A SITUATIONAL ANALYSIS FOR OCCUPATIONAL HEALTH PRACTITIONERS WITH SPECIFIC REFERENCE TO SECTION 12(1) AND SECTION 13(3)(A)(i) OF THE MHSA ON THE APPLICABLE RATIO TO SERVICE THE MINES IN ORDER TO MAKE A MEANINGFUL IMPACT TO THE IMPROVEMENT OF OCCUPATIONAL HEALTH IN SAMI

Final Report

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EXECUTIVE SUMMARY

The primary aim of the study was to report on the recommended acceptable ratios of the engagement or appointees in terms of Section 12(1) and Section 13(3)(a)(i) of the MHS Act, considering number of employees, number of mines and distances between mines being serviced.

This is the first kind of research to assess the workload of occupational Health Practitioners (refer to Section 13(3)(a)(i)) and Occupational Hygienists (refer to as Section 12(1)) appointees, in the world.

The purpose of the questionnaires was to determine the time required to complete each role and responsibility of Sections 12(1) and Section 13(3)(a)(i) appointees as required by the Mine Health and Safety Act, Act 29 of 1996 (MHSA). To determine the impact of possible over extending the appointees all the responsibilities assigned to these appointments in terms of the MHSA were outlined and incorporated in the questionnaires.

Online questionnaires were developed according to the MHSA to identify the roles and responsibilities of the Sections 12(1) and Section 13(3)(a)(i) appointees respectively. In addition to the mentioned two questionnaires, a separate online questionnaire was developed to be completed by the mine manager of each mine. This was to obtain information on the number of Section 12(1) and Section 13(3)(a)(i) appointees and whether they are appointed on a full-time or part-time basis at the specific mine under control of the mine manager. After discussions and feedback received from the SIMRAC committee, the revised draft questionnaires were distributed to the Department of Minerals and Resources (DMR) (via the MHSC) and GEEs (via the Chamber of Mines, Brian Mongoma) for comments and inputs. The comments and feedback received from the DMR and GEEs were incorporated submitted to SIMRAC for approval.

The MHSC was approached to request the DMR for the contact details (e-mail address and contact numbers) of mine managers at all operational mines. After receiving contact details, the mine managers were requested by means of a letter provided by the MHSC and Enterprises University of Pretoria (Pty) Ltd (Enterprises UP) to complete the Mine manager questionnaire and to distribute the Section 12(1) and Section 13(3)(a)(i) questionnaires to the respective Section 12(1) and Section 13(3)(a)(i) appointees. Each appointee was requested to complete the online questionnaire within a required time frame of 2 weeks.
Due to the initial poor response rate, discussions were held with the MHSC to investigate additional approaches to increase the response rate. The following additional approaches were followed: 1) Present the project (purpose, background and expected outcomes) at the joint HPC/GEE meeting at the Mineral Council, 2) request the MVSSA to distribute the questionnaires to all their members and 3) utilise a session at the MVSSA conference to request completion of questionnaires included in the conference package and distribute it to the relevant appointees if they did not attend the MVSSA conference.

Submitted responses were downloaded from the cloud and backed up on free standing storage devices and removable facilities to ensure secure storage and protection of submitted data. Captured data was accessed to determine if all fields were completed and all data was downloaded for statistical analysis. Descriptive statistical analyses were completed using Excel.

Subsequent to the analysis of the data and compilation of the draft report a number of mines were randomly selected and the information supplied was telephonically verified. Additional information and/or clarification was also performed.

Over-and-above the verification, a comparison was subsequently drawn between the estimated workload (extracted) and the verified workload to determine if the interpretation of the data provided a true reflection of the current situation.

The questionnaires were distributed to 1938 mines. Initially, questionnaires received back from Industry Leaders (Mine Managers), Section 12(1) and Section 13(3)(a)(i) appointments represented 54/1938 (2.8%), 54/1938 (2.8%) and 50/1938 (2.6%) respectively. After exploring other avenues to increase the response rate a total number of 60/1938 (3.1%) mine managers, 78/1938 (4.0%) Section 12(1) appointees and 50/1938 (2.6%) Section 13(3)(a)(i) appointees responded.

The most important results of the Mine Managers questionnaire in terms of Section 12(1) and Section 13(3)(a)(i). full-time and part-time appointments were:
For <101 employees, 2.6% Section 12(1) full-time appointments are on-site and 0% are full-time off-site. In terms of part-time, 15.8% are part-time on-site and 81.6% are part-time off-site. For 101-500 employees, 18.2% Section 12(1) full-time appointments are on-site and 0% are full-time off-site. In terms of part-time, 9.1% are part-time on-site and 72.763.6% are part-time off-site.
Section 12(1) appointments for >500 employees were 90.9 full-time on-site, 0% full-time off-site, 0% part-time on-site and 9.1% part-time off-site.

- For <101 employees, 0% Section 13(3)(a)(i) full-time appointments are on-site and 7.9% are full-time off-site. In terms of part-time, 15.8% are part-time on-site and 76.3% are part-time off-site. For 101-500 employees, 18.2% Section 13(3)(a)(i) full-time appointments are on-site and 9.1% are full-time off-site. In terms of part-time on-site 18.2% are part-time on-site and 54.5 are part-time off-site. Section 13(3)(a)(i) appointments for >500 employees were 60.0% full-time on-site, 10% full-time off-site, 30.0% part-time on-site and 0% part-time off-site.

The most important results of the 12(1) questionnaires were:

- The Section 12(1), Ventilation Officer/ Occupational Hygiene Technologist and Observer/ Occupational Hygiene Assistant ratios were 1:1.4:1, respectively. This means that currently, for every Section 12(1) appointee, there are 1.4 Ventilation Officer/ Occupational Hygiene Technologist and 1 Observer/ Occupational Hygiene Assistant. Ratios reported for different mine sizes were:
  - Small mines: 1:1.1:1
  - Medium mines: 1:0.7:0.7
  - Large mines: 1:1.5:1

- The number of man-days per Occupational Hygiene Practitioner (OHP) per year per entity (small-, medium- and large mines) were 186.4, 484.1 and 251.8 for the small-, medium and large entities respectively. The highest work-burden was amongst the medium sized entities.

- For small and large mines approximately 20 to 45% of the time is spent on-site, whereas for medium size mines only approximately 10% of the time is spent on-site.

- 34.2%, 31.5% and 34.0% of the OHPs time for the small, medium and large mines are devoted to measurement activities.

- 37.0%, 58.1% and 86.9% of the OHPs are involved in management meetings at the small, medium and large mines respectively.

- Although all OHPs were appointed with a remit to eliminate, control and minimise health risks, only 3.5 to 4.2% of the Man-hours are devoted to this activity.

Based on the information supplied it could be concluded that currently for every hundred Section 12(1) appointees there are 473 too few Ventilation Officers/ Occupational Hygiene
Technologists and no less than 3126 too few Observers/ Occupational Hygiene Assistants employed.

If the current workload, expressed as man-days per year is compared with the criteria it is evident that the workload could be described as less than normal working hours (less than 8-hours per day) for OHPs at small mines and large mines, but abnormal extended working hours (more than 16-hours per day) for the medium entities.

If the OHP measurement functions are compared to the administrative functions it clearly indicates that the administrative functions take-up approximately 30% of the OHPs’ time (36.52% for small-, 28.46% for medium- and 39.88% large mines).

The ratio of 1:5:25 for Ventilation Officers/Occupational Hygiene Technologists to Observers/Occupational Hygiene Assistants is proposed as a ratio for Sec 12(1) appointees independent of the number of employees at a mine. This means that for every one Sec 12(1) appointee, 5 Ventilation officers and 25 Assistants needs to be appointed. Independent ratios for sections cannot be made because a Sec 12(1) appointment is for a mine as a whole and not only for a section thereof. Further a specific number of professionals (Sec 12(1) appointees and support personnel) per number of employees employed at a mine or section of a mine cannot be proposed because the workload of professionals is determined by the stressors to be surveyed (significant risks) and the level of exposure of each stressor (Category Band).

The interpretation of the results raised the following issues of concern:

- For medium size mines only approximately 10% of the time is spent at the mine
- The administrative functions take-up a third of the time
- Virtually no time (less than 5%) is spent on quality control matters

The possible impact of the over-extension at medium mines can be summarised as:

- An underutilisation of OHPs at small- and large mines. This means that the standard of work at small and large mines is probably not at the same standard as for medium mines.
- Occupational hygiene sampling is done over shorter periods that what is legally required which may have possible litigation consequences.
- Administrative functions and legal requirements are performed to the detriment of the monitoring function and the quality control. The latter functions could lead to an underestimation of exposure, more severe litigation and even that the 12(1) appointees could be held accountable in their personal capacity.
Commitment of fraud as the results of previous surveys are used for reporting purposes.

The impact of the skewed ratio between the different categories may have the following effect:
- There would be an increase on salary demands of specifically the Ventilation Officers and inevitably “job-hopping” will occur leading to an unstable OHP workforce

Based on the outcome of the survey it is recommended that:
- The outcome of the survey be made public.
- **The looming manpower shortage of Ventilation Officers/Occupational Hygiene Technologists and specifically Observers/Occupational Hygiene Assistants, nationally is urgently addressed.**
- The MHSC develops and enforces prescribed maximum criteria for the number of mines consultants or consulting firms may provide services to. The ratio of 1:5:25 for Ventilation Officers/Occupational Hygiene Technologists to Observers/Occupational Hygiene Assistants is proposed for OHPs.
- It is recommended that one full-time Sec 12(1) be appointment for a mine of a size of 250 employees and more and that this number is increased with one additional professional full-time appointment i.e., Ventilation Officers/Occupational Hygiene Technologists considering the volume, size and physical location of the mine; the health and safety record of the mine; the number of designated working places and distances between mines to be serviced.
- The MHSC develops prescribed maximum criteria for the number of mines Section 12(1) appointees may provide services to.

