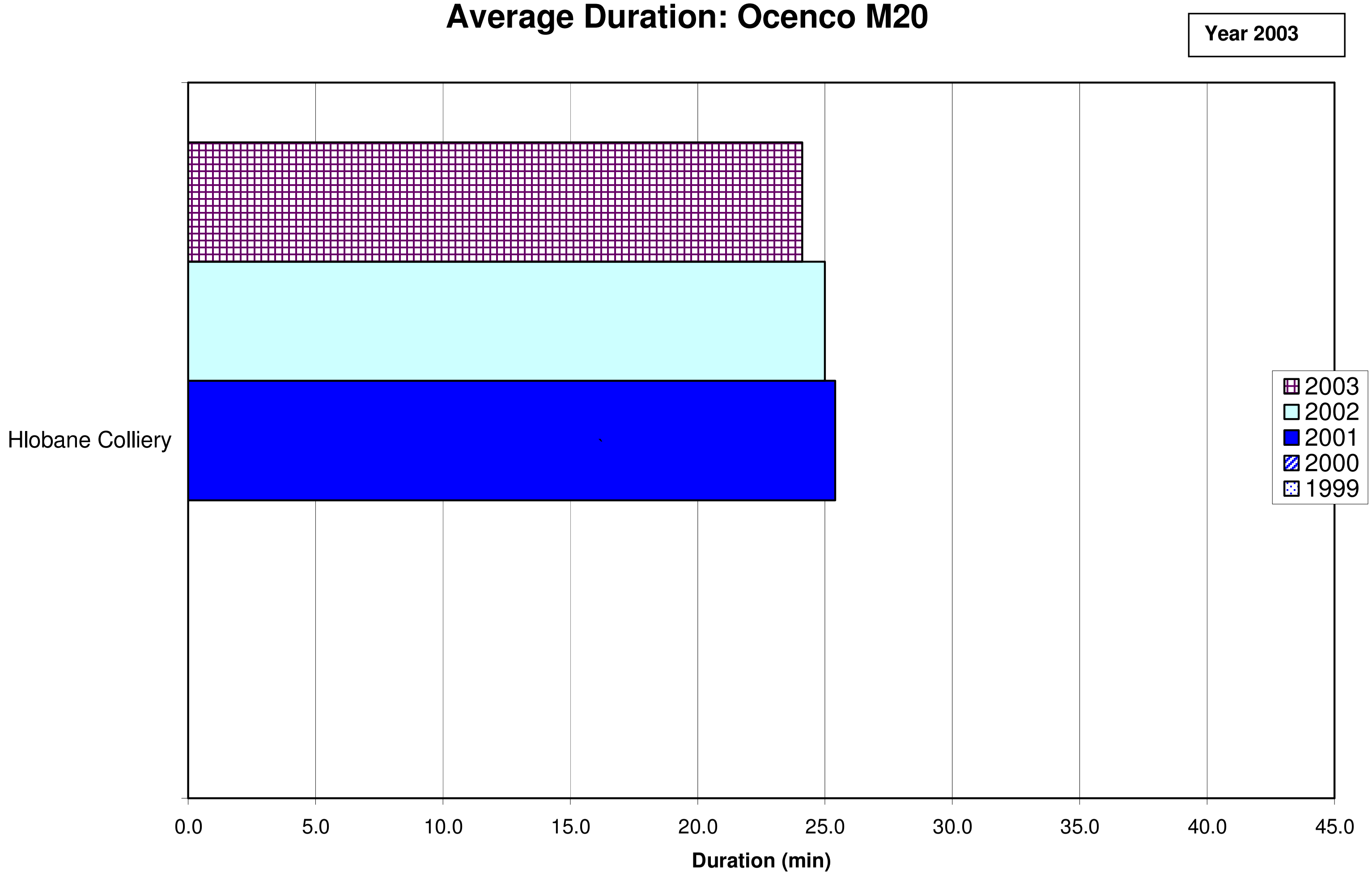
Average Duration : MSA Mk II

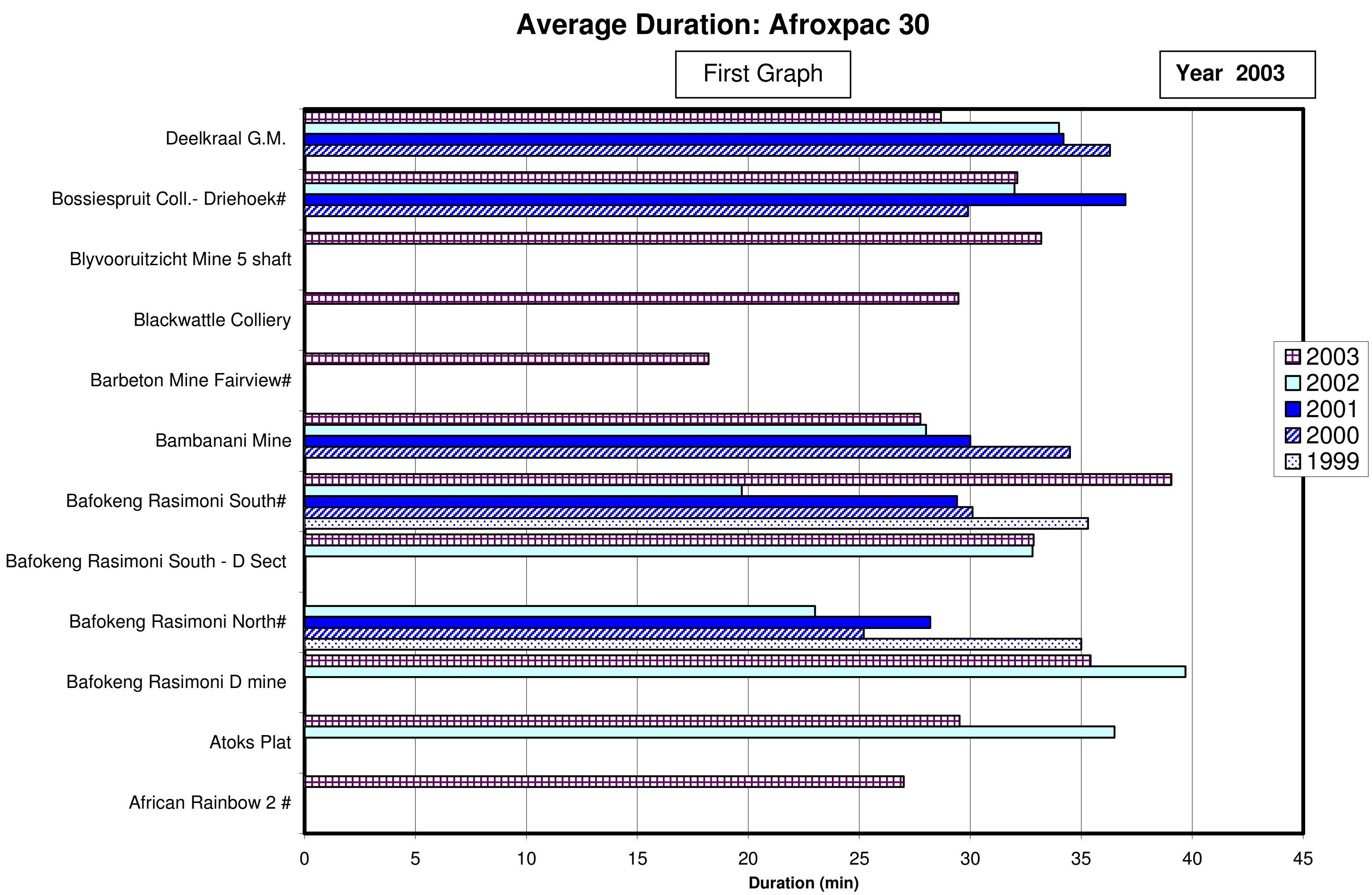



Average Duration: MSA MK II
Third Graph
Year 2003
Leeuwfontein Coll. Lakeview#
Leeuwfontein Coll. / Main#
Kriel Coll. / Nw#
Koornfontein Wilmansrust Coll.
Koornfontein Gloria Coll.
Grinaker Mining - Glisa site
Greenside Coll.
Goedehoop Colliery Vlaklaagte #
Goedehoop Colliery Hope #
Beatrix 4#
Beatrix 2#
Beatrix 1#
0
5
10
15
20
25
30
35
40
45
Duration (min)
2003
2002
2001
2000
1999


