DME 16/3/2/2 - A5

DEPARTMENT OF MINERALS AND ENERGY

MINERALS AND ENERGY FOR

DEVELOPMENT AND PROSPERITY

MINE HEALTH AND SAFETY INSPECTORATE

GUIDELINE FOR THE COMPILATION OF A MANDATORY CODE OF PRACTICE FOR THE SAFE OPERATION OF

MONORAIL SYSTEMS

_____

Acting Chief Inspector of Mines

01 - 12 - 2006

DATE

CONTENTS OF GUIDELINE

PART A: THE GUIDELINE

1. FOREWORD

Monorail systems were identified as having the potential to create significant risks possibly requiring regulating. A task group with members chosen from the regions where monorail systems are used was established under the auspices of the MRAC to investigate the most appropriate means of regulating monorail systems. After considering South-African and international standards it was decided that a guideline for the compilation of a mandatory COP would be the most appropriate means of regulating monorail systems as it will allow for mine specific solutions to be written into a comprehensive COP.

2. LEGAL STATUS OF GUIDELINES AND CODES OF PRACTICE

2.1 In accordance with section 9(2) of the MHSA an employer must prepare and implement a mandatory COP on any matter affecting the health and safety of employees and other persons who may be directly affected by activities at the mines if the Chief Inspector of Mines requires it. These COPs must comply with any relevant guidelines issued by the Chief Inspector of Mines (section 9(3).

2.2 Failure by the employer to prepare or implement a COP in compliance with this guideline is a breach of the MHSA. Any contravention of, or failure to comply with, a COP is not, in it self, a breach of the MHSA, except a contravention or failure by an employer that also constitutes a failure to implement the COP. Since the DME does not approve COPs, its focus is not to enforce them either. The focus of the DME is to ensure that employers provide health and safe working environments at mines, i.e. focusing on systems failures and compliance with the MHSA, rather than enforcing compliance with COPs.

2.3 The fact that a contravention of, or failure to comply with, a COP is not a breach of the MHSA does not mean that such breaches will have no legal implications. As far as the employer is concerned, there are numerous specific and general obligations on the employer in the MHSA aimed at ensuring the health and safety of all employees and all persons who are not employees but may be directly affected by the activities at the mine. Where any failure to comply with a COP also constitutes a breach of any of the employer's obligations under the MHSA the employer could be liable to an administrative fine for such breach. An inspector could also issue various instructions to the employer and employees in terms of section 54 to protect the health or safety of persons at the mine. Failure by an employer to comply with such an instruction could render the employer liable to an administrative fine.

2.4 As far as employees are concerned, section 22 places a number of obligations on employees, including that they must take reasonable care to protect their own health and safety and the health and safety of other persons who may be affected by their conduct. Where a failure by an employee to comply with a COP would also constitute a breach of the employee's duties in terms of section 22 (or a breach of section 84, 86(1) or 88), the employee could be criminally charged for such breach. As is the case with employers, the inspectorate could issue instructions to employees in terms of section 54 and failure to comply with such an instruction constitutes a criminal offence.

2.5 Employers should deal with breaches by employees of COPs in terms of the mine's standard instructions and the employer's disciplinary procedures. This is not the responsibility of the State.

3. THE OBJECTIVE OF THIS GUIDELINE

The objective of this guideline is to enable the employer at every mine where monorail systems are used to compile a COP, which, if properly implemented and complied with, would improve health and safety in connection with the use of such monorail systems.

4. DEFINITIONS AND ACRONYMS

In this guideline for a COP or any amendment thereof, unless the context otherwise indicates: -

COP means Code of Practice

DME means the Department of Minerals and Energy;

Drive unit means a power unit that propels the monorail train;

MHSA means Mine Health and Safety Act, Act 29 of 1996;

MRAC means the Mining Regulation Advisory Committee;

Monorail means a single rail track used for the conveyance of equipment, mineral, material and persons;

Monorail conveyance means any conveyance and its attachments running on the rail track that can be coupled to the drive unit from which any load can be suspended;

Monorail system means a combination of monorail trains and rail tracks;

Monorail train means a combination of drive units and various types of monorail conveyances with their load;

Rail track means a system of carrying and guiding rails, including switches and turn tables.

