InDuna
Risk Management
Your Safety, Health and Environmental Compliance Specialists
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Company Profile

The name "InDuna" comes from the isiZulu language meaning *Advisor*.

At InDuna Risk Management, our goal is to be the trusted advisor to our clients with regard to their Safety and Health as well as Environmental Legal compliance requirements.

We are committed to identifying the risks associated with the client's specific operational activities by implementing a Risk Management Programme with key outcomes that mitigates the specific hazards that could adversely affect the client as well as their employees and other affected parties' interests. Thus limiting the legal liabilities that clients may be challenged with in their day-to-day operations.

The InDuna Risk Management Team, through 19 years' experience in the Industrial and Mining sectors of Southern Africa, identified a need from clients for a multipronged approach and guidance under the prescribed legal operating environments of the Occupational Health and Safety Act (OHS Act), Mine Health and Safety Act (MHS Act), National Environmental Management Act (NEM Act), as well as the ISO 14000 Environmental Management and ISO 18000 Occupational Health and Safety Systems, to conduct compliance monitoring with the assistance of one consulting firm looking after the clients' respective needs.

At InDuna Risk Management, we conduct the prescribed compliance monitoring and physical exposure assessments in-house or utilise the services of an industry specialist where certain legal functions have to be performed by a SANAS Accredited Inspection Body to ensure that our clients meet the guidelines set out by the relative pieces of legislation and quality systems applicable to their operation.

We are committed to rendering a quality service at a competitive price.

Vision:

InDuna Risk Management's vision is to be the trusted advisor to our clients, as one of the industry leaders in safety, occupational health and environmental compliance issues. Through the development and implementation of management strategies aimed at limiting the client's exposure to risk, ultimately resulting in the increased productivity and profitability of the organisation.

Mission:

We have a shared vision of promoting safety, health and environmental awareness in an ethical and moral manner to the industries that we serve.
We strive for excellence in everything we do by supporting each member and performing effectively as a team.
We show passion in our pursuit of objectives and clearly communicate our goals so that we can further the client's vision and mission.

Our Safety, Health and Environmental legal compliance monitoring services include:

- **Safety Management Services**
- **Risk Assessments Services**
  - Hazard Identification Health Risk Assessments
  - Baseline Health Risk Assessments
  - Environmental Impact Assessments
- **Occupational Hygiene Monitoring Services** (including DMR Codes of Practices)
  - **Physical Stressors**
    1) Area Noise (Noise Zoning) and Personal Noise Monitoring
    2) Vibration Exposure Monitoring
    3) Thermal Stress (Heat and Cold) Exposure Monitoring
    4) Illuminance Monitoring in the Workplace
    5) Non-Ionising Radiation Monitoring
    6) Ionising Radiation Monitoring
    7) Ergonomics Assessments
    8) Indoor Air Quality Assessments
    9) Local Extraction Ventilation Assessments
    10) Mine Ventilation Management Services
  - **Chemical Stressors**
    1) Hazardous Chemical Substances
    2) Department of Labour Silica Quartz Compliance Monitoring
    3) Mine Health and Safety Act – Occupational Hygiene Monitoring Programme
    4) Mine Health and Safety Act - Engineering Dust Sampling
    5) Asbestos Monitoring
    6) Lead Monitoring
  - **Biological Stressors**
    1) Micro-organisms
    2) Pathogens
    3) Cell Cultures
    4) Human Endoparasites
- **Environmental Monitoring**
  - Ambient Environmental Noise Monitoring
  - Dustfall Monitoring Programme (Fallout Dust Monitoring)
  - Surface and Groundwater Quality Monitoring
  - Stack Emission Monitoring
- **Laboratory Services**
- **Instrumentation**
  - New Instrumentation Sales
  - Service and Calibration

(Note to reader on a digital platform: Further information on each service detailed above can be navigated to with ease by clicking on the service above whenever you see your cursor change from the arrow to a pointing finger. This will automatically take you to the selected service for more detailed information. Simply select the “back” option under each service below to return to this page, or click here to skip this section to the last part of our company profile.)

- Safety Management Services:

In today's demanding business world, high expectations are placed on employers to limit the exposure to hazards that employees may encounter in their working environment. The regulatory obligations that are placed on an employer, requires that a safety management system be implemented to identify and control the exposure to risks.

There are three extremely important reasons for adopting a safety management system for a business – these are ethical, legal and financial.

There is a moral obligation placed on the employer to ensure that the working environment is free from risk, the prescribed legal obligations placed on the employer requires that the risk is reduced and the implementation of an effective safety management system has shown that the financial exposure of the business can be limited due to the reduction in the direct and indirect costs associated with incidents and accidents.

To ensure that the safety management system is effective, the business should define how it will manage the risks through a hazard identification risk assessment process that will identify the controls required to mitigate such risk. The safety management system should include the implementation of measurable objectives that are clearly communicated to all departments to ensure that the non-conformances are addressed and the risks are reduced as far as reasonably practicable. This should include the allocation of sufficient resources (finances, time, training, etc.) to achieve the objectives. The safety management system should be evaluated continually to ensure that progress is made in achieving the objectives and should ultimately become part of the culture of the business and the way people perform their job functions.

The safety management system should be designed to meet the individual requirements of each business and should as a minimum address the following aspects:

a) Policies:
Implement policies that define the occupational health and safety targets and stipulate management's commitment towards the organisational requirements with regard to the resources required to achieve the health and safety objectives.

b) Organisational Structures:
Define how the organisation will be structured by assigning accountable responsibilities and reporting structures.

c) Planning and Implementation:
Determine the requirements of the legislation and standards that are applicable to the organisation. Define the occupational health and safety objectives and implement programmes that will prevent, reduce, review and manage the risk.

d) Evaluation:
Determine how the occupational health and safety objectives of the organisation will be assessed and how progress will be measured. Adopting processes that will facilitate the reporting and investigation of incidents and accidents and what internal and external audit processes should be implemented to review the safety management system.

e) Action for Improvement:
What are the preventative and corrective actions implemented to manage the risks and what processes are implemented to facilitate continual improvement of the safety management system.