Average Duration: MSA MK II
Fourth Graph
Year 2003
Zululand Antrecite Main #
Tshepong
St. Helena G.M. / 8#
St. Helena G.M. / 4#
St. Helena G.M. / 2#
Springlake Colliery
Spitzkop Colliery
RPM Union Section
Northam Plats
New Denmark Coll./Okhozini#
New Denmark Coll./Centre#
New Clydesdale Col
2003
2002
2001
2000
1999
0
5
10
15
20
25
30
35
40
45
50
Duration (min)

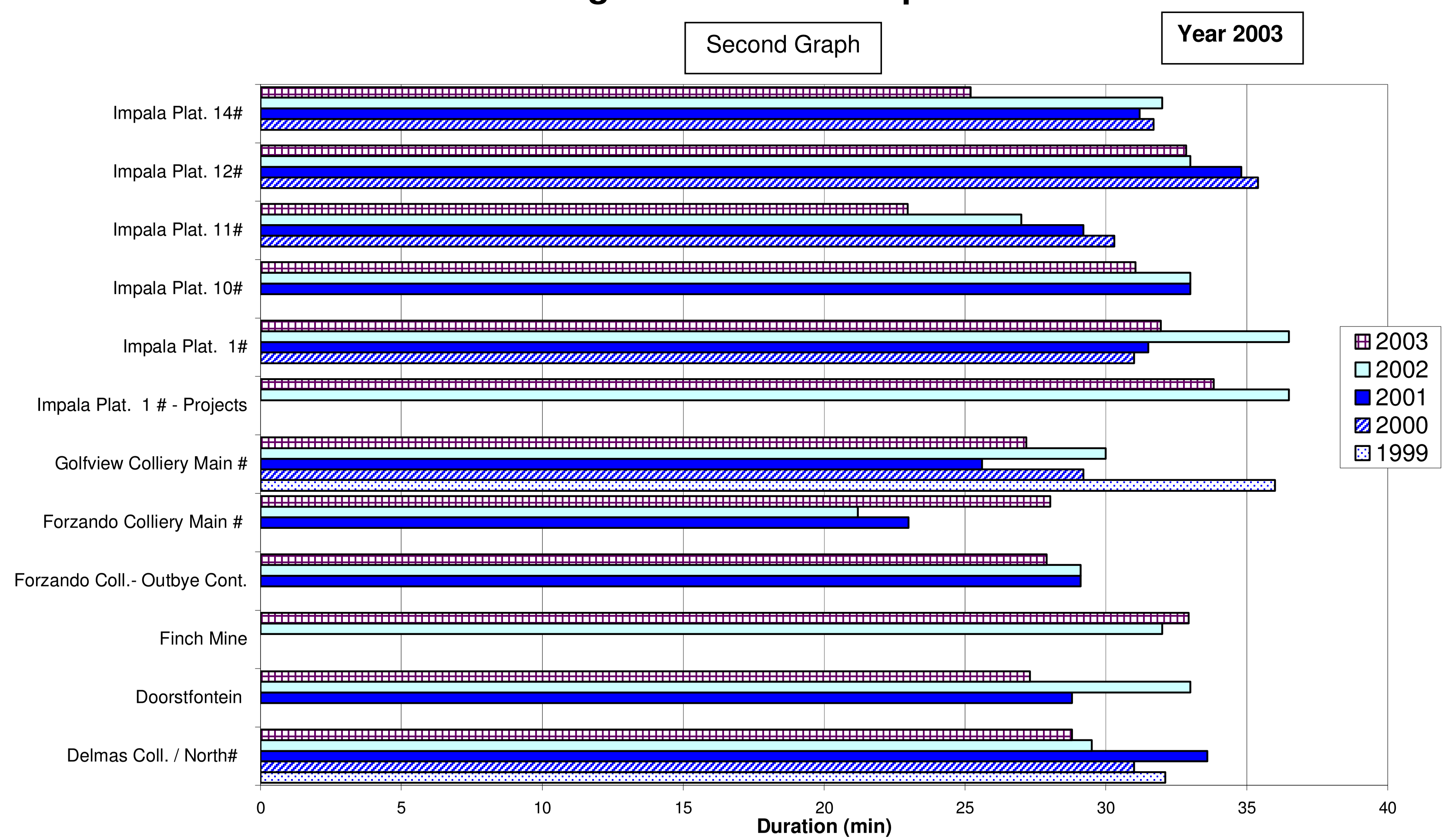
Average Duration: Ocenco M20