5. SCOPE

This guideline for a mandatory COP covers the significant health and safety aspects associated with the design, installation, application, organisational work methods, competency criteria for drivers or operators as well as the provision of personal and protective equipment as they relate to monorail systems.

6. MEMBERSHIP OF TASK GROUP PREPARING THE GUIDELINE

6.1 This document was prepared by the DME Task Group responsible for the drafting of legislation relating to monorail systems appointed in terms of the baseline regulation implementation schedule approved by the MRAC.

6.2 The members appointed were the following:

Messrs	LJA	Bezuidenhout	-	DME (Convener)
	ES	Coetzee	-	DME
	RP	Swart	-	DME

6.3 The task group consulted the following engineers from selected mines utilizing monorail sys tems:

Messrs	JO	Carstens	-	Impala Platinum
	MJ	van Niekerk	-	Target Gold Mine
	E	van Rooyen	-	Target Gold Mine

6.4 A Tripartite Task Group was established on recommendation of the MRAC who completed the final document. The following persons were members of this task group.

Messrs	LJA	Bezuidenhout	-	DME (Convener)
	ES	Coetzee	-	DME
	JO	Carstens	-	Impala Platinum
	C	Hughes	-	Avgold
	L	Martin	-	Anglo Coal
	BH	Brasher	-	Consultant for Avgold

PART B: AUTHOR'S GUIDE

1.1. The COP must, where possible, follow the sequence laid out in Part C "Format and Content of the Code of Practice". The pages as well as the chapters and sections must be numbered to facilitate cross-referencing. Wording must be unambiguous and concise.

1.2. It should be indicated in the COP and on each annex to the COP whether

1.2.1 The annex forms part of the COP and must be complied with or incorporated in the COP or whether aspects thereof must be complied with or incorporated in the COP; or

1.2.2. The annex is merely attached as information for consideration in the preparation of the COP (i.e compliance is discretionary).

1.3. When annexes are used the numbering should be preceded by the letter allocated to that particular annex and the numbering should start at one (1) again. (e.g. 1,2,3,….A1,A2,A3,…….)

1.4. Whenever possible illustrations, tables, graphs and the like, should be used to avoid long descriptions and/or explanations.

1.5. When reference has been made in the text to publications or reports, references to these sources must be included in the text as footnotes or side notes as well as in a separate bibliography.

PART C: FORMAT AND CONTENT OF THE CODE OF PRACTICE

1. TITLE PAGE

The COP must have a title page reflecting at least the following:

1.1 Name of mine;
1.2 The heading: "Mandatory COP for the Operation of Monorail Systems";
1.3 A statement to the effect that the COP was drawn up in accordance with guideline DME 16/3/2/2-A5 issued by the Chief Inspector of Mines;
1.4 The mines reference number for the COP;
1.5 Effective date; and
1.6 Revision dates.

2. TABLE OF CONTENTS

The COP must have a comprehensive table of contents.

3. STATUS OF MANDATORY CODE OF PRACTICE

This section must contain statements to the effect that-

3.1 The mandatory COP was drawn up in accordance with Guideline DME 16/3/2/2-A5 issued by the Chief Inspector of Mines;

3.2 This is a mandatory COP in terms of sections 9(2) and 9(3) of the MHSA;

3.3 The COP may be used in an incident investigation/inquiry to ascertain compliance and also to establish whether the COP is effective and fit for purpose;

3.4 The COP supersedes all previous relevant COPs; and

3.5 All managerial instructions or recommended procedures (voluntary COPs) and standards on the relevant topics must comply with the COP and must be reviewed to assure compliance.

4 MEMBERS OF DRAFTING COMMITTEE

4.1 In terms of section 9(4) of the MHSA the employer must consult with the health and safety committee on the preparation, implementation or revision of any COP.

4.2 It is recommended that the employer should, after consultation with the employees in terms of the MHSA, appoint a committee responsible for the drafting of the COP.