It is important to note that the effectiveness of a safety management system is directly connected to the continual support and commitment received from management to ensure that the health and safety culture is driven from the top structures of the organisation and that the personal health and safety as well as the operational safety of the business is addressed, thereby reducing the legal liability that the top structure of the organisation is exposed to.

InDuna Risk Management assists clients by implementing a safety management system in the working environment and recommends the best system of control to mitigate the risks identified.

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- Risk Assessment Services:

Risk Assessments are the foundation of any Risk Management Programme.

It is aimed at identifying the Safety, Health and Environmental hazards that clients and their employees are exposed to in the working environment and awarding each hazard its own risk ranking based on an industry accepted Risk Matrix that identifies the severity and probability of each hazard, also taking into account the safety, health, environmental and financial impact and legal liability that such hazards might pose to the client, its employees and other affected parties.

A risk assessment is the starting point for any operation to determine the extent of its' liabilities as prescribed under Section 5 of the Hazardous Chemical Substances Regulations, Section 6 of the Hazardous Biological Agents Regulations and Section 8 of the Occupational Health and Safety Act or Section 11 of the Mine Health and Safety Act and Chapter 1.4(b; i) and Chapter 7.28(1; 3) of the National Environmental Management Act or all of these combined.

There are three pillars that support a Risk Management Programme:

a) Hazard Identification Risk Assessment (HIRA):

The Hazard Identification Risk Assessment is a process of identifying the safety hazards (moving machinery, working at heights, stacking, confined spaces, lifting equipment, welding, etc.) in the working environment and which employees are exposed to those safety hazards and what their raw risk profile is when taking into account the probability and severity of exposure to the safety hazard. Current control measures implemented to reduce the raw risk profile is taken into account and weighed up to determine the residual risk ranking and additional control measures that are required to mitigate exposure to the safety hazards.
The HIRA should be recorded and reviewed on a regular basis or whenever there is a change in the process, procedures or when an incident or accident occurs.

InDuna Risk Management assists clients by conducting the Hazard Identification Risk Assessment and recommends the best system of control to mitigate the risks identified.

b) Baseline Health Risk Assessment (BHRA):

The Baseline Health Risk Assessment is a process of identifying the health hazards (physical stressors, chemical stressors, biological stressors, etc.) in the working environment and which employees are exposed as well as the frequency of exposure to those health hazards and what their raw risk profile is when taking into account the probability and severity of exposure to the health hazard. Current control measures implemented to reduce the raw risk profile is taken into account and weighed up to determine the residual risk ranking and additional control measures that are required to mitigate exposure to the health hazards.
The BHRA should be recorded and reviewed on a regular basis or whenever there is a change in the product, process, procedures or when a health related incident or accident occurs.

InDuna Risk Management assists clients by conducting the Baseline Health Risk Assessment for the Mining Sector and facilitating it for the Industrial Sector and recommends the best system of control to mitigate the risks identified.

c) Environmental Impact Assessment (EIA):

The Environmental Impact Assessment is a process of identifying the environmental hazards (effluents, emissions, waste, noise, development, mining, etc.) in the operational area and the impact that such hazards could have on the environment and what their raw risk profile is when taking into account the probability and severity of potential impact of the environmental hazards. Current control measures implemented to reduce the raw risk profile is taken into account and weighed up to determine the residual risk ranking and additional control measures that is required to mitigate the impact of the environmental hazards.
The EIA should be recorded and reviewed on a regular basis or whenever there is a change in the process, procedures or when a health related incident or accident occurs.

InDuna Risk Management assists clients by facilitating the Environmental Noise Assessments and Stack Emission Monitoring and by conducting the Dustfall Monitoring and Surface and Groundwater Quality Monitoring for the Environmental Impact Assessment and recommends the best system of control to mitigate the risks identified.

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- Occupational Hygiene Monitoring Services:

An Occupational Hygiene Monitoring Programme is the outcome of a Baseline Health Risk Assessment and is implemented to monitor all the Physical (Noise, Vibration, Thermal, Illumination, , Non-Ionising Radiation, Ionising Radiation, Ergonomics, Indoor Air Quality, Local Extraction Ventilation and Mine Ventilation), Chemical (Hazardous Chemical Substances, Silica Quartz, Lead, Asbestos) and Biological (Micro-organisms, Pathogens, Cell Cultures, Human Endoparasites) Stressors that employees may be exposed to during a normal shift in their working environment that may adversely affect their health.

The Occupational Hygiene Monitoring Programme is a legal requirement under Sections 5 and 6 of the Hazardous Chemical Substances Regulations and Section 7 of the Hazardous Biological Agents Regulations as contained in the Occupational Health and Safety Act as well as Section 12 of the Mine Health and Safety Act.

The frequency of monitoring is determined by guidelines issued by the Department of Labour, the Department of Mineral Resources and the regulations contained in the respective Health and Safety Acts applicable to each operating environment as well as Industry Best Practice Guidelines, Risk Assessments and Codes of Practices.

InDuna Risk Management is equipped to supply all the required monitoring instrumentation (sound level meters, noise dosimeters, dust sampling pumps, lux meters, etc.), sampling media (pre-packed filter cassettes, silica gel, charcoal tubes, etc.), associated laboratory and analytical services and management structures to compile and submit the prescribed legal reporting formats (DoL and DMR), as well as the compilation of Codes of Practice's, Procedures and Standards to enable the client to make informed decisions and implement effective control strategies to mitigate the risk associated with exposures to all Physical, Chemical and Biological Stressors in the working environment.

