

# Monitoring of dust deposition and determination of mineral composition in the dust in gold mine and coal mine

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Leaders in Applied Geoscience Solutions

# Contents of the Presentation

- **Introduction**
- **Objectives**
- **Location of the mine per sites**
- **Methodology**
- **Results**
- **Conclusion**
- **Recommendations**
- **Acknowledgements**



# Introduction

- Dust fallout (nuisance) monitoring in SA is mostly done by the use of simple non-directional deposition gauge according to ASTM D1739.
- Dust deposition measurement has been used extensively in the South African mining sector as a method to quantify nuisance due to dust.
- High values are an indication that health impact due to fine dust may also have to be investigated.
- Dust is generated during the handling, grinding, crushing, movement of trucks on unpaved roads and wind blowing from mine tailings etc.

# Objectives

- Monitor dust deposition in coal mine and gold mine.
- Determine impact of mine dust deposition to the environment due to mining.
- Establish awareness on how to monitor and manage dust deposition rate emanating from mining operations.

# Location of the mine per sites

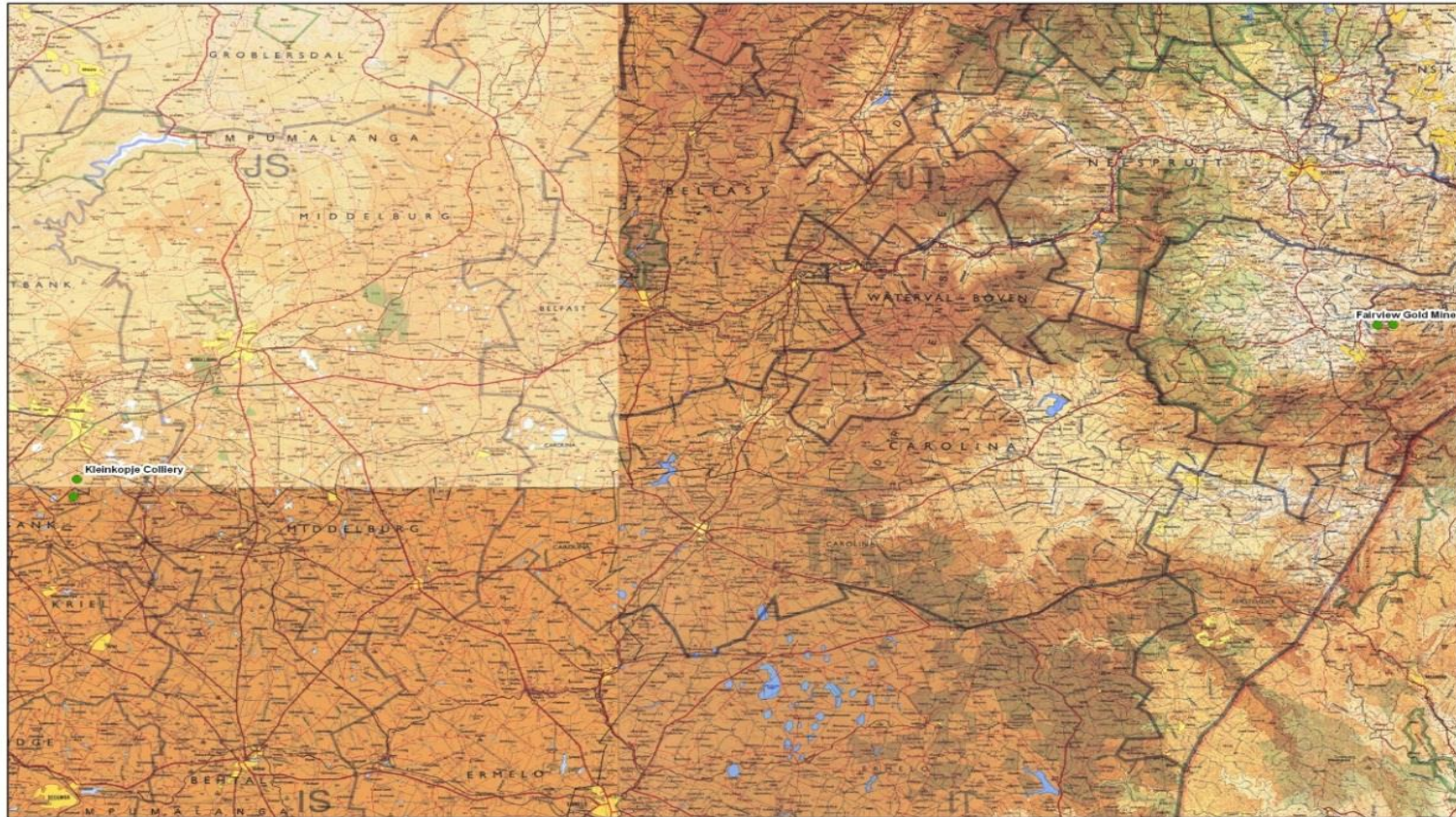


Figure 1: A map showing the location of the mines :Kleinkopje Colliery: Ericson Dam and Tip Area and Fairview Mine : Fairview Adit and Fairview Biox Plant



# Methodology



Fairview Adit



Fairview Bio Plant



Tip Area



Ericson Dam

# Methodology Contin...

American Standard Testing and Material (ASTM) 1739-1998:

- Bucket , wind shield, stand of 2m,ropes and pegs.
- 30 to 33 days onsite.
- Install far away from trees, buildings etc. (due to dust falling on the leaves and building).
- Install in a safe area(security guard).