4.3 The members of the drafting committee assisting the employer in drafting the COP should be listed giving their full names, designations, affiliations and experience. This committee should include competent persons sufficient in number to effectively draft the COP.

5. GENERAL INFORMATION

The general information relating to the mine must be stated in this paragraph. The following minimum information must be provided:

5.1. A brief description of the mine and its location;
5.2. The commodities produced;
5.3. The mining methods/mineral excavation processes;
5.4. A description of the monorail systems used at the mine, including indicating the machine population; and
5.5. Other relevant COPs.

6. TERMS AND DEFINITIONS

Any word, phrase or term of which the meaning is not absolutely clear or which will have a specific meaning assigned to it in the COP, must be clearly defined. Existing and/or known definitions should be used as far as possible. The drafting committee should avoid jargon and abbreviations that are not in common use or that have not been defined. The section on definitions should also include acronyms and the technical terms used.

7. RISK MANAGEMENT

7.1 Section 11 of the MHSA requires the employer to identify hazards, assess the health and safety risks to which employees may be exposed while they are at work and record the significant hazards identified and risk assessed. The COP must address how the significant risks dentified in the risk assessment process must be dealt with, having regard to the requirement of section 11(2) and (3) that, as far as reasonably practicable, attempts should first be made to eliminate the risk, thereafter to control the risk at source, thereafter to minimize the risk and thereafter, insofar as the risk remains, to provide personal protective equipment and to institute a programme to monitor the risk.

7.2 To assist the employer with the risk assessment, all possible relevant information such as accident statistics, ergonomic studies, research reports, manufacturers' specifications, approvals, design criteria, performance figures for the monorail system should be obtained and considered. Annex A sets out a list of useful reference documents. Annex A is attached for information purposes.

7.3 In addition to the periodic review required by section 11(4) of the MHSA, the COP should be reviewed and updated after every serious incident relating to the topic covered in the COP, or if significant changes are introduced to procedures, mining and ventilation layouts, mining methods, plant or equipment and material.

8. ASPECTS TO BE ADDRESSED IN THE MANDATORY CODE OF PRACTICE

The COP must set out how the significant risks identified and assessed in terms of the risk assessment process referred to in paragraph 7.1 will be addressed.

The COP must address the design, installation, operation, maintenance and de-commissioning of monorail systems with regard to the aspects set out hereunder unless there is no significant risk associated with that aspect at the mine.

NOTE: Annex A sets out useful reference documents which could be consulted when drafting the CoP. These documents are attached for information purposes only. The references included and indicated by ■ in some of the paragraphs below are from documents referenced in Annex A.

8.1 Monorail train falling from support system

8.1.1. In order to prevent failure of the hanging wall or roof due to additional stress caused by the monorail system and rail track being supported on the hanging wall or a roof, the COP must set out measures to address the support of the monorail system and rail track to the hanging wall or roof with reference to rock mechanic principles and the applicable COP for falls of ground.

8.1.2. In order to prevent suspension components such as roof bolts, bolts, shackles, chains and steel supports from failing under static and dynamic loads, the COP must address such suspension components for both static and dynamic loads.

- ■ Suspended monorail systems for mining: Mounting rails for rope-driven suspended monorail systems - DIN 20 629 Part1
- ■ Double-end fork turnbuckles - DIN 20 633.
- ■ Suspension Shackles - DIN 20 635
- ■ Suspension Claws Requirements and Testing - DIN 20 636.
- ■ Calibrated round steel long-link chains for suspensions - DIN 20 637.
- ■ Circular of the Regional Superior Mining Office of Nordrhein-Westfalen: 1981-08-24: Guidelines for rope-hauled suspended monorail transport.- Section 3.2.
- ■ The installation, maintenance and safe use of overhead monorail transport systems for underground use. SANS 10335 Section 4.1

8.1.3. In order to prevent the monorail train from falling due to rail tracks and rail track connections breaking or disconnecting, the COP must set out measures to prevent rail tracks and rail track connections from breaking or disconnecting.