InDuna Risk Management drafts Codes of Practices on the following topics:

- Mandatory Code of Practice for an Occupational Health Programme on Personal exposure to Airborne Pollutants.
- Mandatory Code of Practice for an Occupational Health Programme (Occupational Hygiene and Medical Surveillance) on Noise
- Mandatory Code of Practice for an Occupational Health Programme on Thermal Stress
- Mandatory Code of Practice for a Lamproom
- Mandatory Code of Practice for the Prevention of Flammable Gas Explosions in Mines other than Coal Mines
- Mandatory Code of Practice for Emergency Preparedness and Response

The Occupational Hygiene Monitoring Services include:

- **Physical Stressors**

1) **Area Noise (Noise Zoning) and Personal Noise Monitoring**

The Occupational Health and Safety Act as well as the Mine Health and Safety Act requires that the exposure levels of employees to noise in their working environment be determined and reported on should the exposure levels exceed the prescribed noise rating limits and that mitigating measures be implemented to reduce such high noise levels.

<u>Occupational Health and Safety Act:</u>

Under the guidelines of the Noise Induced Hearing Loss (NIHL) Regulations set out in the Occupational Health and Safety Act, the employer is required to implement a Hearing Conservation Programme (HCP) in the working environment to prevent any noise exposures at or above the 85 dBA noise rating limit.

This would require the employer to conduct noise assessments that conform to the guidelines of the Noise Induced Hearing Loss Regulations as well as SANS 10083:2012 – The Measurement and Assessment of Occupational Noise for Hearing Conservation Purposes so as to identify and demarcate noise zones at intervals not exceeding two (2) years and include the monitoring of personal noise exposures .

The Hearing Conservation Programme is aimed at the prevention of hearing loss and involves the implementation of the following measures:

a) Assessment and prediction of noise exposures in the workplace (new and existing),
b) The reduction of the 8 hour exposure rating level where it is expected to exceed the noise rating limit,
c) Prohibiting persons to enter a workplace where the noise rating limit is exceeded unless such a person is adequately protected,
d) The introduction of a Medical Surveillance Programme for all employees working in such an area,
e) The introduction of a follow-up assessment programme to determine the actual exposure levels of workplaces that fall under point (a) and (b) above.

The Hearing Conservation Programme is also subject to review when one of the following points apply:

a) The implementation timeframe exceeds two (2) years,
b) There are reasons to believe that the previous risk assessment is no longer valid,
c) There are reasons to believe that the control measures implemented are no longer effective,
d) Technological or scientific advances allow for more effective control measures to be implemented,
e) There has been a significant change in:
    1. The workplace methods used,
    2. The type of work carried out,
    3. The type of equipment used to control exposures,
    4. The type of machinery, plant and equipment used in the initial process.

<u>Mine Health and Safety Act:</u>

At the Mine Health and Safety Summit of 2003, the tripartite stakeholders in mining agreed to targets and milestones, which are aimed at addressing the major health and safety concerns of the sector. The milestones are considered to be intermediate steps to achieving targets of zero fatalities and injuries, silicosis elimination and the elimination of noise-induced hearing loss.

Elimination of Noise-Induced Hearing Loss:

a) The present noise exposure limit stated in the Mine Health and Safety Act, 1996 (Act 29 of 1996) Regulations is no more than 85dB $L_{Aeq,8h}$.
b) After December 2008, the hearing conservation programme implemented by the industry must ensure that there is no deterioration in hearing greater than 10% amongst occupationally exposed individuals.
c) By December 2013, the total noise emitted by all equipment installed in any workplace must not exceed a sound pressure level of 110 dBA at any location in that workplace (including individual pieces of equipment).

The Mine Health and Safety Act requires that the employer establishes and maintains a system of occupational hygiene measurements, as stipulated in Section

12 (Occupational Hygiene Monitoring), of all working places where the noise rating is at or above 82dB $L_{Aeq,8h}$.
As indicated earlier, the employer under the Occupational Health and Safety Act is responsible for implementing a Hearing Conservation Programme. The employer under the requirements of the Mine Health and Safety Act, should implement an Occupational Health Programme on Hearing Conservation and has a requirement for conducting Personal Noise Exposure Monitoring and report back on the findings on a quarterly basis to the Department of Mineral Resources on Personal Noise Exposure - Report Form 21.9(2) (e).

The Occupational Health Programme on Hearing Conservation is drawn up in accordance with the guidelines of the South African Mines Occupational Hygiene Programme (SAMOHP) Codebook. Personal exposure monitoring is conducted in accordance with section 8.3.3 for Personal Noise Dosimetry (Annex D of SANS 10083:2012 – The Measurement and Assessment of Occupational Noise for Hearing Conservation Purposes), and continuous monthly monitoring is conducted to determine the exposure levels of employees in their respective Homogeneous Exposure Groups (HEG) and allocated a classification band in accordance with the SAMOHP Classification Band and Action Requirements Table for Noise.

If use of the above references are unable to clearly determine HEGs then an acceptable international methodology such as NIOSH Occupational Exposure Sampling Strategy Manual (OESSM) or the British Standard BS EN 689:1996 may be utilised.

Any exposures at or above 85 dB $L_{Aeq,8h}$, and/or Peak Sound Level > 135 dBA requires the employer to implement a formal Hearing Conservation Programme as described above.

It is important to note that these requirements under the OHS and MHS Acts are applicable to fixed as well as mobile working places.

InDuna Risk Management assists clients by facilitating noise assessments in the working environment and recommends the best system of control to mitigate the risks identified.

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2) Vibration Exposure Monitoring

Human vibration is the assessment of vibration present in the working environment and how the human body is affected by vibrating tools, equipment, working stations and vehicles. Hand tools, machinery and heavy vehicles are all sources of vibration. The risk of exposure is determined by the intensity, frequency and time of exposure and the impact that vibration has on the human body causes various symptoms and disorders.

