

**THE EFFECTIVENESS OF THE ENVIRONMENTAL MANAGEMENT
PROGRAMME AS A MANAGEMENT TOOL FOR COAL MINING WITHIN THE
MPUMALANGA PROVINCE**

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ABSTRACT

The EMP as an environmental management and regulatory tool are being utilized by the Department of Minerals and Energy through the requirements of the Minerals Act, 1991. The Aide-Memoire is a practical guideline document that intends to assist and guide entrepreneurs and mine owners to compile environmental management programmes. In order to complete the command and control loop, appropriate monitoring and auditing requirements had to be developed. The monitoring and auditing requirements should cater for the appropriate and specific requirements of the mining industry. The focus of EMP performance assessment and monitoring should strive towards the following two main objectives: compliance with the EMP as well as testing the appropriateness and effectiveness of the EMP. The aim of this paper is to prove that environmental compliance auditing can be used as a management tool in order to test the effectiveness of the EMP; to develop a user-friendly checklist to be used for EMP compliance auditing and to prove that the EMP as management tool can be implemented effectively for ten coal mines in the Mpumalanga Region. The audits was conducted and started of with an opening meeting, a walk of the site to record findings, a closing meeting took place, the audit findings was analyzed and an audit report for each mine was produced. To conclude, it was found that the environmental compliance audit procedure could be used successfully for EMP performance assessment. A user-friendly checklist was developed and used very successfully in the EMP performance assessment procedure. The result of the study proved that the coalmines in Mpumalanga do implement the EMP effectively as an environmental management tool.

DIE EFFEKTIWITEIT VAN DIE OMGEWINGS BESTUURS PROGRAM AS 'N OMGEWINGS BESTUURS-MEGANISME VIR STEENKOOLO MYNE IN DIE MPUMALANGA STREEK

Die Minerale Wet, 1991 (Wet no 51 van 1991) vereis dat 'n OBP (omgewings bestuurs program) ingedien word deur enige aansoeker wat beoog om minerale te ontgin. Die Aide-Memoire is 'n praktiese riglyn dokument wat daarop gemik is om bystand en rigting te verleen aan die entrepreneur of myn eienaar in die samestelling van 'n OBP. Om die kontrole kringloop te voltooi is daar 'n noodsaaklikheid vir toepaslike moniterings en ouditerings meganismes. Die vereistes van hierdie moniterings en ouditerings meganismes moet van so 'n aard wees dat dit sal voorsiening maak vir die spesifieke behoeftes van die mynbou bedryf. Die fokus van OBP monitering en ouditering moet streef om twee hoofdoelstellings te verwesenlik: die effektiwiteit sowel as die toepaslikheid van die OBP word getoets sowel as die algemene implementering daarvan.

Die doel van hierdie skripsie is om te bewys dat omgewings ouditering - as 'n bestuursstelsel - gebruik kan word om die effektiwiteit van die OBP te toets; om 'n gebruikersvriendelike kontrole lys saam te stel - volgens die riglyne van die Aide-Memoire sodat dit in die ouditeringsproses gebruik kan word. Laastens is gepoog om te bewys dat 10 steenkool myne in die Mpumalanga Streek die OBP wel effektief as 'n bestuursmeganisme implementeer en optimaal gebruik. Die omgewings ouditerings proses is as volg ten uitvoere gebring: die oudit is beplan, en is voorafgegaan deur 'n inligtings vergadering, die terrein is besoek en oudit bevindinge is aangeteken op die kontrole lys. Die proses is afgesluit met 'n inligtingsessie saam met die topbestuur sodat nodige bevindinge uitgelig kon word. Die gevolgtrekking van hierdie studie het getoon dat die omgewings ouditerings proses wel met sukses aangewend kan word om die effektiwiteit van die OBP te toets. Daar is ook daarin geslaag om 'n verbruikers-vriendelike kontrole lys saam te stel om die uitvoer van die oudit te vergemaklik. Die finale bewys was dat die tien gekose steenkool myne in die Mpumalanga Streek wel die OBP suksesvol implementeer en effektief en optimaal gebruik as omgewings bestuurs meganisme.

ABBREVIATIONS

DME	DEPARTMENT OF MINERALS AND ENERGY
DMD	DIRECTOR: MINERAL DEVELOPMENT
EMP	ENVIRONMENTAL MANAGEMENT PROGRAMME
EMEM	ENVIRONMENTAL MANAGEMENT EXCELLENCE MERIT
EMPPA	ENVIRONMENTAL MANAGEMENT PROGRAMME PERFORMANCE ASSESSMENT
I&APs	INTERESTED AND AFFECTED PARTIES
PPE	PERSONAL PROTECTIVE EQUIPEMENT

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CHAPTER 1

1. Introduction

In terms of Section 39 (1) of the Minerals Act, 1991 (Act 50 of 1991): “an environmental management programme in respect of the surface of land concerned in any prospecting or mining operations or such intended operations, shall be submitted by the holder of the prospecting permit or mining authorization concerned to the Director Mineral Development (DMD) concerned for his approval

The Department of Minerals and Energy is using the EMP as an environmental management and regulatory tool through the requirements of the Minerals Act, 1991, as mentioned in the top paragraph. The Aide-Memoire is a practical guide-line document that intends to assist and guide entrepreneurs and mine owners to compile environmental management programmes in accordance with procedures and norms acceptable to all concerned with a view of leaving a useful heritage to future generations after the mineral resources have been extracted (Department of Minerals and Energy, 1992:2).

The initial focus of the EMP-process was to develop, evaluate and approve EMP's. The evolution and development of the EMP process for mines have been in accordance with the principles of Integrated Environmental Management. This process worked well within the planning stages of a mine and it was generally accepted that certain controls had to be in place during the operational phase of a mine to ensure that the EMP is implemented effectively. Therefor appropriate monitoring and auditing requirements were developed to complete the command and control loop.

The monitoring and auditing requirements should cater for the appropriate and specific requirements of the mining industry. Each mine has a certain site-specific and individual character and with the EMP, each mine will require its own monitoring and auditing programme relevant to the circumstances. The monitoring and auditing programme should also provide criteria for continual improvement and should be effectively designed and implemented during the implementation of the EMP process.

According to the EPA (1995:27), the environmental performance of a mine can be measured against objectives set out in the EMP. The monitoring programme will reflect the EMP objectives, and the information needs to be described in order to produce a comprehensive and informative report on environmental performance.

To achieve all of these mentioned objectives the strategy followed for the implementation of monitoring and auditing programmes should be consistent and structured. The focus of EMP performance assessment and monitoring should strive towards the following two main objectives:

- Compliance with the EMP (commitments made by the mine in the legally binding chapter 6 of the EMP)
- Appropriateness and effectiveness of the EMP (for example a change in mining plan can have more and different impacts on the environment as it was addressed in the EMP)

According to the Department of Minerals and Energy (2000:2) the EMP-process should therefore link the concept of controlled self-regulation with the framework of an integrated approach. The State and the industry have obligations in this regard: the State must ensure continued appropriateness and compliance and the industry must implement the EMP in an effective manner to demonstrate their compliance. Specific objectives and guidance are required to ensure consistent application and to maintain the correct focus on what is required by whom. It is evident that there is a definite need for certain self-regulatory functions that could be performed by industry itself.

1.1 Problem statement

The EMP, as used in the coal mining industry within the Mpumalanga province, had to be evaluated to test the effectiveness of this environmental management tool

The following research questions arises:

- a) Is there a complete auditing procedure, which tests the effectiveness of the EMP as a management tool?
- b) Is there a specific audit checklist to be used for EMP compliance auditing?
- c) Can the EMP be used effectively as a management tool for coalmines in the Mpumalanga Region?

1.2 Objectives of the study

The objectives of the study are:

- To prove that environmental compliance auditing can be used as a management tool in order to test the effectiveness of the EMP;
- To present a number of relevant environmental auditing terms and definitions to the reader of the document;

- To understand the environmental compliance auditing process by describing the process, characteristics of audit checklists and auditor characteristics;
- To develop a user-friendly checklist to be used for EMP compliance auditing;
- To prove that the EMP as management tool can be implemented effectively for coalmines in the Mpumalanga Region.

1.3 The need to test the effectiveness of the EMP as environmental management tool

The evolution and development of the EMP-process for mines have been in accordance with the principles of Integrated Environmental Management. For the purpose of enhancing the environmental management process, it is necessary to follow up the development and approval of EMP's, with appropriate monitoring and auditing requirements. There must however be a specific focus on the appropriateness for and specific requirements of the mining industry. A strategy was developed for EMP compliance auditing, with the following objective in mind (Department of Minerals and Energy: 2000:1-3):

- To promote effective environmental management including the nationally accepted principles of integrated environmental management.
- To create a structured and consistent mode of conduct through which effective compliance will be achieved.
- To ensure an effective and structured approach for the assessment of the continued effectiveness and appropriateness of the EMP
- To clarify what the term's environmental auditing means, environmental monitoring and environmental management programme performance assessment (EMPPA) as well as to define the relevant terms and requirements.
- To provide guidance and to describe the purpose, aspects, functions, phases, procedures and technical requirements involved in EMP performance assessment and monitoring.
- To distinguish between the responsibilities of the mining industry on the one hand and the State on the other.
- To establish a framework for preparing guidelines for the implementation of environmental monitoring and EMP performance assessment.

- To make provision for the implementation of formal arrangements concerning EMPPA and to document the arrangements in an appropriate and transparent manner.
- To identify the aspects, which have to be addressed, including the requirements regarding financial provision.
- To accommodate the site specific nature of mines and the flexibility required, it is vital to maintain a flexible approach when designing a performance assessment and monitoring system so that adaptations can be made to suit particular circumstances and satisfy the needs of all concerned.

The basis for the requirements for monitoring and EMPPA stems from the Minerals Act, 1991. Section 38 of the said act requires: “The rehabilitation of the surface of land concerned in any prospecting or mining shall be carried out by the holder of the prospecting permit or mining authorization concerned –“

- (a) in accordance with the EMP approved in terms of section 39, if any,
- (b) as an integral part of the prospecting or mining operations concerned;
- (c) simultaneously with such operations, unless determined otherwise in writing by the DMD; and
- (d) to the satisfaction of the DMD concerned.

Section 63 (1) (d) (viii) of the Minerals Act, 1991, authorizes the Minister of Minerals and Energy to promulgate regulations pertaining to the monitoring and auditing of environmental management programmes.

The Department of Minerals and Energy (2000:4) compiled a guideline document for the preparation of EMP's – the Aide Mèmoire . The Aide Mèmoire requires the applicant to provide, inter alia, particulars regarding:

- a description of the environment;
- a motivation for the project;
- a detailed description of the operation and infrastructure;

- an assessment of the impacts of the project on the environment;
- a clear indication of how the identified impacts on the environment will be managed;
- details of financial provision for effective environmental management.

The EMP performance assessment strategy will be discussed in detail in chapter 2, since it was the stimulus for this study. EMP performance assessment reporting is a requirement in terms of regulation 18.2 of the Minerals Act, 1991 (Act 50 of 1991) and an appropriate management tool needs to be identified which can assist in the development of the EMP performance assessment report.

CHAPTER 2

2.1 Defining EMP Performance Assessment (EMPPA)

To ensure however that mines comply with the provisions of the Minerals Act, 1991, the state requires a specific assessment to be made pertaining to the appropriateness, effectiveness and compliance with the approved EMP. According to the Department of Minerals and Energy (2000:5), this assessment may form part of the environmental auditing activities of the mine, but will for the fact of the legally binding EMP required, be known as environmental management programme performance assessment (Department of Minerals and Energy, 2000:6).

This strategy involves monitoring – as a continuous information gathering and control procedure. Monitoring and the performance assessment system should be linked to highlight the shortcomings of the system and do corrective action. The definitions of environmental management performance assessment – with the requirements and considerations of the Minerals Act, 1991 taken into account- will be:

“ EMPPA is a requirement for the systematic, periodic, objective and documented evaluation of the continued appropriateness and effectiveness of the contents of an approved environmental management programme and the execution thereof.

According to the Department of Minerals and Energy (2000:18) the evaluation and investigation of an approved environmental management programme is necessary to ascertain whether the said requirements are being complied with. Quantitative and qualitative data gathering techniques is used in this monitoring process, which forms part of the EMP Performance Assessment.

2.2 The purpose of EMP Performance Assessment

According to the Department of Minerals and Energy (2000:6) the purpose of EMP Performance Assessment is:

- To ensure that a mine complies with the EMP from the beginning to the closing phase of a mining project;
- To ensure ongoing identification and assessment of environmental impacts that was not properly addressed or even unknown at the time that the EMP was compiled

- To ensure a control mechanism that will promote pro-active action that will lead to the establishment of appropriate performance indicators and timeous amendments of the EMP
- To ensure good standards and continual improvement that will guide the mine towards effective closure.
- To ensure that financial provision for rehabilitation is adequate throughout the life of the mine

2.3 The scope of EMP Performance Assessment

EMP Performance Assessment will focus mainly on two objectives according to the Department of Minerals and Energy (2000:7);

- Compliance with the EMP;
- Appropriateness and effectiveness of the EMP

It is important to remember, for the purpose of this study, that EMP performance assessment is seen as a specific formal evaluation activity of a periodic nature (two-yearly). There must however be a link with monitoring that will be done more frequently by the mine – monthly or quarterly.