The results of the **Section 13(3)(a)(i) appointees** questionnaires revealed the following:
- The Section 13(3)(a)(i), Occupational Health Nurse and Practitioners (Other than OMP and OHN) ratios were **1:2:0:0.7**, respectively. This means that currently, for every Section 13(3)(a)(i) appointee, there are 2.0 Occupational Health Nurse and 0.7 Practitioners (Other than OMP and OHN). Ratios reported for different mine sizes were:
  - Small mines: **1:2:1:0.4**
  - Medium mines: **1:2:0:0.7**
  - Large mines: **1:2:0:9**
- 92% of small mines contracted services of Occupational Medical Practitioners (OMPs) and Occupational Health Nurses (OHNs) for only 1 man-day per month. This number should rather be 2 days per month for an OMP and 3 days for an OHN for mines of 100 employees. For mines between 50-100 employees it very difficult to determine the exact
number of hours but the following should apply. For an OMP 2 hours travel time and two hours for examinations and meetings per week (2 days per month). For an OHN 2 hours travel and 5 hours of examinations / meetings per week (24-28 hours per month);

- 60% and 50% of medium mines contracted services of OMPs and OHNs for only 1 man-day per month. This number should rather be 4-5 days per month for an OMP and 6-8 days for an OHN for mines of 300 employees. For an OMP 4 -5 hours per week plus travel time of 2 hours per week (4-5 days per month). For an OHN 3 hours per day (60 hours per month = 6-8 days);

- 33% and 20% of large mines contracted services of OMPs and OHNs for 1 man-day per month. This number should rather be 10-11 days per month for an OMP and 30-37 days for an OHN for mines of 1000 employees. For an OMP 12-15 hours per week due to examinations, risk assessments and meetings plus 2-3 hours travelling per week. For an OHN 10 - 12 hours per day for examinations and meetings.

It is important to note that specific requirements of a mine have an impact on the number of Sec 13(3)(a)(i) appointees per number of employees. If risk based medical surveillance is performed, less time is required if employees are exposed to stressors that influence two organ systems compared to a mine where employees are exposed to stressors that may have an impact on multiple organ systems.

It is recommended that one part-time Sec 13(3)(a)(i) be appointment for a mine of a size of 100 employees or more and that this number is increased with one additional part-time appointment considering the volume, size and physical location of the mine; the health and safety record of the mine; the number of designated working places and distances between mines to be serviced.

The results reflected that the average number of man-days per year per OMP per entity were 147.41, 152.54 and 335.52 for the small-, medium and large entities respectively. However, it should be noted that the time spend on certain one-time activities, such as the development of OREPs, MHSs, etc., were not incorporated into the calculations.

The highest work-burden is thus amongst the large mines.

The work-load for the OMPs could thus be described as not over extended of the OMPs at small and medium mines and that of “long-working hours” for the OMPs at large mines.
It was interesting to note that the majority of the time of OMPs (between approximately 60% to 70%) of the total time were spent on the fitness assessment of employees, medical incapacity and the elimination, minimising and control of risks. The possible impact of this is that they have to spent too much time on incapacity management and not for example on quality control.

The impact on over extending of the Section 13(3)(a)(i) appointees in the SAMI mines was as follows:

- Increased probability of miss diagnosis and underreporting of occupational diseases, misrepresentation of information and capturing of unreliable data
- Substandard medical care due to limited time available to engage with employees during screening
- Employees' not being compensated or a delay in the compensation and or incapacity process because quality control is not being done or sub-standard
- Health risks of employees and other employees may increase due to miss diagnosis of certain chronic medical conditions.

It will be critical for the MHSC to develop guidelines for mines on the responsibilities of Section 13(3)(a)(i) appointees as well as the ratio of OMP/OHN man-days required (availability of OMPs and OHNs on the mine premises) to ensure good performance of mines with such responsibilities.

The distances OMPs travel to mines, specifically smaller mines of OMPs and the impact thereof on the OMP:employee ratio and service delivery should be discussed in an appropriate forum.
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<th>Description</th>
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<tbody>
<tr>
<td>COP</td>
<td>Code of Practice</td>
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<tr>
<td>DMR</td>
<td>Department of Mineral Resources</td>
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<td>DoL</td>
<td>Department of Labour</td>
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<tr>
<td>GEE</td>
<td>Group Environmental Engineers Committee</td>
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<td>HIRA</td>
<td>Hazard Identification and Risk Assessment</td>
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<tr>
<td>HPC</td>
<td>Health Policy Committee</td>
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<tr>
<td>ILO</td>
<td>International Labour Organisation</td>
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<td>MHSA</td>
<td>Mine Health and Safety Act</td>
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<td>MVSSA</td>
<td>Mine Ventilation Society of South Africa</td>
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<td>O</td>
<td>Observer</td>
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<tr>
<td>OHA</td>
<td>Occupational Hygiene Assistant</td>
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<td>OHP</td>
<td>Occupational Hygiene Practitioner</td>
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<td>OHT</td>
<td>Occupational Hygiene Technologist</td>
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<tr>
<td>OMP</td>
<td>Occupational Medical Practitioner</td>
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<td>ONP</td>
<td>Occupational Health Nurse</td>
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<tr>
<td>OREP</td>
<td>Occupational Risk Exposure Profile</td>
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<td>SAMI</td>
<td>South African Mining Industry</td>
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<tr>
<td>SOP</td>
<td>Standard Operating Procedure</td>
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<td>VO</td>
<td>Ventilation Officer</td>
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## GLOSSARY

<table>
<thead>
<tr>
<th>Appointment Type</th>
<th>Description</th>
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<tr>
<td>Full-time on-site appointment</td>
<td>Appointment letter indicate that appointment is full-time and services are provided on site</td>
</tr>
<tr>
<td>Full-time off-site appointment</td>
<td>Appointment letter indicate that appointment is full-time but certain specialised services can only be provided off-site i.e., Medical practice is based in nearby town where infrastructure is available to provide the required service</td>
</tr>
<tr>
<td>Part-time on-site appointment</td>
<td>Appointment letter indicate that appointment is part-time and services need to be provided on site</td>
</tr>
<tr>
<td>Part-time off-site appointment</td>
<td>Appointment letter indicate that appointment is part-time and services are provided off-site i.e., where medical practice is based in nearby town where infrastructure is available to provide the required service</td>
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1 INTRODUCTION

The primary aim of the study was to report on the recommended acceptable ratios of the engagement or appointees in terms of Section 12(1) and Section 13(3)(a)(i), considering number of employees, number of mines and distances between mines being serviced.

The expected research outcomes were described as:

- Report on the total number of Section 12(1) and Section 13(3)(a)(i) appointees in South African Mining Industry (SAMI), categorising the full-time employment and part-time, taking cognisance of the size of the mines and number of employees, number of mines serviced by each appointee and the distance travelled between the different mines serviced.
- Report on the impact of over-extending Sections 12(1) and Section 13(3)(a)(i) appointees.
- Report on the recommended acceptable ratios of the engagement or appointees in terms of Section 12(1) and Section 13(3)(a)(i), considering number of employees, number of mines and distances between mines being serviced.

It would therefore provide a framework to ensure that appointees are capable (in terms of manpower and equipment) and that they do not overextend their capabilities of rendering the services to mines in SAMI.

2 OVERALL PROJECT AIMS AND OBJECTIVES

The overall project aims and objectives were to:

- Develop an online questionnaire to identify roles, responsibilities and workload of 12(1) and Section 13(3)(a)(i) appointees.
- Report on the total number of Section 12(1) appointments in SAMI, categorising those full-time employment and part-time.
- Report on the total number of OMPs engaged by mines in SAMI, categorising those part-time and full-time.
- Report on the impact of over-extending the appointees.
- Report on the recommended acceptable ratios of the engagement or appointees in terms of Section 12(1) and Section 13(3)(a)(i), considering numbers of employees, number of mines and distances between mines being serviced.
3 METHOD

The method consisted of the following steps:

- First the responsibilities and functions of the Occupational Hygiene Professionals (OHPs, Section 12(1)) and Occupational Medical Professionals (OMPs, Section 13(3)(a)(i)) were determined. This was done by identifying/listing of all legislative responsibilities of the respective appointments. Appointment letters received from mines were also consulted to ensure that all legislative requirements are covered. It is important to note that activities other than legislative requirements assigned to the mentioned appointees, were not considered to determine over extending or workload.

- Subsequently questions related to the responsibilities and functions of the different appointees were compiled.

- Thereafter the framework (structure) of the questionnaire was determined.

- All the questions were incorporated into electronic questionnaires for online distribution.

- Finally, the questionnaires were circulated for approval by SIMRAC.

The Ethical Committee of the Faculty of Health Sciences, University of Pretoria approved the project (Ethical clearance number: 17/2018).

An online questionnaire was developed according to the MHSA, Act 29 of 1996 to identify the roles and responsibilities for the Sections 12(1) and Section 13(3)(a)(i) appointees respectively. After discussions with the SIMRAC committee it was indicated that all legislative roles and responsibilities of the respective appointments were not included. Contracts for the appointment of Section 12(1) and other related documentation were utilised to expand the online questionnaires to cover all legislative responsibilities of Section 12(1) appointees. Section 12(1) and Section 13(3)(a)(i) questionnaires were thereafter circulated to the SIMRAC committee for approval was granted for distribution of the questionnaires.

The revised draft questionnaires for the mine manager, Sections 12(1) and Section 13(3)(a)(i) appointments were distributed to the DMR (via the MHSC) and GEEs (via the Chamber of Mines, Brian Mongoma) for comments and inputs. Comments and inputs received from the GEEs and DMR were incorporated into the final questionnaires. Thereafter the questionnaires were approved for distribution. The final questionnaires in PDF format as well as the letter that was sent with the email to Mine Managers are included in Addendum A of this report.
In summary, the questionnaires covered the following aspects:

- **Mine managers questionnaire**
  - Information on mine (address, contact details, province, commodity, number of employees, etc)
  - Number of appointees the mine contract on full- and part-term basis and their qualifications

- **Section 12(1) appointee’s questionnaire**
  - Information on mine (address, contact details, province, number of employees on the mine they serve, etc)
  - If the OHPs are located on the mine and the distances they travel, if not as well as the time the OHPs spend on the mine
  - The roles and responsibilities and the time the OHPs spend on these roles and responsibilities, including meetings, training and incident investigations
  - The activities and time spend on DMR-related functions, including capturing of data
  - The OHPs involvement in control measures and quality control measures
  - The number and categories of OHPs and their registration information

Although the focus of the Section 12(1) questionnaire was on surface and underground operations, open cast operations and smelters operations were not excluded because a large percentage of legislative responsibilities included in the questionnaires apply for all mentioned operations i.e., underground, surface, open cast and smelter.