Human Vibration can be divided into two subcategories:

a) Whole Body Vibration (WBV) risks are encountered in the construction, agriculture, forestry, mining and transportation sectors and is a source of various

symptoms like back problems, discomfort, visual and nervous system disorders, motion sickness and disorders of the reproductive and digestive systems.

b) Hand Arm Vibration (HAV) risks are encountered in the mining, iron and steel, construction, fabrication and forestry sectors and is a source of various symptoms like muscular, vascular, joint, neurological and bone disorders.

One of the most serious HAV disorders is called white finger syndrome (Reynaud's Syndrome) caused by working in cold environments with vibrating hand tools. The vibrating hand tools causes vasoconstriction to the extremities and due to the loss in blood flow to these areas, the affected parts suffers irreversible damage and in extreme cases, the sufferer may lose his fingers. The effects are cumulative. When symptoms first appear, they may disappear after a short time. If exposure to vibration continues over months or years, the symptoms can worsen and become permanent.

InDuna Risk Management assists clients by facilitating vibration assessments in the working environment and recommends the best system of control to mitigate the risks identified.

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3) Thermal Stress (Heat and Cold) Exposure Monitoring

Thermal conditions in Southern Africa is of such a nature that heatstroke and heat stress is the biggest concern and can be classified as a substantial risk to the health and safety of employees in their working environment. Cold stress conditions are limited to mechanical environments (cold rooms, freezer rooms, etc.) and in areas where the winter temperatures regularly fall below zero.
The monitoring of thermal stressors in the working environment is prescribed in Section 2 of the Environmental Regulations for Workplaces as contained in the Occupational Health and Safety Act, and prescribes that no employer shall require or permit an employee to work in thermal conditions (heat and cold) that exceeds the allowable exposure limits without implementing reasonable measures to protect such employee against thermal extremes and takes all precautions necessary for the safety of such an employee.

Regulation 9.2 of the Mine Health and Safety Act requires that the employer establishes and maintains a system of occupational hygiene measurements where the prescribed exposure limits are exceeded for thermal stressors (heat and cold).

InDuna Risk Management assists clients by facilitating thermal stress assessments in the working environment and recommends the best system of control to mitigate the risks identified.

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4) Illuminance Monitoring in the Workplace

Artificial lighting sources have become a major source of luminance in today's working environment where the majority of workspaces are on the inside of

buildings (factories, offices, operating theatres, etc.) and the utilisation of natural illuminance as the main source of light is limited.

Although architects these days realise the importance of applying green building designs due to the high cost of electricity and the current social expectations from the general public to reduce the use of light sources that have a high energy consumption, there are certain legal requirements that the employer must comply to when making use of artificial light sources as the main source of illuminance as well as emergency lighting for evacuation purposes.

Section 3 of the Environmental Regulations for Workplaces as contained in the Occupational Health and Safety Act, and the table of illuminance values, stipulates the minimum average illuminance levels that should be maintained in the working environment.

Regulation 9.2.9 of the Mine Health and Safety Act stipulates that the employer is responsible for maintaining sufficient illumination levels in the working environment. Although Regulation 9.2.9 does not stipulate the required illumination levels that must be maintained in the working environment, the table of illuminance values contained in the Occupational Health and Safety Act is adopted as an industry best practice guideline for compliance.

InDuna Risk Management assists clients by facilitating illumination assessments in the working environment and recommends the best system of control to mitigate the risks identified.

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5) Non-Ionising Radiation Monitoring

Non-Ionising Radiation (NIR) describes two areas of the electromagnetic spectrum, the first is optical radiation (ultraviolet, visible and infrared) followed by electromagnetic fields (EMF's: power frequencies, microwaves and radio frequencies). NIR is found in various working environments and can have adverse health effects on employees being exposed to welding, heating, cutting, lasers and wireless communication sources.

The health risks associated with exposure to NIR includes skin burns, cataracts, melanoma, central nervous system, deep organ and tissue heating and damage. It is common knowledge that exposure to EMF can result in an increase in adverse health effects, but it must be noted that these cases are not wide spread and should not be a problem to the general workforce.

Non-Ionising Radiation is covered under the Hazardous Substances Act (HSA, No.15 of 1973) and the Department of Health Directorate: Non-Ionising Radiation and Electromedical Devices, is responsible for overseeing and regulating all NIR sources.

Assessing the risk of exposures to NIR is covered under the general duties of an employer to assess risk in the working environment as prescribed under the Occupational Health and Safety Act as well as the Mine Health and Safety Act and guidance is given under Directive 2006/25/EC Optical Radiation Directive for the

minimum health and safety requirements regarding the exposure of workers to the risk arising from physical agents (artificial optical radiation).

InDuna Risk Management assists clients by facilitating non-ionising radiation assessments in the working environment and recommends the best system of control to mitigate the risks identified.

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6) Ionising Radiation Monitoring

Ionising Radiation means radiation that can pass through matter and cause it to become electrically charged (ionised). Ions produced by radiation can negatively impact the living cells in the human body. Ionisation is a sign of radiation produced when radioactive elements decay. Due to its intensity it can remove the electrons from atoms in matter and therein lies the risk to human health.

Ionizing Radiation is in general harmful to human health and potentially lethal to living organisms but does have some health benefits through radiation therapy for the treatment of cancer. The main benefit to human health, of ionising radiation, is in the treatment of cancerous growths through radiation therapy that can stop the growth of tumours. Controlled doses are used for medical imaging and radiotherapy but prolonged or repeated exposure to ionising radiation can result in adverse health effects.

High amounts of ionising radiation exposure can result in genetic defects, cancers or tumours and even death.

In the South African mining industry, ionising radiation is covered under the Nuclear Energy Act of 1999. In the past it required all mines producing or mining uranium as a by-product, and later all gold mines to obtain a Certificate of Registration. Today this requirement extends to all mines and places the responsibility on them for nuclear regulatory control and the National Nuclear Regulator enforces compliance under the National Nuclear Regulations Act (NNRA No. 47 of 1999) and the Mine Health and Safety Act. The Mine Health and Safety Act prescribes the monitoring requirements to ensure that no person is exposed to ionising radiation as a result from mining activities.