2.4 Responsibilities and levels of EMP Performance Assessment

According to Department of Minerals and Energy (2000:8), there are various levels or types of assessment that can be distinguished based on both the differentiation in responsibility between the State and the industry, and the specific need. Therefore, to ensure that the responsibility is effectively categorized and assigned, the assessment phase must include the following different levels of EMP performance assessment:

By the Mine:

- Internal EMP performance assessment and reporting to DME;
- Final EMP performance assessment at mine closure.

By the State:

- Control EMP performance assessment;

- Emergency EMP performance assessment;
- Final EMP performance assessment after an application for closure has been received.

2.5 EMP Performance Assessment: the key aspects

With EMP Performance Assessment it is not constituted that the EMP must be completely rewritten. What is required is the undertaking of an inquiry, which is sufficient to enable the mine and the regulatory authority to assess compliance with the EMP. In this way the appropriateness and effectiveness of the EMP is tested. The aspects contained in the EMP, according the guidance from the Aide-Memoire, should be highlighted with the execution of the EMP Performance Assessment. These aspects include the following: (Department of Minerals and Energy, 2000:9)

Compliance to:

- The effective achievement of specified objectives as agreed to and the adherence to applicable standards and procedures.
- Timeousness in the implementation of the measures and actions specified in the EMP.
- Effective and efficient implementation of the control measures for prevention and mitigation of impacts.
- Adherence to all relevant regulatory requirements
- The execution of appropriate monitoring as specified in the EMP
- The conformance to the financial provision requirements
- Commitment to BATNEEC, preventative principles and continual improvement
- Appropriateness and effectiveness of the EMP
- Adequacy of the impact assessment with regard to each of the relevant environmental components
- Relevance of the impacts assessed
- Adequacy and technical correctness of the baseline information to establish an effective management plan

- **Effective establishment and appropriateness of performance assessment**
- **Adequacy of the objectives achieved and standards being adhered to**
- **Effectiveness and efficiency of the strategy followed with regard to the control measures for prevention and mitigation of impacts**
- **Effectiveness and efficiency of the monitoring being done**
- **Integration of all applicable regulatory requirements**
- **Adequacy of financial provision**
- **The integration of the ongoing assessment of impacts**

It is evident from the definition of Environmental management performance assessment – as defined by the Department of Minerals and Energy (2000:4) this assessment can form part of a mine auditing activities. Auditing can be done on various levels and various types of audits can be identified within the bigger spectrum of auditing. It is therefore important to consider the specific type and levels of auditing which are required in a management system applicable to the EMP. The type of audit that is recommended, with the objective of testing EMP effectiveness, is environmental compliance auditing. Before discussing the basic compliance auditing process, it is necessary to provide the reader of this document with the fundamental definitions and terms – which is often used in compliance auditing.

CHAPTER 3

3.1 Defining Environmental Auditing

“ A systematic, documented verification process of objectively obtaining and evaluating audit evidence to determine whether specified environmental activities, events, conditions, management systems, or information about these matters, conform with audit criteria, and communicating the results of this process to the client.”

Brown, (1993:28) explained environmental auditing as:

- A management tool – the audit serves to facilitate management control of environmental practices.
- “Systematic assessment – auditing involves a structured approach following an established protocol.”
- “Periodic” – audits are conducted periodically in relation to the overall review process.
- “Documentation” – the result of an audit is a written report
- “Environmental risk” – audits highlight environmental risks faced by the company and should recommend how to minimize risk.
- “Compliance” – compliance assessment is part of every audit, compliance is determined by the audit objectives.
- “Objectivity” – there is a distinction between self-assessment and verified independent auditing. Auditors are generally independent of the organization being audited.

3.2 Other fundamental terms and definitions used in environmental auditing

The following terms and definitions, according to the ISO 14000 standards are used in environmental auditing:

- Environmental auditor – a person who is qualified to perform environmental audits.
- Auditee – is the company or organization to be audited
- Client – is the organization or company commissioning the audit

- Lead environmental auditor – the person who is qualified to manage and perform environmental audits
- Audit team – a group of environmental auditors who has been tasked to perform a given audit.
- Technical expert – a person who provides specific knowledge or expertise to the audit team, but who does not participate as an auditor
- Audit criteria – policies, practices, procedures or requirements against which the auditor compares collected audit evidence
- Audit evidence – verifiable information, records or statements of fact
- Audit findings – results of evaluation of the collected audit evidence compared against the agreed audit criteria
- Audit conclusion – professional judgement or opinion expressed by an auditor about the subject matter of the audit, based on the reasoning the auditor has applied to the audit findings.

3.3 Defining environmental compliance auditing

The focus of these type of audits is on verification of technical principles or compliance to performance-type standards. Regulatory compliance or environmental performance audits should be done by all organizations on a routine basis. It will entail the compliance with all environmental laws and regulations applicable to the specific site at local, regional, state and national levels. Even sometimes to international levels in the case where an organization might export products.

The proposed legislation is important to track as well and the permit requirements of the organization.

3.4 Background and General Principles of environmental compliance auditing

According to SENRIO (6:1) an audit may be divided into four phases, namely:

- Planning,
- Preparation,
- Performance
- Report and Follow-up

Audit planning and preparation activities are linked in as much as they are both phases, which will set the scene for an effective and meaningful audit. The focus and procedure of an audit needs to be clearly understood because of the wide variety of activities and topics that an environmental audit can cover according to Kuhre (1996:21).

The planning activities are important in the sense that the team leader has the opportunity to understand the context of the audit. This will include knowledge of where the site audit will take place, what criteria will be used as the audit requirements and other necessary background information.

The preparation phase ensures full knowledge of the auditees business processes and related technologies in advance. The team leader can prepare the auditors for all eventualities and can ensure that the appropriate technical representation is included within the audit team (SENRIO, 6:1)

The audit performance is the core activity of the audit, which is supported by the planning, preparation, reporting and follow-up phases. The success of the audit performance depends largely on the effectiveness of the planning and preparation activities. The performance phase of an audit only makes up 1/3 of the total time spent on an audit.

On completion of the performance phase all the information should be gathered to compile the audit report. The report is the collective result of all the activities and contributions of the members of the audit team. The auditee with appropriate actions to be implemented in order to improve the weaknesses or correct deficiencies acts upon the report.

The end of the loop is for the audit team to do a follow-up to ensure that the points raised and documented in the audit report have been resolved by the auditee (SENRIO, 6:3).

It is important that the following general principles should be considered very early in the process in order to ensure the direction of the audit.

According to Kuhre (1996:29-33) many principles should be considered when designing a site audit system. The system must be consistently followed and systematic. The results should be supported by evidence and reported in a format that is readily understandable and reliable. Quality assurance should be followed as well as the field individuals involved in the process. The analysis must be fair, measurable and done in a non-threatening way. It should contain opinions or judgements with the following key principles taken into account.

- Legal sensitivity
- Total Quality Management;
- Systematic;
- Findings supported by evidence;
- Fair and non-petty analysis;
- Audits to be done in a non-threatening way;
- Focus on systems, not items;
- Quality;

3.5 Environmental Compliance Auditing: The process

“The actual audit process steps range from very simple and straightforward for small sites without many waste streams to very involved procedures for large or complicated facilities”, (Kuhre, 1996:53). Before the formal audit activities are started, there should be determined whether an audit should even be done at the proposed time.

There are some actions that should be done by the audit team before visiting the site. The more important up-front activities include selection of the audit team and facility, scheduling of the audit and gathering background information for the team. According to Kuhre (1996:53), the most important, is to contact the site management before the audit. When the site is large and complicated a pre-audit visit by the audit team leader is a good idea. The site’s schedule, sensitivities and needs must be considered for the audit to be successful.

When the up-front activities are done, the fieldwork can start. The first action is usually an opening meeting at the site. Everyone gets to know the purpose of and schedule for the day. Next, interviews and other on-site information gathering occur. This is followed by the most important step, the location walk-through. Audit findings are recorded during the walk-through. The final step at the site is an exit meeting to review and summarize the initial findings.

Post-audit actions are done after the fieldwork and are completed by the audit team and site individuals, with as much involvement of the latter as possible. The audit team will analyze and interpret the findings. The checklist or action plan is usually prepared to suggest specific action within clearly defined timeframes. If there are big problems, a feasibility

study and remedial action plans may be necessary. Correction and follow-up to ensure that the problems and their root causes are fixed are of paramount importance. It is important to complete a checklist with a report or action plan. The audit process will be discussed in more detail (SENRIO, 8:2-5):

3.5.1 Audit planning

The audit plan is the first step in the process; it would determine the ease with which the rest of the audit process proceeds. An auditor must have clear insight as to the defined objectives of an audit prior to the planning phase.

The audit plan should include pertinent information to help the team prepare for the audit in a meaningful way. If the audit plan is complete the entire audit will be valuable and cost-effective. The team leader is responsible for the completion of the audit plan, but the inputs from the other audit team members and the site management is imperative.

The audit objectives, criteria and scope should be identified. The scope of an audit defines the parameters within which the audit is performed. The overall extent and boundaries of the audit will therefore be addressed. The client with the help and inputs of the lead auditor will do this. The client has the ultimate authority to make decisions – for examples how much time and money will be spend on the audit.

The elements of the auditee's EMS with the highest priority need to be identified in order to prioritize the audit objectives and scope. This knowledge will provide assistance in deciding on appropriate duration and selection of team members. When a decision is made regarding the duration, the auditor should consider the time it takes to carry out preparation, performance and reporting activities. The size and complexity of the operation will also play a significant role in deciding on the audit duration. The travel time should also be considered at this stage.

All stakeholders must have complete confidence in the audit results based on the competence of the audit team. It is imperative that the team is selected carefully and with due consideration of all the attributes of auditors.

The audit details and site information should also be included in the audit plan. This is dates, proposed activities, places, individuals involved and their functions, documents needed, time of the audit start and duration and communications. Any other details that are known at this point in the process should be spelled out in the audit plan. A description of how the

audit findings will be recorded and reported must be presented in the audit plan. Confidentiality, report format and documentation control is the minimum to cover.

3.5.2 Audit Preparation

The next phase of the auditing process is the preparation phase. Some of the activities of the preparation phase do however overlap with that in the planning phase, but these two phases needs to compliment one another. The auditor must be aware that the success or failure of the audit - to achieve the given objectives - will depend on the adequacy of the planning and preparation before the audit commences.

The preparation activities may include the following:

➤ Preliminary document review

The auditor must spend adequate time to review the applicable regulations and information about the site to be audited. An environmental auditor should never show up unprepared. The location maps and site drawings should be the first to be reviewed for the auditor to geographically orient himself. It is therefore important to see how the operation physically fit into the environment.

An operational process flow diagram or schematic is a key bit of background information to be reviewed very early. The auditor must understand the basics such as where the process starts, key emission points and where the process ends. According to SENRIO (8:5) other additional documents that should be reviewed by the auditor is: environmental and safety procedures, manifests, hazardous material management plans, environmental policy statements, material safety data sheets, chemical inventories, permits and permit applications, underground storage tank records, biannual reports, previous audits, site history documents and so on. The auditor must prioritize the available documents. All the information should be used in preparation of the audit itinerary and checklists.

➤ The review of results of previous audits

If this information is available, it is used to compare reports from previous audits. The changes in the latest documentation are also noted during the preliminary document review or desk study.

➤ **Liaise with the Auditee and report on results of the preliminary document review**

Any anomalies and misunderstandings within the documentation need to be clarified with the auditee before the site audit.

➤ **Compile an itinerary and agenda for the opening and closing meeting**

The itinerary should be set up by using the information gathered during the desk study as well as knowledge that were obtained during the pre-audit visit, if there was such a visit conducted. The program for the audit as well as the agenda should be communicated to the auditee well in advance in order for the company to make the necessary arrangements for the audit (SENRIO, 8:2).

➤ **Compile a checklist**

During the desk study the auditor must verify whether the documentation reviewed conforms to the criteria requirements for the audit. The checklist for the audit with different points to verify, must be prepared. At this stage it is important to make sure that everybody involved with the audit know the defined scope of the audit that was agreed upon prior to the audit.

➤ **Confirmation of domestic arrangements**

The various requirements that needs to be arranged can include:

- The provision of a meeting room for auditors to use in privately discussing their findings;
- Knowledge of the auditee organizations opening and closing times as well as tea and lunch breaks, enabling the audit team leader the opportunity to co-ordinate the itinerary with availability of auditee personnel;
- Arrangement and provision of guides or escorts to ensure all desired areas may be visited to ensure achievement of the agreed objectives.

➤ **Site notification of audit**

A combination of announced and unannounced audits should be utilized since the purpose of doing audits is to evaluate and to help the organization meet specified criteria. The announced audits are usually more comprehensive and encourage the people at the site to correct many things in advance on their own, which is a valuable exercise.

Formal channels of communication should be followed in order to ensure maximum effectiveness of the notification. Advance notice of at least a few weeks should be given. The audit timing should be flexible to fit into the site's production schedule. The site should be encouraged to fix problems before the audit.

➤ **Briefing the audit team**

According to SENRIO (8:4), the team leader should have already been in place for a while to prepare, assemble or complete the previously described steps in the audit process. The audit team can be set up in many different ways. The team can be established according to subject, experience, expertise or area, or a combination of these. The team will most probably consists of a team leader, an environmental technical member and a representative from the site who knows the operation well. In the case of a large facility, the auditors will split up according to floors or functional areas and in such a case may include an individual knowledgeable about employee health and safety on the audit team.