- ■ Safety evaluation of suspended monorail sections in relation to different operating parameters - Martin Tobrock.
- ■ Force-guided railways in underground mining DIN 20 620-1.
- ■ Suspended monorail systems for mining: Mounting rails for rope-driven suspended monorail systems - DIN 20 629 Part1.
- ■ Circular of the Nordrhein - Westfalen Regional Mining Authority of 1979-03-22: Directives for suspended monorail systems with diesel locomotives. Section 2.3.1.
- ■ Suspended monorail transport systems for mining: Permissible loads for I140E rails with 140E/76 rail bonds, rail suspensions and their abutments - DIN 20 622
- ■ Suspended monorail systems in underground mining: Rails; Straight rails - DIN 20 593 Part 1 and Curved Rails and adapting rails DIN 20 593 Part 2.
- ■ Circular of the Regional Superior Mining Office of Nordrhein-Westfalen: 1981-08-24: Guidelines for rope-hauled suspended monorail transport.- Section 3.2.
- ■ The installation, maintenance and safe use of overhead monorail transport systems for underground use. SANS 10335 Section 4.7.1

8.1.4. In order to prevent the monorail train from falling or derailing by driving off the end of a rail track, the COP must address the use of rail track end stops.

- Circular of the Regional Superior Mining Office of Nordrhein-Westfalen: 1981-08-24: Guidelines for rope-hauled suspended monorail transport.- Section 3.3.
- The installation, maintenance and safe use of overhead monorail transport systems for underground use. SANS 10335 Section 4.7.2 and 4.5.2

8.1.5 In order to prevent the monorail train from falling or derailing at a switch due to the switch failing under the load of the monorail train, or due to the switch being operated while the monorail train is traveling through the switch or due to the switch being switched in the wrong direction causing the monorail train to drive off the end of the open rail track, the COP must set out measures to:

- ensure safe and effective switches;
- ensure effective and proper interlocking of switches to prevent inadvertent switching of the switch while the monorail train is traveling through it; ensure the prevention of derailment at the switch when driving into the
- switch from both directions (e.g. stop blocks); and
- indicate the status of the switch.

- Circular of the Nordrhein - Westfalen Regional Mining Authority of 1979-03-22: Directives for suspended monorail systems with diesel locomotives. Section 2.3.2.
- Circular of the Regional Superior Mining Office of Nordrhein-Westfalen: 1981 -08-24: Guidelines for rope-hauled suspended monorail transport.- Section 3.2.
- The installation, maintenance and safe use of overhead monorail transport systems for underground use. SANS 10335 Section 4.7.2

8.2 Monorail train running out of control or moving inadvertently

8.2.1 In order to prevent the monorail train from running out of control due to a lack of traction by the drive unit to the rail track, the COP must set out measures to ensure that the drive unit is capable of moving the fully loaded monorail train from standstill against the steepest gradient of the route on which it is used.

- Increasing total pull loads for diesel locomotives - 1994-02-23. - To the Nordrhein Westfalen Regional Mining Authority.
- Improving the performance capacity of diesel locomotives by means of drive partitioning - Dr G. Apel.
- Factors influencing the train resistance of the suspended monorail system - Dr G. Apel, R. Skrzeba and H. Kindermann.
- Circular of the Regional Superior Mining Office of Nordrhein-Westfalen: 1981-08-24: Guidelines for rope-hauled suspended monorail transport.- Section 3.12.5
- The installation, maintenance and safe use of overhead monorail transport systems for underground use. SANS 10335 Section 4.4

8.2.2 In order to prevent the monorail train from running out of control as a result of the drive unit or operator allowing it to exceed a safe speed, the COP must set out measures to ensure that safe speeds are maintained.