- **Section 13(3)(a)(i) appointee’s questionnaire**
  - Information on mine (address, contact details, province, number of employees on the mine they serve, etc)
  - If the OMPs are render services on the mine and the distances they travel, as well as the time the OMPs spend on the mine
  - The roles and responsibilities and the time the OMPs and OHNs spend on these roles and responsibilities, including meetings, training and incident investigations
  - The involvement of Occupational Health Practitioners in the development of minimum health standards and the health programmes and health-related incident investigations
  - The involvement of Occupational Health Practitioners in occupational health risk assessments, control measures, management of medical incapacities and quality control
  - The activities and time spend on DMR-related functions, including medical appeals
The number and categories of OMPs and OHNs and their registration information

Due to the poor response rate, a discussion was held with the MHSC. In response to the meeting with the MHSC it was decided to submit a request to present the project (purpose, background and expected outcomes) at either the HPC or GEE or even the joint HPC/GEE meetings at the Mineral Council and to request the MVSSA to distribute the questionnaires to all their members and to investigate if a session at the MVSSA annual conference can be utilised to discuss the project.

The request to attend the joint HPC/GEE meeting at the Mineral Council was approved for the meeting scheduled for 13 April 2018. Hard copies of the Mine Manager, Section 12(1) and Section 13(3)(a)(i) questionnaires were distributed at the meeting with a request to distribute it to the designated appointments and to submit either online or to return the completed questionnaires via e-mail in PDF format.

The MVSSA was also contacted via their President, Mr Kobus Dekker to assist with distribution of questionnaires to all their members. The links to the online questionnaires and soft copies of the questionnaires were e-mailed to all MVSSA members to distribute it to designated appointees and then to request the designated appointee to either complete the online questionnaire or to submit the completed questionnaires via e-mail in PDF format.

The MVSSA conference on 31 May 2018 was also attended to communicate the need to Section 12(1) appointees to submit either the online questionnaire or hard copy included in their conference pack. The Mine Manager questionnaire and Section 13(3)(a)(i) questionnaires were also included in the conference pack and attendees to the conference were requested to distribute the respective questionnaires to the designated appointments.

From the completed questionnaires, ultimately two aspects were determined:

- What is the ratio of OHPs and OMPs to the number of employees?
- How does the workload of the OHPs and OMPs compare to national and international guidelines?

The ratios were extracted from the information provided by the OHPs and OMPs in the questionnaires. **Subsequently the ratios were compared to national and international guidelines.**
The workload of OHPs and OMPs, whether appointed full-time or in part-time capacity, was mathematically calculated by determining the sum of the total number of hours spent per function or activity as indicated by the professionals in the questionnaire. The workload was subsequently compared to guidelines as specified in the Basic Conditions of Employment Act. Longer than normal working hours were further classified as "long" working hours, "extended" working hours and "abnormal extended" working hours (see criteria for more detail).

Subsequent to the analysis of the data and compilation of the draft report a number of mines were randomly selected and the information supplied was telephonically verified. Additional information and/or clarification was also performed.

For the 12(1) appointees the following questions were asked to verify the ratio of the different OHPs and to verify the reported workload:
- How many mines do you service?
- Did you complete the questionnaire for one facility only?
- Are you appointed full-time or part-time?
- How many gravimetric sampling pumps do you have?
- How many dosimeters do you have?
- How long do you sample?
- What is the ratio of OHPs categories do you make use of?
- Do you service surface and/or underground?

From the completed questionnaires the following information, specifically regarding the workload, was extracted:
- Man-days per month as per questionnaire
- Estimated number of samples (HCS/ noise) taken per month
- Do you have a high staff turnover?

Over-and-above the verification a comparison was subsequently drawn between the estimated workload (extracted) and the verified workload to determine if the interpretation of the data provided a true reflection of the current situation.

For sake of convenience the mining entities were divided into three groups:
- Small mining entity (maximum 100 employees)
- Medium size mining entity (101 to 500 employees)
- Large mining entity (more than 500 employees)
3.1 Methodology – Quality check

The 12(1) appointee who completed the questionnaire was telephonically interviewed in order to ensure that some of the questions were correctly interpreted and information provided represent the services rendered to all the mines. This was done for quality control purposes.

12 mines were randomly selected which included 4 small, 4 medium and 4 large mines. Telephonic interviews were conducted with the responsible person for delivering the services at the mines at the following entities and regions were randomly selected:
- Large mines (Limpopo, North-West, Western Cape and Northern Cape)
- Medium mines (North-West, Kwa-Zulu Natal, North-West and Mpumalanga)
- Small mines (Mpumalanga, Mpumalanga, Gauteng and Western Cape)

4 ASSUMPTIONS AND BACKGROUND

The following assumptions were made to express data in terms of general accepted criteria:
- The information provided by the respondents is representative of the entire workforce
- 48 work weeks per year
- 260 work days per year
- 20 working days per month
- 8-hr working days
- Work was evenly spread over the entire year
- For calculation purposes < values; e.g. <3 was mathematically “converted” to 2
- For calculation purposes > values; e.g. >3 was mathematically “converted” to 4, except for larger values > 30 a higher value; e.g. 32 was used
- For calculation purposes ranges e.g. 3-4 the higher value (4) was used
- For calculation purposes ranges e.g. 3-5 the mid-value (4) was used
- The number of “N/A” or “none” observations was deducted from the total number of professionals

Three levels of OHPs are employed by the mining industry. They are the:
- Section 12(1) appointee, who carries the legal appointment, referred to as 12(1)
- Ventilation Officers or Occupational Hygiene Technologists (OHT), referred to as VO/OHT
- Observers or Occupational Hygiene Assistants (OHA) referred to as O/OHA
The OMPs make use of Occupational Health Nurses (OHN) to primarily conduct all the evaluations and in some instances to interpret the outcome of the evaluations. However, in all instances the OMPs evaluate borderline cases, not fit for work outcomes and sign-off the medical certificates.

5 CRITERIA

As far as the workload is concerned the following criteria was used.

**Table 1: Workload classifications**

<table>
<thead>
<tr>
<th>Workload (hrs)</th>
<th>Man-days/ year</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-hrs</td>
<td>260 – 325 Man-days</td>
<td>Normal working hours*</td>
</tr>
<tr>
<td>12-hrs</td>
<td>326 – 390 Man-days</td>
<td>Long working hours</td>
</tr>
<tr>
<td>16-hrs</td>
<td>391 – 455 Man-days</td>
<td>Extended working hours</td>
</tr>
<tr>
<td>&gt; 16-hrs</td>
<td>&gt; 455 Man-days</td>
<td>Abnormal extended working hours</td>
</tr>
</tbody>
</table>

*Basic Conditions of Employment Act

The Department of Labour (DoL) prescribes the (maximum) ratio of the different categories of OHPs as 1:5:25 Occupational Hygienists to Occupational Hygiene Technologists to Occupational Hygiene Assistants.

In India “the required number of Industrial Hygienists was estimated assuming that the factories which employ more than 1000 workers would require one Industrial Hygienist as per the norm for safety officers mentioned in the Indian Factories Act”.

No other information regarding ratios could be found in the literature.

6 RESULTS

6.1 General results

Of the total number of questionnaires 1938 that were distributed 78 Section 12(1) appointees and 50 Section 13(3)(a)(i) appointees responded. The response data per province are represented in Figure 1 and 2 for the Section 12(1) and Section 13(3)(a)(i) respondents, respectively.
Figure 1: The Section 12(1) respondents per province

Figure 2: The Section 13(3)(a)(i) respondents per province
6.2 Section 12(1) appointees

The number of respondents that completed the Section 12(1) questionnaires for the different mining categories (entities) were 17, 20 and 46 for the small, medium and large entities. The number of respondents is depicted in Table 2 and Figure 3.

**Table 2: The number of respondents appointed on a full- and part-time basis**

<table>
<thead>
<tr>
<th>Number of respondents</th>
<th>Small mines</th>
<th>Medium mines</th>
<th>Large mines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-time</td>
<td>2</td>
<td>5</td>
<td>42</td>
</tr>
<tr>
<td>Part-time</td>
<td>15</td>
<td>15</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>17</td>
<td>20</td>
<td>46</td>
</tr>
</tbody>
</table>

**Figure 3: Number of respondents appointed at different mine categories**

The number of OHPs located at the mines and the distances they have to travel are reflected in Table 3 and 4 respectively.
**Table 3: Data reflecting weather OHPs are located on mine**

<table>
<thead>
<tr>
<th>Located at mine</th>
<th>Small mines</th>
<th>Medium mines</th>
<th>Large mines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>6</td>
<td>6</td>
<td>36</td>
</tr>
<tr>
<td>No</td>
<td>11</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>17</td>
<td>15</td>
<td>46</td>
</tr>
</tbody>
</table>

35.2% of OHPs are located at the small mines, whereas 40% and 78.3% of the OHPs are located at the medium and large mines, respectively.

**Table 4: The distances OHPS travel to render services**

<table>
<thead>
<tr>
<th>Distance travel</th>
<th>Small mines</th>
<th>Medium mines</th>
<th>Large mines</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 10 km</td>
<td>3</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>11 - 20 km</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>21 - 40 km</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>41 - 60 km</td>
<td>1</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>&gt;60 km</td>
<td>4</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>9</td>
<td>8</td>
<td>7</td>
</tr>
</tbody>
</table>

Most OHPs travel more than 40 km to render occupational hygiene services.

