GUIDANCE NOTE FOR A MANAGEMENT AND CONTROL PROGRAMME FOR TUBERCULOSIS IN THE SOUTH AFRICAN MINING INDUSTRY

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I, MTHOKOZISI ZONDI, Acting Chief Inspector of Mines, under section 98(1) of the Mine Health and Safety Act, 1996 (Act 29 of 1996) and after consultation with the Council, hereby issues the guidance note for a management and control programme for tuberculosis in the South African mining industry in terms of the Mine Health and Safety Act, as set out in the Schedule.

(Signed)

MTHOKOZISI ZONDI
Acting Chief Inspector of Mines

SCHEDULE

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DEPARTMENT OF MINERAL RESOURCES
MINE HEALTH AND SAFETY INSPECTORATE

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(Signed)

Chief Inspector of Mines

mineral resources
Department:
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REPUBLIC OF SOUTH AFRICA

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GUIDANCE NOTE

1 Foreword

1.1 This Guidance Note has been produced to assist in the diagnosis and treatment of **TB** in the South African mining industry. It is intended as a supplement to the **NTBMG** issued by the **NDOH**. Even though **TB** control, as an infectious disease, is primarily the responsibility of the **NDOH**, the mining industry has assumed a more active role to address the national problem of **TB** and to support the **NTBMG**.

1.2 Section 13 of the MHSA requires establishment of the system of the medical surveillance and the reporting of the results are done in terms of **DMR** form 164. **TB** is one of the diseases that need to be reported on. The employer's system of medical surveillance should therefore include a **TB** control programme.

1.3 The following are the recognised risk factors that contribute in the epidemiology of **TB** in the mines: dust exposure, migrant labour system, in-house spread of **TB** facilitated by hostel accommodations, the development of informal housing and **HIV**. However, this document does not specifically address the management of these risks. Integration of **TB, HIV** and **AIDS** care is essential

for any **TB** control programme. The management of **TB** cases on mines requires measures that are additional to those in the national guidelines. The reasons for this include the occupational risk of silica dust, the high **TB** incidence rates, the high prevalence of Non-tuberculosis mycobacteria (NTM) disease, the fact that **TB** and silico tuberculosis are potentially compensable diseases in terms of the **ODMWA** and **COIDA**.

1.4 This document aims to define these additional practice standards. The practice standards set out in this document should apply to all people working on mines, irrespective of employment category, and including contract workers. Employee representatives should be involved in all aspects of programme implementation that might directly affect them, either through health and safety committees, or through infectious diseases committees.

1.5 In the mining industry implementation of the **NTBMG** is facilitated through documents issued by the **DMR**. This Guidance Note is one of three such documents. The other two are the Guidelines for Tuberculosis Preventive Therapy among People Living with HIV and Silicosis In South Africa (Isoniazid Preventative Therapy (IPT) Policy) and the Guidance Note for Implementation of TB Preventative Therapy among People Living with HIV and Silicosis). All three of these documents should be consulted in compiling the employer's **TB** control programme.

2 Legal status of the guidance note

This Guidance Note sets out good practice and will be widely distributed by the Mine Health and Safety Inspectorate within the industry. As is the case with all other documents setting out accepted good practice, the application of inferior practices without justification could be regarded as negligence.

3 Objective of the guidance note

The objective of this Guidance Note is to assist employers to establish and maintain tuberculosis control programmes at mines to reduce the burden of **TB**, the prevention of disability and mortality, through the prevention, early detection and successful treatment of cases.

4 Definitions and acronyms

'AIDS' means Acquired Immunodeficiency Syndrome.

'AMR' means Annual Medical Report.

'ART' means Antiretroviral Therapy.

'Case of tuberculosis' means either a definite case (as defined below) or a patient that has been diagnosed with **TB** by a **health worker** based on clinical picture, x-rays or other tests, and who has started on a full course of **TB** treatment.

'Close contact' means a person who shared the same enclosed living or working space for at least eight continuous hours with the index case during the 3 months before commencement of the current treatment episode.

'COIDA' means Compensation for Occupational Injuries and Disease Act, Act 130 of 1993.

'Contact' means a person who has been sharing the same environment with a person who has confirmed infectious **TB** disease (index case).

'DMR' means Department of Mineral Recourses.

'DST' means Drug Susceptibility Testing.

'Health worker' means all people primarily engaged to enhance health by providing preventative, curative, promotional or rehabilitative health care services.

'HIV' means Human Immunodeficiency Virus.

