



**Ebenaeser
Environmental
Consultants**

Occupational Hygiene Surveys

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1. Introduction - EEC



Ebenaeser Environmental Consultants (EEC) is a world-class professional practice fulfilling the growing demand by the Road Construction, Crushing and Screening operations, Mining activities, Food Processing Outlets, Construction, Manufacturing Industries and Educational Facilities for professional expertise in Safety, Health, Hygiene and Environmental fields (SHE).

Our company is renowned for its ability to manage and prepare solutions for a wide range of Health, Safety and Environmental issues nationally and in Africa.

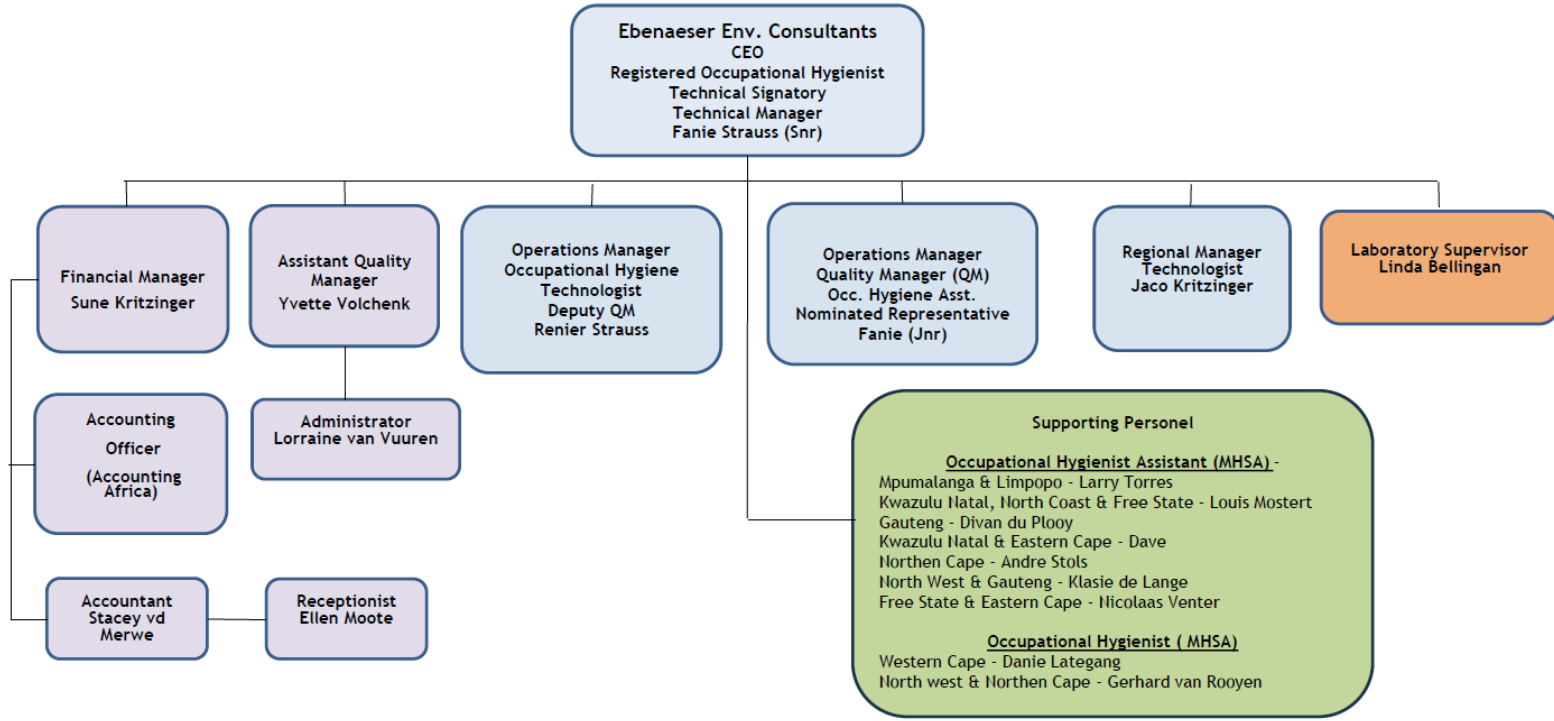
The consultancy's professional credibility is assured through the affiliation to SAIOH, MVSSA, SAIOSH and BOHS. Accreditation by SANAS.