Because of the Department of Mineral Resources (DMR) requirements in terms of the occupational hygiene programme, it is expected that more full-time OHPs would perform work for the large mining entities than part-time employees. The different categories employed are reflected in Table 5 and Figure 4. Regardless of the size of the mine the number of Section 12(1), VO/OHT and O/OHA appointments are 130, 177 and 8124 respectively.
Table 5: The different categories employed on a full-time and part-time basis

<table>
<thead>
<tr>
<th>Appointment</th>
<th>Description</th>
<th>Small</th>
<th>Medium</th>
<th>Large</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12(1) VO/OHT</td>
<td>6</td>
<td>9</td>
<td>86</td>
</tr>
<tr>
<td></td>
<td>O/OHA</td>
<td>5</td>
<td>4</td>
<td>135</td>
</tr>
<tr>
<td></td>
<td>12(1) VO/OHT</td>
<td>5</td>
<td>4</td>
<td>88</td>
</tr>
<tr>
<td></td>
<td>O/OHA</td>
<td>4</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Full-time</td>
<td>Total per category</td>
<td>6</td>
<td>9</td>
<td>86</td>
</tr>
<tr>
<td></td>
<td>Total per entity</td>
<td>16</td>
<td>20</td>
<td>309</td>
</tr>
<tr>
<td>Part-time</td>
<td>Total per category</td>
<td>15</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Total per entity</td>
<td>51</td>
<td>26</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
<td>19</td>
<td>13</td>
<td></td>
</tr>
</tbody>
</table>

Figure 4: A graphic representation of the different categories of OHPs appointed on a full-time and part-time basis
The number of man-days to perform the different functions is depicted in Table 6. The results reflected that the average number of man-days per OHP per entity were 186.44, 484.05 and 251.78 for the small-, medium and large entities respectively. The highest work-burden is thus amongst the medium size entities.

Table 6: The number of Man-days to perform the different occupational hygiene functions

<table>
<thead>
<tr>
<th>Description</th>
<th>Small mines (Man-days/year)</th>
<th>Medium mines (Man-days/year)</th>
<th>Large mines (Man-days/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compilation and review of COPs</td>
<td>10.00</td>
<td>9.09</td>
<td>16.00</td>
</tr>
<tr>
<td>Observations and enforcement of instructions, etc.</td>
<td>10.60</td>
<td>26.14</td>
<td>36.07</td>
</tr>
<tr>
<td>Data capturing</td>
<td>21.08</td>
<td>19.25</td>
<td>77.99</td>
</tr>
<tr>
<td>Mandatory reports</td>
<td>119.99</td>
<td>176.53</td>
<td>325.53</td>
</tr>
<tr>
<td>Performing functions</td>
<td>258.43</td>
<td>468.06</td>
<td>681.61</td>
</tr>
<tr>
<td>Surface audits</td>
<td>29.13</td>
<td>44.48</td>
<td>57.82</td>
</tr>
<tr>
<td>Underground audits</td>
<td>54.16</td>
<td>91.73</td>
<td>89.22</td>
</tr>
<tr>
<td>Development-end surveys</td>
<td>72.00</td>
<td>168.30</td>
<td>113.31</td>
</tr>
<tr>
<td>Stoping environmental surveys</td>
<td>0.00</td>
<td>153.00</td>
<td>73.50</td>
</tr>
<tr>
<td>Underground performance analysis</td>
<td>29.68</td>
<td>57.89</td>
<td>68.45</td>
</tr>
<tr>
<td>Management-related meetings</td>
<td>61.66</td>
<td>99.67</td>
<td>167.75</td>
</tr>
<tr>
<td>DMR inspection-related functions</td>
<td>18.38</td>
<td>20.35</td>
<td>38.71</td>
</tr>
<tr>
<td>Health-related incident investigations</td>
<td>5.47</td>
<td>8.20</td>
<td>24.46</td>
</tr>
<tr>
<td>Involvement in control measures</td>
<td>26.40</td>
<td>52.38</td>
<td>84.37</td>
</tr>
<tr>
<td>Involvement in training and other meetings</td>
<td>18.77</td>
<td>31.77</td>
<td>64.16</td>
</tr>
<tr>
<td>Involvement in quality control</td>
<td>21.00</td>
<td>57.57</td>
<td>84.33</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>756.75</strong></td>
<td><strong>1484.41</strong></td>
<td><strong>2003.27</strong></td>
</tr>
<tr>
<td><strong>Average number of OHPs per entity</strong></td>
<td><strong>4.06</strong></td>
<td><strong>3.07</strong></td>
<td><strong>7.96</strong></td>
</tr>
<tr>
<td><strong>Average Man-hours per person per entity</strong></td>
<td><strong>186.44</strong></td>
<td><strong>484.05</strong></td>
<td><strong>251.78</strong></td>
</tr>
</tbody>
</table>

Notes:
- The average number of OHPs were calculated from the total number of OHPs whom render services for each entity (derived from data extracted from Section 12(1) questionnaires) divided by the number of respondents for the particular entity (small- n = 17, medium- n = 15 and large mines n = 46)
- The average Man-hours per person per entity was calculated by adding the total number of Man-days per year, as reported by appointees, by the average number of OHPs
The results of the questionnaires completed by the Section 12(1) appointees revealed the following:

- Most of the small- (11/17) and medium-size mines (9/15) are serviced by Occupational Hygiene Practitioners (OHP) that are not located at the mines and most of the practitioners travel further than 20 km’s to the mines.
- Whereas OHPs for the small (76.1%) and medium mines (56.5%) are appointed on a part-time basis, most OHPs (97.2%) at large mines are performing their functions on a full-time basis.
- The total number of OHPs employed were 138, 204 and 140 Section 12(1), Ventilation Officer/Occupational Hygiene Technologist and Observer/ Occupational Hygiene Assistant, respectively which calculated to a ratio of 1:1.4:0.95.
- The average number of Man-days per OHP per entity were 186.44, 484.05 and 251.78 for the small, medium and large entities respectively.
- **For small and large mines approximately 20 to 45% of the time is spent on-site, whereas for medium size mines only approximately 10% of the time is spent on-site.**
- 34.15%, 31.53% and 34.03% of the OHP man-days are spent on measurement functions and the remainder on administrative functions for the small, medium and large mines, respectively.
- Five activities were prominent, spending more than 10% of the time on the particular activity:
  - Mandatory reports
  - Performing measurement functions
  - Development-end surveys (only medium mines)
  - Stoping environmental surveys (only medium mines)
- Almost all OHPs are involved in the compilation and review of OHP-related Codes of Practices.
- All OHPs, except for two, are all involved with observation and enforcement of any instructions, procedures, directive, exemption etc. in terms of Codes of Practices issued by the mine, the DMR or any other person authorised to do so.
- Most of the OHPs are involved in capturing occupational hygiene data to link their exposure to HEGs or individuals.
- 34.15%, 31.53% and 34.03% of the OHPs time for the small, medium and large mines is spend on measurement activities.
36.98%, 58.10% and 86.92% of the OHPs are involved in management meetings at the small, medium and large mines respectively.

The number of health-related incidents investigated per month for the small, medium and large mines where OHPs are involved are 31, 41 and 375 respectively.

Although all OHPs were appointed with a remit to eliminate, control and minimise health risks, only 3.5 to 4.2% of the Man-hours are devoted to this activity.

The majority of the incident investigations was related to exposure of employees in the working environment.

Only 3.3 to 4.3% of the Man-hours are spent on quality control.

The telephonic follow-up revealed the following:

- Except where services are rendered on a full-time basis, that the Section 12(1) appointees have completed the questionnaires for ONE facility only, whereas they may render services to as many as 90 facilities.
- Occupational hygiene sampling is not done over a full-shift, in fact it is only done over an 8-hr period in exceptional instances. In most instances sampling is done for more than 6 hrs.

6.3 Section 13(3)(a)(i). appointees

- Number of man-days spent per on mine for OMPs and OHNs at Small Mines:
  - 92% of small mines contracted services of OMPs and OHNs for only 1 man-day per month. This number should rather be 2 days per month for OMPs and 3 days for OHNs for mines of 100 employees. For mines between 50-100 employees it are usually very difficult to determine the exact number of hours but the following should apply. For an OMP 2 hours travel time and two hours for examinations and meetings per week (2 days per month). For an OHP 2 hours travel and 5 hours of examinations / meetings per week (24-28 hours per month)
  - 60% and 50% of medium mines contracted services of OMPs OHNs for only 1 man-day per month. This number should rather be 4-5 days per month for OMPs and 6-8 days for OHNs for mines of 300 employees. For an OMP 4-5 hours per week plus travel time of 2 hours per week (4-5 days per month). For an OHN 3 hours per day (60 hours per month = 6-8 days)
  - 33% and 20% of large mines contracted services of OMPs and OHNs for 1 man-day per month. This number should rather be 10-11 days per month for OMPs and
30-37 days for OHNs for mines of 1000 employees. For an OMP 12-15 hours per week due to examinations, risk assessments and meetings plus 2-3 hours travelling per week. For an OHN 10 - 12 hours per day for examinations and meetings.

- **Development of Occupational Risk Exposure Profiles (OREP):**
  - 35% of small mines do not have OREPs for each employee.

- **Compilation of Mandatory Codes of Practice:**
  - 22 – 38% of small to medium mines do not involve OMPs or OHNs in the compilation and/or review of Mandatory Codes of Practice.

- **Compilation and review of Codes of Good Practice (COP’s):**
  - With 25% of small mines OMPs are not involved in compiling or reviewing of COP.
  - Numbers for OHN involvement are worse with 75% of small mines and 40% of large mines that do not involve OHNs in this process.

- **Involvement on Mine Health and Safety Committees:**
  - 35% of small to medium mines do not involve OMPs or OHNs on their regular Health and safety Committees.

- **Involvement in health-related investigations:**
  - Only 30-40% of small to medium mines involve OMPs and OHNs in this type of investigation. These figures should be more than 95% (100% if possible).

- **Involvement in hazard identification and risk assessment processes:**
  - 33% of small to medium mines and 19% of large mines do not involve OMPs or OHNs in these processes.

- **Involvement in processes for elimination, control and minimising health risks:**
  - 30 – 50% of small to medium mines do not involve OMPs or OHNs in these processes.

- **Involvement in programs for management of medical incapacity:**
  - 56% of small mines do not have a specific forum to deal with these cases.