- General provisions of the Nordrhein-Westfalen Regional Mining Authority - 1976-06-08: Standard for the construction of automotive locomotives with diesel engines for suspended monorail systems. - Section 6.
- Circular of the Regional Superior Mining Office of Nordrhein-Westfalen: 1981-08-24: Guidelines for rope-hauled suspended monorail transport.- Section 3.12.2. and 4.7
- The installation, maintenance and safe use of overhead monorail transport systems for underground use. SANS 10335 - Section 4.3 and 4.6.3.4

8.2.3 In order to prevent the monorail train from running out of control as a result of the brakes failing to stop the running monorail train, or of the brakes failing to hold the standing mono -rail train static, or of the operator failing to apply the brakes correctly, the COP must set out measures to;

- ensure that the braking system of the monorail train is capable of stopping and preventing the monorail train from running out of control; and
- address the use and testing of brakes and braking systems to ensure efficiency in term of brake designs specifications.

- General provisions of the Nordrhein-Westfalen Regional Mining Authority - 1976-06-08: Standard for the construction of automotive locomotives with diesel engines for suspended monorail systems. Section 5
- Improving the performance capacity of diesel locomotives by means of drive partitioning -Dr G. Apel.
- Circular of the Nordrhein - Westfalen Regional Mining Authority of 1979-03-22: Directives for suspended monorail systems with diesel locomotives. - Section 3.2.
- To the Nordrhein-Westfalen Regional Mining Authorities: Technical requirements for shunting trolleys and climbing trolleys in underground mining: 1989-06-20.
- Circular of the Regional Superior Mining Office of Nordrhein-Westfalen: 1981-08-24: Guidelines for rope-hauled suspended monorail transport.- Sections 3.5, 3.12.3, 3.16 and 6.3.
- The installation, maintenance and safe use of overhead monorail transport systems for underground use. SANS 10335 - Section 4.2 and 4.6.2

8.2.4 In order to prevent persons from being injured while coupling monorail conveyances, or because of any part of the monorail train running out of control due to it becoming disconnected from the drive unit or braking unit, the COP must set out measures to;-

- ensure that tow bars, coupling devices and hauling ropes are safe and effective;
- ensure the safe coupling, towing, pushing and de-coupling of monorail conveyances;
- prevent inadvertent de-coupling of monorail conveyances being towed or pushed;and
- ensure that disconnected monorail conveyances are kept stationary in a safe position.

- Bolted Couplings for Rope Hauled and Self Propelled Rail Installations - DIN 20 633.
- Circular of the Regional Superior Mining Office of Nordrhein-Westfalen: 1981-08-24: Guidelines for rope-hauled suspended monorail transport- Sections 3.4, 3.9.1, 3.18, 4.4, 4.5 and 6.3.
- The installation, maintenance and safe use of overhead monorail transport systems for underground use. SANS 10335 - Section 4.5.3.

8.2.5 In order to prevent excessive mechanical stresses being induced on coupling devices as a result of the wrong configuration of the monorail train, the COP must set out measures to prevent the unsafe configuration of the monorail train.

- Force-guided railways in underground mining DIN 20 620-1.
- Circular of the Nordrhein - Westfalen Regional Mining Authority of 1979-03-22: Directives for suspended monorail systems with diesel locomotives. - Section 3.1.
- Circular of the Regional Superior Mining Office of Nordrhein-Westfalen: 1981-08-24: Guidelines for rope-hauled suspended monorail transport.- Section 3.6 and appendixes
- The installation, maintenance and safe use of overhead monorail transport systems for underground use. SANS 10335 - Section 4.0

8.2.6 In order to prevent persons from being injured as a result of the monorail train running out of control or being set in motion by an unauthorised person, the COP must set out measures to prevent the monorail train from -

- Inadvertently running out of control; and
- Being set in motion by an unauthorised person.

- The installation, maintenance and safe use of overhead monorail transport systems for underground use. SANS 10335 - Section 4.6.2, 4.6.3.1 to 4.6.3.3
- Becker Mining Systems - Risk analysis-1999-07-05 - Klaus Weyand. - Section E5, E7 and M19

8.3 Protection of persons

8.3.1 In order to prevent objects from the monorail system falling on persons where overhead monorail systems are used, the COP must set out measures to address the protection of persons in close proximity to monorail systems from such objects falling on them.