Low levels of uranium is contained in the mineral deposits mined by some mines and the National Nuclear Regulator monitors and inspect the performance standards, conditions and procedures related to the processing of ore and tailing deposits at tailings dams to ensure that no exposure is present.

Ionising Radiation and Radioactive Nuclides are covered under the Hazardous Substances Act (HSA, No.15 of 1973) and the Department of Health Directorate: Radiation Control is responsible for overseeing and regulating ionising radiation exposures. Assessing the risk of exposures to ionising radiation is covered under the general duties of an employer to assess risk in the working environment as prescribed under the Occupational Health and Safety Act and should be incorporated into an Occupational Hygiene Monitoring Programme.

InDuna Risk Management assists clients by facilitating ionising radiation assessments in the working environment and recommends the best system of control to mitigate the risks identified.

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7) Ergonomics Assessment

Ergonomics plays an integral part in today's working environment and the interaction of employees with their working environment. Employees have to overcome the compatibility challenges faced by design, implementation or integration of work positions and environments that have a negative impact on their health and safety.

Various pieces of legislation makes reference to ergonomic standards and requirements, Section 8 of the Facilities Regulations, as contained in the Occupational Health and Safety Act, makes limited provision for the assessment of ergonomics in the working environment by referring to seating. Section 7.6 of the Construction Regulations, as contained in the Occupational Health and Safety Act, requires that ergonomic related hazards must be identified. Circular Instruction 180 as contained in the Compensation for Occupational Injuries and Diseases Act makes reference to Work Related Upper Limb Disorders and Section 22.1 of the Mine Health and Safety Act refers to the requirements placed on any person that designs, manufactures, erects or installs any article on a mine to take ergonomic principals into consideration.

InDuna Risk Management assists clients by facilitating ergonomic assessments in the working environment and recommends the best system of control to mitigate the risks identified.

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8) Indoor Air Quality Assessment

Indoor Air Quality (IAQ) refers to the air quality within a working environment and focuses primarily on the office environment. Indoor Air Quality (Sick Building Syndrome) can be affected by numerous physical stressors (lighting, noise, thermal discomfort, etc.), chemical stressors (gases: carbon monoxide, carbon dioxide, ozone, volatile organic compounds and dust particulates: asbestos) and biological stressors and includes the monitoring of microbial contaminants (mould, bacteria, etc.).

Central ventilation systems are mainly used in the indoor office environment to provide fresh air and remove, through filtration and dilution, any contaminated air within the working environment.

Section 5 of the Environmental Regulations for Workplaces as contained in the Occupational Health and Safety Act stipulates the requirements pertaining to the Indoor Air Quality in the working environment.

InDuna Risk Management assists clients by facilitating indoor air quality assessments in the working environment and recommends the best system of control to mitigate the risks identified.

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9) Local Extraction Ventilation Assessment

Local extraction ventilation systems (dust extraction plants, fume cupboards, etc.) are one of the main engineering control measures that is implemented to remove contaminants from the working area.

Section 9.g of the Hazardous Chemical Substances Regulations, as contained in the Occupational Health and Safety Act, requires that investigations and tests are carried out on the local extraction ventilation systems as per Section 12 of the same act, to determine that all control measures and facilities are in good working order, these records should be kept for a minimum of three (3) years.

InDuna Risk Management assists clients by facilitating local extraction ventilation assessments in the working environment and recommends the best system of control to mitigate the risks identified.

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10) Mine Ventilation

Ventilation plays an integral part in the supply of fresh air to a working environment. Ventilation in the working environment is discussed under the sections for Indoor Air Quality and Local Extraction Ventilation and in this section the primary focus will be on Mine Ventilation Systems.

The mining environment poses unique challenges to the health and safety of workers and underground ventilation plays an integral part in the control of these hazards. Underground mine ventilation supplies a constant flow of air through the mine and is utilised to provide fresh air for breathing purposes, but also for the dilution and removal of dust, diesel exhaust fumes, ionising radiation, gases and heat that is created during the underground mining activities.

InDuna Risk Management is capable of planning, implementing and managing the underground ventilation requirements of the mine ventilation systems.

Planning of the underground ventilation system requires that the short-term and long-term planning phases take into consideration the mine design and mining methods to ensure that the underground working environment is free from risk to employees and that the future ventilation requirements for any developments can be accommodated, thereby reducing the risk that production increases can be hampered due to the lack of sufficient underground ventilation supply.

The implementation of the ventilation design is facilitated through a hands-on approach with active participation from the ventilation specialist in the day-to-day

development of the mine by providing guidance to the development team in matters related to the ventilation requirements of the project.

Once the planning and implementation phases of the project has reached completion, the day-to-day management of the ventilation system is maintained by a team of on-site ventilation specialists that monitor the underground mining conditions through regular assessments and by introducing changes in the underground ventilation system based on additional planning to ensure optimal utilisation of the available ventilated air, and ultimately implementing expansions based on the long-term planning requirements identified during the initial phase of the mining project.

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- **Chemical Stressors**

1) Hazardous Chemical Substances Monitoring

The Occupational Health and Safety Act as well as the Mine Health and Safety Act requires that the Hazardous Chemical Substances (HCS) exposure levels of employees in their working environment be determined and reported on, should the exposure levels exceed the prescribed Occupational Exposure Limits (OEL), mitigating measures must be implemented to reduce exposures to hazardous chemical substances that exceed the prescribed OEL.