- **Involvement in compiling of statutory DMR reporting:**
  - 30-40% of small to medium mines do not involve OMPs in compilation of these reports.

- **Involvement in training of employees:**
  - 60-70% of small to medium mines do not involve OMPs or OHNs in occupational health and safety training programs.

- **Involvement in management committee meetings:**
  - 80% of small and medium mines do not involve OMPs and OHNs in these management committees.
Involvement in occupational health and safety audits:

- 60-70% of small and medium mines do not involve OMPs or OHNs in these processes.

The number of man-days to perform the different functions is depicted in Table 7. The results reflected that the average number of man-days per OMP per entity were 147.41, 152.54 and 335.52 for the small-, medium and large entities respectively. **However, it should be noted** that the time spend on certain one-time activities, such as the development of OREPs, MHSs, etc, were not incorporated into the calculations.

The highest work-burden is thus amongst the large mines.

**Table 7: The number of Man-days to perform the different OMP functions**

<table>
<thead>
<tr>
<th>Description</th>
<th>Small (Man-days/year)</th>
<th>%</th>
<th>Medium (Man-days/year)</th>
<th>%</th>
<th>Large (Man-days/year)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time spend on OHREPs</td>
<td>0.01</td>
<td>0.01</td>
<td>0.04</td>
<td>0.03</td>
<td>0.06</td>
<td>0.02</td>
</tr>
<tr>
<td>Compilation and review of COPs</td>
<td>4.48</td>
<td>3.04</td>
<td>4.68</td>
<td>3.07</td>
<td>6.68</td>
<td>1.99</td>
</tr>
<tr>
<td>Compilation and review of SOPs/ guidelines in support of COPs</td>
<td>3.71</td>
<td>2.52</td>
<td>3.00</td>
<td>1.97</td>
<td>6.69</td>
<td>1.99</td>
</tr>
<tr>
<td>Review of MHSs</td>
<td>3.75</td>
<td>2.54</td>
<td>4.50</td>
<td>2.95</td>
<td>7.95</td>
<td>2.37</td>
</tr>
<tr>
<td>Work-related diagnosed cases</td>
<td>2.31</td>
<td>1.57</td>
<td>2.31</td>
<td>1.51</td>
<td>3.08</td>
<td>0.92</td>
</tr>
<tr>
<td>Nonwork-related diagnosed cases</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.00</td>
</tr>
<tr>
<td>Health-related incidents</td>
<td>0.55</td>
<td>0.38</td>
<td>1.38</td>
<td>0.91</td>
<td>1.75</td>
<td>0.52</td>
</tr>
<tr>
<td>HRAs</td>
<td>3.53</td>
<td>2.39</td>
<td>6.33</td>
<td>4.15</td>
<td>11.53</td>
<td>3.44</td>
</tr>
<tr>
<td>Fitness assessments</td>
<td>69.49</td>
<td>47.14</td>
<td>56.25</td>
<td>36.88</td>
<td>126.56</td>
<td>37.72</td>
</tr>
<tr>
<td>Eliminate, minimising and control risks</td>
<td>6.00</td>
<td>4.07</td>
<td>10.00</td>
<td>6.56</td>
<td>50.10</td>
<td>14.93</td>
</tr>
<tr>
<td>Medical incapacity</td>
<td>23.14</td>
<td>15.70</td>
<td>24.55</td>
<td>16.09</td>
<td>53.13</td>
<td>15.83</td>
</tr>
<tr>
<td>Statutory DMR reporting</td>
<td>14.33</td>
<td>9.72</td>
<td>8.70</td>
<td>5.70</td>
<td>20.25</td>
<td>6.04</td>
</tr>
<tr>
<td>Annual reports</td>
<td>0.75</td>
<td>0.51</td>
<td>0.68</td>
<td>0.45</td>
<td>1.33</td>
<td>0.40</td>
</tr>
<tr>
<td>Medical appeals</td>
<td>2.33</td>
<td>1.58</td>
<td>1.50</td>
<td>0.98</td>
<td>1.25</td>
<td>0.37</td>
</tr>
<tr>
<td>Training</td>
<td>3.00</td>
<td>2.04</td>
<td>8.00</td>
<td>5.24</td>
<td>11.45</td>
<td>3.41</td>
</tr>
<tr>
<td>Management committee meetings</td>
<td>3.00</td>
<td>2.04</td>
<td>6.33</td>
<td>4.15</td>
<td>11.60</td>
<td>3.46</td>
</tr>
<tr>
<td>Other committee meetings</td>
<td>3.00</td>
<td>2.04</td>
<td>8.00</td>
<td>5.24</td>
<td>13.09</td>
<td>3.90</td>
</tr>
<tr>
<td>Quality control (audits, system evaluations, etc)</td>
<td>4.00</td>
<td>2.71</td>
<td>6.27</td>
<td>4.11</td>
<td>9.00</td>
<td>2.68</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>147.41</strong></td>
<td><strong>100.00</strong></td>
<td><strong>152.54</strong></td>
<td><strong>100.00</strong></td>
<td><strong>335.52</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>
It is interesting to note that the majority of the time was spend on the fitness assessment of employees (47.14%, 36.88% and 37.72%), medical incapacity (17.70%, 16.09% and 15.83%) and the elimination, minimising and control of risks (4.07%, 6.56% and 14.93%) for the small-, medium and large mines, respectively.

6.3.1 Outcome of Quality check

Appointment of OMP’s (Full-time or Part-time):
Telephonic verification
i. All Mines contacted had appointed OMP’s
Electronic Questionnaires
ii. Small mines = 75%
iii. Medium mines = 87%
iv. Large mines = 100%

Development of Occupational Risk Exposure profiles (OREP):
Telephonic verification
i. All mines (small medium and large) confirmed 100 % OREP’s developed for all employees.
Electronic Questionnaires;
ii. Small mines indicated that only 65% had OREP’s for all jobs.
iii. 93% Medium and Large mines indicated OREP’s for all jobs.

Involvement of OMP in compilation and reviews of COP’s:
Telephonic verification
i. 100% of mines confirmed involvement of OMP’s in compilation of COP’s and reviews between 2 - 4 yearly.
Electronic Questionnaires
i. 76% small mines, 86% of medium mines and 100% of large mines confirmed involvement of OMP’s.

Involvement of OMP’s in Health and Safety Committees:
Telephonic verification
i. All mines responded that the questions within the electronic questionnaire were insufficient for them to answer these questions accurately.
Electronic Questionnaires
i. 65% small mines, 67% medium mines and 89% large mines indicated that OMP’s were involved with these committees

**Involvement of OMP’s in Health-related investigations:**

Telephonic verification

i. 3 of the 4 small mines indicated involvement of OMP.

ii. 1 of the 4 medium mines indicated involvement of OMP.

iii. All 4 large mines indicated involvement of OMP.

Electronic Questionnaires

i. 33% of small mines indicated involvement of OMP’s.

ii. 40% of medium mines indicated involvement of OMP’s.

iii. 83% of large mines indicated involvement of OMP’s.

**Involvement of OMP’s in hazard identification and risk assessment (HIRA):**

Telephonic verification

i. 3 out of 4 small mines indicated OMP in process.

ii. All medium and large mines indicated involvement of OMP in process.

Electronic Questionnaires

i. 6% of small mines indicated OMP involvement.

ii. 27% medium mines indicated OMP involvement.

iii. 56% large mines indicated OMP involvement.

**Involvement of OMP’s in measures to control or eliminate health hazards:**

Telephonic verification

i. 3 out of 4 small mines indicated OMP involvement.

ii. All medium and large mines indicated OMP involvement.

Electronic Questionnaires

i. 59% of small mines indicated OMP involvement.

ii. 67% of medium mines indicated OMP involvement.

iii. 87% of large mines indicated OMP involvement.

**Involvement of OMP’s in medical incapacity management forums:**

Telephonic Verification

i. All of small, medium and large mines indicated that discussions take place with involvement of OMP.

Electronic Questionnaire

i. 44% small mines, 73% of medium mines and 89% of large mines indicated that specific meetings are held where OMP is involved.
Involvement of OMP in Statutory Reporting:

Telephonic verification
   i. All small, medium and large mines reported involvement of OMP in the reporting process.

Electronic Questionnaire
   i. 88% of small and 100% of medium and large mines reported involvement of OMP’s in reporting process.

Involvement of OMP’s in health-related training:

Telephonic Verification
   i. 1 of 4 small mines reported OMP involvement in health-related training.
   ii. 3 of 4 medium and large mines reported involvement of OMP’s.

Electronic Questionnaires
   i. 30% small, 40% medium and 85% large mines reported involvement of OMP’s in health-related training.

Involvement of OMP’s in Occupational Health Audits:

Telephonic verification
   i. 2 of 4 of small and medium mines reported involvement of OMP’s in audit processes.
   ii. 3 of 4 large mines reported involvement of OMP’s in audit processes.

Electronic Questionnaires
   i. 35% small, 60% medium and 83% large mines reported involvement of OMP’s in audit processes.

7 DISCUSSION
7.1 Section 12(1) appointees

Because of the fact that legal requirements regarding monitoring is related to the number of employees it would be expected that the OHPs for the small mines are appointed on a part-time basis. **It is interesting to note that one (1) OHP for the small mines was appointed in a full-time capacity.** As expected the OHPs would be appointed on a full-time basis as the number of employees increase (medium and large size mines). This is supported by the results where the full-time appointments of 23.9% at small mines increase to 43.5% and 97.2% for medium- and large size mines. Unexpectedly, 2.8% of the OHPs at large mines are appointed on a part-time basis.
It was expected that the ratio of Section 12(1), VO/OHT and O/OHA should be approximately 1:5:25. Based on the outcome of the survey the calculated ratio of 1:1.4:0.9 is a completely skew representation compared to the criteria. Not only are there far too few VO/OHT but the number of O/OHA, compared to the other categories, is alarmingly low. **In essence it means that there are, for the mines that provided information, 473 too few VO/OHT and no less than 3126 too few O/OHA employed in relation to the Section 12(1) appointees.** The comparison between the current situation and what is required is depicted in Figure 5.