The team leader should start the preparation phase with a meeting where all the team members must be present. The agenda for this meeting must be finalized.

All the team members must have a clear vision of their role during the audit and each team member should leave this meeting with a defined task to prepare for the audit. The team leader may call for more progress meetings, depending on the objectives and size of the audit.

It is therefore of the utmost importance that each member of the audit team has to look basically for environmental management systems or potential environmental problems. The observations are measured against the established criteria and with good judgment.

Each team member of the audit team must receive a copy of the audit plan, documentation, audit procedure and tools. The team should have an insight in suggestions and improvements of the audit documents. This will help with the development of ownership of each team member into the entire audit process.

3.5.3 The audit activities

According to SENRIO (9:3), the following audit activities can be identified in the environmental audit process:

➤ **Opening meeting at the site**

The meeting is usually started with the introduction of individuals and a presentation of the scope of the audit. Emphasis should be on the benefit of the audit to everyone involved. A summary of the audit plan, timetable and procedure can be given during this meeting as well. A confirmation should be made of resources and facilities that must be available to the audit team.

The site individuals should clearly identify the hazardous and critical operational areas at the facility. If there are critical production operations that must not be disturbed, they should be made known to the auditors during the opening meeting. Personal protective equipment should be given to the audit team as well as training in the wearing of the PPE.

The team should be informed regarding the site's emergency action plan. This would include an explanation about alarms, evacuation routes and other key information. At the end of the opening meeting there should be a buy-in from all the individuals so that there can be maximum site participation and openness. The auditors should also have a clear appreciation of the facility that they are not injured and do not interfere significantly with production. The opening meeting should be closed with a statement of when the closing meeting will occur and who will attend such a meeting.

➤ **Site visit and record findings**

This is one of the most important steps of the entire audit. The auditor needs to record observations and findings before his memory fail. There are basically two basic purposes for the site visit. Important factors, especially environmental management systems and controls noted in the documentation needs to be confirmed. Second, the site visit should also strive to uncover new compliance problems not necessarily associated with the documentation reviewed.

Information is collected during an audit from numerous sources and in different ways. For example, evidence is usually obtained by visual observations, interviews and the examination of site documents and files. Observations should be made inside and outside the facility, especially of areas that has contained chemicals or hazardous wastes and emission sources. The interviews should be with longer-term employees concerning their knowledge of previous occurrences such as regulatory contacts, spills, abandoned sumps and storage tanks. All sources of information should be considered, some of, which will not be obvious (SENRIO, 9:6).

The progression or agenda for the site audit can be organized in many different ways. Normally site audits follow the process flow, which is acceptable. Another way of organizing the site visit is according to observations that relate to air, water and land discharges. The environmental auditor should, at a minimum, check out adjacent properties and, if time will allow, assess in a radius of at least one-mile out from the facility.

Recording of data can be done in various ways. Whatever enables auditors to efficiently record the data in a consistent and accurate manner should be utilized. Data can be entered directly into some of the tools presented earlier in the discussion. The auditor can merely record observations but it is important to record non-conformities as well. It would also be useful if remarks regarding the specific problem as well as the description of the problem were made.

➤ **Closing meeting**

The closing meeting is an extremely important part of the audit process and every effort should be made to make this meeting meaningful, positive and an effective part of the process.

The closing meeting should be with the site management. In addition to thanking the site individuals for allowing the audit to occur, the major findings, positive and negative, and next steps should be discussed. Priorities should be set and root causes discussed.

It is critical that non-conformities and other observations of an urgent nature that were noted be immediately related to the site management. It is important for site management to know about these critical issues as quickly as possible so that the impact can be minimized. The auditors should not push to get a commitment from site management to correct non-urgent deficiencies at this point in time.

Several common-sense suggestions will also help the closing meeting end on a positive note. The auditor should explain carefully and never argue. The auditee should be encouraged to start thinking about practical solutions for some of the action items identified.

➤ **Analyze data and evidence**

Some of the observations or findings will be straightforward and will not require analysis. Other data, however, should be analyzed before it is entered into the software tracking system. Data and observation analysis is usually done informally and without any rigid procedure. In most cases this is not acceptable because it results in lack of consistency, inability to

repeat questionable analyses, and inaccurate observations and conclusions being recorded. Unless it is an extremely simple and straightforward site with few environmental impacts, it is usually necessary to perform statistical, risk or some other form of structured analysis. It is important to interpret the information.

The audit results should be analyzed at the micro and macro levels. The micro level portion of the analysis would include only the specific issues and corrections for the one site. An orientation towards root causes is very important.

➤ **Report audit results to management**

The scope or focus of the audit should spell out what is expected of the auditor since it is really up to the auditor to decide whether only a list of observations, data and problems will be presented to the auditee or whether corrective actions or improvements for most problems will also be noted. It may be hard for auditors to come up with corrective actions, however, they should make every attempt to do so since improvement or correction is really the purpose of the audit. The corrective actions should be suggestions, not requirements, and be cost-effective. In this way the auditor will stimulate the auditee to think of practical solutions themselves.

3.5.4 Post audit activities

According to SENRIO (9:8-9) the following post audit activities will take place when conducting an environmental audit:

➤ **Prepare and set up the audit report**

The next step is to prepare the draft audit report, utilizing the data, observations and corrections already discussed. The audit report is very important. The draft audit report should be sent to the client and as much feedback as possible should be incorporated into the final report.

The way the draft and final reports are presented is important. The findings can be written in a constructive way and not point to fault at individuals. Care must also be taken in term of who receives the audit report. Only those with a need to know should receive the audit report. Only the client and those individuals who can correct the problems should receive the report to avoid possible regulatory violations. Other management individuals should be listed on the audit cover memo that they are aware that an audit occurred and can request a copy of the entire document if there is a real reason to do so.

➤ **Follow-up: Action plan preparation and implementation**

Most organizations do good audits, however, many do not follow up and correct the problems noted in a timely manner. This is worse than not auditing at all since it increases the organization's liabilities significantly. The follow-ups are therefore as important as conducting an audit in the first place. The facility or plant personnel should now develop an action plan to address the findings. This plan serves as a mechanism for obtaining management approval for future application of resources and for tracking progress towards its completion.

Further follow-ups must be made to ensure that the action plan is implemented according to the pre-determined schedule and all corrective action is taken. Line function monitoring, a surveillance team or management may do this.

It is evident from the above discussion that the environmental compliance process is quite simple and easily understood. In order to simplify the auditing process, various audit tools can be used at various stages of the auditing process. A need for such an audit tool to aid the EMP performance assessment was established. One of the most effective audit tools available is the checklist. A standard checklist to be used for EMP performance assessment was designed for the purpose of this study. The checklist will comply with the minimum standards of the Department of Minerals and Energy, since the Aide-Memoire format was used for the compilation of the list. The site specifics of a mine were also taken into account. This, EMP Performance Assessment checklist was tested through the execution of this study. Therefore, for the purpose of this study, the checklist will be presented and described in more detail.

3.6 Tools for auditing

Technical procedures should be designed to facilitate effective communication and the purpose of such technical aids should be to exchange information between different groups (Bruder, 1992: 37). The technical procedure that can be used for auditing should encourage active involvement of all the parties involved with the audit. The method therefore needs to be simple and understood by different professions and agencies to avoid that the value of the outcome be reduced.

According to Kuhre (1996:45) it is up to the lead auditor to select one or two audit tools that will enhance the audit. Just a walk about the site and to expect memories or experience to remind an auditor what to look for will not be sufficient for an environmental audit. Some of the tools that can be used include: checklists, topical outlines, detailed guides, and questionnaires, bar coding and software worksheets.

The various audit tools will help minimize the chance that important issues are overlooked. Well-defined audit criteria or factors are needed to rate the factors. For the purpose of this study, only the checklist will be discussed in more detail.

3.6.1 Checklists

Checklists are one of the most commonly used audit tools. It is a straightforward way to remind the auditor what to consider, especially if one consider the volume of things that need to be assessed, according to Kuhre (1996:46). Audit checklists vary in terms of length and type of data to be observed. Checklists however don't contain only the item to be assessed but also columns for recording observations, suggested corrective action, scheduled completion date, actual completion date and responsible individuals.

According to SENRIO (8:7), the detail contained in the checklist will depend on the experience of the Auditor. The Auditor must contain a list of checkpoints in simple words and phrases that seeks to clarify the who, what, where, when and how of every situation. The checklist can therefore be seen as a collection of key points and important characteristics from the available information documents that were evaluated. The checklist is a working document and will serve as a useful record that could be needed to substantiate information. The checklist can also be entered into a computer software system and be easily upgraded.

According to Bruder (1992:41) checklist can pose certain problems because:

- Checklists can fail to address policy interaction; and
- Checklists rely on the ruthless honesty of the Auditor.

Despite these two negative points, noted, it was decided to develop a checklist for EMP Performance Assessment. The aide-memoire (Department of Minerals and Energy, 1992:1-34) was used as the design criteria.

3.7 The design criteria for the EMP Performance Assessment Checklist

The Aide-memoire can be seen as the minimum requirements for the compilation of an EMP. The purpose of the Aide-memoire is to assist applicants to draw up EMP's in accordance with an established approach that is acceptable to all regulating authorities. The Aide-memoire provides a list of all the items to be considered when drawing up an EMP. The EMP's for operating mines will therefore be set up in the following ways (Department of Minerals and Energy, 1992:6):

- the executive summary should be completed;

- part 1 – which describes the mine and its actual operating parameters-should be included:
- Complete part 2 – a description of the existing environment.
- Give a motivation of the project in part 3;
- Complete the mining plan in part 4;
- Consider the information contained in part 2 and describe the actual impacts;
- Complete part 6 – which give the management programme for the impacts described in part 5.
- Complete all the remaining parts of the Aide-memoire where applicable.

According to the Department of Minerals and Energy (1992:2) the EMP should be as simple, yet as comprehensive as possible to accommodate a mining or prospecting operation of any size and complexity. The document should be tailored to be site-specific, flexible, and adaptable.

The environmental management programme, contained in part 6 of the EMP, results in site-specific legal obligations on the part of the proponent. Once the approval of the EMP has been granted, part 6 is binding and must be adhered to.

3.8 The EMP Performance Assessment Checklist

A. Name of mine:

B. Date of EMP Approval:

C. Date of EMP Performance Assessment:

D. General Environmental Objectives according to EMP	Compliance*	Remarks*
6.1. Construction phase (A performance assessment will not include the construction phase.)		
6.2 Operational phase		
6.2.1 Geology		
6.2.2 Topography		
6.2.3 Soils		
6.2.4 Land Capability		
6.2.5 Land Use		
6.2.6 Natural vegetation		
6.2.7 Animal life		
6.2.8 Surface water		
6.2.8.1 The water balance		
6.2.8.2 Storm water		
6.2.8.3 Surface rehabilitation		
6.2.8.4 Surface water users		
6.2.8.5 Success of river diversion if applicable		
6.2.9 Ground water		
6.2.9.1 Optimizing surface rehabilitation to minimize ground water impacts		
6.2.9.2 Ground water users		
6.2.9.3 River diversions		
6.2.10 Air quality		
6.2.11 Noise		
6.2.12 Sensitive landscapes		
6.2.13 Visual aspects		
6.2.14 Regional socio-economic structure		
6.2.15 Interested and affected parties		
6.2.16 Submission of information		
6.2.17 Maintenance		
6.2.17.1 Rehabilitated land		
6.2.17.2 Water pollution control structures		
6.2.17.3 Rehabilitated residue deposits		
6.3 Decommissioning phase and closure (This phase will only be included in the checklist for the performance assessment at mine closure)		

Note:

Compliance* Recorded as Yes, No, Partial and n/a

Remarks* Observations, the reason for non-compliance or recommendations

The Aide-memoire was used as guideline for the development of the EMP Performance Assessment Checklist. For the purpose of this study, only the commitments for the operational phase were assessed. The reasoning for this was that all the mines – which were assessed – are in the operational phase. A performance assessment would only be conducted for the operational phase of a mine, or at decommissioning at mine closure. The effectiveness of the EMP Performance Assessment Checklist was tested during the EMP compliance audits conducted at ten coalmines in the Mpumalanga Region.

CHAPTER 4

ENVIRONMENTAL PERFORMANCE ASSESSMENTS FOR TEN COAL MINES IN THE MPUMALANGA REGION

4.1 Research method

Ten coal- mines within the Mpumalanga Region were randomly selected to be assessed for the purpose of this study. The selection was done in such a way as to ensure general representation of the various types of coalmines within the region. Opencast and underground mines were selected as well as small, medium and large operations from various representative companies. The audit plan was set up as described in a previous chapter and the audits were performed in October to November 2000 with the objective to test the effectiveness of EMP performance.

The audit process – as discussed in chapter 3, point 3.5 – was strictly followed. The following audit preparation activities was completed prior to the audit:

- The EMP for each mine was reviewed, with the emphasis on the commitments made in chapter 6 of the document.
- No previous audit results were available to be assessed;
- An itinerary and agenda for each audit was compiled and communicated to the relevant environmental managers on each mine;
- The checklist was compiled with the aspects listed in the aide-memoire as basis. It was decided to make the checklist as simple and easy to use as possible. Each checklist will vary from the previous because of the site specifics of each mine. The checklist can be modified depending on the detail required and the purpose of use thereof.
- The arrangements was confirmed with each environmental manager at each mine;
- The environmental managers was contacted to confirm the date of the audit (site notification)
- The audit was conducted by myself, the environmental manager of the mine and in some cases two or more representatives of the mine.

