



# ASPASA AT WORK

## Health & Safety

## Health & Safety Bulletin

5<sup>th</sup> Edition - 2018

### Introduction

This reported is tasked in providing broad overviews of the current and relevant activities and the work of the Health & Safety Committee and industry related matters relevant to ASPASA members.



12 June 2018 – Health & Safety Committee Meeting

### Some Safety Tips – Construction Sites

#### Introduction

Aspasa has its own, very comprehensive Health & Safety Audit protocol, which it has been running for many years. At a recent Aspasa Technical Committee meeting it was proposed that Aspasa also share some of the issues with others and it was felt that Civil Engineers and Construction companies who work closely with Aspasa members need to understand some of the issues, so as to ensure that a broader understanding is gained by the industry.

A few issues will be touched on in this bulletin. Member to feel free to let Aspasa have more ideas.

#### Fall Protection

Duty to have fall protection is the most cited standard in the construction industry and is one of the leading causes of worker deaths in construction. Employers need to do a better job of assessing job sites and implementing fall protection systems to workers.

- **Workers:** Workers should familiarize themselves with all potential fall hazards on a job site. Never work in an area where fall protection systems have yet to be installed. Workers using personal fall arrest systems should inspect them before each use to ensure they are working properly and are free of damage. The lanyard or lifeline should be short enough to prevent the worker from making contact at a lower level in the event

of a fall. This means taking into account the length of the lanyard, length of dynamic elongation due to elastic stretch and the height of the worker.

- **Employers:** Employers are required to provide fall protection systems to protect their workers on walking or working surfaces with unprotected edges or sides that are six feet above a lower level. Fall protection can include guardrails, safety net systems and personal fall arrest systems. Guardrails are the only method approved that actually prevents falls from occurring. Safety nets and personal fall arrest systems prevent workers from falling a great distance.

Fall protection includes protecting workers from falling into holes such as elevator shafts and skylights as well as excavations. Employers are also required to protect workers from falling objects by requiring hard hats to be worn by workers and by installing toeboards, screens or guardrails, erecting canopies or barricading the area to keep workers out.

### Scaffolds

Approximately 65% of all construction workers perform work on scaffolds. Employees performing work on and around scaffolding are exposed to falls, electrocutions and falling object hazards.

- **Workers:** Hard hats should be worn when working on, under or around a scaffold. Workers should also wear sturdy, non-skid boots and use tool lanyards when working scaffolds to prevent slips and falls and to protect workers below. Workers should never work on scaffolding covered in ice, water or mud. Workers are prohibited from using boxes, ladders or other objects to increase their working height when on a scaffold.

Workers should never exceed the maximum load when working on scaffolds. Never leave tools, equipment or materials on the scaffold at the end of a shift. Workers should not climb scaffolding anywhere except for the access points designed for reaching the working platform. Tools and materials should be hoisted to the working platform once the worker has climbed the scaffold.

If personal fall arrest systems are required for the scaffold you will be working on, thoroughly inspect the equipment for damage and wear. Workers should anchor the system to a safe point that won't allow them to free fall more than six feet before stopping.

- **Employers:** All scaffolding should be designed, erected and disassembled by a competent person. A competent person should also inspect scaffolding before the start of work each day to ensure that it is safe for use.

Scaffolding should be erected on solid footing, fully planked at least 10 feet away from power lines. Scaffolding should be erected with guardrails, midrails and toeboards to protect employees working on, under and around scaffolding.

### Stairways and Ladders

Improper ladder use is one of the leading causes of falls for construction workers resulting in injury or death. Reasons for ladder falls include incorrect ladder choice, failure to properly secure the ladder and attempting to carry tools and materials by hand while climbing.