Ebenaeser Environmental Consultants is an **Approved Inspection Authority**, approved by the Department of Employment and Labour.

2. Organogram



Ebenaeser Environmental Consultants cc Organogram



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2. Legislation - OHSA and Regulations

- 1. Occupational Health & Safety Act No. 85 of 1993

2. Legislation- OHSA

- Occupational Health and Safety Act, Regulation 8.

- **8. General duties of employers to their employees**

(1) Every employer shall provide and maintain a working environment that is Safe and without Risk to the health of his employees.

Matters to which those duties refers include:

a) The provisions and maintenance of systems that as is safe and without risks to health;

b) Taking such steps to eliminate or mitigate any Hazard or potential Hazard to the safety or health of employees, before resorting to personal protective equipment;

c) Making arrangements for ensuring the safety and absence of risks to health.

d) Establishing what hazards to the health or safety of persons are attached to any work which is performed and he shall, further establish what precautionary measures should be taken to protect the health and safety of persons, and he shall provide the necessary means to apply such precautionary measures;

e) Providing such information, instructions, training and supervision as may be necessary to ensure the health and safety of his employees;

2. Legislation - OHS Act Continue

- f) Not permitting any employee to do any work or to produce, unless the precautionary measures contemplated precautionary measures which may be prescribed, have been taken;
- g) Taking all necessary measures to ensure that the requirements of this Act are complied with.
- h) Enforcing such measures as may be necessary in the interest of health and safety;
- i) Ensuring that work is performed under the general supervision of a person trained to understand the hazards associated with it and who have the authority to ensure that precautionary measures taken by the employer are implemented; and
- j) Causing all employees to be informed regarding the scope of their authority as contemplated in section 37(1)(b).



2. Legislation - OSHA and Regulations

- 2. Noise - Noise-Induced Hearing Loss regulations (7 March 2003)

2. Noise - Noise Induced Hearing loss regulation

7. Noise monitoring

(1) Where an assessment of noise exposure indicates that any employee may be exposed to noise at or above the noise-rating limit, an employer shall ensure that a measurement programme of noise exposure at that workplace is -

(a) Carried out in accordance with the provisions of these regulations;

(b) Carried out only after the relevant health and safety representative or relevant health and safety committee has been informed thereof and given a reasonable period to comment thereon;

(c) Carried out by an approved noise inspection authority (AIA); and

(d) representative of the employees' exposure to noise.

(2) The employer shall ensure that:

(a) In the case where a number of employees work in an area of approximately equal noise level, makes provision for the selection of not less than three locations which are representative of the positions occupied by employees and for the taking of measurements at each position as contemplated in SANS 10083: 2021 Edition 6.

(b) That the measurement programme, in the case of an employee working at an approximately fixed location relative to the noise source, makes provision for the measurement to be taken at the approximate position of the person's ear that receives the higher noise level as contemplated in SANS 10083: 2021 Edition 6.

2. Noise - Noise Induced Hearing loss regulation

(c) That representative measurements are carried out at least every 24 months: Provided that whenever the noise is at or above the noise-rating limit, the provisions of regulation 10(1) shall apply.

Regulation 10. Control of noise exposure

(1) An employer shall ensure that the exposure of a person to noise is either prevented or, where this is not reasonably practicable, adequately controlled.

Provided that the control of the exposure shall be regarded as adequate if the exposure is below the noise-rating limit

If the exposure is at or above the noise-rating limit but the reason has been identified and action is taken by means other than the use of hearing protective equipment, to lower exposure so that it does not exceed the noise-rating limit.

2. Noise - Noise Induced Hearing loss regulation

(3) An employer shall ensure that the results of measurements as contemplated in sub regulation (2)(c) are recorded in the record required by regulation 11.