![Figure 5: The current and required OHPs for similar number of Section 12(1) Appointees](image)

It is however important to note that the ratio of 1:5:25 for Ventilation Officers/Occupational Hygiene Technologists to Observers/Occupational Hygiene Assistants is proposed as a ratio for Sec 12.1 appointees independent of the number of employees to be serviced at a mine. This approach needs to be followed because a specific number of professionals (Sec 12.1 appointees and support personnel) per number of employees employed at a mine or section of a mine cannot be a fixed number because the workload of professionals is determined by the number of stressors to be surveyed (significant risks) and the level of exposure of each stressor to be surveyed (Category Band).
It is recommended that one full-time Sec 12(1) be appointment for a mine of a size of 250 employees and more and that this number is increased with one additional professional full-time appointment i.e., Ventilation Officers/Occupational Hygiene Technologists considering the volume, size and physical location of the mine; the health and safety record of the mine; the number of designated working places and distances between mines to be serviced.

As the OHPs indicated that they provide services on an irregular basis to small mines (because of the little monitoring to be performed) it was expected that very few would be located at the mines. Unexpectedly, 35.3% of the OHPs are located at the small mines. 78.2% of the OHPs are located at the large mines.

Based on the telephonic information supplied it was concluded that the ratio of OHPs and the workload using the analytical data of OHPs was most probably an **UNDERESTIMATION** of the current situation. This conclusion was supported by the “correlation” of the man-days per month and the number of samples to be taken, as provided in the questionnaires.

Most of the OHPs travel more than 40 km to render occupational hygiene services, which means more than an hour (considering traffic and road conditions) would be lost on the day when the services are rendered. This could negatively impact on the services rendered and is probably one of the reasons why sampling is not conducted over an entire shift.

If the number of man-days per year per OHP for the different size mines are compared (186.44, 484.05 and 251.78) for the small, medium and large entities respectively) it is clear that the highest work-burden is amongst the medium sized entities.

If the current workload, expressed as man-days per year is compared with the criteria it is evident that the workload could be described as **less than normal working hours (less than 8-hours per day)** for OHPs at small mines and large mines, but **abnormal extended working hours (more than 16-hours per day)** for the medium entities.

It is only in exceptional cases that OHPs are not involved in performing all the different functions they are legally required to perform.

**If one considers the time spent by the OHPs and the type of functions and the quality control they perform on-site the following is of concern:**
For medium size mines only 10.7% of the time is spent at the mine.

The administrative functions take-up approximately 30% of the OHPs’ time (36.52%, 28.46% and 39.88% for small-, medium- and large mines respectively).

Virtually no time (less than 5%) is spent on quality control.

The fact that more than 75% of the OHPs are involved in compiling other COPs are an indication that there is a good amount of inter-disciplinary interaction. This should be further encouraged.

The number of health-related incident investigations per month, where OHPs are involved in, for small and medium sized mines are approximately the same (31 versus 41), however, the number escalates by more than 9 times for the larger mines. Thus, health-related incidents are far more prominent at the large entities.

Based on the telephonic information supplied it was concluded that the workload using the analytical data of OHPs was most probably an UNDERESTIMATION of the current situation. This conclusion was supported by the “correlation” of the man-days per month and the number of samples to be taken, as provided in the questionnaires.

The possible impact of the over-extension at medium mines can be summarised as follows:

- The underutilisation of OHPs at small- and large mines. This means that the standard of work at small and large mines is probably not at the same standard as for medium mines.
- The occupational hygiene sampling is done over shorter periods that what is legally required which may have possible litigation consequences. The shorter sampling periods may further be a result of the distances some of the OHPs need to travel to render services at the mines.
- Administrative functions (system requirements [i.e. audits] and legal requirements [i.e. reporting and investigations]) are performed to the detriment of the monitoring function and the quality control, which should be the most important functions. The latter functions could lead to an underestimation of exposure, more severe litigation and even that the Section 12(1) appointees could be held accountable in their personal capacity.
- Commitment of fraud as the results of previous surveys are used for reporting purposes.
The impact of the skewed ratio between the different categories may have the following effect:

- Because of the shortage of OHPs it would increase the salary demands of specifically the Ventilation Officers and inevitably “job-hopping” will occur leading to an unstable OHP workforce

### 7.2 Section 13(3)(a)(i) appointees

The performance of the different categories of mines was analysed using the information gathered from questionnaires filled out by Section 13(3)(a)(i) appointees and covered the following issues:

- Presence of a dedicated occupational health service facility (clinic) and travel time;
- Number of man-days spent per on mine for OMPs and OHN’;
- Number of full-time / part-time OMPs and OHNs;
- Development of Occupational Risk Exposure Profiles;
- Compilation and review of Codes of Good Practice (COP’s);
- Compilation and reviews of Mandatory Codes of Practice;
- Development and annual review of Standard Operating Procedures to support Mandatory COP’s;
- OMP involvement in health and safety management committees;
- Management of chronic diseases;
- Involvement in health-related investigations;
- Involvement of hazard identification and risk assessment processes;
- Involvement in elimination, control and minimising of health risks;
- Involvement in medical incapacity management programs;
- Involvement in compilation of statutory DMR reporting;
- Involvement in Section 20 appeals;
- Involvement in training programs;
- Involvement in occupational health audits (quality control).

The average number of man-days per OMP per entity were 147.41, 152.54 and 335.52 for the small-, medium and large entities respectively, revealed that the work-load could be described as an “under-utilisation” of the OMPs at small and medium mines and that of “long-working hours” for the OMPs at large mines. **Note this interpretation does not incorporate the once-off activities.**
The results of this limited analysis showed a potential lack of participation of OMP’s in actions / forums crucial to effective and efficient risk assessment and management of employee health and occupational health in especially small and medium mines e.g.

- 25% of small mines not involving OMP’s in compiling or reviewing COP’s;
- 35% of small to medium mines do not involve OMP’s in Health and Safety Committees;
- Only 30-40% of small to medium mines involve OMP’s in health related investigations;
- Only 33% of small to medium mines involve OMP’s in hazard identification and risk assessment.

These results may indicate that the current workload on OMP’s appointed by these small to medium mines is too heavy to allow the individual OMP’s to participate in these important actions. This has to be further investigated by a more comprehensive evaluation of the individual mines.

It is further normal for smaller mines to make use of external clinics to provide occupational health services, because the mines don’t have the financial capacity nor have to perform many medical examinations (surveillances), and this aspect was considered to be within normal standards.

There should be a concern as 92% of small mines only contracted OMPs and OHNs for one day a month while 36% of the service providers must travel more than 60 km to and from the mines where they are delivering services. The implication of this is that service providers will spend 25% of the day travelling and may therefore not be available to do occupational health work for a full work day if they do not stay over close to the mine the night before. If service providers do not stay over the night before, travelling on the day the service is required may have an impact on their ability to provide an efficient service at the mine.

From the information presented it appears that there may be some concerns with the number of man-days / hours available for OMPs and OHNs, especially with small and large mines. The numbers provided suggest that the availability of OMPs and OHNs may be too little to comply adequately with all the occupational health responsibilities of most of these mines.
In terms of the compilation of occupational health risk exposure profiles (OREPs) for each individual employee at the mine, the information presented suggests that there may be some difficulties in developing OREPs for employees, especially with the small mines where it was reported that there were no OREPs available for 35% of employees.

The development of OREPs require the occupational health specialists (OMPs, OHNs and Industrial Hygienists) to do workplace inspections and to consider all exposure profiles of employees involved. The previous concern on the availability of OMPs and OHNs, especially on small mines, may be the main reason for this deviation.

The number of OREP categories that exist indicate however a relatively good performance for different job categories on all mines. On average the small-, medium- and large mines have 6, 23 and 32 OREPs, respectively. However, as indicated previously, there seems to be difficulties on smaller mines to develop individual OREPs.

It is essential for OMPs and OHNs to be involved with compilation and review of all COPs regarding occupational health as these documents regulate the specific protocols. Involvement of OMPs and OHNs in compilation and review of COPs ensures that all OMPs and OHNs are aware of what is required from them as well as the process to be implemented. On average each OMP spends 4.5, 4.7 and 6.7 man-days/year on the compilation and review of COPs. It is of concern that OMPs and OHNs are not involved in these very important aspects on some mines (26% of small mines and 14% of medium mines). This fact may also be an indication of too little availability of OMPs / OHNs to be involved.

All mines seem to have a good focus on Minimum Standards of Fitness and Medical Incapacity management but there seems to be some difficulties with involvement of OMPs and OHNs in all other COPs. OMPs may therefore spent too much time on incapacity management and not for example on quality control and other COPs. Of special concern is the relative low involvement of OMPs and OHNs in COPs for noise exposure, fatigue management and emergency preparedness where 23 – 38% of mines do not involve the OMPs or OHNs; these COP’s are critical for maintaining good health status of employees working on the mines and to effectively manage the risks involved.

There is a great concern with regards to the involvement of an OMP and/or OHN in the development and/or review of standard operating procedures / guidelines to support the
implementation of the mandatory COPs because the Standard operating Procedures (SOPs) under question are viewed as critical documents to ensure effective and efficient implementation of Mandatory Codes of Practice. The OMPs spend annually on average 3.7, 3.0 and 6.7 man-days on the development and/or review of standard operating procedures/guidelines to support the implementation. The results indicate poor involvement of OMPs and OHNs to develop and review SOPs over the whole spectrum of mines with only 38-54% of small and medium mines and 78% of large mines involving OMPs/OHNs in these extremely critical activities.

It is good practice that OMPs/OHNs should be present at all monthly Health and Safety Committee meetings as this is the main forum to share occupational health and safety data and to ensure that all deviations in health and safety programs are dealt with effectively and in a timely manner. The data showed however that there is a deviation from this standard all over the spectrum of mines with small and medium mines performing the worst (65 and 67% involvement only). This should be of great concern and is most probably due to the unavailability of OMPs and OHNs for this purpose because the services are rendered off-site and part-time.