- **Workers:** Always maintain three points of contact while ascending and descending a ladder, that's both feet and at least one hand. Portable ladders should be long enough to be placed at a stable angle extended three feet above the work surface. Workers should tie ladders to a secure point at the top and bottom to avoid sliding or falling. Tools and materials should be carried up using a tool belt or a rope to pull things up once you've stopped climbing. Never load ladders beyond their rated capacity, including the weight of the workers, materials and tools.
- **Employers:** A competent person should inspect all ladders before use each day. Defective ladders should be marked or tagged out and taken out of service until they can be properly repaired. Workers should be trained on ladder safety and know how to select the proper ladder for the job. All ladders on the construction site should conform to OSHA standards. This includes job-made ladders, fixed ladders and portable ladders, both self-supporting and those that aren't. If workers are using energized electrical equipment, ladders should have nonconductive side railings.

### Fall Protection

It's not a surprise that the top four most frequently cited OSHA standards in construction have to do with protecting workers from falls. Falls are the leading cause of fatalities in construction.

Providing proper and ongoing training to workers can go a long way in reducing the number of falls suffered at the construction site.

- **Workers:** Workers should be able to recognize the hazards of falling and know the procedures to follow to minimize hazards and prevent falls.
- **Employers:** A competent person is required to provide training to all employees that might be exposed to fall hazards. Again, this should cover all employees because at some point nearly everyone on the construction site is exposed to a fall hazard of some type. Topics of the training program should include the nature of fall hazards present on the construction site, proper erection, inspection and maintenance of fall protection systems, use of fall protection system and personal fall arrest systems and the role of the employee in safety monitoring and the fall protection plan.

Employers are also required to maintain certification records of fall protection planning for all employees. Retraining is required for changes that render prior training obsolete and instances where it is apparent that a worker has not retained enough knowledge from the training program to ensure their safety.

OSHA requires that workers be provided with and wear face and eye protection when there are eye or face hazards present from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gasses or vapors, or potentially injurious light radiation. These hazards are present when doing a variety of tasks on the job site

such as welding, chipping, grinding, masonry work, sanding, woodworking and drilling. When flying object hazards are present, eye protection must be equipped with side protection or be fitted with detachable side protectors.

- **Workers:** When wearing eye and face protection, workers should make sure that they don't interfere with their movements and fit snugly on their faces. Eye and face protection should be kept clean and in good repair. Workers should inspect face and eye protection before use to ensure it is free of cracks, chips and other damage. Eye and face protection that becomes damaged should be replaced immediately.
- **Employers:** Employers are required to provide eye and face protection to worker free of charge. Eye and face protection must meet standards. Employers should issue eye and face protection to workers based on an assessment of anticipated hazards. If workers have prescription lenses, employers are required to make sure that they have eye protection that incorporates the prescription or that can be worn over the corrective lenses without disturbing them.

#### Personal Protective and Life Saving Equipment – Head Protection

Hard hats are commonplace at the construction site. They protect workers from a number of hazards such as falling and flying objects, electrical shock and other impacts.

- **Workers:** Workers are required to wear head protection wherever there is the potential for being struck in the head, which is basically the entire time you are on the construction site. Possible scenarios include falling tools or debris, accidental nail gun discharge, contact with electrical hazards or swinging construction equipment. Workers should inspect their hard hat for any cracks, dents or any signs of deterioration. Hard hats should fit snugly on your head and not come loose during normal movement or work activities.
- **Employers:** Employers are responsible for providing all employees with head protection that meets consensus standards or is constructed in accordance with one of those consensus standards. Employers are not allowed to charge employees for the cost of head protection or require them to provide their own hard hat unless they do so voluntarily. Hard hats should be kept in good condition and be replaced immediately if they suffer a heavy blow or electric shock

#### Toxic and Hazardous Substances

This is a general industry standard that focuses on requirements for employers that have hazardous chemicals in their workplace. Some examples of hazardous materials commonly found at construction sites include lead, silica, asbestos and treated wood or wood that will be cut and generate dust. Certain building materials also contain hazardous chemicals such as zinc, cadmium, beryllium and mercury.