Regulation 11. Record

An employer shall:

- (a) keep records of the results of all assessments, noise monitoring and medical surveillance reports and of maintenance of control measures required by these regulations;
- (b) Make the records contemplated in paragraph (a) available for inspection by an inspector;
- (c) Subject to the formal written consent of an employee, allow any person to peruse the records with respect to that particular employee;
- (d) Make the records of all assessments and noise monitoring available for perusal by the relevant health and safety representative or relevant health and safety committee;
- (e) Keep all records of assessments and noise monitoring for a minimum period of 40 years;
- (f) Keep all medical surveillance records, including the baseline audiogram of every employee, for a minimum period of 40 years and if the employer ceases activities, hand over or forward by registered post all those records to the relevant provincial director: Provided that those records shall contain at least the following information:
- (g) Keep a record of training given to an employee in terms of regulation 4(6) for as long as the employee remains employed at the workplace in which he or she is being exposed to noise.

3. Noise - AIA requirements to Conduct Occupational Hygiene Survey (DOEL)

2. WHAT IS AN APPROVED INSPECTION AUTHORITY (AIA)?

The Occupational Health and Safety Act, 1993 (Act No. 85 of 1993), defines an Approved Inspection Authority as:

“any person who with the aid of specialised knowledge or equipment or after such investigations, tests, sampling or analyses as he may consider necessary renders a service by making special findings, purporting to be objective findings, as to:

- a) The exposure of any person
- b) The safety or risk to health of any work or condition prevalent on or in any premises
- c) The question of whether any particular legislated standard has been or is being complied with with respect to work or a condition prevalent on or in any premises by issuing a certificate, stating such findings, to the person to whom the service is rendered.”

In terms of the Act, an inspection authority can only operate if it has been approved by the Chief Inspector. The inspection authority approved by the Chief Inspector with respect to any particular service shall be an Approved Inspection Authority with respect to that service only.

4. SANAS Accreditation



The mission of the South African National Accreditation System (SANAS) is to create an impartial and transparent mechanism for organisations to independently demonstrate their competence to provide a service that is recognised as equatable to best international practice, while reflecting the demographics of South Africa in all that it does.

SANAS, as the sole national accreditation body in its scope of activity; encouraging and promoting the accreditation of testing (AIA) and verification laboratories.

SANAS promotes the acceptance of SANAS activities and those of all accredited bodies accredited by SANAS or its international counterparts.

SANAS promotes the recognition of accredited bodies.

SANAS obtains and maintain membership of national or international organisations that may assist SANAS in achieving its objects.

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5. Hygiene Survey Approach



Typical Hygiene Survey Approach

Assessment of noise

Noise assessments are conducted to:

1. Identify all employees likely to be exposed to noise at or above the noise rating limit for hearing conservation.
2. Obtain information on noise sources and work practices that will help to decide what measures should be taken to reduce the noise.
3. Guide in the selection of equipment and layout of workplaces to reduce noise exposure.
4. Check the effectiveness of measures taken to reduce noise exposure.
5. Guide in the selection of appropriate hearing protection equipment and demarcate noise zones.

5. Hygiene Survey Approach - Continue



Procedure

Determination of the equivalent continuous rating level ($L_{Aeq,8h}$)

Sound measuring equipment

1. Integrating sound level meter configuration, that complies at least with the accuracy requirements specified for a type 2 instrument in SANS 61672-1 and SANS 61672-2.
2. Use a windscreen of a type specified by the manufacturer as being suitable for the particular microphone and which does not detectably influence the accuracy of the meter under the ambient conditions of the test.
3. Sound calibrator that complies with the requirements prescribed for a type 2 calibrator in SANS 60942.

5. Hygiene Survey Approach - Continue Noise - Instrumentation



Integrated Sound Level Meter
Reference Sound Calibrator

Integrated Sound Level Meter
Class 1 Instrument in SANS 61672-1

5. Hygiene Survey Approach - Continue

A wide, straight road with yellow lane markings stretches into the distance under a bright blue sky. A vibrant rainbow arches across the horizon, framing the road. The surrounding landscape is a flat, grassy plain.