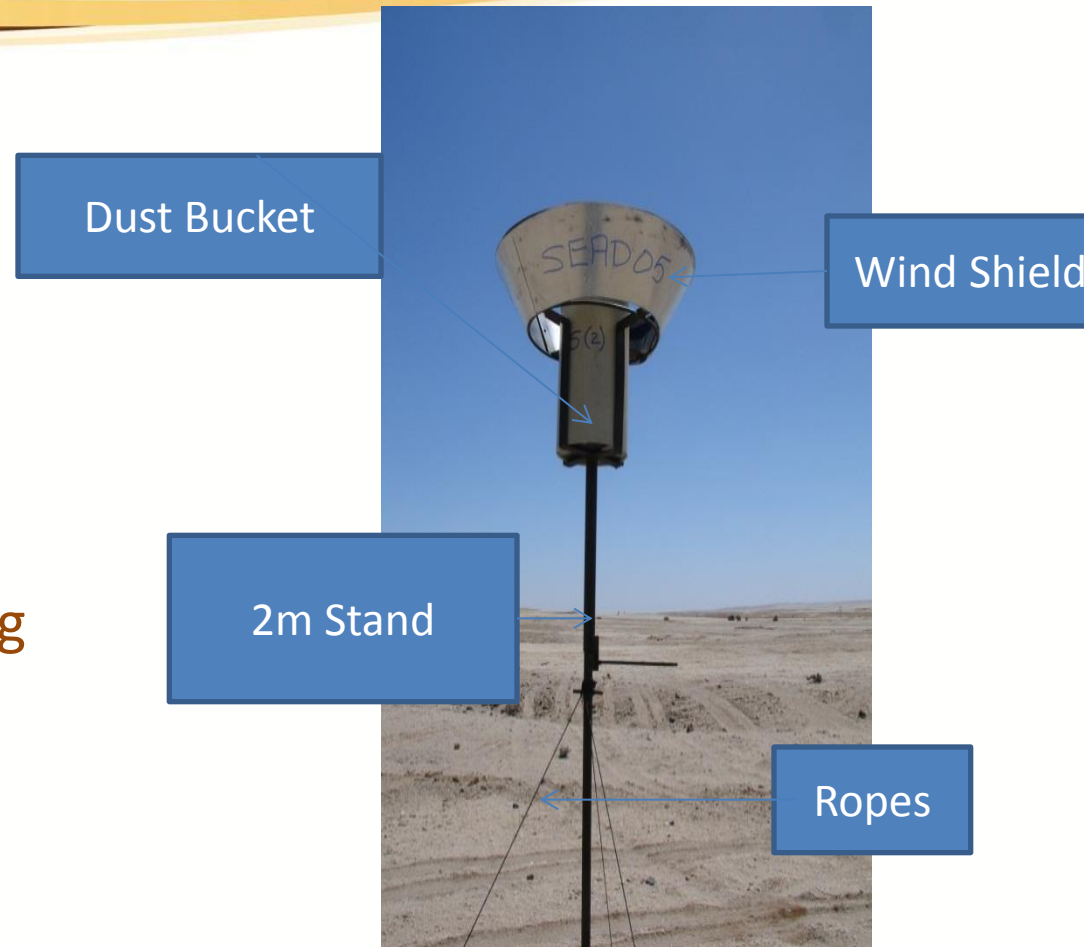


Figure 2:ASTM D1739:1998 Wind Shield



# Methodology Contin...

**Methodology:** dust collection → weigh → filter → dry → weigh → calculate → mineralogy → interpret (SANS1929:2005)

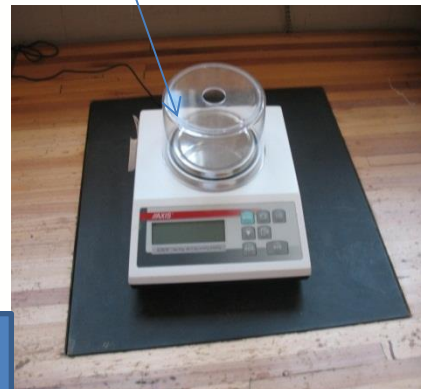
Dust Bucket



Oven



AXIS 500g



Buchner Funnel



Evaporation Dish



# Results

Table 1: Dust deposition rates for Kleinkopje Colliery and Fairview Mine from 2012 August till June 2013

Location	2012 August	2012 September	2012 October	2012 November	2012 December	2013 January	2013 February	2013 March	2013 April	2013 May	2013 June
FA	367	848	139	88	184	199	83	371	739	102	122
FBP	1556	133	99	11	48	182	221	35	35	52.2	40.4
ED	104	204	468	586	586	274	1137	283	669	1388	497
TA	863	807	849	1034	1034	11804	647	2.8	902	2286	1434

SANS:1929-2005 Target limit-300 mg/m<sup>3</sup>/day; Residential limit :600 mg/m<sup>2</sup>/day; Industrial limit :1200 mg/m<sup>2</sup>/day; Alert limit :2400 mg/m<sup>2</sup>/m<sup>2</sup>/day