- **Workers:** Workers should be able to read and use Material Safety Data Sheets (MSDS) for any hazardous chemicals being used at the construction site. Employees should wear proper PPE when handling hazardous chemicals and should clean up any spill when they occur.

- **Employers:** Employers are required to implement a written hazard communication program that includes an inventory of all hazardous chemicals used at the site. All containers of hazardous substances must have a hazard warning and be labeled. Employers should have an MSDS available for each hazardous substance. Employees should be trained regarding the risk of all hazardous chemicals along with proper handling instructions.

### General Safety and Health Provisions

The purpose of this standard is to protect construction workers from being required to “work in surroundings or under working conditions which are unsanitary, hazardous or dangerous to his health or safety” by contractors and subcontractors.

- **Workers:** The key takeaway from this standard for workers is that they should know that there are protections in place for their safety while working on the construction site. This includes receiving proper training for specific job duties and being provided with personal protective equipment (PPE). Workers should never operate any machinery or equipment if they have not been properly and adequately trained on its safe operation.
- **Employers:** Employers are required to implement safety programs in order to protect workers and prevent accidents. A competent person(s) is required to provide inspections of job sites, equipment and materials and includes ensuring that non-compliant tools and machinery are taken out of use by locking or tagging or removing them from the job site. Construction standards take precedence over any similar or applicable general industry standard.

In addition to providing necessary PPE to employees at no cost, employers are also required to provide training to all employees on hazards and all related matters for construction standards applicable to a worker’s job duties.

### Scaffolds

Aerial lifts fall under scaffolding and are vehicle-mounted devices used to elevate workers such as articulating and extendable boom platforms, vertical towers and aerial ladders. Hazards associated with the use of aerial lifts include fall and ejections from the lift platform, tip-overs and structural failures of the lift, electric shock, contact with overhead objects or ceiling and being struck by objects falling from lifts.

- **Workers:** Workers must be trained and authorized in order to operate an aerial lift. Inspect all vehicle and lift components based on the manufacturer’s recommendations before operating an aerial lift to ensure it is in safe working condition. Never operate a lift if any component is missing, damaged or appears defective.

Always stand on the floor of the lift platform or bucket when working, never use a ladder or other device to increase your working height. Make sure that your harness or restraining belt and lanyard are securely attached to the boom or bucket and that they are in good working condition.

Never exceed the load capacity or the vertical and horizontal reach limits of the lift. Lower the lift platform when driving the lift and stay at least 10 feet away from overhead lines.

- **Employers:** Employers should ensure that all workers operating aerial lifts receive proper training before being authorized to use them and provide retraining in the event a worker has an accident while operating a lift, hazards are discovered, a different type of lift is being used or if the workers are observed improperly operating a lift.

In addition to ensuring that all aerial lifts are in good operating condition, employers are also responsible for having work zones inspected for hazards including holes or unstable surfaces, overhead obstruction, inadequate ceiling heights and slopes or ditches. Employers should also have power lines de-energised when possible when workers are in the vicinity.

### Fall Protection

This standard covers all of the requirements and provisions for the different types of fall protection required by OSHA. It covers items like guardrail height requirements and minimum tensile strength for components of personal fall arrest systems. This standard also covers requirements for covers over holes and openings and provisions for establishing controlled access zones.

- **Workers:** Workers should be aware of potential fall hazards as well as what fall protection systems have been put in place to protect them. If workers are using personal fall arrest systems, they should inspect them for wear and ensure that all components are in good working order and that the harness fits properly.
- **Employers:** Employers are required to install all required fall protection systems before any employees begin work. Employers should remember that they are also responsible for protecting workers from falling objects with either toeboards, canopies or guardrails. If using a safety monitoring system, the safety monitor should be a competent person who remains on the same walking or working surface and in visual sight and hearing distance from the workers when they are working unsafely or may be unaware of a fall hazard.