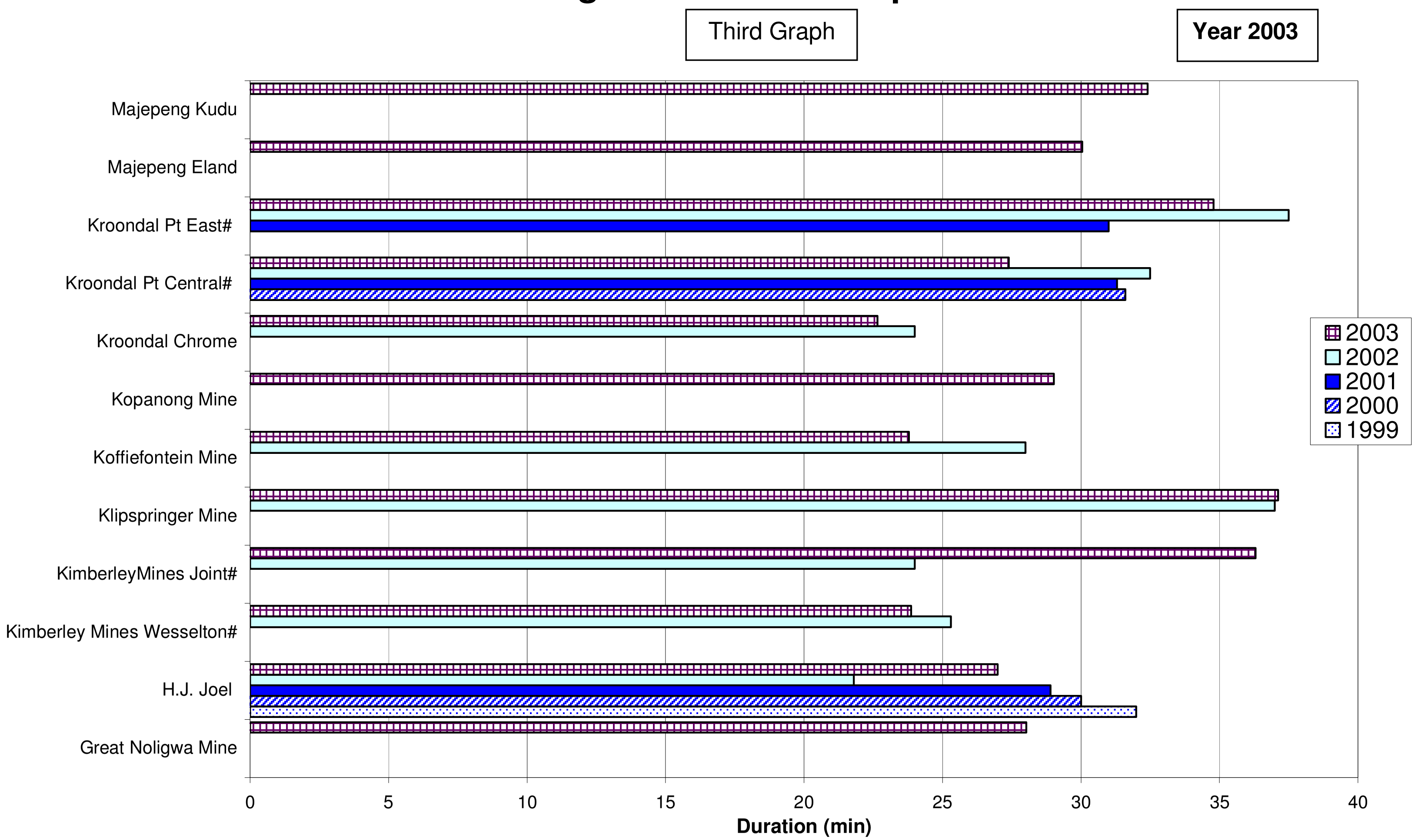


Average Duration: Afroxpac 30
First Graph
Year 2003
Deelkraal G.M.
Bossiespruit Coll.- Driehoek#
Blyvooruitzicht Mine 5 shaft
Blackwattle Colliery
Barbeton Mine Fairview#
Bambanani Mine
Bafokeng Rasimoni South#
Bafokeng Rasimoni South - D Sect
Bafokeng Rasimoni North#
Bafokeng Rasimoni D mine
Atoks Plat
African Rainbow 2 #
2003
2002
2001
2000
1999
0
5
10
15
20
25
30
35
40
45
Duration (min)