The number of newly diagnosed conditions seems to be acceptable (approx. 300 annually across the different categories). For non-work-related conditions, a rough estimate is that annually OMPs attend to approximately 388, 420 and 741 cases at small-, medium-, and large mines, respectively. This may indicate that OHPs spend more time on non-work-related cases than work-related cases. The ratios also indicate that the bigger the mine the more time is spent on non-work-related cases. However, there is some concern on the numbers attended to by OMPs, especially with 6% of small mines reporting that more than 100 such cases are attended to each month. This can be a reflection of poor development/implementation of occupational health programs to address the prevention/early identification of such conditions. There appears to be a poor involvement of OMPs and OHNs especially with small mines (only 33% involvement) and medium mines (only 40% involvement) in terms of involvement in health-related incident investigations. OHPs are involved in 11, 34 and 63 health-related incident (including excessive exposure and health threatening occurrence) investigations per month at small-, medium- and large mines respectively. This results in each OHP to be involved in 1.0, 2.3 and 1.9 health-related incidents (including excessive exposure and health threatening occurrence) investigations per month. Legislation and international good practise guidelines require that OMPs/OHNs should be involved in all health-related investigations to
identify the cause and to implement corrective actions. Even with large mines only 83% of respondents indicated that OMPs/OHNs are involved in health-related investigations.

It appears that OMPs and OHNs are not utilised optimally over the whole spectrum in terms of hazard identification and risk assessment processes. 33% and 53% of OMPs and OHNs at medium mines indicated that they are not involved on an annual basis. At larger mines 19% and 44% OMPs and OHNs reported respectively not to be involved in hazard identification and risk assessment processes. This should be of great concern as the process of hazard identification and risk assessment forms the basis of any occupational health program. It is expected that more employees will be evaluated by OHNs than OMPs as OHNs are allowed to do routine, uncomplicated, medical surveillance evaluations and therefore these figures are not a matter of great concern at this stage.

There should be great concern on the high percentage of mines not utilising OMPs and/or OHNs in elimination, control and minimising health risks as this is the ultimate goals of an occupational health program. 37% - 41% (Average) of all mines do not involve OMPs and 27 – 88% do not involve OHNs. Although OMPs are involved in the elimination, control and minimising of health risks, the time spend on these activities are alarming. OMPs spend less than 10 min/day on this activity by small- and medium mines. At large mines approximately 32 min/day are spent on this activity. OHNs spend less than 10 min/day on this activity by small- and medium mines. At large mines approximately 46 min/day are spent on this activity. This may be one of the main obstacles to ensure effective and efficient occupational health programs.

The lack of a specific forum to deal with medical incapacity cases with small mines (56% do not have a specific forum) is a concern. Medium mines (23% do not have a specific forum) and large mines (11% do not have a specific forum) are better organised in this field.

Whereas each OMP spends on average 4.8, 5.8 and 18.0 man-days/year on statutory DMR reporting, they spend 0.8, 0.7 and 1.3 man-days/year on annual reports.

Of concern is the lack of involvement of OMPs in the compiling of health incident reports (38% small mines and 33% medium mines do not involve OMPs) and HIV & TB reports (43% small mines and 20% medium mines do not involve OMPs).
The results indicate that OMPs at small mines spend more time on Section 20 medical appeals than at the other mines. Each OMP spends on average 2.3, 1.5 and 1.3 Man-days/year on these appeals at small, medium and large mines respectively.

Large percentages of small (70%) and medium mines (60%) indicated that OMPs were not utilised to run training programs. 76% of small mines and 40% of medium mines also indicated that they also do not utilise OHNs for training purposes. With large mines these figures were 17% and 33% respectively. Each OHP spends approximately 4.0, 7.0 and 13.2 man-days on training at the small-, medium and large mines. It is interesting to note, the larger the mine the more time is spent by the OHP on training. This is of great concern as the quality of training and training material cannot be guaranteed if there is no, or little, involvement of occupational medical personnel.

Small and medium mines show great deviations in terms of average hours per month spent on management committee meetings. Small mines indicated that in 80% of cases no OMPs or OHNs were involved in these committees. There also seems to be a sub-standard performance with large mines with 17% that indicated no involvement of OMPs or OHNs. Each OHP spend on average 4.7, 5.8, 13.6 man-days/year and 3.0, 6.6, and 13.8 man-days on management- and other committee meetings. The same tendency as with training appears; the larger the mine the more time is spent at meetings. This is of concern as this is the forum where the effectivity and efficiency of occupational health and safety programs should be evaluated and discussed.

Sixty-five percent of small mines indicated no involvement of OMPs or OHNs in occupational health audits. Medium and large mines performed better with 27% of medium mines and 17% of large mines indicated that OMPs/ OHNs were not involved in regular occupational health audits.

As occupational health audits are the mainstay of quality control for occupational health programs the large percentage of mines not utilising OMPs or OHNs for audit purposes should be of concern. Each OHP spent approximately 6.8, 10.6 and 12.4 man-days/year at small, medium and large mines respectively on quality control matters.
7.2.1 **Quality check**

Due to the difference in sizes and diversity of the mines surveyed it may be difficult to accurately gather relevant data on the utilisation of the OMP’s. This is especially so taking into consideration that the initial sample of electronic questionnaires was not representative enough to be used as a randomised sample of the 1938 mines and the value of the findings should therefore rather be regarded as an approximate indicator of the current situation in the SAMI.

In general, the response during the telephonic verification was much more positive and painted a more positive picture of the abilities of the existing OMP’s to deal with their responsibilities on the mines; this however is not in agreement with the findings of the DMR of sub-standard performances on some of the mines.

One OMP has admitted to wrong interpretation of the electronic questionnaires, two of the mines appointed new OMP’s that completed the electronic questionnaires and one OMP was very concerned about the effect the information could hold on the mine if the real status quo was to be noted in writing.

Although the information gathered by the 12 mines during the telephonic verification process paints a more positive picture than the original information extracted from the electronic questionnaires, In addition, a physical audit on a representative sample of mines needs to be performed to develop guidelines on the man-days/ hours of OMP’s required for each mine.

7.2.2 **Section 13(3)(a)(i) ratio**

According to ILO findings of Mines in Europe there was 1 full time OMP and 3 full time OHNs per 2000 employees. These ratios mean that for every 100 employees it could be expected that an OMP should be contracted for at least 1 full shift and an OHN for at least 3 full-day shifts per month to do the normal day to day occupational health evaluations at a mine.

When taking into consideration that the OMPs and OHNs should also be involved in routine hazard identification and risk assessment, incident investigations, quality control and Health and Safety management committees, an additional day per month for each of the OMPs and OHNs should be available.
According to the Encyclopedia of workplace health and safety typical guidelines regarding the ratio of OMP's to number of employees vary widely depending on the type of industry or mine:

“Since quantitative needs for occupational health staff vary widely depending on the enterprise in question, the organization model and the services provided by the occupational health service, as well as on the availability of support and parallel services, it is not possible to be categorical about the numerical size of the staff (Rantanen 1990; Rantanen, Lehtinen and Mikheev 1994). For example, 3,000 workers in one large enterprise require a smaller staff than would be needed to provide a similar range of services for 300 workplaces with 10 employees each. It has been noted, however, that at present in Europe, the usual proportion is one physician and two nurses to serve from 2,000 to 3,000 workers. The variation is wide, ranging from 1 per 500 to 1 per 5,000. In some countries, decisions on the staffing of the occupational health service is made by the employer on the basis of the kinds and volume of services provided, whereas in a number of countries the number and composition of occupational health staff are stipulated by legislation. For example, recent legislation in the Netherlands requires that the occupational health team must consist at least of a physician, a hygienist, a safety engineer and an expert in labour/organisation relations (Ministerial Order on the Certification of SHW Services and Expertise Requirements for SHW Services 1993).”

However, when getting to smaller mines a huge factor will be the distance to travel and such distance has to be factored into the calculation for each individual mine and the more accurate formula could be to factor in the availability (in OMP-hours) taking into consideration an OMP : employee ratio of 1: 1000 – 1500 and add to that the time allowed for travel to and from the mine.

According to ILO findings of Mines in Europe there was 1 full time OMP and 3 full time OHN’s per 2000 employees. These ratios means that for every 100 employees it could be expected that an OMP should be contracted for at least 1 full shift and an OHN for at least 3 full-day shifts per month in order to do the normal day to day occupational health evaluations at a mine.

It needs to be noted that specific requirements from the mine may however have an impact on the number of Sec 13(3)(a)(i) appointees per number of employees. For instance, if risk
based medical surveillance is performed, less time is required if employees are exposed to stressors that influence two organ systems compared to a mine where employees are exposed to stressors that may have an impact on multiple organ systems.

It is recommended that one part-time Sec 13(3)(a)(i) be appointment for a mine of a size of 100 employees or more and that this number is increased with one additional part-time appointment considering the volume, size and physical location of the mine; the health and safety record of the mine; the number of designated working places and distances between mines to be serviced.

This principle should be discussed in an appropriate forum and a practical decision to be taken which could work for the South African environment.

8 CONCLUSIONS

The total number of Section 12(1) in SAMI could not be established due to the fact that a data base does not exist of full-time and part-time Section 12(1) appointees in spite of the fact that reporting of a Section 12(1) appointments is a legal requirement. According to the 78 Section 12(1) appointees who completed the questionnaire, 49 was appointed on a full-time and 29 on a part-time basis.

The total number of Section 13(3)(a)(i) in SAMI could not be established due to the fact that a data base does not exist of full-time and part-time Section 13(3)(a)(i) appointees in spite of the fact that reporting of a Section 13(3)(a)(i) appointments is a legal requirement. According to the 50 Section 13(3)(a)(i) appointees that completed the questionnaire, 13 was appointed on a full-time and 37 on a part-time basis.

The impact on over extending of the Section 12(1) appointees at medium mines was as follows:

- An underutilisation of OHPs at small- and large mines. This means that the standard of work at small and large mines is probably not at the same standard as for medium mines.
- Occupational hygiene sampling is done over shorter periods than what is legally required which may have possible litigation consequences. The shorter sampling
periods may further be a result of the distances some of the OHPs need to travel to render services at the mines.