# Results contin....

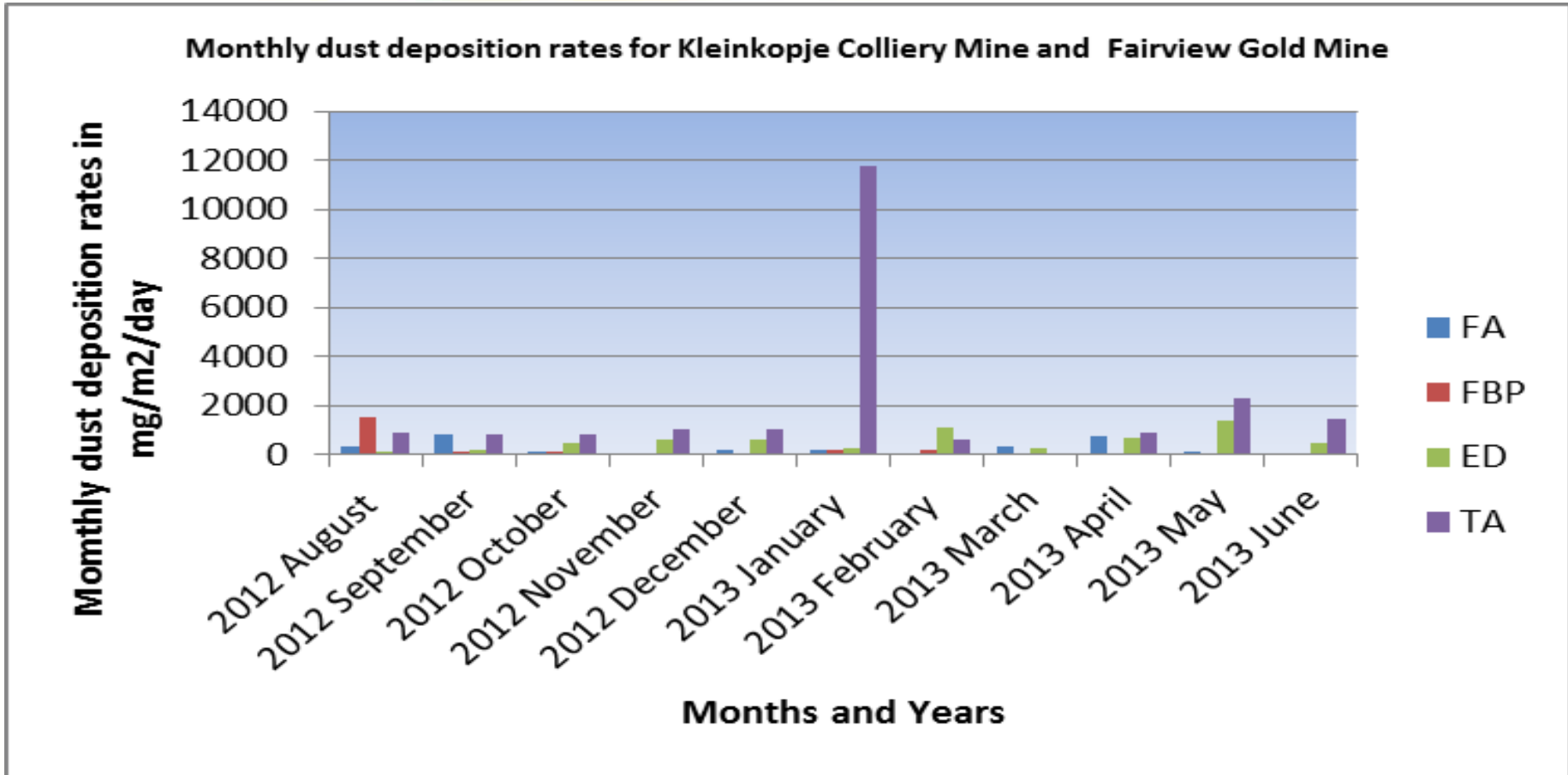


Figure 3: Dust deposition rates for Kleinkopje Colliery and Fairview Mine from 2012 August and 2013 June.