The actual audit activities included:

- An opening meeting at the mine with the environmental manager and mine manager. The audit process was explained.

- The site visit about and recording of findings was done. The checklist prepared specifically for each mine was used.
- The audit ended with a closing meeting where the major findings were discussed.

The activities that took place after the audit was:

- The analyzing of the data and audit findings;
- The reporting of the audit results to the mine (completed checklists);
- This report was prepared and will be the formal audit report.

The results of each audit are set out hereunder. For the purpose of confidentiality all the names and specifics that will reveal the identity of the mine was left out. (As a condition from the mine manager from each mine)

4.2 EMP Performance Assessment Checklists for ten coal mines in the Mpumalanga Region

The detailed audit findings, as registers on the checklist from each mine, will be discussed in the following section.

4.2.1 EMP compliance audit: Mine A

The compliance in terms of the commitments made in part 6 of the EMP was assessed during an environmental audit. The results of this audit are presented in table 4.2.1.

Table 4.2.1 Environmental Audit Checklist: Mine A

General Environmental Objectives according to EMP	Compliance	Remarks
6.2.1 GEOLOGY		
* A safety factor of at least 1,4 will be used to ensure long term stability of pillars	Yes	
* At depths of less than 45m the maximum percentage extraction will be 75%	Yes	
* Additional support will be left when mining under the stream	Yes	
* Known faults and dykes that may link workings to farm boreholes will be sealed.	n/a	
6.2.2 TOPOGRAPHY		
* All areas will be free draining	Yes	
* All long slope areas will be profiled so as to minimize erosion	Yes	

6.2.3 SOILS		
* The stockpiled mounds will be less than 2,5m high and will be vegetated	Partial	
* Erosion of rehabilitated areas will be prevented	Yes	
* Soils will be sampled to determine lime and fertilizer requirements.	n/a	
* Nutrients will be added at the start of the growing season.	n/a	
* The fertilizer programme will be conducted annually (pH 5,5; phosphates 10 ppm.)	n/a	
* The approved seed mix will be used	Yes	
* Waterways to prevent erosion will be hand planted with star grass.	No	
* Where necessary grass will be top dressed with 350 kg/ha of LAN.	n/a	
6.2.4 LAND CAPABILITY		
* Vegetate the area as described above.	n/a	
* Prevent erosion using suitably constructed contour Drains	n/a	
6.2.5 LAND USE		
* Areas not used by the mine will be leased to farmers	Yes	
* Areas to be used to their full capacity	Yes	
6.2.6 NATURAL VEGETATION		
* Prevent damage to rare and endangered plants	Yes	
* All rare and endangered species disturbed will be relocated	n/a	
* Exotic and invader species to be managed	Partial	
6.2.7 ANIMAL LIFE		
* No hunting or trapping	Yes	
* No artificial introduction of wild life	Yes	
6.2.8 SURFACE WATER		
* Water to flow off dump and rehabilitated areas as quickly as possible without erosion.	Yes	
* Seepage water will be used for road wetting and mining processes	n/a	
* Topsoil will be replaced as soon as possible	n/a	
* Extraneous water will not be allowed to accumulate on the shale floor	Yes	
* Erosion of topsoil will be prevented by vegetation	Partial	
* Water wastage will be prevented.	Yes	
* Excess water will only be discharged with the Permission of DWAF	n/a	
* Pollution control dams will be de-sited as necessary	Yes	
* Storm water runoff will be diverted around box cut	Yes	

6.2.9 GROUNDWATER * Monitor groundwater changes * Monitor existing boreholes that can be affected by mining * Drill new monitoring boreholes where necessary * Grout major water bearing dykes and fissures where necessary * Limit mining into or through water bearing features	Yes n/a n/a n/a n/a	
6.2.10 AIR QUALITY * Dust will be controlled by the regular spraying of water from the bowser	Yes	
6.2.11 NOISE * No significant impact 6.2.12 SENSITIVE LANDSCAPES * No sensitive landscapes identified 6.2.13 VISUAL ASPECTS * The discard dump will be vegetated as to blend in with the surrounding landscape * Trees be planted to screen the plant and dump site	 n/a n/a	
6.2.14 REGIONAL SOCIO-ECONOMIC STRUCTURE * Impact not assessed		
6.2.15 INTERESTED AND AFFECTED PARTIES * If possible a local contractor will be employed to do earth works * A local farmer will be employed to do agricultural operations (fertilizing, ect.) * Traffic issues concerning the trucks on the roads will be addressed. * Dust on the dirt roads will be suppressed with water * Suitable fencing will be erected * A local committee will be established and regular meetings held	Yes Yes Yes Yes Yes	Meeting is held with the local council on an on-going basis
6.2.16 SUBMISSION OF INFORMATION * The results of additional studies will be forwarded to the DME * Locations of mining, final rehabilitation and closure dates will be submitted to DME if they should change * The surface water points will be sampled quarterly and submitted to DME and DWAF in Feb. and Sept. * The presence of rare and endangered plants will be reported to the DEAT	n/a n/a Yes n/a	
6.2.17 MAINTENANCE * Land will be leased to farmers and audited on an annual basis * Erosion measures will be designed to be stable over a long period. * Soil fertility will be monitored	Partial Yes Partial	

This mine is a classic example on a medium sized underground coalmine. The board and pillar mining method is being used for coal extraction. A prominent company (X) owns the mine and all activities on the mine are contracted to capable personnel: from the management, the environmental specialist and the engineers. A total of 50 commitments, made in chapter 6 of the EMP, were assessed during the environmental compliance audit; 24 aspects were recorded as a positive compliance, 1 aspect was recorded as a negative compliance and 5 aspects were complied with only partially. This results in a 54% total compliance to the EMP commitments.

A number of areas of excellence were revealed by the audit:

- The mine implements a very successful surface- and groundwater monitoring programme;
- The ongoing communication with interested and affected parties is ensuring good relations with the neighboring communities

A number of areas of risk were encountered:

- The erosion control measures on the soil stockpiles are inadequate;
- No erosion control structures are in place at the different waterways;
- Exotic and invader plant species are not managed;
- No monitoring programme with regard to soil fertility exists.

The following recommendations were made:

Quite a few commitments is only complied with partially this could be due to the fact that the environmental specialist is not employed on a full time basis by the mine, and is not always present on the mine to check whether systems and programmes are adhered to. A lot of the commitments was however not applicable anymore and it was recommended that the mine have a re-look at these commitments and amend the EMP accordingly.

4.2.2 EMP compliance audit: Mine B

The compliance in terms of the commitments made in part 6 of the EMP was assessed during an environmental audit. The results of this audit are presented in table 4.2.2.

Table 4.2.2 Environmental Audit Checklist: Mine B

General Environmental Objectives according to EMP	Comply	Remarks
6.2.1. GEOLOGY (BLASTING)		
➤ Pillars be designed according to acceptable scientific criteria to avoid surface subsidence	Yes	
➤ A detailed modeling exercise to be undertaken	Yes	
6.2.2. TOPOGRAPHY		
➤ A water diversion plan will be devised	Yes	
➤ All coal remnants will ultimately be removed	No	Needs to be done
6.2.3. SOILS		
➤ The ore stockpile will be lined with a concrete base	No	
➤ Topsoil removed from affected areas to be stockpiled for rehabilitation	Yes	
6.2.4. LAND CAPABILITY		
➤ No clear commitment	N/a	
6.2.5. LAND USE		
➤ No clear commitment	N/a	
6.2.6. NATURAL VEGETATION		
➤ No clear commitment	N/a	
6.2.7 ANIMAL LIFE		
➤ No clear commitment	N/a	
6.2.8 SURFACE WATER		
➤ Will be designed for a 1:50 year rainfall event	Yes	
➤ Will be inspected on a weekly basis	Yes	
➤ Will be inspected after all rainstorms	Yes	
➤ Debris will be removed and damage repaired	Yes	
➤ A clean water diversion drain and berm constructed upslope of the dirty area.	Yes	
➤ Contaminated run-off water will be diverted by drains and berms to the pollution control dams	Yes	
➤ Run-off water entering the dams will be reduced by diverting clean water away from the dirty area by drains and berms	Yes	
➤ Domestic water will be treated and put into the pollution control dams	Yes	
➤ All mine infrastructure will be placed outside the 1:100 year flood line	Yes	
2.6.9. GROUNDWATER		
➤ Monitoring of water inflow into the mine will be done	Yes	
➤ Water will be pumped from the mine as quickly as possible	No	This water is being stored in the underground workings
➤ Groundwater will be monitored	Yes	
➤ Farm boreholes will be monitored	Yes	

6.2.10. AIR QUALITY		
➤ Road dust will be suppressed by spraying	Yes	
➤ Disturbed land will be re-vegetated	Yes	
➤ Dust monitoring programme implemented	Yes	
6.2.11. NOISE		
➤ Sires will be used	No	No complaints has been received
➤ Complaints will be fully investigated	No	No complaints has been received
6.2.12. SENSITIVE LANDSCAPES		
➤ The water in the River will be monitored	Yes	
➤ Water entering the mine will be monitored to prevent potential surface dewatering	N/a	
➤ Grave sites will not be disturbed	Yes	
6.2.13. VISUAL ASPECTS		
➤ Only essential lighting will be utilized	Yes	
➤ Servitude placed along existing servitudes	No	No new servitudes was necessary
➤ Disturbed land will be re-vegetated as soon as possible	Yes	
6.2.14. REG. SOCIO-ECONOMIC STRUCTURE		
➤ A system established to respond to concerns by employees and local people	Yes	
➤ Employees educated on activities that are considered undesirable	Partial	
6.2.15. INTERESTED AND AFFECTED PARTIES		
➤ A I&AP forum will be established	Yes	
2.6.16. SUBMISSION OF INFORMATION		
➤ A programme will be set up to determine The following factors:		
* Surface water quality	Yes	
* Borehole water quality and yield	Yes	
* Mine water quality	No	
* The impact of blasting on structures	N/a	
* Dust generation	No	
* Information regarding water samples Submitted to IAP's	Yes	
6.2.17. MAINTENANCE		
➤ The water management infrastructure will be retained until the vegetation is sufficient to control erosion	Yes	
➤ Where necessary, erosion control structures will be established	No	Needs to be done

With the analysis of the environmental audit findings of Mine B, it was found that:

This mine is a classic example of a medium sized underground coalmine. The board and pillar mining method is being used for coal extraction. A prominent company (X) owns the mine and all activities on the mine are contracted to capable personnel: from the management, the environmental specialist and the engineers. A total of 40 commitments, made in chapter

6 of the EMP, were assessed during the environmental compliance audit; 29 aspects were recorded as a positive compliance, 9 aspects were recorded as a negative compliance and 1 aspect were complied with only partially. This results in a 61% total compliance to the EMP commitments.

A number of areas of excellence were revealed by the audit:

- Quite a number of environmental impacts that was predicted at the time of EMP compilation changed from a negative to positive. The extent of pollution in general is contained to a smaller area that was envisaged.

A number of areas of risk were encountered:

- The situation with regard to water management changed significantly and was not addressed at all.
- No new servitude's was needed – this situation also changed from what was said in the EMP
- Water quality results have not been submitted to DWAF, since recently
- No dust monitoring is in place
- No noise impacts have been identified, with the audit it was established that this statement is not true
- The ore stockpile area was not lined with a concrete base and no reasoning could be given for this deviation from the EMP commitment made. The stockpile areas are not always kept damp, which could increase the risk of spontaneous combustion.
- No erosion control structures were established on the rehabilitated land.

The following recommendations were made:

The number of non-compliance's could be the result of the absence of the environmental manager on the mine. It was recommended that the mine implement an environmental management system in order to address the non-compliance's. The EMP should also be updated with regard to the changed situation of water management on the mine. The commitments that were not applicable should be minimized in the EMP revision.

4.2.3 EMP compliance audit: Mine C

The compliance in terms of the commitments made in part 6 of the EMP was assessed during an environmental audit. The results of this audit are presented in table 4.2.3.

Table 4.2.3: Environmental Audit Checklist: Mine C

General Environmental Objectives according to EMP	Comply	Remarks
6.2.1 GEOLOGY * There will be no significant impact	N/a	
6.2.2 TOPOGRAPHY * Discard will be placed on a 1:5 slope * Discard placed in consecutive terraces * The discard will be covered with 150 mm ash barrier * The discard will be covered with a 200mm layer of topsoil * The discard dump will be grassed and returned to grazing	No Partial Partial No No	Slopes of discard are 1:3. Due to safety reasons ash was not recovered but instead subsoil from a different colliery was used as a barrier. The mine is scaling down - no topsoil was placed in 2001 No areas were grassed in 2001 year.
6.2.3 SOILS * Dealt with by means of rehabilitating discard	Yes	
6.2.4 LAND CAPABILITY * No significant impact- no management required	n/a	
6.2.5 LAND USE * The infrastructure site will be restored to the pre-mining land use at closure	n/a	
6.2.6 NATURAL VEGETATION * Vegetation outside infrastructure area will not be disturbed	No	Additional areas was used for crushing - this area is now included in the dirty area.
6.2.7 ANIMAL LIFE * No significant impact- no management required		
6.2.8 SURFACE WATER Main shaft area: controlled by v-drain which divert water into the evaporation ponds * Treated effluent from sewage plant returned to industrial water circuit * Water from surface pollution control dam used in industrial water circuit * Water from underground pumped to surface pollution control dam * No water to be discharged to the public stream * Surface water samples will be taken monthly * The monitoring data will be submitted to DWAF and DME annually	Yes Yes Yes Yes Partial Yes Yes	Seepage occur from the discard dump
6.2.9 GROUNDWATER * Water levels in selected farmers boreholes, will be monitored six monthly * Water quality in selected boreholes to be monitored annually	No No	The groundwater study was conducted and indicated that it was not necessary anymore. The groundwater study was conducted and indicated it was not necessary anymore.