- Administrative functions and legal requirements are performed to the detriment of the monitoring function and the quality control. The latter functions could lead to an underestimation of exposure, more severe litigation and even that the Section 12(1) appointees could be held accountable in their personal capacity.
- Commitment of fraud as the results of previous surveys are used for reporting purposes.

The impact on over extending of the Section 13(3)(a)(i) appointees in the SAMI mines was as follows:

- Increased probability of miss diagnosis and underreporting of occupational diseases, misrepresentation of information and capturing of unreliable data
- Substandard medical care due to limited time available to engage with employees during screening
- Employees’ not being compensated or a delay in the compensation and or incapacity process because quality control is not being done or sub-standard
- Health risks of employees and other employees may increase due to miss diagnosis of certain chronic medical conditions.

9 RECOMMENDATIONS

Based on the outcome of the survey it is recommended that for:

- Section 12(1) appointees
  - The looming manpower shortage of Ventilation Officers/ Occupational Hygiene Technologists and specifically Observers/Occupational Hygiene Assistants, nationally is urgently addressed.
  - The ratio of 1:5:25 for Ventilation Officers/Occupational Hygiene Technologists to Observers/Occupational Hygiene Assistants is proposed for OHPs
  - It is recommended that one full-time Sec 12(1) be appointment for a mine of a size of 250 employees and more and that this number is increased with one additional professional full-time appointment i.e., Ventilation Officers/Occupational Hygiene Technologists considering:
    - the volume, size and physical location of the mine
The health and safety record of the mine;
the number of designated working places and
distances between mines to be serviced.

- The MHSC develops prescribed maximum criteria for the number of mines Section 12(1) appointees may provide services to.

- Section 13(3)(a)(i).

  o The distances OMPs travel to mines, specifically smaller mines of OMPs and the impact thereof on the OMP:employee ratio and service delivery should be discussed in an appropriate forum and a practical decision taken which could work for the South African environment.
  
  o For every 100 employees at least one part-time OMP should be contracted for 1 full shift and one OHN for 3 full-day shifts per month. It is further recommended that the number is increased with one additional part-time Sec 13(3)(a)(i) appointment considering the volume, size and physical location of the mine; the health and safety record of the mine; the number of designated working places and distances between mines to be serviced.
  
  o The number of employees to be serviced by an appointed Sec 13(3)(a)(i) should be discussed in an appropriate forum and a practical decision taken which could work for the South African environment.
  
  o The DMR have to perform compliance monitoring to ensure compliance to recommended guidelines.

Based on the outcome of the questionnaire survey amendments to legislation as depicted in ADDENDUM B need to be considered.

9 LIMITATIONS

The following limitations of the research were identified:

- Percentage full-time and part-time appointments (Section 12(1) and Section 13(3)(a)(i)) for the SAMI could not be reported because a complete list of appointees could not be obtained from any of the professional registration bodies. Percentages expressed is therefore in terms of total number of questionnaires returned and not for the SAMI.
• The outcome of questionnaire was on surface and underground operations only. Section 12(1) and Section 13(3)(a)(i). of smelters and refineries did not complete questionnaires.

• Non-legislated activities were not included in the questionnaires and are also not reported. Such responsibilities may overstretch appointees further as already indicated by the current investigation.

• Appointees involved at more than one operation completed one questionnaire and indicated the mine code of only one mine. This may cause information bias because it is not clear if information provided reflects responsibilities of the specific mine or an average of the mines serviced by the appointee.

• The spread of number of mines serviced by a single consultancy could not be established because Section 12(1) and Section 13(3)(a)(i) appointees did not indicate all the mine codes they are responsible for.

• During the telephonic verification, one OMP admitted incorrect interpretation of some of the electronic questions.

• During the telephonic verification process an OMP expressed concern that if the real status quo was reported, it could adversely affect the mine, which confirms possible information bias.

• All concerns and challenges might not be reflected by the outcome of the online questionnaire. Round table discussions with appointees up to saturation could have generate more insight and understanding in terms of concerns and challenges.

• The outcome of this investigation only provides broad guidance in terms of man-days/hours of specific appointees.
10 REFERENCES

DEPARTMENT OF LABOUR. 2012. Requirements for approval as an Approved Inspection Authority: Occupational Health and Hygiene. October 2012
INTERNATIONAL LABOUR ORGANISATION. Chapter 16. Occupational Health Services, Encyclopedia of workplace health and safety information from the ILO:
11 ACKNOWLEDGEMENTS

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ADDENDUM A

Mine Manager questionnaire

Section 12(1) questionnaire

Section 13(3)(a)(i) questionnaire

MHSC letter send with questionnaires
ADDENDUM B

Based on the outcome of the questionnaire survey the following amendments to legislation need to be considered:

**For Section 12(1) appointees**

- Training and continued education programmes and or Platforms needs to be developed to increase the number of qualified Ventilation Officers/ Occupational Hygiene Technologists and Observers/Occupational Hygiene Assistants. This needs to be done as a matter of urgency because the current training platform where practical, intermediate and advanced mine ventilation society (MVS) certification can be obtained is going to be discontinued in 2020. The proposed option to continue the aforementioned training through Mining Engineering at the University of the Witwatersrand (Wits) to obtain the MVS qualifications, seems to experience challenges due to the required minimum number of enrolled candidates to present the course. The reason why the minimum number of enrolled candidates is not reached needs to be investigated to find a solution before discontinuing the current MVS certification programme. The shortage in qualified Ventilation Officers/ Occupational Hygiene Technologists and Observers/Occupational Hygiene Assistants is going to increase substantially if a proper bridging phase is not implemented to ensure a smooth transition from the current MVS qualification to the Wits programme.

- A ratio of 5 Ventilation Officers/Occupational Hygiene Technologists to 25 Observers/Occupational Hygiene Assistants per Section 12(1) appointee needs to be used as a guideline. This ratio in terms of supporting staff will enable the Section 12(1) appointee to focus on critical functions and responsibilities required as per legislative appointment. This will further enable the Section 12(1) appointee to perform quality control activities, which have been identified as during the questionnaire survey as poor, to ensure that measured and reported results are an accurate account of the exposure levels employees are exposed to.

- It is recommended that one full-time Sec 12(1) be appointment for a mine of a size of 250 employees and more and that this number is increased with one additional professional full-time appointment i.e., Ventilation Officers/Occupational Hygiene Technologists considering the volume, size and physical location of the mine; the health and safety record of the mine; the number of designated working places and distances between mines to be serviced.
To ensure quality occupational hygiene services to the SAMI, the DMR needs to develop prescribed maximum criteria for the number of mines Section 12(1) appointees may provide services to. In addition to the number of employees appointed at a specific mine also needs to be considered. If agreed number of employees is reached, an additional Section 12(1) appointment needs to be made. This should be discussed in an appropriate forum and a practical decision taken which could work for the South African environment.

The distance Section 12(1) needs to travel to service mines cannot be specified. The distances OHPs travel to mines, specifically to smaller mines and the impact thereof on the OHP:employee ratio and service delivery should be discussed in an appropriate forum and a practical decision taken which could work for the South African environment. As an interim measure, travel time on a daily basis to service mines must not exceed two hours in total. Maximum distance from base or where consultant stay over to visit mine must therefore not exceed 100 km.

SAIOH and MVS need to generate a database of all Section 12(1) appointees. Each Section 12(1) appointee or responsible mine manager needs to submit the letter/s of appointment to the respective professional body they are registered with to enable capturing of information.

The primary responsibility of Section 12(1) appointees must be to perform their legislated functions. A checklist that include all the legislated functions to be performed by Section 12(1) appointee, needs to be developed. The checklist must be signed off by the mine manager when the Section 12(1) appointment is confirmed. The signed off checklist must then be attached to the appointment letter to ensure the Sec 12(1) appointee is aware of all the legislated functions to be performed. This could imply that there will be a Section 12(1) legal appointee and a Section 12(1) technical appointee (without legal responsibilities).

For Section 13(3)(a)(i) appointees

The distances OMPs travel to mines, specifically smaller mines of OMPs and the impact thereof on the OMP:employee ratio and service delivery should be discussed in an appropriate forum and a practical decision taken which could work for the South African environment.

The distance Section 13(3)(a)(i) needs to travel to service mines cannot be specified. The distances OMPs travel to mines, specifically to smaller mines and the impact thereof on the OMP:employee ratio and service delivery should be
discussed in an appropriate forum and a practical decision taken which could work for the South African environment. As an interim measure, travel time on a daily basis to service mines must not exceed two hours in total. Maximum distance from base or where consultant stay over to visit mine must therefore not exceed 100 km.

- For every 100 employees at least one part-time OMP should be contracted for 1 full shift and one OHN for 3 full-day shifts per month. It is further recommended that the number is increased with one additional part-time Sec 13(3)(a)(i) appointment considering the volume, size and physical location of the mine; the health and safety record of the mine; the number of designated working places and distances between mines to be serviced.

- The DMR must develop strict guidelines in terms of the ratio of Section 13(3)(a)(i) appointees to the number of employees to ensure optimum utilisation of manpower. The number of employees to be serviced by an appointed Sec 13(3)(a)(i) should be discussed in an appropriate forum and a practical decision taken which could work for the South African environment.

- The DMR have to perform compliance monitoring to ensure compliance to recommended guidelines.

- SASOM and MMPA need to generate a database of all Section 13(3)(a)(i) appointees. Each Section 13(3)(a)(i) appointee or responsible mine manager needs to submit the letter/s of appointment to the respective professional body they are registered with to enable capturing of information.

- The primary responsibility of Section 13(3)(a)(i) appointees must be to perform their legislated functions. A checklist that include all the legislated functions to be performed by Section 13(3)(a)(i) appointee, needs to be developed. The checklist must be signed off by the mine manager when the Section 13(3)(a)(i) appointment is confirmed. The signed off checklist must then be attached to the appointment letter to ensure the Sec 13(3)(a)(i) appointee is aware of all the legislated functions to be performed. This could imply that there will be a Section 13(3)(a)(i) legal appointee and a Section 13(3)(a)(i) technical appointee (without legal responsibilities).