If conventional fall protection methods laid out by OSHA are infeasible or create a greater hazard and a worker is performing leading edge work, precast concrete erection or residential construction work, the employer must have a fall protection plan. The plan must be site specific and developed by a qualified person. In areas where conventional methods cannot be used must be classified as controlled access zones and only workers designation to perform work there are allowed to enter.



## **FEEDBACK FROM MRAC SAFETY PRACTITIONER MEETING – 15 MAY 2018**

1. The Chairman noted that the meeting was not represented by women or unions.
2. The agenda was accepted with the exception of item 9 – re: discussion on a way forward regarding the regulating of safety practitioners.
3. Definitions were discussed of a “Safety Officer”, “Chief Safety Officer” and “Safety Rep”. There appears to be some confusion regarding terminology around a Safety Practitioner and the function of a Safety Practitioner.
4. The confusion came about because of item 6 on the agenda – Appointments, Duties and the Responsibilities of Safety Practitioners.
5. It was agreed that the term Safety Practitioner would not be used in order to avoid confusion.
6. The discussion was centered around the competencies of a Safety Officer.
7. It was agreed that SAMTRAC, COMSOC and NEBOSH were identified as courses, and not a qualification. These however would be considered as part of the RPL for accreditation towards the qualification of a Safety Officer.
8. It was recommended that a Safety Officer have a Diploma or a Degree due to the nature of the job in the underground mining industry.
9. A point was raised by Chamber of Mines that a Degree or a Diploma may negatively affect smaller operations in the Surface Mining sector who wish to appoint a Safety Officer, but due to the nature of the person’s qualification, would not necessarily be able to afford or have the scope for a qualified Safety Officer.
10. It was also proposed by the DMR that the Safety Officer have some form of Technical qualification. This was dismissed by the committee.
11. The Association of Mine Safety Professionals agreed that there would possibly be a need for a separation of categories for different classes of operations. For e.g.: Mines and Works Regulations:2.17.1 identifies that a Safety Officer is only required after employing 300 or more employees.
12. Currently QCTO (Quality Council for Trades and Occupations) has the only qualification for a Safety Practitioner recognized by SAQA. There is no recognised qualification by MQA. Therefore, concern was raised as to what Quality Organisation would be used in recognizing the qualification for a Safety Officer.
13. The committee agreed to adopt the Safety, Health and Quality Level 5 as a qualification for a Safety Officer.

14. 5 members of the committee were appointed to review the qualification of the Safety Officer. The committee was made up of the members of the DMR, MRAC, large mines, and the COM.
15. Part of the scope of the committee is to review the proposal of Chapter 15 of MHSA and report back by July 2018 and recommendations to be made by September 2018 to MRAC.
16. For interested parties, who would like to comment on the qualification, 04 June 2018, is the deadline for any input.
17. A proposal was made that all Safety Officers should also be licensed to practice, over and above their qualification. For e.g.: a GCC needs to have a license to practice, in the same manner, a Safety officer should have a license to practice. This proposal was turned down as it was felt that it would overly complicate an already burdened system for handling licensing and qualifications.
18. It would be up to the employer to define in the Safety Officers appointment, the qualification, knowledge, training and experience required for a particular position required within an operation.
19. A point of concern is the draft to reduce the required number of employees for the requirement of a Safety Officer, from 300 employees to 100 employees. It was felt that this would compromise operations where they would not have the need for a fully qualified / functional Safety Officer.

*Courtesy: Paul Chamen – Noshcon*

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## **Fire suppression systems for electrical panels**

An ASPASA Member recently suffered a devastating fire in an electrical substation and subsequently lost all electrical power in the crushing and screening plant due to the complete destruction of the control room and substation. Fortunately nobody was injured during this incident, but you can imagine the financial loss to the Company to rebuild everything, but still carry on with contracted mobile crushing and screening to honor certain contracts for material delivery.