* Water levels in the mined out areas to be monitored annually	No	Will be introduced in areas that is sealed off
* Water quality in flooded sections to be Monitored annually	No	Will be introduced in areas that is sealed off
* Water quality and levels in areas influenced by pollution sources, will be monitored quarterly	Yes	
6.2.10 AIR QUALITY		
* Dust pollution will be minimized - spraying water onto roads	Yes	
* Air pollution from discard dump will be managed by rehabilitation	Partial	Discard dump is only partially rehabilitated, final rehabilitation to be done at mine closure
6.2.12 SENSITIVE LANDSCAPES		
* No sensitive landscapes indicated on mine	n/a	
6.2.13 VISUAL ASPECTS		
* Dealt with by means of rehabilitating discard dump	Partial	Discard dump is only partially rehabilitated, final rehabilitation to be done at mine closure
6.2.14. REG. SOCIO-ECONOMIC STRUCTURE		
* Positive impact during operational phase of mine	n/a	
6.2.15. INTERESTED AND AFFECTED PARTIES		
• Meetings with IAP's will be held regularly	Yes	Received minutes of meetings
6.2.16. SUBMISSION OF INFORMATION		
* Monitoring of groundwater levels will continue during operations and reported	No	The groundwater study was conducted and indicated that it was not necessary anymore.
* Monitoring of surface water will continue during Operations and reported	Yes	Received data from mine annually
6.2.17. MAINTENANCE		
* Rehabilitated land will be monitored regularly	Partial	Will negotiate contract with farmer to do Maintenance on rehabilitated land
* All surface water dams will be monitored	Yes	
* Should seepage occur, the matter will be investigated and remedial action taken	Partial	Actions in progress
* Mine will implement a system to prevent seepage	Partial	Actions in progress
* Discard will be placed at a 1:5 slope	No	Slopes currently at 1:3
* Discard placed in consecutive terraces	Partial	
* The discard will be covered with 150 mm ash barrier	Partial	Due to safety reasons ash was not recovered but instead subsoil from a different colliery was used as a barrier.
* The discard will be covered with a 200mm layer of topsoil	No	The mine is scaling down - no topsoil was placed in 2001
* The discard dump will be grassed and returned to grazing	No	No areas were grassed in 2001 year.
* Infiltration will be minimized through compacting, covering and contouring	No	Mine is scaling down, slopes are not ready for covering
* Seepage will be intercepted by boreholes	Partial	Partially implemented

With the analysis of the environmental audit findings for mine C, it was found that:

This is a large underground coal mine owned by a large Corporate Company(Y). The board and pillar mining method is being used for coal extraction. A total of 40 commitments, made in chapter 6 of the EMP, were assessed during the environmental compliance audit; 11 aspects were recorded as a positive compliance, 13 aspects were recorded as a negative compliance and 11 aspects were complied with only partially. This results to a 27,5% total compliance to the EMP commitments.

A number of areas of excellence were revealed by the audit:

- The surface water management is well handled by the mine
- The dust monitoring programme is in place
- The communication with the I&APs is excellent
- The mine is in the process of the implementation of an environmental management system and it seems as if most of the workers were exposed to an environmental awareness programme.

A number of areas of risk were encountered:

- The mine deviated from the committed 1:5 slope of the discard dump to a 1:3 slope on the southern side of the dump.
- The mine also reclaimed ash from the dump to be used as a barrier material for placement between the discard and the topsoil. This practice was stopped due to safety reasons but was not communicated to DME.
- The limited discard placed and no final grading resulted in no topsoil placing or rehabilitation by means of grassing.
- Limited maintenance was also done on the already rehabilitated areas of the discard dump
- High sulfate concentrations are measured in the borehole between the discard dump and the river. The quality of the water in these boreholes gives an indication of the seepage from the discard dump.
- According to the EMP, water in the mined-out as well as the flooded areas should be monitored. Due to safety reasons, this can only be measured when the areas are sealed off or at mine closure.

The following recommendations were made:

- The performance of this colliery illustrates general compliance with its EMP commitments. The major non-compliance issues, as discussed above, must receive priority in the ongoing environmental management system on the mine.

4.2.4 EMP compliance audit: Mine D

The compliance in terms of the commitments made in part 6 of the EMP was assessed during an environmental audit. The results of this audit are presented in table 4.2.4.

Table 4.2.4: Environmental Audit Checklist: Mine D

General Environmental Objectives according to EMP	Comply	Remarks
6.2.1. GEOLOGY <ul style="list-style-type: none"> • Discard removed from the conveyors is placed into an open area underground • The mining will ensure safety standards so that none of the roof sections will collapse 	Yes Yes	No surface subsidence has taken place
6.2.2 TOPOGRAPHY <ul style="list-style-type: none"> • The footprint of the mining area is kept within the existing disturbed area • The mine will ensure safety standards so that none of the roof sections will collapse and therefore alter the topography 	Yes Yes	No surface subsidence has taken place to Date
6.2.3. SOILS <ul style="list-style-type: none"> • Soils will be separated into different stockpiles; topsoil, subsoil and hards • Soils stockpiles to be kept separate at all times Efforts are made not to contaminate it. 	Yes Partial	Road on subsoil stockpile constructed from coal discard, soil is being contaminated
6.2.4 LAND CAPABILITY <ul style="list-style-type: none"> • No mitigation provided 	n/a	
6.2.5 LAND USE <ul style="list-style-type: none"> • No mitigation provided 		
6.2.6. NATURAL VEGETATION <ul style="list-style-type: none"> • A program to eradicate the alien plant species Will be implemented. 	Partial	Black wattle problem within the area disturbed by mining infrastructure
6.2.7 ANIMAL LIFE <ul style="list-style-type: none"> • No significant impact and no mitigation 	n/a	
6.2.8. SURFACE WATER <ul style="list-style-type: none"> • The pollution control dam will have enough capacity to deal with water in underground areas • The pollution control dam will not seep • The water balance to be implemented accordingly Described in the EMP 	No No Partial	Lack of capacity Pollution control dam seepage evident Needs to be re-calculated: more water Pumped from underground workings

<ul style="list-style-type: none"> Storm water trenches to be constructed around the dirty areas 	Yes	
<ul style="list-style-type: none"> No river diversions will be made 	Yes	
6.2.9. GROUNDWATER <ul style="list-style-type: none"> Boreholes, W2 and W5 to be monitored on a regular basis 	No	
<ul style="list-style-type: none"> Water levels of boreholes, W2 and W5 to be measured on a regular basis 	No	
6.2.10. AIR QUALITY <ul style="list-style-type: none"> Dust suppression on the haul road and access roads 	Yes	
6.2.11. NOISE <ul style="list-style-type: none"> Blasting to be done only during daylight hours 	Yes	
<ul style="list-style-type: none"> Truck equipped with noise buffers 	Yes	
6.2.12. SENSITIVE LANDSCAPES <ul style="list-style-type: none"> Monitoring of the wetland 	No	
6.2.13. VISUAL ASPECTS <ul style="list-style-type: none"> The site will be kept neat and tidy 	No	General waste management is lacking
6.2.14. REG. SOCIO-ECONOMIC STRUCTURE <ul style="list-style-type: none"> No mitigation provided 	n/a	
6.2.15. INTERESTED AND AFFECTED PARTIES <ul style="list-style-type: none"> Regular meetings to be held with IAP's 	No	
<ul style="list-style-type: none"> Continuous water quality monitoring results to be communicated to IAP's 	No	
<ul style="list-style-type: none"> Complaints register to be kept by the mine 	No	
6.2.16. SUBMISSION OF INFORMATION <ul style="list-style-type: none"> Surface water quality results to be submitted to DWAF and DME annually 	No	
<ul style="list-style-type: none"> Groundwater monitoring results to be submitted 	No	
<ul style="list-style-type: none"> To DWAF and DME annually 	No	
<ul style="list-style-type: none"> Wetland monitoring results to be submitted to DWAF, DME and DACE annually 	No	
<ul style="list-style-type: none"> Annual financial provision for rehabilitation Submitted to DME 	Yes	
6.2.17. MAINTENANCE <ul style="list-style-type: none"> No mitigation provided 	n/a	

This mine is small, owned by a private company and entails and underground operation. The infrastructure on the mine includes only the bare essentials. The board and pillar mining method is used for coal extraction. A total of 25 commitments, made in chapter 6 of the EMP, were assessed during the environmental compliance audit; 10 aspects were recorded as a positive compliance, 13 aspects were recorded as a negative compliance and 2 aspects were complied with only partially. This results to a 40% total compliance to the EMP commitments no real areas of excellence were encountered at this mine. However it must be noted that the management structure at the mine changed and that the new management is committed in

addressing on the shortcomings with regard to environmental management. The mine hired a consulting team to do the addendum to the EMP.

A number of areas of risk were encountered:

- No rehabilitation has taken place to date, and this component was not assessed at all.
- The stockpiles contain mixed material and are being contaminated by general waste.
- No eradication programme is in place to handle the occurrence and spread of alien plants.
- A pipe was found in the wall of the pollution control dam, which indicates that polluted water is released to the natural environment
- The storm water cut-off trenches have not been maintained
- Coal has been used to construct the cut-off berms in places.
- No groundwater monitoring is being done
- No air quality monitoring programme in place
- There is a lack of general waste management
- No communication with I&APs takes place
- No complaints register is kept on the mine

The following recommendations were made:

- It was recommended that the water balance for the mining operation needs to be recalculated, especially in terms of the water pumped from underground.
- In view of the mining operations not complying with the approval of the EMP granted in terms of The Minerals Act, 1991 (Act 50 of 1991) it is recommended that an addendum to the Current EMP be compiled in order to address the non-compliances.
- The surface infrastructure plan should also be amended and included in the EMP addendum. The Addendum should also address the decommissioning phase of the operation.
- The mining company's accountability in terms of the rehabilitation of previously mined areas should be determined as part of the addendum.

4.2.5 EMP compliance audit: Mine E

The compliance in terms of the commitments made in part 6 of the EMP was assessed during an environmental audit. The results of this audit are presented in table 4.2.5

Table 4.2.5: Environmental Audit Checklist: Mine E

General Environmental Objectives according to EMP	Comply	Remarks
6.2.1. GEOLOGY		
<ul style="list-style-type: none"> Discard removed from the conveyors is placed in an open area underground The mining will ensure safety standards so that none of the roof sections will collapse 	Yes Yes	No surface subsidence has taken place to date
6.2.2. TOPOGRAPHY		
<ul style="list-style-type: none"> The footprint of the mining area is kept within the existing disturbed area The mine will ensure safety standards so that roof sections will not collapse to alter the topography 	Yes Yes	No surface subsidence has taken place to date
6.2.3 SOILS		
<ul style="list-style-type: none"> Soils will be separated into different stock-piles: topsoil, subsoil and hards 	No	The hards stockpile contains mixed material, which is being contaminated by general waste
6.2.4. LAND CAPABILITY		
<ul style="list-style-type: none"> No mitigation presented 	n/a	
6.2.5. LAND USE		
<ul style="list-style-type: none"> No mitigation presented 	n/a	
6.2.6. NATURAL VEGETATION		
<ul style="list-style-type: none"> A program to eradicate the alien plant Species will be implemented. 	Partial	Black wattle problem within the pollution control dam, also Blue gums noted on site
6.2.7. ANIMAL LIFE		
<ul style="list-style-type: none"> No mitigation presented 	n/a	
6.2.8. SURFACE WATER		
<ul style="list-style-type: none"> The pollution control dam will have enough Capacity to deal with water underground The pollution control dam will not seep The water balance to be implemented accordingly described in the EMP Storm water trenches to be constructed around the dirty areas No river diversions will be made 	No No Partial Yes Yes	Lack of capacity Pollution control dam seepage evident Needs to be re-calculated: more water is pumped from underground workings
6.2.9. GROUNDWATER		
<ul style="list-style-type: none"> Boreholes, BH13, BH14 and BH18 to be monitored on a regular basis 	No	

• Water levels of boreholes, BH13, BH14 and BH18 to be monitored on a regular basis	No	
6.2.10. AIR QUALITY		
• Dust suppression on the haul roads	Yes	
6.2.11. NOISE		
• Blasting done only during daylight hours	Yes	
• Truck equipped with noise buffers	Yes	
6.2.12. SENSITIVE LANDSCAPES		
• Monitoring of the wetland	No	
6.2.13. VISUAL ASPECTS		
• The site will be kept neat and tidy	No	General waste management is lacking
6.2.14. REG. SOCIO-ECONOMIC STRUCTURE		
• No mitigation presented	n/a	
6.2.15. INTERESTED AND AFFECTED PARTIES		
• Regular meetings to be held with IAP's	No	
• Continuous water quality monitoring results communicated to IAP's	No	
• Complaints register to be kept by the mine	No	
6.2.16. SUBMISSION OF INFORMATION		
• Surface water quality results submitted to DWAF and DME annually	No	
• Groundwater monitoring results submitted to DWAF and DME annually	No	
• Wetland monitoring results submitted to DWAF, DME and DACE annually	No	
• Annual financial provision for rehabilitation submitted to DME	Yes	
6.2.17. MAINTENANCE		
• No mitigation presented	n/a	

With the analysis of the environmental findings for Mine E, it was found that:

This mine is small owned by a private company and entails an underground operation. The infrastructure on the mine includes only the bare essentials. The board and pillar mining method is being used for coal extraction. A total of 26 commitments, made in chapter six recorded as a positive compliance, 12 aspects were recorded as a negative compliance and 3 aspects were complied with only partially. This results to a 42,3% total compliance to the EMP commitments

No real areas of excellence were encountered at this mine. However it must be noted that the management structure at the mine changed and that the new management is committed in addressing on the shortcomings with regard to environmental management. The mine hired a consulting team to do the addendum to the EMP.