'MBOD' means Medical Bureau for Occupational Diseases.

'MDR-TB' means Multidrug-Resistant Tuberculosis, which has the following categories:

(a) **'New case of MDR-TB'** means a patient who has received no anti tuberculosis treatment for **TB, MDR—TB** or Extensively Drug Resistant Tuberculosis (**XDR-TB**) or received less than 4 weeks anti-**TB** drugs.

(b) **'Previously treated with first-line drugs only'** means a patient who has been treated for 4 weeks or more with first line drugs.

'MHSA' means Mine Health and Safety Act, 1996 (Act 29 of 1996) as amended.

'MHSC' means Mine Health and Safety Council.

'NAT' means Nuclear Amplification Test.

'New case of TB' means in cases of **TB**, other than **MDR-TB**, a patient who has never had treatment for **TB** or who has taken anti-tuberculosis drugs for less than 4 weeks and possibly having smear positive/ negative **PTB** or Extra Pulmonary **TB** (EPTB).

'NDOH' means National Department of Health.

'NIOH' means National Institute for Occupational Health.

'NTBMG' means National Tuberculosis Management Guideline issued by **NDOH**.

'ODMWA' means Occupational Diseases in Mines and Works Act, Act 78 of 1973 (as amended).

'PTB' means Pulmonary **TB**.

'Relapse' means a pulmonary **TB** patient who received treatment and was declared cured or treatment completed at the end of the treatment period and has now developed sputum smear or culture positive pulmonary **TB** again.

'TB' means tuberculosis.

NOTE: Patients who remain smear/culture positive at the end of the second or subsequent treatment period are no longer defined as chronic they should be classified by the outcome of their most recent treatment course ie failed, defaulted or relapsed.

5 The objectives of a tuberculosis control programme at a mine

The objectives of a **TB** control programme should be to:

5.1 Obtain at least 90% treatment success rate for all **TB** cases.

5.2 Reduce defaulter rate to less than 5%.

5.3 Implement Directly-Observed Treatment, course (DOTS) for 100% of **TB** cases on intensive and continuation treatment phases.

5.4 Notify 100% of **TB** cases to the **NDOH**.

5.5 Report all **TB** cases to the **DMR** as per the Health Incident Report (HIR) and the **AMR** requirements.

5.6 Submit 100% of **TB** cases reportable under **ODMWA** and **COIDA**.

5.7 Screen all **close contacts**.

5.8 Achieve 100% investigation of all symptomatic **TB contacts**.

5.9 Conduct annual **TB** symptomatic screening of all employees.

5.10 Ensure continuity of care for patients on **TB** treatment.

5.11 Promote access to **HIV** and **AIDS** prevention, treatment care and support services for all employees with **TB** by ensuring the following:

5.11.1 Offer every **TB** patient with provider initiated **HIV** counselling and testing;

5.11.2 Put every **TB** and **HIV** co-infected patients on Highly Active Antiretroviral Therapy (HAART); and

5.11.3 Screen all **HIV** positive patients for **TB** with increased frequency.

PART B
COMPONENTS OF A TB CONTROL PROGRAMME

The **TB** control programme should cover the following components:

1 Passive case finding

1.1 There should be a **TB** education initiative, which may be through peer educators or formal presentations, and which reaches all employees. Medical or nursing staff should implement awareness training programme on signs and symptoms of **TB**, the importance of early presentation and diagnosis, and on prevention of transmission.

1.2 A high index of suspicion for **TB** should be inculcated in all **health workers**, and should be maintained through continuous training as well as regular awareness campaigns.

1.3 The employer should provide easy access to a good quality, diagnostic and treatment service for **TB**, and integrated **TB** and **HIV** treatment services.

2 Active case finding

2.1 Employees should be screened by means of annual chest x-rays.

2.2 All employees should undergo symptomatic screening for **TB** at every health care visit (cough questionnaire).

2.3 Screening of **close contacts** of **TB** index cases should be initiated as per **NTBMG**.

3 TB case definition

The case definition of **TB** is any patient with either of, or both, the following compatible clinical or radiological features:

3.1 **Bacteriologically confirmed**: A patient with Mycobacterium tuberculosis complex identified from a clinical specimen, either by smear microscopy, culture or molecular assays; and/or

3.2 **Clinically diagnosed**: A person started on **TB** treatment by a **health worker** based on clinical presentation, x-rays findings or other tests.