Unfortunately most of our members are exposed to this risk as only a small percentage do have fire extinguishing systems in their electrical substations. The risk can be minimized by frequent inspections, maintenance and thermal testing for possible hot joints, but what do we have in place as a “system” to put that unforeseen fire out to limit damages.

According to the Mine Health and Safety Act is it a legal requirement to have an effective fire extinguishing system to protect electrical apparatus against the possibility of a fire. The CO<sub>2</sub> fire extinguisher on the outside wall of the substation is not deemed as a “system” as it needs to be used by a person.

**Regulation 3.4** - The employer must take reasonable practicable measures to ensure that at any place at a mine, where electrical apparatus is installed and which may constitute a danger to persons shall be—

(f) equipped with an effective fire extinguishing system.

At one of the member mines, a system was found that might be the solution and will definitely be more cost effecting compared to some old traditional overhead detection and suppression systems where you see about twenty CO2 cylinders connected to this and needs frequent inspections and certifications. Quotes of up to R1M for these detection and CO2 suppression systems in fairly big substations have been quoted.

### **JOGR BLAZECUT**

#### **Automatic Fire Suppression**

According to the GCC Engineer of the ASPASA Member where this system was found:

The Pros are:-

- Not Too Expensive
- Easily installed
- Once installed all you have to do is inspect the Pressure gauge
- Should you have a fire in the MCC this Blasé cut will extinguish the flames without releasing any residue on to your switchgear (isolators and contactors), any other current installation tends to release a residue which in turn destroys the switchgear, sometimes to such a point that you have to spend hours cleaning the switchgear that it is better to replace it.

The Cons are:-

- None at present

Follow these links below and have a look at what this system can do and where (how) it can be installed.

<https://jogrusa.com/products/blazecut-fire-suppression-system?variant=16369324485>

<https://youtu.be/02l6-OJtVuM>

<https://youtu.be/VlhM1tazBdq>



*Courtesy: Marius van Deventer – SOMCA*

## **Alcohol On Site**

During a recent ISHE Audit: Everybody has got Policies preventing the use and availability of alcohol and drugs on site and you are tested for alcohol when entering most operations, but how do we explain this when it is kept “for the sole purpose of entertaining customers”.



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## **Rules for the Mine Health and Safety Council Awards Scheme**

### Scope of work and deliverables

The health and safety awards task team was mandated to review the Safety Awards in light of the following:

- Identify background documents needed to do the scope of work set out below;
- Identify shortcoming of the current criteria for Safety Awards;
- Recommend new criteria for Safety Awards;
- The recommended criteria must accommodate all mining commodities;
- The recommended criteria should discourage employers from not reporting incidents and injuries in order to win safety awards;
- Leading indicators should also be included as criteria for safety awards, although lagging indicators should be retained;
- The criteria should include health issues in consultation with MOHAC;
- Obtain and consider the criteria used for safety awards in other mining countries and by Mine Safe, Coal Safe, Aspasa and Professional Associations;
- Consider how small mines can be included.

### Rules of the Mine Health and Safety Council Award Scheme

Any mine wishing to participate in the annual voluntary award scheme administered by the Mine Health and Safety Council (MHSC), with statistics verified with Department of Mineral Resources (DMR) must comply with the following rules:

- Must be registered as a mine with the DMR and must be in continuous operation for the qualifying period.
- Awards should be linked to the Minister's release of the State of Health and Safety in the Mining industry annually for that reporting period. The health data to be considered would be for the previous year.
- The mines must register with the Mine Health and Safety Council for the category they wish to participate in. Registration of Occupational Health Awards must be done within six months prior to release of the Minister's State of Health and Safety in the Mining Industry.
- The MHSC office to collect and verify the information which would be presented by the Minister.
- The DMR as the custodian of the legislated statutory reports will be the sole source to derive information to be utilized for awarding.
- The level of management appointment for the breakdown of data for Mines/Plants participating in any of the Awards is a MHSA section a 4.(1) or 3. (1)(a) appointee.
- Trophies to be awarded to the top 3 achievers (Gold, Silver and Bronze) in each commodity for each category.
- Participating commodities:
  - Gold Mines – Underground and Surface
  - Platinum Mines – Underground and Surface
  - Coal Mines – Underground and Surface
  - Diamond Mines – Underground and Surface
  - Chrome Mines – Underground and Surface
  - Manganese Mines – Underground and Surface
  - Iron Ore Mines – Underground and Surface
  - Other Commodities – Underground and Surface Mines
  - Plants – Concentrators/Smelters/Crushers/Laboratories