# Results contin....

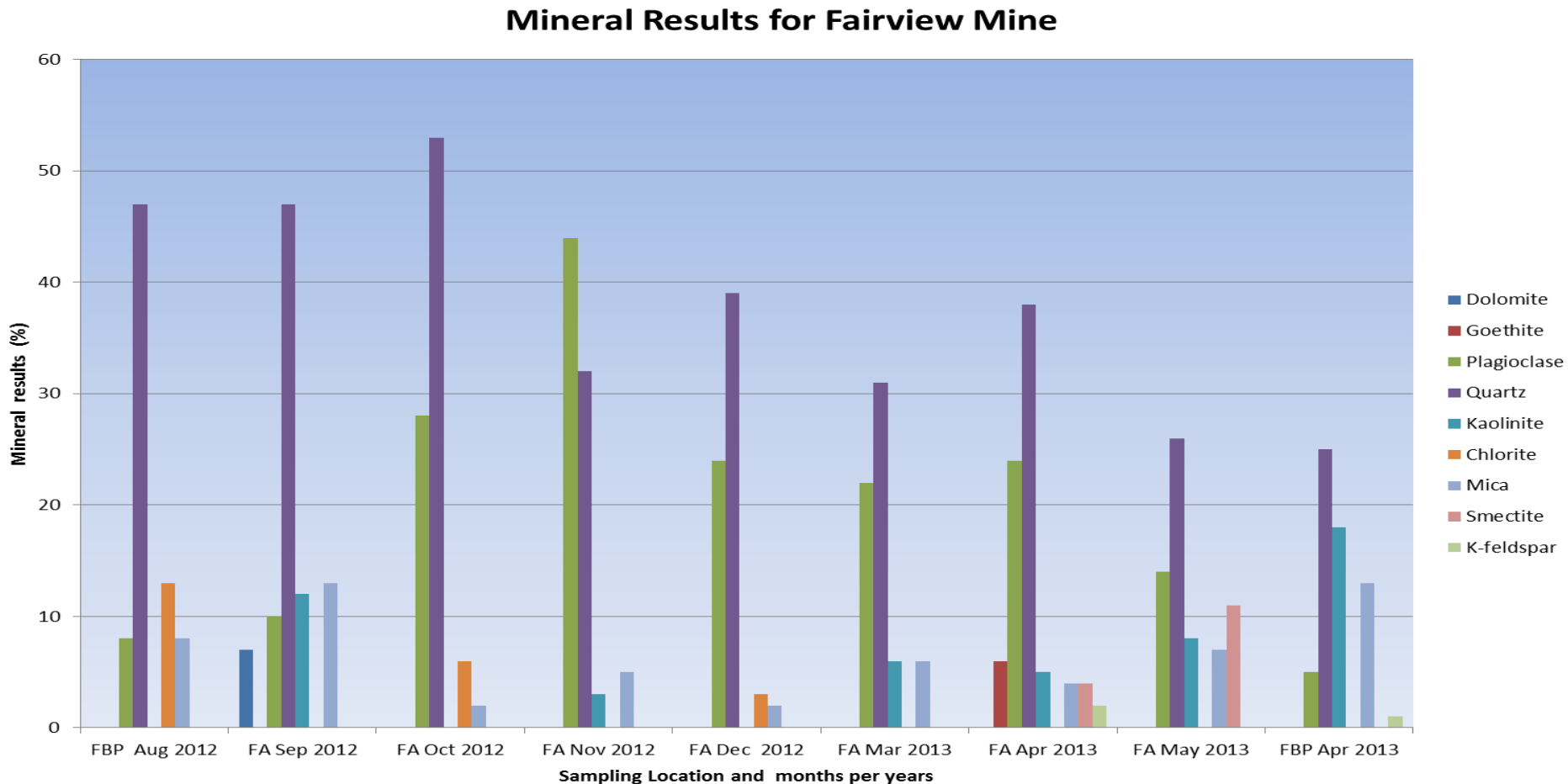


Figure 4: Mineral Results (%) for Fairview Mine from 2012 August and 2013.