Reports on noise measurements carried out least include the following information:

- The purpose of the measurement.
- A description of the measured environment.
- A dimensioned drawing or sketch that indicates measuring points and noise zone boundaries.
- The 8 h rating level, (including the derived or estimated impulse correction, if and where relevant) for each noise zone, and also for specific areas or locations, such as operators' positions.
- A description of the noise source(s).
- A description of the operating conditions of the noise source(s) (including non-operational sources and machinery, of which the estimated effect should be given when in operation) during measurements.

5. Hygiene Survey Approach - Continue

A wide-angle photograph of a paved road stretching into the distance, flanked by green grass. The sky is overcast with grey clouds, and a faint rainbow is visible in the background. The overall scene is somewhat desaturated, giving it a somber or atmospheric feel.

- A description of the measuring equipment, including serial numbers.
- The calibration dates of the measuring equipment.
- The date(s) of the test.
- The name of the test officer.
- The address of the site.

6. Discussion of a Hygiene Survey

Risk Assessment Plant Environment Process.

The noise exposure for each category of risk is allocated as indicated in the table 1 below:

$L_{Aeq/8h}$ dB(A)	OH Risk	Exposure Classification		
		Risk Factor	Significance of Risk to NIHL	Action Required
≤70-82	-	0	Insignificant	No Action
83-85	C	1	Potential Risk of NIHL	OH Monitoring of Exposure levels
86-90	B	2	Moderate Risk of NIHL	Intervene and Re-evaluation of Risk
91-95	B	3	Significant Risk of NIHL	Priority Intervene, Followed by Re-evaluation of Risk
96-105	B	4	Unacceptable Level of Risk	Immediate Intervention and Re-evaluation for Risk
≥106	A	5	Definite & Extreme Risk of NIHL	Urgent Intervention and Ongoing Re-evaluation of Risk

6. Discussion of a Hygiene Survey - Continue

Typical Hygiene Noise Assessment Results

Pos	Locality	L _{Aeq} /8h	Noise Type	Remarks	OH Risk	Risk Factor	NRR
1	Ball Mill 1 Front	94.4	CON	Plant Operational	B	3	25
2	Ball Mill area Back	98.4	CON		B	5	33
3	Ball Mill Control room	64.3	CON	Plant Operational	B	2	-
4	Ball Mill area	88.7	CON		B	2	13
5	Ball Mill MM4	100.5	CON		B	4	39
6	MM7 Walkway outside plant	88.0	CON		B	2	13
7	Ball Mill MM7 Entrance	93.7	CON		B	3	25
8	Ball Mill 2	98.5	CON		B	5	35
9	Ball Mill 3	99.2	CON	Plant Operational	B	5	35
10	Trombones	90.1	CON		B	2	17
11	Ball Mill 1 Back	87.7	CON		B	2	13
12	Slag Bay	85.8	CON		B	2	9
Zone 1 - 95.4dB							
13	Bag Filters	77.6	CON	Plant Operational	-	0	-
14	Bag Filters Floor	83.3	CON		C	1	1
Area 7 - 81.3dB							
15	M8 Substation	84.5	CON	Plant Operational	C	1	7
16	M8 BTX	78.9	CON		-	0	-
17	M8 Screen	82.6	CON		C	1	1
18	M8 Control room	76.7	FLU	People talking in background	-	0	-
19	M8B Furnace	84.3	CON	Plant Operational	C	1	5
20	M8A Furnace	86.7	CON		B	2	11
21	M8 Platform	91.3	CON		B	3	19
22	M8 Macsap	87.6	CON		B	2	13
23	Piet se Gat / Sasolgas	93.0	CON		Background noise from plant operations	B	3
24	Coolers	91.8	CON	Plant Operational	B	3	21
Zone 2 - 88.3dB							
25	M9 Cyclones	85.1	CON	Plant Operational	C	1	7
26	M9 Furnace Left (stocker)	91.0	CON		B	3	19
27	M9 Furnace Right (stocker)	85.8	CON		B	2	13
28	M9 Furnace Center (stocker)	88.0	CON		C	1	3
29	M9 Control room	71.8	FLU	People talking in background	-	0	-
30	M9 Control room Kitchen	72.7	FLU		-	0	-
31	Paste store	75.9	FLU	No activity in area	-	0	-
32	Emergency Shower	78.3	FLU	Plant operational	-	0	-
33	Dryer	87.9	CON		C	1	3
34	Tap Floor	84.9	CON		C	1	7
Zone 3 - 85.6dB							

7. General discussion



The quality of hearing protection device (HPD) to be worn is indicated in the “NRR” column in the above “Hygiene Noise Assessment results” table.