### Health Awards Criteria

The long term adverse occupational health effects emanating from the workplace due to occupational hygiene exposures have resulted in much more focus and attention on occupational health issues in the South African Mining Industry (SAMI). The intent of the occupational health award is to encourage zero harm in relation to occupational health exposures, diseases and fatalities at mines.

### Occupational Health Awards Categories

The Occupational Health statistics will be derived from the DMR Statutory report. The following categories will be considered for the awards:

- Noise and exposure and noised induced hearing loss (NIHL)
- Airborne pollutants and Occupational lung diseases (OLD)
- Heat stress and heat stress related illnesses.
- HIV Management

Table 1 shows the weighting ratio to be used for the occupational health awards as follows:

Table 1: Occupational Health Awards Categories

ASPECTS	WEIGHTING
Noise Exposure	15
Noise Induced Hearing Loss	15
Airborne Pollutants Exposure	15
Occupational Lung Diseases	15
Heat Stress	15
Heat Stress Related Illnesses	15
HIV Management	10
<b>TOTAL SCORE</b>	<b>100</b>

Occupational Hygiene Criteria

The award criteria for the above-mentioned Stressors will be based on the following:

Table 2 : Awarding Criteria for Stressors

	WEIGHTING	CLASSIFICATION		
		A	B	C
Mine 1	15	0%	0%	100%
Mine 2	10	0%	≤ 25%	75%
Mine 3	5	0%	≤ 50%	50%

\* Percentage of employees at risk

Gold – A Classification Band: 0% (no exposure); and

- B Classification Band : 0% (no exposure); and
- C Classification Bank: 100% ≤ Exposure

Silver – A Classification Band : 0% (no exposure); and

- B Classification Band: 0% < Exposure ≤ 25%; and
- C Classification Band: 75% ≤ Exposure ≤ 100%

Bronze – A Classification Band: 0% (no exposure); and

- B Classification Band: 0% < Exposure ≤ 50%; and
- C Classification Band: 50% < Exposure ≤ 100%

Occupational Medicine Criteria

Noise Induced Hearing Loss (NIHL)

The denominator will be the employees exposed/at risk.

Table 3 shows the percentage reduction from the previous year

Table 3: Percentage Reduction from Previous Year (NIHL)

Percentage	≥ 75%	≥ 50%	≥ 25%
Weighting	15	10	5

Example for the above indicator

Table 4: Example 1 – Percentage Reduction (NIHL)

Year	2016	2017
Number of new NIHL Cases	20	10
Total of all Workforce at risk (Denominator)	100	100

The above example indicates a 50% reduction and therefore qualifies for a rating of 5.

Occupational Lung Diseases

The denominator will be the employees exposed/at risk.

Percentage reduction from the previous year

Table 5: Percentage Reduction from Previous Year (Occupational Lung Disease)

Percentage	≥ 75%	≥ 50%	≥ 25%
Weighting	15	10	5

Example for the above indicator

Table 6: Example 2 – Percentage Reduction (Occupational Lung Disease)

Year	2016	2017
Number of new OLD cases	20	10
Total of all Workforce at risk (denominator)	100	100

The example above indicates a 50% reduction and therefore qualifies for a rating of 5.

Heat Stress and Heat Stress Related Illnesses

The denominator will be the employees exposed/t risk.

Percentage reduction from the previous year.