A number of areas of risk were encountered:

- No rehabilitation has taken place to date, and this component was not assessed at all.
- The stockpiles contain mixed material and are being contaminated by general waste.
- No eradication programme is in place to handle the occurrence and spread of alien plants.
- A pipe was found in the wall of the pollution control dam, which indicates that polluted water is released to the natural environment
- The storm water cut-off trenches have not been maintained
- Coal has been used to construct the cut-off berms in places.
- No groundwater monitoring is being done
- No air quality monitoring programme in place
- There is a lack of general waste management
- No communication with I&APs takes place
- No complaints register is kept on the mine

The following recommendations were made:

- It was recommended that the water balance for the mining operation needs to be recalculated, especially in terms of the water pumped from underground.
- In view of the mining operations not complying with the approval of the EMP granted in terms of the Minerals Act, 1991 (Act 50 of 1991) it is recommended that an addendum to the current EMP be compiled in order to address the non-compliances.
- The surface infrastructure plan should also be amended and included in the EMP addendum. The addendum should also address the decommissioning phase of the mining operation.
- The mining company's accountability in terms of the rehabilitation of previously mined areas should be determined as part of the addendum.

4.2.6 EMP compliance audit: Mine F

The compliance in terms of the commitments made in part 6 of the EMP was assessed during an environmental audit. The results of this audit are presented in Table 4.2.6.

Table 4.2.6: Environmental Audit Checklist: Mine F

General Environmental Objectives according to EMP	Comply	Remarks
6.2.1. GEOLOGY <ul style="list-style-type: none"> • Subsided ground to be monitored and managed • Dump designed and built in such a way to ensure safe operation for both short and long term stability of the slopes • The discard dump will be compacted • Discard dump be re-vegetated concurrently with the construction thereof 	<p>Yes</p> <p>Partially</p> <p>Yes</p> <p>No</p>	<p>Terraces sloped incorrectly causing erosion</p> <p>No rehabilitation of the dump is present at the time of the audit</p>
6.2.2. TOPOGRAPHY <ul style="list-style-type: none"> • Vegetate dump accord. to COM guidelines • Leveling of disturbed land to pre-mining topography 	<p>No</p> <p>Partially</p>	<p>No rehabilitation of the dump is present at the time of the audit</p> <p>Final void and ponding on rehab still exists</p>
6.2.3. SOIL <ul style="list-style-type: none"> • Careful stripping, handling and replacement of soils to ensure little damage. • Soils to be stockpiled for the minimum amount of time and be rehabilitated • Surface erosion and soil misuse be avoided • All disturbed soils rehabilitated on completion of mining operations • Environmental Assessments completed before any further infrastructure is built • Topsoil stockpiles be protected from erosion by re-vegetation 	<p>Partially</p> <p>Partially</p> <p>No</p> <p>n/a</p> <p>Partially</p> <p>No</p>	<p>Opencast areas A1 and C inadequate topsoil thickness</p> <p>Final void still to be rehabilitated and borrow pits still open</p> <p>Open void exists and poor vegetation cover</p> <p>Budget provision for this to be confirmed</p> <p>New discard facility not addressed in any reports</p> <p>No re-vegetation records of topsoil stockpiles</p>
<ul style="list-style-type: none"> • Rehabilitation of disturbed sites on a concurrent basis • To minimize reduction in topsoil quality: contamination by seepage runoff • Storm water drains constructed to direct clean water runoff away from dirty areas • Contaminated storm water at plant area to be drained to sumps • Toe paddocks are in place to trap silt • Sides and top of the compaction dump be re-vegetated 	<p>No</p> <p>Partially</p> <p>Partially</p> <p>Partially</p> <p>No</p>	<p>Areas disturbed by past surface operations and not rehabilitated areas were observed</p> <p>Clean and dirty water mixing occurring</p> <p>All drains not constructed</p> <p>Some walls breached, capacity inadequate</p> <p>No time stipulations were made</p>

<p>6.2.4. LAND CAPABILITY</p> <ul style="list-style-type: none"> To restore the land as close to its pre-mining capability as possible All structural materials removed or buried for decommissioned areas Areas rehabilitated to wilderness and higher standards where practicable. 	<p>No</p> <p>Partially</p> <p>No</p>	<p>No surveys done on pre-mining land capability of the area</p> <p>Areas of rubble and concrete still exists</p> <p>No plan for this and nothing being done</p>
<ul style="list-style-type: none"> Opencast mining areas covered with 150mm depth of topsoil - which was stripped before operations commence and vegetated Vegetation and soil monitoring on opencast mining areas 	<p>Partially</p> <p>No</p>	<p>No plan of these areas exist that meets the specifications</p> <p>No records available</p>
<p>6.2.5. LAND USE</p> <ul style="list-style-type: none"> Ensure that post closure use will not differ significantly from pre-mining use (dry land cultivation and grazing) Ensure that economic land use development takes place in unorganized manner Implementation of veld management programme Management of rehabilitated areas Management of veld areas 	<p>n/a</p> <p>No</p> <p>No</p>	<p>No plan in place yet</p> <p>Spread of black wattle not controlled</p>
<p>6.2.6. NATURAL VEGETATION</p> <ul style="list-style-type: none"> Erosion control structures provided where necessary to ensure erosion control Stable self-sustaining vegetation cover will be established at mine closure 	<p>Yes</p> <p>n/a</p>	
<p>6.2.7. ANIMAL LIFE</p> <ul style="list-style-type: none"> No mitigation presented 	<p>n/a</p>	
<p>2.6.8. SURFACE WATER</p> <ul style="list-style-type: none"> Separation of clean storm water from mine water systems Reduction of storm water arising on mining Areas Solids retention in dams, runoff paddocks around the discard dump and slurry ponds Maximization of recycling and minimization of the pumping of contaminated storm water and mine de-watering to the new dams 	<p>Partially</p> <p>Partially</p> <p>Yes</p> <p>Partially</p>	<p>Clean and dirty water mixing in plant, workshop and scrap yard areas</p> <p>Ponding of water in plant and workshop areas</p> <p>Structures in place</p> <p>Dam F not being utilized yet</p>
<ul style="list-style-type: none"> Located down slope from the plant area 		
<p>6.2.9. GROUNDWATER</p> <ul style="list-style-type: none"> Implementation of a groundwater monitoring programme Surface rehabilitation to reduce recharge Reshaping and sealing cracked surfaces to minimize infiltration and maximizing run-off Stooping limited to areas lower in elevation that the applicable streams (2) 	<p>Yes</p> <p>Partially</p> <p>n/a</p>	<p>Not all disturbed areas fully rehabilitated satisfactory</p>

<ul style="list-style-type: none"> • Shallow seepage minimization and control • Compensation to landowners for ground-water draw down caused by mining 	No No	Not included in water use liscence No monitoring records
6.2.10. AIR QUALITY <ul style="list-style-type: none"> • To minimize dust arising emanating from all mining activities • The burning dump will be encapsulated by new discard dump 	Yes	
<ul style="list-style-type: none"> • Air quality monitoring of particulates will be undertaken • Normal dust suppression techniques will be used during all opencast operations 	No No	
6.2.11. NOISE <ul style="list-style-type: none"> • Screening berms will be constructed to screen the opencast operations 	Yes	
<ul style="list-style-type: none"> • An assessment of noise levels be carried out • An assessment of blasting effects on surface structures will be carried out 	No No	
6.2.12. SENSITIVE LANDSCAPES <ul style="list-style-type: none"> • Disturbance of sensitive landscapes will be minimized • Installation of dams for retention of contaminated storm water 	Yes	
6.2.13. VISUAL ASPECTS <ul style="list-style-type: none"> • Mine infrastructure impacts will be mitigated within practical limits • Screening berms will be constructed • Shrouding of discard dump 	Partially No	
6.2.14. REG. SOCIO-ECONOMIC STRUCTURE <ul style="list-style-type: none"> • No mitigation presented 	n/a	
6.2.15 INTERESTED AND AFFECTED PARTIES <ul style="list-style-type: none"> • The mine will ensure that the concerns of I&APs are identified and addressed 	Partially	Not on a continues basis
6.2.16. SUBMISSION OF INFORMATION <ul style="list-style-type: none"> • Mitigation not presented 	n/a	
6.2.17. MAINTENANCE <ul style="list-style-type: none"> • Development of waste manage. programme • Close waste disposal facilities as to provide for long term sustainability • Implementation of COM guidelines on planning, design and closure of tailings dams 	Yes n/a N/a	

With the analysis of the environmental audit findings of Mine F, it was found that:

This is a large coalmine with underground and opencast sections. Corporate Company (Z) owns it. The board and pillar mining method is being used for coal extraction and the opencast mining entails a truck and shovel operation. A total of 56 commitments, made in chapter 6 of the EMP, were assessed

during the environmental compliance audit; 11 aspects were recorded as a positive compliance, 21 aspects were recorded as a negative compliance and 16 aspects were complied with only partially. This results to a 19,64% total compliance to the EMP commitments

A number of areas of excellence were revealed by the audit:

An induction course has been developed and an environmental awareness presentation forms part of it;

- A very detailed water monitoring protocol has been developed and improved;
- The use of polluted mine water in processing coal and in underground mining equipment was well advanced and considerable infrastructure has been constructed to aid in this process.
- In general areas and levels of littering observed was very low.

A number of areas of risk were encountered:

- The discard dump;
- Containment of coal stockpiles;
- Pollution water management systems around the plant area;
- The land rehabilitation of the opencast mining areas remains a significant liability, as areas A and C have not been rehabilitated to the standards committed in the EMP.
- Alien invader species pose a problem, as extensive areas of wattle that had been harvested recently have not been chemically treated.

The following recommendations were made:

- The mine is in the process of implementing an environmental management system. Through the implementation thereof the identified areas of risk will be decreased and managed.

4.2.7 EMP compliance audit: Mine G

The compliance in terms of the commitments made in part 6 of the EMP was assessed during an environmental audit. The results of this audit are presented in table 4.2.7.

Table 4.2.7: Environmental Audit Checklist: Mine G

General environmental objectives according to EMP	Comply	Remarks
6.2.1. GEOLOGY • No significant impact		
6.2.2. TOPOGRAPHY • Spoils to be leveled at a slope average of 8%	Partial	Leveling of old opencast areas took place without prior design of final landscape
• Voids, ramps, high walls sloped at 1:3	Yes	
• Dumps sloped at 1:5	Yes	
6.2.3. SOILS • Topsoil to be stripped, stockpiled & replaced	Partial	Not enough leveled areas available to be Top soiled Final drainage not assessed yet
• Erosion prevented by the use of contours	Partial	
6.2.4. LAND CAPABILITY • No clear commitment	N/a	
6.2.5. LAND USE • No clear commitment	N/a	
6.2.6. NATURAL VEGETATION • Vegetation returned to its pre-mining state	Partial	Only 39,3 ha of the planned 78 ha was seeded Mine did not include this requirement in contract Done according proposed programme
• Government certified seed mix will be used	No	
• Fertilization done according to the results of soil sample analyses	Yes	
2.6.7. ANIMAL LIFE • No specific objective	n/a	
2.6.8. SURFACE WATER • No commitment to update water balance	n/a	Not all water is re-used Use also fresh water from nearby river Monitoring done on a monthly basis Monitoring done on a monthly basis Backlog on rehabilitation
• Store/re-use/evaporate process water	Partial	
• Use affected water in the plant	Partial	
• Measure various stream flows and EC	Yes	
• Water quality must not deteriorate	Yes	
• Surface rehabilitation will be free-draining and surface contours constructed if necessary	Partial	
6.2.9. GROUNDWATER • Existing availability of the groundwater to be maintained	Yes	Borehole and spring survey conducted
• Groundwater quality must not deteriorate	Yes	Monitoring done on a monthly basis
6.2.10. AIR QUALITY • Dust monitoring to be done	Yes	Dust suppression done on haul roads
6.2.11. NOISE • No specific objectives	n/a	
6.2.12. SENSITIVE LANDSCAPES • No clear commitment	n/a	
6.2.13. VISUAL ASPECTS • No clear commitment	n/a	

6.2.14. REG. SOCIO-ECONOMIC STRUCTURE • No clear commitment	n/a	
6.2.15. INTERESTED AND AFFECTED PARTIES • I&AP meetings every 6 months	Yes	Minutes of meetings was forwarded to DME
6.2.16. SUBMISSION OF INFORMATION • Conduct annual closure cost assessments and submit to DME	Yes	
6.2.17. MAINTENANCE • No clear commitment	n/a	

With the analysis of the environmental audit findings for Mine G, it was found that:

This is a large coalmine with underground and opencast sections. The large Corporate Company (Y) owns the mine. The board and pillar mining method is being used for coal extraction as well as opencast mining, which entail a dragline operation. A total of 23 commitments, made in chapter 6 of the EMP, were assessed during the environmental compliance audit; 10 aspects were recorded as a positive compliance, 1 aspect was recorded as a negative compliance and 7 aspects were complied with only partially. This results to a 43,3% total compliance to the EMP commitments

A number of areas of excellence were revealed by the audit:

- The commitment from top management towards general environmental management has changed significantly since the mine is in the process of implementing an environmental management system.