When choosing the correct hearing protection for specific areas it is important to know what the meanings of the reduction rates mean to determine whether the specific type of protector will be suitable for employees.

The following noise reduction systems are commonly used when hearing protectors are tested for their attenuation:

7. General discussion - Continue

NRR - Noise Reduction Rating

NRR means Noise Reduction Rating and is the greatest amount of sound reduction that a hearing protection device can provide.

To get an accurate idea of the protection provided in dB(A) take the NRR value, subtract 7 and divide by 2. For example: An NRR rating of 25 offers a protection factor of 9 dB(A).

$$25 \text{ (NRR)} - 7 = 18$$

$$18/2 = 9\text{dB}$$

This rating is used in the United States and is accepted for use in a variety of other countries such as South Africa.

The NRR labelling requirement is a standardized format for all hearing protectors distributed in South Africa.

7. General discussion - Continue

Health Risk Assessment - Medical Linkage

Noise															
Occupation	No of employees exposed /occupation	Risk	Hazard	OEL dB	Actual dB	Action level dB	Severity	R	Frequency	R	Exposure	R	RR	Current control Measures	Monitoring
Exposure Group - Trackless Machinery															
Mobile Machine operator	20	NIHL	Noise	85.0	73.6	82.5	Negligible	1	Regularly	4	Negligible	1	4	Engineering PPE	Hygiene measurement Medical surveillance
Exposure Group - Plant															
Foreman	2	NIHL	Noise	85.0	89.7	82.5	Serious	3	Regular	4	Widespread	4	48	Engineering PPE	Hygiene measurement Medical surveillance
Plant operator	1	NIHL	Noise	85.0	89.7	82.5	Serious	3	Regular	4	Widespread	4	48		
General Workers / Cleaner	8	NIHL	Noise	85.0	89.7	82.5	Serious	3	Regular	4	Widespread	4	48		
General Workers / Cleaner	8	NIHL	Noise	85.0	89.7	82.5	Serious	3	Regular	4	Widespread	4	48		
Team Leader	3	NIHL	Noise	85.0	89.7	82.5	Serious	3	Regular	4	Widespread	4	48		
Safety Representative	1	NIHL	Noise	85.0	89.7	82.5	Serious	3	Regular	4	Widespread	4	48		
Exposure Group - Workshop															
Welder / Boilermaker / Mechanic / Electrician	4	NIHL	Noise	85.0	82.7	82.5	Negligible	1	Regularly	4	Negligible	1	4	Engineering PPE	Hygiene measurement Medical surveillance

1. Evaluating Severity

Catastrophic = 5 Multiple fatalities as a result of occupational disease	Critical = 4 Fatality number of irreversible occupational disease cases	Serious = 3 Irreversible occupational diseases	Marginal = 2 Reversible health conditions	Negligible = 1 Under exposure
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2. Evaluating Frequency

Frequent = 5 Risk result in specific consequence continuously present	Regular = 4 Risk result in specific consequence daily	Occasional = 3 Risk result in specific consequence monthly	Uncommon = 2 Risk result in specific consequence more than once per year	Rare = 1 Risk result in specific consequence less than once per year
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3. Evaluating Exposure

Extensive = 5 Value is greater than 2x OEL	Widespread = 4 Value is between OEL and 2x OEL	Significant = 3 Value is equal to OEL	Restricted = 2 Value is between Action level and OEL	Negligible = 1 Value is below Action level
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4. Risk Ranking is: Severity x Frequency x Exposure = RR

8. Questions

A wide-angle photograph of a paved road stretching into the distance. The road is flanked by green grass. In the sky, there is a rainbow and many birds flying. The overall scene is bright and open.

Questions?