4 Diagnosis

4.1 In all suspected cases of **TB**, a chest x-ray and the following laboratory investigations should be conducted:

4.1.1 At least two sputum smear examinations; and

4.1.2 Sputum culture and first line **DST** or **NAT** (eg Gene-Xpert).

4.2 In all confirmed **MDR-TB** cases second line **DST** should be conducted.

4.3 Only laboratories accredited by the South African National Accreditation System (SANAS) to do the tests contemplated in 4.1.1 and 4.1.2 above should be used. The target for the turnaround time for smear and nuclear amplification test is to

have the results back at the health facility within 48 hours. The target for the turnaround time for culture is to have the results back at the health facility within 2-8 weeks.

NOTE: Under **ODMWA**; pleural, inter-thoracic lymph nodes and pericardial **TB** is considered as occupational tuberculosis. Investigation and diagnosis of disease involving these sites may require additional investigations.

5 Treatment category

Patients should be classified as either 'new' or 'previously treated' patients as follows:

5.1 New patients are those who are a **new case of TB** or a **new case of MDR-TB**; and

5.2 Previously treated patients are those who:

5.2.1 Have taken **TB** treatment for 4 weeks or more in the past and either relapsed, defaulted or had treatment failure and possibly having positive or negative smear microscopy and culture or extra pulmonary **TB** disease; or

5.2.2 In the case of **MDR-TB**, are previously treated with first-line drugs only.

6 Treatment regimens

These should be strictly as recommended in the **NTBMG** (as set out below).

REGIMEN 1: For new patients and previously treated

Pre-treatment body weight	**Intensive Phase** 7 days a week for 2 months	**Continuation phase** 7 days a week for 4 months	
	RHZE (150,75,400,275)	**RH (150,75)**	**RH (300,150)**
30-37 kg	2 tabs	2 tabs	
38-54 kg	3 tabs	3 tabs	
	4 tabs		2 tabs
>70 kg	5 tabs		2 tabs

NOTE: Where **NAT** is used and the result is Rifampicin susceptible then Regimen 1 should be used for both new and previously treated patients. Where the **NAT** result is Rifampicin resistant, the patient should be started on **MDR-TB** treatment. All Rifampicin resistant patients should have a culture and first line **DST** conducted to confirm **MDR-TB**. The dosages may be adjusted based on changes in weight.

7 Fitness to perform work

Evaluation of fitness to return to work should be individualised, as per the Minimum Standards of Fitness to Perform Work Guideline. It is further recommended that the employee should be clinically well and smear negative. The assessment for fitness to perform work must be conducted to determine whether the employee is fit to perform their previous work.

NOTE: Loss of income and disability should be managed in accordance with the relevant legislation and collective agreements.

8 Case monitoring

8.1 Smear positive patients should be kept isolated in the ward where possible, until they are smear negative.

8.2 A holistic package of **TB** care should include: **HCT**; adherence counselling; psychological support; nutritional assessment and education; and integration with the **HIV** prevention and management programme.

8.3 A treatment adherence programme should be implemented for all **TB** cases. The programme should cover the following:

8.3.1 Education about the disease;

8.3.2 Duration of treatment;

8.3.3 Medication to be taken and possible side effects;

8.3.4 Importance of adherence to prescribed treatment regime;

8.3.5 Psychological support when required; and

8.3.6 Treatment support and monitoring.

8.4 The response to treatment should be assessed at the end of the intensive and continuation treatment phases in accordance with the **NTBMG**.

8.5 For assessment and reporting of possible disability, a clinical examination, chest-x-ray and lung function test should be performed six to twelve months after completion of therapy.

8.6 Leave arrangements for employees on **TB** treatment should take account of the following:

8.6.1 Taking leave during the initial phase of treatment is not encouraged.

8.6.2 When leave is taken, there must be counselling and provision of sufficient medication.

9 Treatment outcomes

Treatment outcomes should be classified as follows:

Cured:	Patient whose baseline smear (or culture) was positive at the beginning and who is smear-negative (or culture negative) in the last month of treatment and on at least one previous occasion at least 30 days prior to the last month of treatment.
Treatment completed:	Patient whose baseline smear (or culture) was positive at the beginning and has completed treatment but does not have a negative smear/culture in the last month of treatment and on at least one previous occasion more than 30 days prior.
Treatment failure:	Patient whose baseline smear (or culture) was positive and remains or becomes positive again at 5 months or later during treatment.
Died:	Patient who dies for any reason during the course of **TB** treatment. (see note below)
Treatment default:	Patient whose treatment was interrupted for more than two consecutive months before the end of the treatment period.
Transfer out:	Patient who has been transferred by the employer to another reporting unit (eg district, province or country) and for whom the treatment outcome is not known.