Table 7: Percentage Reduction from Previous Year (Heat Stress and Heat Stress Related Illness)

Percentage	≥ 75%	≥ 50%	≥ 25%
Weighting	15	10	5

Example for the above indicator

Table 8: Example 3 – Percentage Reduction (Heat Stress and Heat Stress Related Illness)

Year	2016	2017
Number of new Heat Stress Related Illness	20	10
Total of all Workforce at risk (denominator)	100	100

The example above indicates a 50% reduction and therefore qualifies for a rating of 5.

**TB**

Diagnosis derived from screened workforce

Workforce	Screened	Percentage
100	90	90%

Score of 90% equals to 1  
 Score of <90% equals to 0

Diagnosed	Initiated on treatment	Percentage
10	9	90%

Score of 90% equals to 1  
 Score of <90% equals to 0

Employees on treatment	Successfully treated	Percentage
10	9	90%

Score of 90% equals to 1  
 Score of <90% equals to 0.  
 Successfully treated. A patient who was cured and completed treatment.

**HIV Management**

The table below shows the criteria used when awarding based on HIV management:

Workforce	Tested for HIV	Percentage
100	90	90%

Score of 90% equals to 1  
 Score of <90% equals to 0

Initiated on treatment	With viral suppression	Percentage
100	90	90%

Score of 90% equals to 1  
 Score of <90 equals to 0

**Safety Awards Criteria**

The safety awards will be awarded according to the following categories:

- a) Lost Time Injuries – Lowest progressive LTIFT on 31 December for the year announced. If the LTIFR is Zero this year, then go back another year, and another year until the clear winners can be determined.
- b) Progressive fatality free shifts on 31 December for the year – Mines with ≥1500 employees
- c) Progressive fatality free production shifts on the closing date – Mines with < 1500 employees.

**Lost Time Injuries**

The example below shows how the “Lost Time Injury Frequency Rate (LTIFR)/1000 000 hours worked” award will be evaluated.

Assume 275 working days/year and an average of 8 hours worked per day.

In the example, all mines had 3 Lost Time Injures for the year.

Table 9: Lost Time Injury Frequency Rate Example:

<b>Employers</b>	<b>Employees</b>	<b>Hours Worked</b>	<b>LRIFT/1000 000 Hours worked</b>
Mine 1	25	55000	54.54545455
Mine 2	50	110000	27.27272727
Mine 3	100	220000	13.63636364
Mine 4	500	1100000	2.727272727
Mine 5	1000	2200000	1.363636364
Mine 6	1500	3300000	0.909090909
Mine 7	3000	6600000	0.454545455
Mine 8	3500	7700000	0.38961039
Mine 9	4000	8800000	0.340909091
Mine 10	5000	11000000	0.272727273

**Methodology for Progressive Fatality free shifts and Progressive Fatality Free Production Shifts.**

For mines with more than 1500 employees (1000 000 FFS)

Progressive Fatality free shifts = Amount of people at work/day \* Days worked without a fatality.

For mines with 1500 or less employees (1000 FF Prod Shifts)

Progressive Fatality free production shifts = shifts per working day \* Days worked without a fatality.

Assume 275 working days/year

Employers	Employees	Shifts/year	Workdas to get 1000 000 FFS	Months
Mine 1	1501	412775	666	29.0
Mine 2	2000	550000	500	21.7
Mine 3	2500	687500	400	17.4
Mine 4	3000	825000	333	14.5
Mine 5	4000	1100000	250	10.9
Mine 6	5000	1375000	200	8.7

For mines that have 1500 or less employees, the amount of employees is not used in the calculation.

Employer	Shifts/Day	Shifts	Days to get 1000	Months
Mine 1	Only morning shift	1	1000	43.5
Mine 2	Only Morning and Night	2	500	21.7
Mine 3	Work 3 eight hour shifts	3	333	14.5

*N Pienaar*

**NICO PIENAAR  
DIRECTOR**