A number of areas of risk were however encountered:

- The re-use of water can be optimized
- There is a backlog of rehabilitation
- There is no clear commitment regarding the end land use after mine closure.
- The water balance was not amended to reflect the changes in water management

The following recommendations were made:

- It was recommended that the EMP be updated especially with regard to the changed situations on the mine.

- The water balance must be re-looked
- The rehabilitation backlog must receive the first priority and areas should be rehabilitated, as it becomes available.

4.2.8 EMP compliance audit: Mine H

The compliance in terms of the commitments made in part 6 of the EMP was assessed during an environmental audit. The results of this audit are presented in table 4.2.8.

Table 4.2.8: Environmental Audit Checklist: Mine H

General Environmental Objectives according to EMP	Comply	Remarks
6.2.1. GEOLOGY <ul style="list-style-type: none"> • Selective placing of carbonaceous and non-carbonaceous material 	No	Mixing does take place
6.2.2. TOPOGRAPHY <ul style="list-style-type: none"> • Ensure post-mining slopes are free draining and not steeper than 1:7 • Final land surface will reflect the present day topography as closely as possible 	Yes n/a	Rehabilitated areas do comply To be achieved at mine closure
6.2.3. SOILS <ul style="list-style-type: none"> • During mining the overburden and topsoil from the box cut being mined are removed to cover areas of backfill completed 	Yes	
6.2.4. LAND CAPABILITY <ul style="list-style-type: none"> • Post mining capability will be grazing 	Partial	Striving towards this objective
6.2.5. LAND USE <ul style="list-style-type: none"> • Pre-mining use of land is veld only • No grazing or arable development is occurring on any of the mined areas 	n/a n/a	
6.2.6. NATURAL VEGETATION <ul style="list-style-type: none"> • Ensure a basal cover of 15% is achieved during the maintenance program. • The veld restored to a state where it re-establishes itself without irrigation 	Partial Yes	Some areas to be re-seeded Will be achieved at mine closure
6.2.7. ANIMAL LIFE <ul style="list-style-type: none"> • No pouching 	n/a	
6.2.8. SURFACE WATER <ul style="list-style-type: none"> • Water leaving the mine area must comply with general standards as compared to the water qualities upstream • Process water is stored and re-used • Optimizing re-use of all affected water • Affected run-off is collected in pollution control dams. 	Yes Yes Yes Yes	Surface water qualities monitored on a monthly basis Re-used in the plant Re-used in the plant and for dust suppression

<ul style="list-style-type: none"> Opencast rehabilitated to a free-draining post-mining surface topography 	n/a	Will be achieved at mine closure
<ul style="list-style-type: none"> Upstream and down-stream water qualities are monitored regularly 	Yes	Monitoring results send to DWAF monthly
6.2.9. GROUNDWATER <ul style="list-style-type: none"> Ensure that no boreholes in use become affected by mining without the situation being addressed Ensure that any significant groundwater Seepage is identified at the point of decant. Ensure opencast rehabilitation is concurrent with mining operations Place 300 mm topsoil over leveled spoils Ensure opencast area is rehabilitated to a free draining surface topography 	Yes Yes Partial Yes Yes	Boreholes in the affected zone is monitored Boreholes is monitored A bit of a backlog Available areas was rehabilitated
<ul style="list-style-type: none"> Placement of fresh spoils as deep as possible to be covered with weathered overburden Subsided areas as a resulted from total extraction be rehabilitated as soon as possible to be free-draining Ground water qualities will be measured regularly monitor the affected zone 	Yes Yes Yes	All areas rehabilitated Water monitoring programme in place
6.2.10. AIR QUALITY <ul style="list-style-type: none"> Compact discard on discard dump while placing it according to CSIR specifications Cover discard dump with topsoil and vegetate Implement dust suppression system at plant Rehabilitate opencast area and vegetate as soon as possible 	Yes Yes Yes Yes	Available areas was rehabilitated Available areas was rehabilitated
<ul style="list-style-type: none"> Continuous watering of haul roads 	Yes	Re-use of process water
6.2.11. NOISE <ul style="list-style-type: none"> Ensure the 80Db noise contour remains within the confines of the mine A monitoring system to monitor noise 	Yes Yes	Signs to indicate noise zones Monitoring system in place
6.2.12. SENSITIVE LANDSCAPES <ul style="list-style-type: none"> Continuous monitoring of water quality up and down stream of the river diversion Ensuring pollution prevention measures are in place and functioning well Visual dust from all workings and roads will be controlled by dust suppression Continuous cleaning of working areas Effective waste disposal 	Yes Yes Yes Yes Yes	Water monitoring programme in place Dust monitoring taking place At registered waste removal site
6.2.13. VISUAL ASPECTS <ul style="list-style-type: none"> Infrastructure demolished at mine closure, should no alternative use be found 	n/a	Mine is still operational for 10 to 20 years
6.2.14. REG. SOCIO-ECONOMIC STRUCTURE <ul style="list-style-type: none"> Establish a CSI (Corporate Social Investment) committee Assist local community with development plans 	Yes Yes	

and initiatives		
• Assist with construction of dams for livestock during drought periods	Yes	
• Assist community with development of garden projects	Yes	
• Mine is committed to transport and housing of its laborers to and from work	Yes	
6.2.15. INTERESTED AND AFFECTED PARTIES		
• On a regular basis communicate with the surrounding community and relevant authorities	Yes	A complaints register is held by the mine to record all complaints received The committee is meeting regularly Available areas was rehabilitated
• Establish a Environmental Management Committee to implement the necessary remedial actions as soon as possible	Yes	
• To continuously rehabilitate portions of the discard dump when available, monitor the conditions of the rehabilitated areas	Yes	
• Maintain all roads used by the mine on a regular basis	Yes	
• Develop literacy and skill levels amongst the mine's employees	Partial	This programme was just implemented
6.2.1. SUBMISSION OF INFORMATION	n/a	
• Submit an annual closure cost assessment	Yes	No partial closure will be applied for Submitted to DME
• Ensure sufficient funds are provided over the remaining life of mine to cover closure liability	Yes	Financial audit by independent auditors at end of financial year
6.2.17. MAINTENANCE		
• Was addressed earlier		

With the analysis of the environmental audit findings for Mine H, it was found that:

This is a large coalmine with underground and opencast sections. The Corporate Company (Y) owns it. The board and pillar mining method is being used for coal extraction as well as opencast mining which entails a dragline operation. A total of 49 commitments, made in chapter 6 of the EMP, were assessed during the environmental compliance audit; 38 aspects were recorded as a positive compliance, 1 aspect was recorded as a negative compliance and 4 aspects were complied with only partially. This results to a 77.55 % total compliance to the EMP commitments

A number of areas of excellence were revealed by the audit:

- This mine implemented an environmental management system some time ago. It was observed that the system is working for the mine and the environmental manager knew exactly what the situation was regarding compliance to the EMP.
- Only one aspect of non-compliance was observed, which was the commitment regarding the separation of carbonaceous and non-carbonaceous material. It became evident that this commitment could not

be complied with because the pre-stripping operations in done with the aid of a dragline.

The following recommendations were made:

- It was recommended that the mine participate in the Regional EMEM Award system, which is organized by DME.

4.2.9 EMP compliance audit: Mine I

The compliance in terms of the commitments in part 6 of the EMP was assessed during an environmental audit. The results of this audit are presented in table 4.2.9

Table 4.2.9: Environmental Audit Checklist: Mine I

General Environmental objectives according To EMP	Comply	Remarks
6.2.1. GEOLOGY <ul style="list-style-type: none"> • Spoils not managed due to high permeability • Pyrite rocks will be kept out of spoils 	Yes Partial	Pyrites in upper levels remain in spoils
6.2.2. TOPOGRAPHY <ul style="list-style-type: none"> • All backfill areas on the operational sections kept free-draining by backfilling localized settlements • The western final void will not be backfilled • Localized variations in topography caused by variations in bulking and material thickness will be managed 	Yes Yes Yes	Available areas was rehabilitated To be kept as an open void In process of rehabilitation
6.2.3. SOILS <ul style="list-style-type: none"> • Minimum dept of 600 mm over all new rehabilitated areas • Soil not be stockpiled for long periods 	Yes Yes	At some places it exceeds 600 mm Soil placement done as soon as possible
6.2.4. LAND CAPABILITY <ul style="list-style-type: none"> • Post mining land will at least have an equivalent percentage of land suitable for crops than before mining 	Partial	Will be achieved at mine closure
6.2.5. LAND USE <ul style="list-style-type: none"> • Areas contaminated with coal will be managed and returned to grazing after mining 	Yes	Will be achieved at mine closure
6.2.6. NATURAL VEGETATION <ul style="list-style-type: none"> • Ensure a basal cover of 15% during the] maintenance program • The veld must be able to re-establish itself without irrigation in the long term • Veld to be restored to a stable and non-erodible condition • Mainly perennial grasses and some natural veld grasses will be planted 	Yes Yes Partial Yes	Vegetation survey was done Type of grass mix Erosion damage must be fixed Vegetation survey confirmed this fact

<ul style="list-style-type: none"> Government Certified Seeds used in the re-vegetation programme Soil fertility to be corrected (pH) 	Yes Yes	Lime is added to the soil
6.2.7. ANIMAL LIFE <ul style="list-style-type: none"> Wildlife be protected within the mining area 	Yes	No pouching allowed
6.2.8. SURFACE WATER <ul style="list-style-type: none"> Process water be stored/evaporated/re-used Optimizing the re-use of all affected water Affected run-off is collected in pollution control dams Opencast rehabilitated to a free-draining post mining surface topography Upstream and down stream water qualities monitored regularly 	Yes Yes Yes Yes Yes	Re-use of process water, dust suppression Structures and dams inspected regularly Will be achieved at mine closure Monitoring results submitted to DWAF
6.2.9. GROUNDWATER <ul style="list-style-type: none"> No boreholes in use to become affected If boreholes is affected by mining, rectifying steps will be taken to address the situation Significant groundwater seepage to be identified at points of decant 	Yes Yes Yes	Groundwater monitoring programme in use Groundwater monitoring programme in use Groundwater monitoring programme in use
6.2.10. AIR QUALITY <ul style="list-style-type: none"> Compact discard on discard dump while placing it according to CSIR specifications Cover discard dump with topsoil and vegetate Implement dust suppression system at plant Continuous watering of haul roads 	Yes Yes Yes	Available areas are being compacted Available areas was rehabilitated Contaminated water re-used for dust control
6.2.11. NOISE <ul style="list-style-type: none"> Ensure the 80 dB noise contour remains within the confines of the mine A monitoring system will be used 	Yes Partial	Effectively controlled with signs Programme to be implemented
6.2.12. SENSITIVE LANDSCAPES <ul style="list-style-type: none"> Continuous monitoring of water quality up and down stream of the river diversion Pollution prevention measures to be in place and functioning well Visual dust from workings controlled by dust suppression with water Contiuous cleaning of working areas Effective waste disposal 	Yes Yes Yes Yes Yes	Water monitoring programme Regular inspections Re-use of process water, dust suppression On registered waste disposal site
6.2.13. VISUAL ASPECTS <ul style="list-style-type: none"> Infrastructure demolished at mine closure, should no alternative use be found 	n/a	Mine is still operational for 10 to 20 years
6.2.14. REG. SOCIO-ECONOMIC STRUCTURE <ul style="list-style-type: none"> Establish a CSI (Corporate Social Investment) committee Assist local community with development plans and initiatives Assist with construction of dams for livestock during drought periods Assist community with development of garden projects 	Yes Yes Yes Yes	

<ul style="list-style-type: none"> • Mine committed to the transport and housing of its laborers to and from work 	Yes	
6.2.15. INTERESTED AND AFFECTED PARTIES <ul style="list-style-type: none"> • On a regular basis communicate with the surrounding community and relevant authorities • Establish a Environmental Management Committee to implement the necessary remedial actions as soon as possible • To continuously rehabilitate portions of the discard dump when available and monitor the condition of the rehabilitated areas • Maintain all roads used by the mine on a regular basis 	Yes Yes Yes Yes	A complaints register is held by the mine to record all complaints received The committee is meeting regularly Available areas was rehabilitated
<ul style="list-style-type: none"> • Develop literacy and skill levels amongst the mine's employees 	Partial	This programme was just implemented
6.2.16. SUBMISSION OF INFORMATION <ul style="list-style-type: none"> • Submit gravimetric dust samples monthly • Submit a sewage and drinking water analysis to DWAF on a quarterly basis • Submit the annual EMP performance assessment report to DME • Submit an annual closure cost assessment • Ensure sufficient funds are provided over the remaining life of mine to cover closure liability 	Yes Yes Yes Yes Yes	Submitted to Mine Health and Safety (DME) Submitted to DME Closure cost assessment annually
6.2.17. MAINTENANCE <ul style="list-style-type: none"> • To take proper aftercare and ensure that erosion Control is done on all rehabilitated areas • Inspect and monitor all water pollution control measures on a regular basis • To continuously rehabilitate portions of the discard dump when available and monitor conditions of rehabilitated areas • Maintain all roads used by the mine on a regular basis • Develop literacy and skill levels amongst the mine's employees 	Yes Yes Yes Yes Yes	Monthly inspections Monthly inspections

With the analysis of the environmental audit findings for Mine I, it was found that:

This is a large coalmine with underground and opencast sections. It is owned by Corporate Company (Y). The board and pillar mining method is being used for coal extraction as well as opencast mining which entails a dragline operation. A total of 57 commitments, made in chapter 6 of the EMP, were assessed during the environmental compliance audit; 49 aspects were recorded as a positive compliance, 0 aspects were recorded as a negative compliance and 5 aspects were complied with only partially. This results to an 85.9% total compliance to the EMP commitments

A number of areas of excellence were revealed by the audit:

- This mine implemented an environmental management system some time ago. It was observed that the system is working for the mine and the environmental manager knew exactly what the situation was regarding compliance to the EMP.
- No aspect, which poses an environmental risk, was encountered.
- It was recommended that the mine participate in the Regional EMEM Award system, which is organized by DME.

