

# Preface

The events described in this book took place between the years 1990 and 2000 at the South African gold mine Vaal Reefs. My first book (Glazer 2016) describes my experience as a mine seismologist at Palabora Mining Company (PMC), a South African copper mine, from 2002 until 2013. These two periods of my life enabled me to make certain statements on the condition of mine seismology in South Africa as it stands at the end of 2016. Probably less controversial, my first conclusion is that there is a place for seismology in the mines. The problem is that most mining personnel are not convinced that there are any benefits from the use of seismic monitoring. The nonbelievers exist both among the mine managers and the technical staff. The former are sceptical because they must balance the costs and benefits, which is understandable because this is their job. On technical matters, they depend on technical staff. The latter, on the other hand, can be divided into those that know nothing and those that think that they know everything about mine seismology. In my over twenty years of being a mine seismologist, I have come across only two mining engineers who understood mine seismology. What I found strange was that very often the technical personnel were more concerned about saving money for the mine in the short term rather than investing in mine seismology for any future benefits. The reason for this situation is at least twofold.

Installation of the seismic network in the mine on its own doesn't introduce any immediate benefits. These come with time, but only when the seismic network is managed by a professional mine seismologist. That is the second part of the problem: there are no professional mine seismologists available to work at the mines. The mine manager as such is not interested in examining recorded seismicity in the back analysis mode. It doesn't matter if these back analysis examples are of a high standard or are pure fiction. They are about the past and of no help to the mine. What counts at the mine is production and what can make increase it and/or make it safer. That is why recorded seismic data has to contribute towards today's needs in the mine. And this can be done only when the professional mine seismologist is at the place where the action is, which is at the mine. If he is a professional seismologist, then he will be able to prove to the mine management that seismic monitoring benefits the mine. I know this from my experience. The sad part of the

story is that it was often easier to convince a mine manager than a rock engineer. My best practical applications of mine seismology came when I was not related to the Rock Engineering Section. At Vaal Reefs I was working directly for the Klerksdorp Mine Managers Association, and at PMC the seismic network was part of the Cave Management Section. For sure, there must have been a reason for this.

I believe that most of the rock-engineering personnel employed by the mines (at least in South Africa) have no proper knowledge of mine seismology. Knowledge of any technical subject must be based on sound science. If not, then it is fiction, and it doesn't matter if this fiction is mixed with some science. It is still fiction. This fiction, when introduced into industry, awakens false expectations that cannot be achieved. This then degrades mine seismology as a science. As a result, mine management doesn't see any use for it. It will still purchase seismic systems and then appoint amateurs to operate them. In this way, they have done what a reasonable manager would do by installing the system. They are then doing what a good manager would do by reducing the working costs. As a result, there are plenty of operational seismic systems at the mines but there are no practical results. Lack of those convinces the industry that mine seismology is of no use.

At the present time, mine seismology is in serious regression. This applies to theory and practice. The good news is the recording hardware for digital seismic systems. It is good and, what is even more important: it has been tested in practice. We know that the seismic-system hardware operates in difficult conditions, and there is no problem with this part of mine seismology. The setback starts with the use of the recorded data. With the introduction of digital seismic recording, it was assumed that all or most of the existing theory is wrong and that it has to be rewritten from the beginning. From the start, this was not a concept to test but was treated as an axiom. The mining industry was bombarded with new ideas and concepts. It became unclear what is a concept that still requires testing and what is a pure concept. New theory was presented as being very complex and wrapped in terminology that was difficult to understand. In this way, mine seismology that, during the analogue age, had sound theory that resulted in numerous practical applications became a "black box". Under such conditions, mine after mine outsourced management of its seismic systems. The situations became ridiculous. The contractor assumed the role of deciding what the mine requirements from seismic monitoring might be. In this way, mine seismology and the mine industry went in two different directions.

I hope that this book will be read not only by those that are interested in mine seismology but also by the present and future technical mine managers. This book is full of examples where properly used seismic data enabled solving production problems and increasing the underground safety standards. I want to believe that, when given the opportunity, mine seismology will return to the mines.

## Reference

Glazer SN (2016) Mine seismology: data analysis and interpretation. Palabora mine caving process as revealed by induced seismicity, Springer International Publishing, Switzerland, ISBN 978-3-319-32611-5

Mine Seismology: Seismic Warning Concept  
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