NOTE: In addition, deaths while on treatment should be sub-classified as:

(i) Those due to **TB**;

(ii) Those due to other causes; and

(iii) Those in which the cause of death could not be determined.

Where autopsies are requested, these should be performed with appropriate consent of the relatives. Autopsy results should be requested from the **NIOH** in order to determine compensation where indicated.

10 Treatment follow-up

10.1 Where a patient is separated from work while on treatment the employer should make reasonable efforts to ensure continuous treatment and determine the final

outcome. The employer should, as far as reasonably practicable, try to arrange for the patient to return for assessment (at the end of treatment). If this is not possible, alternative arrangements should be put in place to determine the outcome.

10.2 For those patients who interrupt treatment for less than two months refer to the protocol below **(NTBMG)**.

TIMING OF SPUTUM EXAMINATION	AIM	ACTION	COMMENTS
END OF INTENSIVE PHASE			
One week before the end of the two months' intensive phase of treatment (at seven weeks)	To determine smear conversion a sign of good clinical progress.	1) **If negative**, change to the continuation phase of treatment at the end of the 8th week of intensive phase treatment. 2) Register the patient as 'negative'.	This means the patient is responding well to treatment. Educate and counsel patient about importance of treatment compliance.
	To guide the **health worker** on whether to change the patient to continuation phase of treatment or extend the intensive phase.	3) **If positive**, check for treatment compliance, reassess patient clinically: *(a)* Conduct LPA (or culture and DST, if LPA is not available).	This indicates the following: • That the initial phase of therapy was poorly supervised and that patient's compliance to treatment was poor.
		(b) Continue with the intensive phase treatment for one month. *(c)* Register the patient as 'positive'. *(d)* Review the drug susceptibility results when available.	• That there is a slow rate of progress with smear conversion, which is common in patients with extensive cavitations and a high bacillary load at diagnosis. • That the patient may have resistance to the other **TB** drugs ie Isoniazid (since only Rifampicin resistance was excluded upfront) or may have been re-infected with a drug resistant strain. • The patient could have non-tuberculous mycobacterial infection. • The patient may have another condition or taking other medication that affects the absorption or effectiveness of the **TB** drugs. • Patient may have been infected with mixed strains with amplification of resistant strains due to treatment. Address treatment compliance by counselling

			the patient and identifying a treatment supporter where necessary.
FOR THOSE REMAINING POSITIVE AT 2 MONTHS			
Repeat smear one week before the end of the third month (11 weeks)		4) **If negative and drug susceptible**, change to continuation phase of treatment at the end of the 12th week. Register the patient as 'negative'. 5) **If negative and Isoniazid mono resistant TB is confirmed**, continue intensive phase treatment and refer patient to **MDR-TB** for assessment and registration in DR-**TB** register. Register the patient as 'Isoniazid mono-resistant **TB**' in the **TB** register.	The intensive phase treatment is not extended beyond three months in patients with drug susceptible **TB**.
		6) **If still positive and RR-TB or MDR-TB is confirmed**, stop treatment and refer patient to the **MDR-TB** treatment initiation site for assessment and treatment initiation. Register the patient as '**RR-TB** or MDR-**TB**' in **TB** register.	
END OF CONTINUATION PHASE			
One week before the end of the four months' continuation phase (at 23 weeks)	To determine the final outcome of treatment for the patient.	1) **If negative**, stop treatment at the end of the 24th week of treatment. Register the patient as 'cured'.	Educate the patient about **TB** prevention and healthy lifestyle.
		2) **If positive**, stop **TB** treatment. Register patient as 'treatment failure'. *(a)* Conduct LPA and DST for pyrazinamide and ethambutol. *(b)* Review the results when available.	This indicates the following: • That the patient was re-infected with a sensitive or resistant strain. • The treatment during the continuation phase was unsupervised and patient compliance was poor.
FOR THOSE REMAINING POSITIVE AT 6 MONTHS			
	To determine further management of the patient.	1) **If drug susceptible**, restart **TB** treatment, counsel the patient and provide treatment support.	
		2) **If DR-TB**, **RR-TB**, Isoniazid **Mono resistant**, **MDR-TB**, Other resistance), refer to the **MDR-TB** treatment	

		initiation site hospital for assessment and treatment.	