Under the guidelines of the Hazardous Chemical Substances Regulations set out in the Occupational Health and Safety Act, the employer is required to determine:

a) The HCS to which an employee may be exposed to,
b) What effects the HCS can have on an employee,
c) Where the HCS may be present and in what physical form it is likely to be,
d) The route of intake by which and the extent to which an employee can be exposed,
e) The nature of work, process and any reasonable deterioration in, or failure of, any control measures.

Once this information is obtained, together with the information gathered in the Baseline Health Risk Assessment process, a monitoring programme can be implemented to determine the extent of the exposure to HCS's in the workplace.

The monitoring programme should meet the requirements of the Hazardous Chemical Substances Regulations and the guidelines prescribed in the Guidance Note EH 42 of the Health and Safety Executive of the United Kingdom (Monitoring Strategies for Toxic Substances 1989 HSE ISBN 0 11885412 7) and the NIOSH OESSM document, whereby representative measurements should be carried out at least every twelve (12) months for HCS with a Control Limit (CL) and at least every twenty-four (24) months for a HCS with a Recommended Limit (RL).

The HCS exposure levels obtained during the monitoring programme should be compared to the OEL as prescribed in the Hazardous Chemical Substances Regulations contained in the Occupational Health and Safety Act, Table 1 for HCS with a Control Limit and Table 2 for HCS with a Recommended Limit.

It is important to note that any HCS listed in Table 1 can be classified as a suspected carcinogen to human health and exposure to these HCS's should be taken seriously. Exposure levels should be reduced to the absolute minimum.

Hazardous Chemical Substances listed in Table 1 and 2 are given Occupational Exposure Limits based on the inhalable/respirable particulate of such a HCS. Hazardous Chemical Substances in Table 3 are given Biological Exposure Indices (BEI) based on the absorption of such a HCS into the human body that converts to a specific metabolite and exposure can be monitored through obtaining a blood, urine or exhaled air sample to determine the extent of the employee's exposure to a specific HCS.

In some instances the Occupational Hygiene Monitoring Programme will include not only the monitoring of exposures to the hazardous chemical substances and comparing the results to the OEL's in Table 1 and 2, but also include the comparison of the results from biological samples to the BEI's in Table 3 to complement the monitoring programme.

InDuna Risk Management assists clients by conducting the hazardous chemical substance monitoring for the mining sector and facilitating it for the industrial sector and recommends the best system of control to mitigate the risks identified.

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2) DoL Silica Quartz Compliance Monitoring

On the 27th June 2008, Mr Membathisi Mphumzi Shepherd Mdladlana, Minister of Labour, published a Government Notice No. R.683, amending the Occupational Exposure Control Limit for Silica in Table 1 of the Hazardous Chemical Substances Regulations from 0,4mg/m³ to 0,1mg/m³.

This notice requires all industries handling, manufacturing and producing Silica dust to submit annual reports to the Department of Labour (DoL) starting from 1 January 2009 indicating the following:

a) The number of samples taken and analysed,
b) The chemical composition of the dust,
c) The concentrations of the constituents,
d) Whether compliance is achieved with the new Occupational Exposure Limit for Silica, if not complying, what steps are implemented to comply with the exposure limit within six months from the date of the notice being gazetted.

As Silica Quartz is classified as a Table 1 HCS, an Occupational Hygiene Monitoring Programme requires that the employer conducts exposure monitoring every 12 months. The above Department of Labour directive supersedes the requirements of the Hazardous Chemical Substances Regulations and requires the employer to now compile an exposure monitoring programme that meets the NIOSH OEESM guidelines and conducts continuous exposure monitoring throughout the twelve (12) month period. The directive also requires that the employer reports the results of the monitoring programme to their office on an annual basis as per the Silica Exposure Compliance Tool document.

InDuna Risk Management assists clients by facilitating the DOL Silica Quartz monitoring and recommends the best system of control to mitigate the risks identified.

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3) Mine Health and Safety Act – Occupational Hygiene Monitoring Programme

At the Mine Health and Safety Summit of 2003, the tripartite stakeholders in mining agreed to targets and milestones, which are aimed at addressing the major health and safety concerns of the sector. The milestones are considered to be intermediate steps to achieving targets of zero fatalities and injuries, silicosis elimination and the elimination of noise-induced hearing loss.

Elimination of Silicosis:

a) By December 2008, 95% of all exposure measurement results will be below the occupational exposure limit for respirable crystalline silica of 0.1mg/m3 (these results are individual readings and not average results).
b) After December 2013, using present diagnostic techniques, no new cases of silicosis will occur among previously unexposed individuals. Previously unexposed individuals are individuals unexposed prior to 2008, that is, equivalent to a new person entering the industry in 2008.

The Department of Mineral Resources' (DMR) Directorate: Occupational Hygiene issued the South African Mines Occupational Hygiene Programme (SAMOHP) Codebook to give guidance to the employer with regard to establishing an Occupational Hygiene Monitoring Programme.

The Occupational Hygiene sub-committee was mandated by the Mine Health and Safety Council to develop an Occupational Hygiene Database to record exposures to significant occupational hazards in the South African Mining Industry.

Furthermore, Regulation 9.2(2) of the occupational hygiene regulations in conjunction with Section 12 of the Mine Health and Safety Act requires the employer to establish, maintain, and record the system of occupational measurements.

Under Regulation 9.2(2), the employer must establish and maintain a system of occupational hygiene measurements, as stipulated in Section 12, of all working places where the following hazard limits prevail:

a) Airborne Pollutants:
   - Particulates > 1/10 of the occupational exposure limit;
   - Gases and vapours > 1/2 of the occupational exposure limit;
b) Thermal Stress:
   - Heat >25,0°C wet bulb and/or >32,0°C dry bulb and/or >32,0°C mean radiant temperature;
   - Cold <10°C equivalent chill temperature; and
c) Noise:
   - >82dB $L_{Aeq,8h}$

Regulation 9.2(7) requires that the employer must annually submit to the regional principal inspector of mines, on forms 21.9(2)(a); 21.9(2)(b); 21.9(2)(c) and

21.9(2)(d), respectively, prescribed in Chapter 21, and within 60 days from the end of the relevant annual reporting period as indicated on each form, reports which contains quarterly information on the airborne pollutant, heat stress, cold stress and noise aspects of the system of occupational hygiene measurements, established and maintained in terms of Regulation 9.2(2), covering the immediately preceding 12 months.