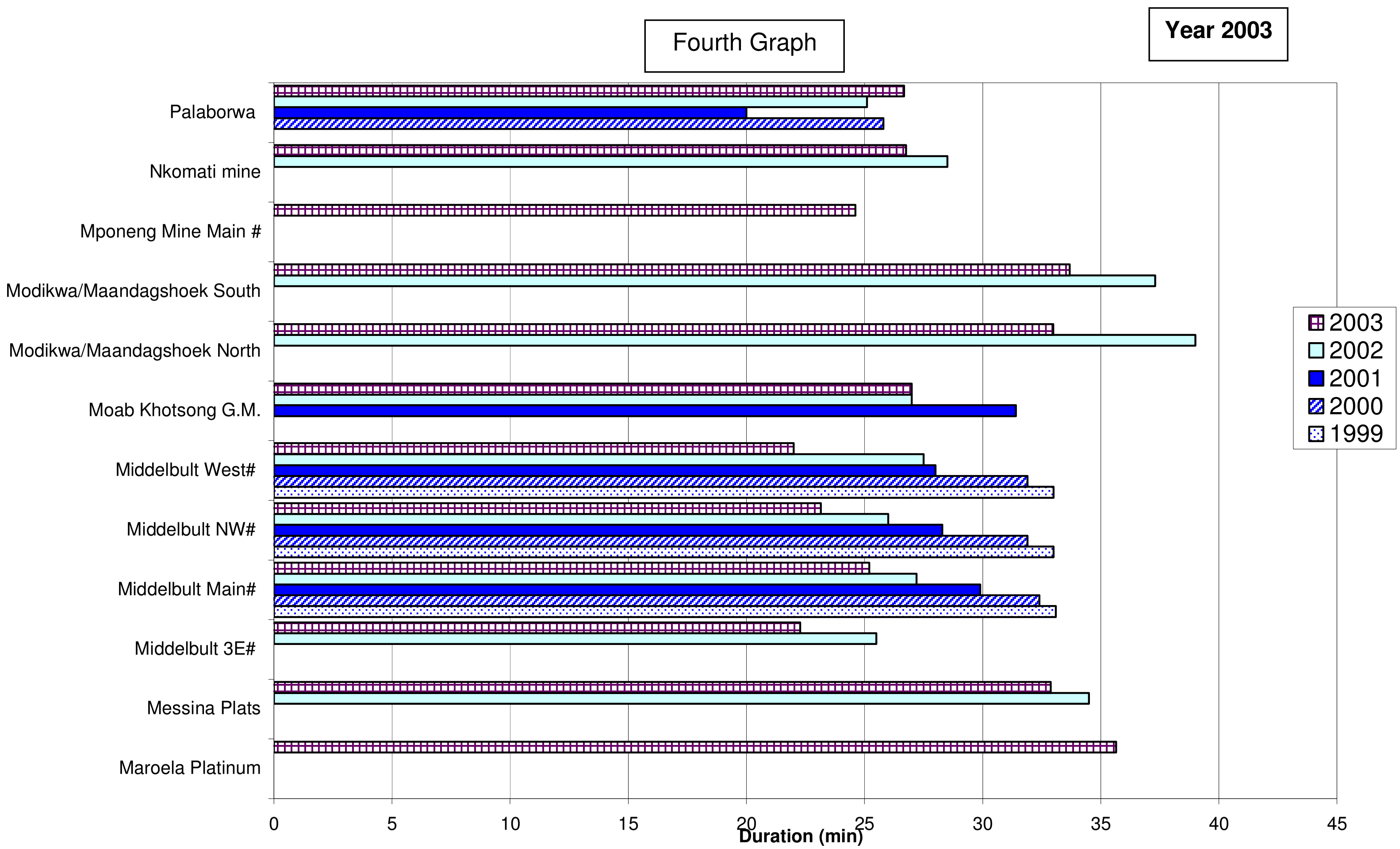
Average Duration: Afroxpac 30



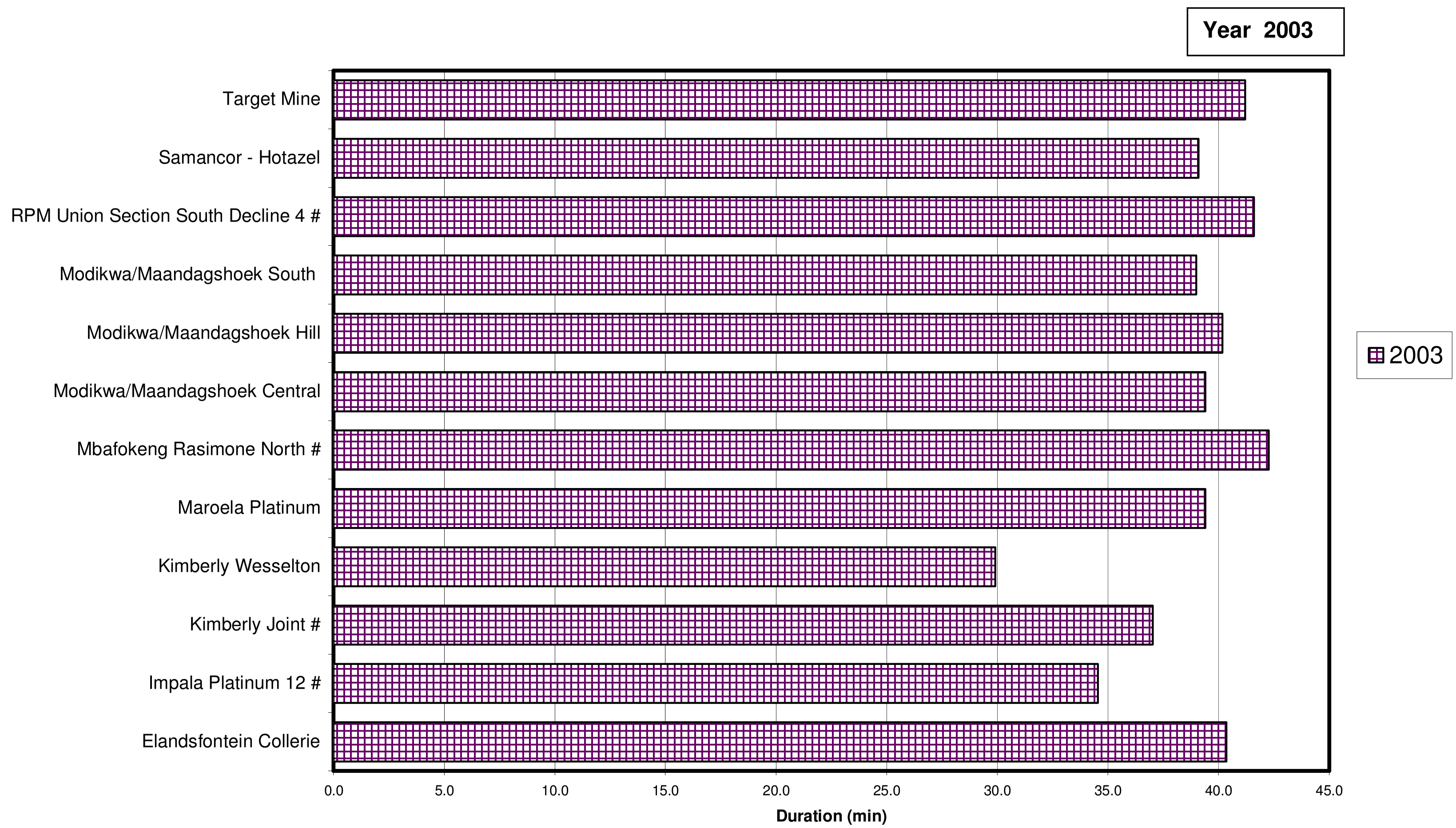
Average Duration: Afroxpac 30



Average Duration: Afroxpac 30



Average Duration: Afroxpac 35



Appendix 2

Performance trends for SCSRs since 1996

AfroxPac-30 SCSRs, deployed underground for more than four years, exhibit a significant reduction in functional duration. In these older units in many instances maximum durations recorded did not exceed 25 minutes. In the majority of cases this is due to premature increases in breathing resistance and, in others, inefficient carbon dioxide scrubbing. The underlying cause is moisture ingress into the chemical. This is partially due to casing leakage following prolonged exposure to mechanical stress. With moisture ingress, powderisation of the granular structure of the chemical bed occurs. In turn, breathing resistance and carbon dioxide scrubbing are affected adversely. It appears that another reason for this functional performance deterioration is the fact that older units incorporate casing seals made from a less suitable material. This leads to moisture diffusion into the chemical, which