10.3 Referral to another facility for **TB** care beyond employment

10.3.1 Where a patient's employment is terminated while on **TB** treatment, the patient should be referred to an appropriate **TB** care facility where the patient can continue with treatment.

10.3.2 The **TB** care facility concerned should be contacted and alerted of the patient referred to it. The **TB** care facility should also be provided with contact details of the patient. If the **TB** care facility concerned is in another country, the National **TB** Manager of that country should be contacted.

10.3.3 The patient should be provided with a letter or form detailing the diagnosis, bacteriological investigations conducted (including dates), treatment regimen dosages and other chronic medication or ancillary medication that the patient is taking. The letter should also indicate the expected date for follow up at the mine health centre/one stop services during and post treatment (12 months after treatment completion). The referral letter should be accompanied by:

(a) GW 20/14 Referral Form prescribed by the **NDOH**;

(b) The patient's health record (green card); and

(c) **MBOD** guideline/**COIDA** (first, progress and final report) for benefit examination and compensation.

10.3.4 The patient should be provided with a counselling package which includes:

(a) the available information on the receiving facility; and

(b) importance of presenting to the receiving facility to his home and continuation and when they should present to the clinic/ hospital.

NOTE: A copy of the GW 20/14 Form should be forwarded to the province/ country where the patient resides to ensure continuum of treatment and care. The acknowledgement slip on the form must be completed by the receiving facility and returned to the referring mine health facility.

10.4 Provision of **TB** services where employer does not have a health care facility

Where the employer does not provide access to health services, it should refer employees to the nearest local health care facility for diagnosis and treatment.

10.5 Infection control

The **TB** management control programme should include appropriate infection control measures, covering at least:

10.5.1 Workplace and administrative controls;

10.5.2 Environmental control measures;

10.5.3 Measures to protect **health workers** and staff; and

10.5.4 An implemented written infection control plan for each facility.

11 Reporting and monitoring

The following reporting and monitoring initiatives should be addressed:

11.1 **NDOH** should be notified of all **TB** cases using the Notifiable Medical Conditions Form (GW 17/5);

11.2 The monthly report for the District Health Information System (DHIS) and quarterly report for the Electronic **TB** Register (ETR.net) should be submitted to the district health authorities;

11.3 Reporting should be made in terms of the **MHSA** requirements; (DMR 164; DMR 165; DMR 231);

11.4 All **TB** cases must be reported to the Director: **MBOD** at the time of diagnosis and after the post treatment completion examination using the **MBOD** prescribed form;

11.5 All deaths presumed to be due to **TB** should be notified on the death form BI-1663 from Department of Home Affairs;

11.6 In cases of deaths due to other causes, cardio respiratory organs should be sent to the **NIOH** for post mortem and **Consent Form for a post-mortem** should be filled. These should be performed with appropriate consent of the next of kin; and

11.7 The **MHSC TB** Programme Review Tool for the mining industry should be used as a standard tool for monitoring and evaluating the **TB** control programme.

12 Training and support

The employer's **TB** control programme should address the following training initiatives:

12.1 **Health Workers** should be specifically trained in all aspects of **TB** management in accordance with the **NTBMG, DMR** Guidance Note and the **MHSC TB** Review Tool;

12.2 All mine health and safety representatives should be trained about the signs and symptoms of **TB**, the importance of early presentation and diagnosis, and on prevention of transmission; and

12.3 Data managers involved in the **TB** control programme must be trained in the collection, recording, analysis and reporting of **TB** data.

13 Liaison with the public sector

It is recommended that medical and nursing staff involved with the management of patients with **TB** should on a regular basis interact with district health staff.

14 Certain documents to be available

The employer should ensure that the following documents are available:

14.1 Copies of the latest **NTBMG** and this guidance note should be available in all clinics and centres where **TB** is treated.

14.2 A copy of the employer's **TB** control programme should be available at the mine.

15 Performance indicators

15.1 The employer's **TB** control programme should provide for the collection of data that will allow calculation of the following:

15.1.1 Percentage of **TB, MDR-TB** and **XDR TB** patients started treatment;

15.1.2 Percentage of **TB** patients tested for HIV;

15.1.3 Percentage of **TB/HIV** co-infected patients on **ART** (not started);

15.1.4 Percentage of **TB** patients with known **HIV** status;

15.1.5 Percentage of all employees screened for **TB**;

15.1.6 New Smear Positive Cure Rates;

15.1.7 New Smear Positive Death Rates;

15.1.8 New Smear Positive Defaulter Rates;

15.1.9 Treatment success for all **TB**;

15.1.10 Defaulter rate for all **TB**; and

15.1.11 Death rate for All **TB**.

Indicator definitions and targets (as per **NTBMG**)