The SAMOHP Codebook describes the steps that must be followed when implementing an Occupational Hygiene Monitoring Programme and requires reporting of the Physical and Chemical Stressors (Airborne Pollutants, Heat Stress, Cold Stress and Noise) to the Department of Mineral Resources on the above frequency.

It is important to note that any Airborne Pollutant, in other words the exposure to any Hazardous Chemical Substance listed in Chapter 22, Schedule for Hazardous Chemical Substances (Silica Quartz, Diesel Particulate Matter, Welding Fumes, VOC's, etc.) identified as a hazard to the health and safety of employees in their working environment during the Baseline Health Risk Assessment must be included into the Occupational Hygiene Monitoring Programme and reported on to the DMR.

InDuna Risk Management assists clients by conducting the occupational hygiene assessments and recommends the best system of control to mitigate the risks identified.

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4) Mine Health and Safety Act - Engineering Dust Sampling

In 1997 the Department of Mineral Resources issued a directive requiring that the dust concentration levels (OEL) at the operator's cab position on continuous mining machines be reduced to below 5 mg/m^3. This directive was issued to determine the effectiveness of engineering controls (water sprays, scrubber systems, ventilation controls, etc.) implemented to reduce the dust emission levels created by continuous mining machines.

This process requires that a pre-weighed sample, connected to a sampling pump, be positioned at the operating controls of the continuous mining machine during each production shift to collect the respirable dust particulates in the ambient environment. The samples are then returned back to the Laboratory for post-weight determination and the results are compared to the OEL for Engineering Samples.

The results are communicated to the client via electronic means and samples exceeding the OEL requires an investigation into the reason for and the source of the high dust levels. Corrective actions can then be implemented to prevent a reoccurrence of the event.

This monitoring strategy can also be utilised for determining the effectiveness of engineering control measures at tipping points, transfer points, crushing plants, etc.

InDuna Risk Management assists clients by conducting the engineering dust sampling and recommends the best system of control to mitigate the risks identified.

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5) Asbestos Monitoring

In the early 1900, asbestos was viewed as the wonder mineral due to its diverse applications and low cost. Asbestos was used in any thinkable product from flowerboxes, pots, roof sheeting, prefabricated buildings, insulation on boilers and furnaces, heaters, seals, fire resistant materials, sound proofing, vehicle brake pads and shoes, general insulation, water storage tanks, pipes and so the list goes on.

The health risks associated with asbestos only became apparent long after this product was used in residential and industrial applications and by that time, for some people exposed to asbestos, it was too late and the silent killer had struck in all spheres of society, from the innocent child playing on the playgrounds next to the asbestos waste dumps to the town residents driving on the dirt roads used by the mine transport vehicles to take the asbestos bales to the railway siding. Asbestos took no hostages and it was too late to stop this monster.

The use of asbestos was phased out from the early 1970s and it became illegal to mine, produce or manufacture asbestos containing products during the course of the late 1990s. The sad truth of asbestos is that because of its prolific abundance many people that have never worked with, or lived in an asbestos mining town are developing asbestos related illnesses by being exposed to asbestos containing products. The impact on society and health management systems are still to peak well into the future.

Due to the impact that asbestos has on society the Asbestos Regulations were promulgated under the Occupational Health and Safety Act and this act prescribes very stringent guidelines for the identification, control and disposal of any asbestos containing materials.

Therefore all employers are required to take heed of the prescribed regulations to ensure that no employee is exposed to asbestos containing materials in their working environment, the company supplied residential homes, their children going to the company school with prefabricated classrooms or the community centres with asbestos roof sheeting.

InDuna Risk Management assists clients by facilitating asbestos assessments in the working environment and recommends the best system of control to mitigate the risks identified.

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6) Lead Monitoring

Lead is a highly poisonous heavy metal that affects numerous parts of the human body. The target organs for lead poisoning is the reproductive system, kidneys, heart, bone marrow and the central nervous system. Lead poisoning can also cause blood (anaemia) and brain disorders, miscarriages in pregnant women. Lead poisoning symptoms include abdominal pains, confusion, headache, anaemia, irritability, insomnia, delirium, cognitive deficits, tremors, hallucinations,

convulsions, male reproductive problems and in severe cases seizures, coma, and death.

As with asbestos, due to the impact that lead has on society the Lead Regulations were promulgated under the Occupational Health and Safety Act and this act prescribes very stringent guidelines for the identification, use, control and disposal of any lead containing materials.

Therefore all workplaces where lead is produced, processed, used, handled or stored in a form in which it can be inhaled, ingested or absorbed by any person in that workplace are required to take heed of the prescribed regulations to ensure that no employee is exposed to lead containing materials in their working environment.

InDuna Risk Management assists clients by facilitating lead assessments in the working environment and recommends the best system of control to mitigate the risks identified.

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- **Biological Stressors**

Biological stressors are bacterium, viruses, protozoans, parasites or fungus that can be found in the workplace. Biological agents have the ability to adversely affect human health in a variety of ways, ranging from relatively mild allergic reactions to serious medical conditions, resulting in death if not identified and contained.

Many of these organisms are prevalent in the natural environment, where they are found in water, soil, plants or animals. Since many biological agents reproduce easily, they are also a potential danger in a wide variety of workplaces.

As with asbestos and lead, and the impact that biological agents have on society, the Hazardous Biological Agents Regulations were promulgated under the Occupational Health and Safety Act. This act prescribes very stringent guidelines for the identification, use, control and disposal of any materials containing any hazardous biological agent.