affects the functional performance of the units negatively. In 2000 the manufacturer changed the material of the casing seals to a more suitable one. In general, units up to three years in underground deployment perform satisfactorily with durations of between 25 minutes and 35 minutes being recorded**.** The number of units exhibiting casing leakage has decreased substantially compared to the previous year.

The AfroxPac-35 units are now deployed for a period of less then two years underground and only minimal deterioration in the functional performance can be detected so far, this is with regard to carbon dioxide scrubbing towards the end of functional test duration (i.e. after 35 minutes).

Functional performance of the Ocenco M20 units has stabilised. In 2003 there were less than 500 units still deployed underground. The supplier informed the DME of its intention to withdraw from the South African market, which obviously will affect the back-up service and therefore the units will from 01 January 2004 no longer be approved for use in the South African mining industry.

The MSA (Mk2) units deployed for four years or longer have deteriorated to an extent where a substantial number (>50%) have reached or are approaching the rejection criterion, i.e. a functional duration of less then 15 minutes. This is mainly as a result of casing seals made from an inappropriate material and used in a large number of units manufactured between 1995 and 1998. The majority of the seals in these units were replaced during 2000 and 2001 with seals made from a more suitable material. However, functional deterioration, which had occurred up to that point, could not be reversed.

A large number of MSA units refurbished since 1999 now exhibit a performance trend similar to older MK2 units. It appears that this is again mainly due to moisture diffusion into the chemical. This is aggravated by the fact that although new inner-parts and chemical canisters have been fitted, many units still incorporate the old protective casings (manufactured in 1987/88). These casings are in some instances deformed to such an extent that the profile and size of the currently used gas-tight casing seal can no longer compensate the deformation of casing and casing lid. Conventional positive pressure leak detectors appear not to detect such changes.