4.2.10 EMP compliance audit: Mine J

The compliance in terms of the commitments in part 6 of the EMP was assessed during an environmental audit. The results of this audit are presented in table 4.2.10

Table 4.2.10: Environmental Audit Checklist: Mine J

General Environmental Objectives according to EMP	Comply	Remarks
6.2.1. GEOLOGY • No significant impact	n/a	
6.2.2. TOPOGRAPHY • Evaporation dam constructed at site X • The stockpile reclaimed and sold • The footprint of the stockpile will form the basis for the new stockpile • Topsoil will be placed on the residue facility slopes will not exceed 1:5	Yes Yes Yes Yes	Available areas was rehabilitated
6.2.3. SOILS • All topsoil will be stripped and stored • Areas will be rehabilitate with a minimum of 300 mm topsoil placement • Topsoil will be fertilized if necessary	Yes Yes Yes	Minimum handling of topsoil Lime is added to topsoil
6.2.4. LAND CAPABILITY • Disturbed areas will be restored for agricultural activities: mainly grazing	n/a	This will be achieved at mine closure
6.2.5. LAND USE • Areas of mine infrastructure restored to mainly to grazing	Partial	Available areas was rehabilitated
6.2.6. NATURAL VEGETATION • Vegetation and soil fertility survey done • A cocktail of seed will be planted	Yes Yes	In process Good basal cover, monitored
6.2.7. ANIMAL LIFE • No significant impact	n/a	

6.2.8. SURFACE WATER		
<ul style="list-style-type: none"> The water balance will be completed and updated Storm water management at plant area be installed 	Yes Yes	Information was submitted to DWAF Systems operational
<ul style="list-style-type: none"> Residue deposits top soiled and re-vegetated A water users survey conducted by 1999. Continuous monitoring of weirs River diversions to be fully managed and a vegetation maintenance programme 	Partial Yes Yes Yes	Available areas was rehabilitated Survey was conducted and all water users registered at DWAF Inspections on monthly basis Monthly monitoring
6.2.9. GROUNDWATER		
<ul style="list-style-type: none"> Surface rehabilitation on residue deposits reduce infiltration of storm water. Monitor boreholes in affected zone 	Partial Yes	Available areas was rehabilitated Monitoring programme in place
6.2.10. AIR QUALITY		
<ul style="list-style-type: none"> Get a gravimetric system in place Do dust fall monitoring on a continuous basis 	Yes Yes	Monitoring programme in place
6.2.11. NOISE		
<ul style="list-style-type: none"> No significant impact 	n/a	No blasting - opencast operations ceased
6.2.12. SENSITIVE LANDSCAPES		
<ul style="list-style-type: none"> Water pollution measures constructed to prevent contamination of wetlands Water pollution measures constructed around the rapid load-out area 	Yes Partial	Maintained systems In process of up-grading systems
6.2.13. VISUAL ASPECTS		
<ul style="list-style-type: none"> Structures to be demolished at mine closure Mine residue site to be rehabilitated 	n/a Partial	Mine still operational Available areas was rehabilitated
6.2.15. INTERESTED AND AFFECTED PARTIES		
<ul style="list-style-type: none"> Forum established and meeting to be held regularly 	Yes	Meetings held annually
6.2.16. SUBMISSION OF INFORMATION		
<ul style="list-style-type: none"> Water monitoring results submitted to DWAF EMP performance assessment submitted to DME annual Closure cost assessment updated annually information submitted to DME 	Yes Yes Yes	
6.2.17. MAINTENANCE		
<ul style="list-style-type: none"> Block X to be fully rehabilitated by end 2002 All pollution control structures maintained Residue deposits to be grassed 	Partial Yes Partial	In process of re-vegetation Monthly inspections of all structures In process of re-vegetation

With the analysis of the environmental audit findings for Mine J, it was found that:

This is a large coalmine with underground and opencast sections. Corporate Company (Y) owns it. The board and pillar mining method is being used for coal extraction and the opencast mining entails a dragline operation. A total

of 36 commitments, made in chapter 6 of the EMP, were assessed during the environmental compliance audit; 49 aspects were recorded as a positive compliance, 0 aspects were recorded as a negative compliance and 5 aspects were complied with only partially. This results to a 63,8% total compliance to the EMP commitments

- This mine implemented an environmental management system some time ago. It was observed that the system is working for the mine and the environmental manager knew exactly what the situation was regarding compliance to the EMP.
- No aspect, which poses an environmental risk, was encountered.
- It was recommended that the mine participate in the Regional EMEM Award system, which is organized by DME.

The general conditions that are usually given by DME for EMP approval must be kept in mind in throughout the auditing procedures. One of the general conditions, is that:

- Environmental Management shall conform to the Environmental Management Programme as approved.

In other words, in order to assess performance in terms of this condition, it is necessary to determine whether the environmental management measures and the commitments in Part 6 of the EMP have been implemented and monitored. Whenever the management measures specified in the EMP have not been implemented and monitored by the mine it has resulted in non-conformance with this condition of the EMP approval.

Another general condition for EMP approval is that:

- Mining activities shall conform to all relevant legislation and such other conditions as may be imposed by any officer of DME, duly authorized thereto.

In terms of legislation regarding water quality, the National Water Act, 1998 (Act 36 of 1998) and Regulation 704 are of importance.

A proper waste management system should be developed and implemented, by each mine, as required in terms of Section 20 of the Environment Conservation Act, 1989 (Act 73 of 1989).

The Mpumalanga Nature Conservation Act, 1998 (Act 10 of 1998) and Conservation of Agricultural Resources Act, 1983 (Act 73 of 1998) are of

importance regarding invader and exotic plant species and rehabilitation practices.

A requirement of the Minerals Act, 1991 (Act 50 of 1991) is that the interested and affected parties are consulted with regards to the mining operations. This is also a requirement in terms of the Environment Conservation Act, 1989 (Act 73 of 1989) and the National Environmental Management Act, 1998 (Act 107 of 1998).

It is clear from the above-mentioned legislation that mines have to comply with various requirements from various acts. This study was started with the idea to test the effectiveness of the EMP as a management tool since the question was asked to what extent does mines implement the EMP? Is the EMP not just another window dressing exercise, and are mine managers really familiar with the contents and commitments contained in the EMP?

The conclusion for this study follows in chapter 5.

CHAPTER 5

5.1 Conclusion

A finding of the literary review was that there is clear links between the concept of EMP Performance assessment and environmental compliance auditing. Seeing that EMP performance assessment reporting is a requirement in terms of regulation 18.2 of the Minerals Act, 1991 (Act 50 of 1991). It was important to consider the specific type and levels of auditing which are required in a management system applicable to the EMP. The study proved that the environmental auditing process could fulfil this function. There was no need to develop another procedure since the auditing procedure was implemented successfully in this case. The type of audit that is recommended, with the objective of testing EMP effectiveness, is environmental compliance auditing.

Various definitions were provided in order to set the scene for a clear understanding of the terms used in this study. Three concepts were linked because of similarities in the definitions:

EMP performance assessment: "... is a requirement for the systematic, periodic, objective and documented evaluation of the continued appropriateness and effectiveness of the contents of an approved environmental management programme and the execution thereof."

Environmental auditing: " A systematic, documented verification process of objectively obtaining and evaluating audit evidence to determine whether specified environmental activities, events, conditions, management systems, or information about these matters, conform with audit criteria, and communicating the results of this process to the client."

Environmental compliance auditing: "Regulatory compliance or environmental performance audits should be done by all organizations on a routine basis. It will entail the compliance with all environmental laws and regulations applicable to the specific site at local, regional, state and national levels."

It can also be said, with confidence, that the reader would understand the other broad definitions that are often used in auditing that was presented in this study. These definitions included:

- Environmental auditor
- Auditee

- Client
- Lead environmental auditor
- Audit team
- Technical expert
- Audit criteria evidence
- Audit evidence
- Audit findings
- Audit conclusion

The environmental compliance auditing process was presented as a four phased process, which entails:

Audit planning,
 Audit preparation;
 The performance of the audit;
 The follow-up activities and audit report.

It was evident that the success of an environmental audit was dependent on the execution of all four legs of the audit process. The one phase linked onto the next. A clear understanding of the audit process was developed through the literary review and the process was followed accordingly, when the effectiveness of the EMP as management tool for coalmines were tested:

The following audit preparation activities was completed prior to the audit:

- The EMP for each mine was reviewed, with the emphasis on the commitments made in chapter 6 of the document.
- No previous audit results were available to be assessed;
- An itinerary and agenda for each audit was compiled and communicated to the relevant environmental managers on each mine;
- The checklist was compiled with the aspects listed in the aide-memoire as basis. It was decided to make the checklist as simple and easy to use as possible. Each checklist will vary from the previous because of the site

specifics of each mine. The checklist can be modified depending on the detail required and the purpose of use thereof.

- The arrangements was confirmed with each environmental manager at each mine;
- The environmental managers was contacted to confirm the date of the audit (site notification)
- The audit was conducted by myself, the environmental manager of the mine and in some cases two or more representatives of the mine.

The actual audit activities included:

- An opening meeting at the mine with the environmental manager and mine manager. The audit process was explained.
- The site visit about and recording of findings was done. The checklist prepared specifically for each mine was used.
- The audit ended with a closing meeting where the major findings were discussed.

The activities that took place after the audit was:

- The analyzing of the data and audit findings;
- The reporting of the audit results to the mine (completed checklists);
- This report was prepared and will be the formal audit report.

It was found that various audit tools could be utilized in order to optimize the process as a whole. It was decided to develop a checklist, which will take the site specifics of each mine into account. The criteria for the compilation of the checklist were the requirements of the aide-memoire, since it could be seen as the minimum requirements for the EMP. The checklist had to be user-friendly, simple and easy to use. It is the conclusion of this study that the checklist can be used with success for EMP performance assessments. The effectiveness of the EMP was indeed tested. The checklist was presented in chapter 3.

Ten coal- mines within the Mpumalanga Region were randomly selected to be assessed for the purpose of this study. The selection was done in such a way as to ensure general representation of the various types of coalmines within the region. Opencast and underground mines were selected as well as small, medium and large operations from various representative companies. The audit plan was set up as described in a previous chapter and the audits were performed in October to November 2000 with the objective to test the effectiveness of EMP performance.

It can be concluded, through the findings of this study, that the success of EMP implementation varies from mine to mine. One reason for this variety (according to the level of EMP implementation) can be mainly depended on the commitment from top management. It is also a reality that the economics play an indefinite role in the implementation of the EMP. At the coalmines, where enough money was utilized for environmental management and the implementation for environmental management systems, it was evident that the concept of sustainable development will prevail in the mining industry.

It is therefore recommended that the coalmines that need to get a grip on environmental management in general. With new legislation on the horizon it will become progressively more difficult for these mines to comply with minimum standards and requirements. According to Bruder (1994 :291) there has been a shift in perspective towards what is referred to as the “new” environmental perspective. This presents the sustainable development perspective, with environmental auditing at the center of an overlapping system of environmental management.

According to EPA (1995:27) there is a progressive change from regulatory inspections towards self-management and independent auditing, with considerable emphasis on internal review. Internal environmental performance evaluation is based on the results of monitoring programs, special investigations, remedial activities and research and development. Most of the larger mining companies employ environmental staff, at corporate level and individual mine sites, to manage and monitor environmental issues. By this way quality control is ensured and risk is minimized to achieve the goal: good environmental performance.

Self- management reduces the resources required by government to supervise mining operations, and the mining companies can establish itself through performance and communication, to be pro-active and open in presenting its performance assessments (EPA, 1995:27).

With the fact of self- management being a reality, it is a good step in the right direction from the Department of Minerals and Energy to deploy a strategy pertaining to EMP performance assessment. (Department of Minerals and Energy, 2000:1-18).

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ANNEXURE 1