# Results contin....

## Mineral results for Kleinkopje Colliery

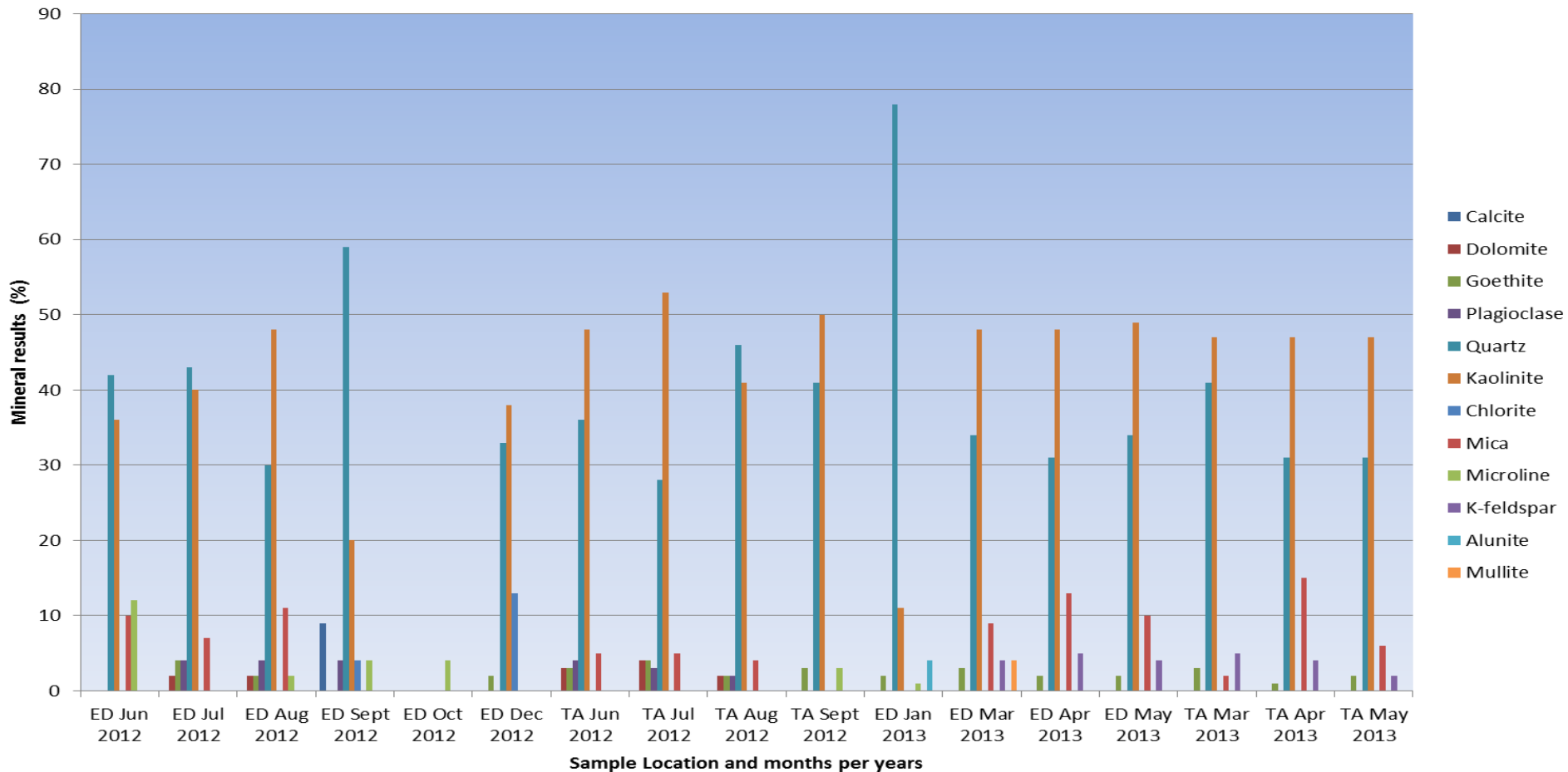


Figure 4: Mineral Results (%) for Kleinkopje Colliery from 2012 August and 2013 May.



# Conclusion

- FBP: August 2012 exceeded the industrial limit of 1200 mg/m<sup>2</sup>/day and ED: May 2013 and TA: January 2013, May 2013 and June 2013.
- FA: September 2012 and April 2013 and FBP: August 2012 (exceeded the residential limit of 600 mg/m<sup>2</sup>/day).
- ED: April 2013 exceeded the residential limit and TA from August 2012 till December 2012, February 2013 and April 2013.
- The mineral found in the dust for Fairview Mine :Quartz:59% for FA in Oct 2012.Plagioclase:44% Nov 2012 for FA.
- April 2013 for ED Quartz :38% and Plagioclase :33% for May 2013.
- The mineral found in the dust for Kleinkopje Colliery: Quartz 59% for ED and TA in Jul 2012 with 53% :Kaolinite .
- Quartz: 78% in January 2013 and Kaolinite:49% in May 2013 for ED.

# Recommendations

Table 2: Mitigation control measures for dust generated activities.

Location	Source	Mitigation control measures for dust pollution	Timing
Fairview Adit and Fairview Biox Plant	Crushing, truck movement, stockpile and mine tailings	Dust suppressant spraying on unpaved roads.	Twice in every week of the month
Ericson Dam and Tip Area	Blasting, truck movement and Plant Operation	Monitor weather conditions (the wind speed and direction) prior to blasting to ensure minimal dust emissions.  Dust suppressant spraying on unpaved roads .	Twice in every week of the month

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