The Draeger (Mk2) units are presently the oldest in regular underground deployment. The majority of these units are six to nine years old and exhibit some deterioration in functional performance, mainly manifested in a premature increase in breathing resistance. This occurs after functional durations in excess of 25 minutes and mostly as a result of powderisation of the potassium superoxide following prolonged exposure to mechanical stress. Furthermore, material fatigue and failure were observed in some of the older units especially in those which were not subjected to the annual lifetime extension service recommended by the supplier for units deployed underground for more than five years. Those units deployed for less then six years exhibit this increase in breathing resistance generally only after a functional duration in excess of 30 minutes.

Appendix 3

Definition of functional performance categories of SCSRs

Definition of functional performance catergories of Self Contained Self Rescuers (SCSRs)) deployed in the South African mining industry

Category 1

Functional performance falls outside approval specification but with life-saving potential unimpaired.

Category 2

- Functional performance exceeds rejection limits,
- Safe functional performance duration reduced by 50 per cent or more,
- Major material or structural faults, which would jeopardize survival if the SCSR were used in an escape mode.

The relevant approval levels for new units, and rejection levels for units, which are deployed in the South African mining industry, are provided in the following table. In the absence of specific levels formulated to represent acceptable levels of functional performance (i.e. to accommodate the degeneration associated with daily deployment underground), the region between approval and rejection levels is deemed to satisfy the category 1 requirements.

PARAMETER	APPROVAL SPECIFICATION SABS 839 (CKM	APPROVAL SPECIFICATION SANS 1737	REJECTION LEVEL
Inhalation oxygen concentration (minimum volume %)	*21	*21	*21
Inhalation carbon dioxide concentration (maximum volume %)	2,5	3,0	5
Inhalation air temperature maximum dry bulb (degrees centigrade)	85	75	85
Inhalation breathing resistance (Pascal's)	600	800	1500
Exhalation breathing resistance (Pascal's)	600	800	1500

* A short-term deviation to a level of not less than 17 volume % and for a period of not more than 2 minutes at the beginning of the test is permissible.

Appendix 4

Regulation/Chapter 16.2, 16.3 and 16.4

SCHEDULE

SELF-CONTAINED SELF –RESCUERS

16.2 Issuing of Self Contained Self Rescuers

Coal Mines

16.2(1) The employer of every coal mine must ensure that no person goes underground at the mine without a body-worn self contained self rescuer, which complies with the South African Bureau of Standards specification SABS 1737.

Mines other than Coal Mines

16.2(2) If at any mine other than a coal mine the risk assessment in tems of section 11 shows that there is a significant risk that employee's may be exposed to irrespirable atmospheres at any area at the mine, the employer must ensure that no person goes into such area without a body worn self contained self rescuer, with complies with the South African Bureau of Standards specification SABS 1737.

Sole Allocation of a Self Contained Self Rescuer

16.2(3) Any body worn self contained self recuer supplied to any employee employed in a full time capacity at the mine, in terms of sub regulations 16.2(1) and 16.2, must be allocated to the employee for that employees sole use for the duration of the deployment of that self contained self rescuer at the mine or until that self contained self rescuer becomes defective and the employee is issued with another self contained self rescuer as required by these regulations.

16.3 No Defective Self Contained Self Rescuer is issued

Employer to ensure no defective self contained self rescuers is issued

16.3(1) The employer must ensure that no defective self contained self rescuer is issued for use to any employee at a mine.

16.4(1) Monitoring Programme

Annual testing of a Self Contained Self Rescuer

16.4(2) The employer must keep the following information, on self contained self recuers at the mine, covering the preceding 24 months:-

(a) total number and makes of self contained self rescuers in service at the mine;

(b) number and make of self contained self recuers purchased by the mine in that period;

(c) number and make of self contained aelf rescuers withdrawn from use by the mine in that period;

(d) the number of shifts worked per day (1,2 or 3);

(e) number of self contained self rescuers in daily use (average for each month);

(f) number of employees underground (average per shift);

(g) number of spare self contained self rescuers available (average per month);

(h) a tabulation of the type of defects found;

(i) number of self contained self rescuers repaired/refurbished; and

(j) number of self contained self rescuers tested in terms of regulation 16.4(1).