Therefore all workplaces where hazardous biological agents are produced, processed, used, handled, stored or transported in a form in which it can be inhaled, ingested or absorbed by any person in that workplace, are required to take heed of the prescribed regulations to ensure that no employee is exposed to any materials containing any hazardous biological agent, in their working environment.

Some of the methods used to identify hazardous biological agents in the workplace is the collection of swab samples, growth plates, water samples, tissue samples and blood samples.

InDuna Risk Management assists clients by collecting and analysing swab samples, growth plates and water samples in the working environment. We facilitate tissue and blood samples as required and recommend the best system of control to mitigate the risks identified.

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- Environmental Monitoring

InDuna Risk Management's Environmental Monitoring Services are limited to the actual monitoring and quantification of the parameters that could have a negative impact on the immediate and surrounding environment as well as other affected parties that might be impacted by a client's day-to-day operational activities.
These services include:

a) Ambient Environmental Noise Monitoring:

The monitoring of the ambient environmental noise levels are done in accordance with SANS 10103:2008 - The Measurement and Rating of Environmental Noise with Respect to Annoyance and to Speech Communication (baseline as well as the annual re-assessments required under the Environmental Impact Assessment Guidelines), to determine the impact that new operations or developments could have on the ambient noise environment and the surrounding communities as well as the impact that established operations have due to their age or the encroachment of new residential developments on industrial zones due to the constrictions of land availability.

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b) Dustfall Monitoring Programme (Fallout Dust Monitoring)

The implementation and management of a Dustfall Monitoring Programme (Dust Deposition Monitoring or Fallout Dust Monitoring) in accordance with the requirements of the National Dust Control Regulations of 2013, as read with Section 32 of the National Environmental Management: Air Quality Act, 2004 (Act No.39 of 2004), whereby any operation that by the nature of its activities creates dust, is required to implement a Dustfall Monitoring Programme conforming to the monitoring standards as prescribed in the American Standard for Testing and Materials Method D1739 (***ASTM D1739***).

The Dustfall Monitoring Programme forms part of the baseline Environmental Impact Assessment process that is conducted for new developments as well as established activities and is to determine firstly the potential impact that new activities might have on the ambient environment, or secondly what impact an established activity has on the ambient environment.

The dustfall monitoring services that InDuna Risk Management render to clients are not limited to the conventional pole and bucket system but also include more modern monitoring methods such as direct reading instrumentation with data logging capabilities that focus on PM_{10} and $PM_{2.5}$ dust loads.

These stations can be positioned in any monitoring area and they are capable of operating from an independent power source with no need for external Eskom power connections. These monitoring stations are capable of transmitting data over various modes of communication from GSM to radio frequency transmitters that feeds data directly into the clients' plant control room SCADA System and is intended for operations that need to maintain an Air Emission Licence from the Department of Environmental Affairs.

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c) Surface and Groundwater Quality Monitoring

The National Environmental Management Act requires that a risk assessment must be conducted to determine the impact of any new or existing operation, through an Environmental Impact Assessment. The Department of Water Affairs also requires that an application has to be obtained for a water use licence.

This licence together with the requirements of the Environmental Management Plan requires that surface and groundwater quality monitoring must be conducted at a prescribed frequency. The water use licence indicates what chemical and bacteriological analysis must be done at what intervals to maintain the validity of the water use licence and to monitor and prevent any environmental incidents from occurring.

InDuna Risk Management assists clients by conducting surface and groundwater assessments in the working environment and recommends the best system of control to mitigate the risks identified.

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d) Stack Emission Monitoring

Stack Emission Monitoring is conducted to determine the contaminant volumes that are released into the atmosphere and the effectiveness of the control measures implemented to reduce the release of such contaminants.

Monitoring includes the assessment of particulate matter and gaseous vapours and comparing the results to the guideline values prescribed in the National Environmental Management Act.

InDuna Risk Management assists clients by facilitating stack emission assessments in the working environment and recommends the best system of control to mitigate the risks identified.

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- Laboratory Services

InDuna Risk Management uses only SANAS accredited laboratories to prepare and analyse our sampling media to ensure a high level of quality.

Laboratory services include the following:

- Weight determination of sampling filters
- Analysis of all chemical elements (Eg. Silica Quartz, Diesel Particulate Matter, Welding Fumes, VOC's, Heavy Metals, Asbestos)
- Gas samples
- Air samples
- Swab samples
- Water samples (Chemical, Bacteriological, Legionella)
- Soil samples

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- **Instrumentation**

    a) New Instrumentation Sales

    We offer a wide variety of instrumentation to help industry professionals conduct monitoring effectively, using the best tool for the job.
    These include: Thermal monitoring equipment, noise monitoring equipment, illumination monitoring equipment, airborne pollutant monitoring equipment, wind and weather meters, ventilation monitoring equipment, environmental monitoring equipment, ergonomics and vibration monitoring equipment, biological monitoring equipment, laboratory equipment and other miscellaneous items. Please visit our website or contact us for more information. If we don't have it, we do our very best to source it for our clients.

    b) Service and Calibration

    It is important, for the integrity of the monitoring conducted, that instrumentation used should be well taken care of, serviced regularly and calibrated annually.

    InDuna offers clients the convenient channel of a single point of contact when having their SHE-related instruments serviced and calibrated by one of our SANS17025 accredited partner facilities, thus ensuring a quick turn-around time and traceability.

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We would like to thank you for your interest in our company and the services that we render.

We trust that we can be of assistance to you to ensure that a safe and healthy working environment is provided to your employees, which will ultimately reduce risk and increase productivity and profitability.

Please visit our website for more information and multiple resources at your fingertips:
www.indunarm.co.za

Should you have any questions, please do not hesitate to contact us at your earliest convenience.
My direct number is 082 417 9808.

Kind Regards,

Riaan Oberholzer
Managing Director