	INDICATOR	DESCRIPTION	SOURCE	COLLECTION	TARGET
1	New smear positive cure rates.	**Numerator**: Number of new smear positive cases cured. **Denominator**: Total number of new smear-positive cases started on treatment.	Electronic **TB** Register (ETR.net)	Quarterly	More than 90%
2	New smear positive death rates.	**Numerator**: Number of new smear positive cases that died. **Denominator**: Total number of new smear-positive cases started on treatment.	ETR.net	Quarterly	Less than 5%
3	New smear positive defaulter rate.	**Numerator**: Number of new smear positive cases that defaulted treatment. **Denominator**: Total number of new smear-positive cases started on treatment.	ETR.net	Quarterly	Less than 5%
4	Treatment success for all **TB**	**Numerator**: Number of all **TB** cases cured and completed treatment. **Denominator**: Total number of all **TB** cases started on treatment.	ETR.net	Quarterly	More than 90%
5	Death rate for all **TB**	**Numerator**: Number of all **TB** cases that died. **Denominator**: Total number of all **TB** cases started on treatment.	ETR.net	Quarterly	Less than 5%
6	Defaulter rate for all **TB** cases	**Numerator**: Number of all **TB** cases that defaulted treatment. **Denominator**: Total number of all **TB** cases started on treatment.	ETR.net		Less than 5%
7	Percentage of **TB** patients started on treatment	**Numerator**: Number of **TB** patients started on treatment. **Denominator**: Number of patients diagnosed with **TB** the ratio multiplied by 100.	ETR.net	Monthly	100%
8	Percentage **MDR-TB** and patients started on treatment	**Numerator**: Number of **MDR-TB** patients started on treatment. **Denominator**: Number of patients diagnosed with **TB** the ratio multiplied by 100.	ETR.net	Monthly	100%
9	Percentage of **TB** patients tested for **HIV**	**Numerator**: Number of **TB** patients tested for HIV.			90%

		Denominator: The number of **TB** patients. The ratio multiplied by 100.			

10	Percentage of **TB** patients with known **HIV** status	**Numerator**: Number of **TB** patients with known **HIV** status. **Denominator**: Number of all **TB** cases. The ratio to be multiplied by 100.			90%
11	Percentage of **TB/HIV** co-infected patients on **ART** (not started on **TB** treatment)	**Numerator**: The number of **TB/HIV** co-infected patients on **ART**. **Denominator**: The number of all **TB** cases. The ratio to be multiplied by 100.			90%
12	Percentage of all employees screened for **TB**	**Numerator**: Number of employees screened for **TB**. **Denominator**: Number of all employees. The ratio multiplied by 100.			100%

16 Programme performance reviews

16.1 It is recommended that internal review of the employer's **TB** control programme should be conducted annually using the **MHSC TB** Review Tool to enable **health workers** to analyse their performance. Groups of mines (ie corporations, or mines of a certain type and in a certain area) may also gain insight through pooling their data for analysis, especially if the numbers of cases on individual mines are low.

16.2 It is recommended that an employer's **TB** control programme should be subject to external review once every five years.

ANNEXURE A:
A LIST OF RESOURCES FOR FURTHER READING

(For information purposes only)

1 Department of Health: National Strategic Plan on HIV, TB and STI's 2017-2022.

2 Department of Health (2009). National Tuberculosis Management Guidelines (2009). Department of Health, Pretoria (2009).

3 Department of Health (2009). Management of Drug-Resistant Tuberculosis (2009). Department of Health, Pretoria (2009).

4 World Health Organisation (2004). TB/HIV a clinical manual second edition. World Health Organization, Geneva (2004).

5 World Health Organisation (2006). Guidelines for the programmatic management of Drug-Resistant Tuberculosis. World Health Organization, Geneva (2006).

6 World Health Organisation (2007). Improving the diagnosis and treatment of Smear-Negative Pulmonary Tuberculosis among adults and adolescents: Recommendations for HIV-prevalent and resource constrained settings. World Health Organization, Geneva (2007).

7 Addendum to WHO guidelines for the prevention of tuberculosis in health care facilities in resource-limited settings (1999).

8 Department of Health (2007). National TB infection control guidelines. Department of Health, Pretoria (2007).