- Circular of the Regional Superior Mining Office of Nordrhein-Westfalen: 1981-08-24: Guidelines for rope-hauled suspended monorail transport.- Section 3.8 and 4.5.

8.3.2 In order to prevent persons in or on or in close proximity of the monorail system from being bumped, crushed or caught by the monorail train, the COP must address the protection of persons in or on or in close proximity to the monorail system against injury by the monorail train whenever it is in motion.

- General provisions of the Nordrhein-Westfalen Regional Mining Authority - 1976-06-08: Standard for the construction of automotive locomotives with diesel engines for suspended monorail systems. - Section 8.
- Circular of the Nordrhein - Westfalen Regional Mining Authority of 1979-03-22: Directives for suspended monorail systems with diesel locomotives. - Section 2.1 and 2.6.
- (The installation, maintenance and safe use of overhead monorail transport systems for underground use. SANS 10335 - Section 7.1 to 7.3)
- Becker Mining Systems - Risk analysis -1999-07-05 - Klaus Weyand. - Section M2

8.3.3 In order to prevent persons on the monorail train from being injured as a result of coming into contact with stationery items while riding in or on the monorail train, the COP must set out measures to protect persons from coming into contact with such stationery items while riding in or on the monorail train.

- Circular of the Nordrhein - Westfalen Regional Mining Authority of 1979-03-22: Directives for suspended monorail systems with diesel locomotives. - Section 2.6 and 3.5.
- Circular of the Regional Superior Mining Office of Nordrhein-Westfalen: 1981-08-24: Guidelines for rope-hauled suspended monorail transport.- Section 3.1.1, 4.2, and 8.
- Becker Mining Systems - Risk analysis-1999-07-05 - Klaus Weyand. - Section M3

8.3.4 In order to prevent persons from being injured while boarding, alighting from, riding in or on or working on or on top of monorail trains or while trying to alight at places that are not boarding or alighting stations, the COP must set out measures to ensure the safe boarding, alighting from, riding in or on or working on top of monorail trains.

- Congener provisions of the Nordrhein-Westfalen Regional Mining Authority - 1976-06-08: Standard for the construction of automotive locomotives with diesel engines for suspended monorail systems. - Section 8.
- Circular of the Nordrhein - Westfalen Regional Mining Authority of 1979-03-22: Directives for suspended monorail systems with diesel locomotives. - Section 2.5.
- Circular of the Regional Superior Mining Office of Nordrhein-Westfalen: 1981-08-24:Guidelines for rope-hauled suspended monorail transport.- Section 3.1.2 and 3.1.3.
- The installation, maintenance and safe use of overhead monorail transport systems for underground use. SANS 10335 - Section 4.5.1

8.3.5 In order to prevent operators and passengers from being injured by collisions of monorail trains, the COP must set out measures to prevent such collision of monorail trains.

- Circular of the Nordrhein - Westfalen Regional Mining Authority of 1979-03-22: Directives for suspended monorail systems with diesel locomotives. - Section 2.4.

8.3.6 In order to prevent persons from being injured as a result of inappropriate use of personal protective equipment, the COP must set out measures dealing with the issuing, use and control of personal protective equipment pertaining to the monorail system.

- Becker Mining Systems - Risk analysis-1999-07-05 - Klaus Weyand. - Section E5, E7 and M8

8.4 Operational issues

8.4.1 In order to prevent collisions occurring due to a lack of visibility in the direction of travel, the COP must set out measures to ensure that the driver or operator of a monorail train can identify any dangerous conditions ahead and timeously stop the monorail train.

- The installation, maintenance and safe use of overhead monorail transport systems for underground use. SANS 10335 - Section 4.6.1
- Becker Mining Systems - Risk analysis-1999-07-05 - Klaus Weyand. - Section M11 and M13

8.4.2 In order to prevent persons from being injured because of the unexpected moving of the monorail train, the COP must set out measures to warn persons of the moving of the monorail train, including addressing the types of warning devices or signals, such as pre-start or tramming devices, which may be required. In deciding which warning devices are appropriate, the general noise, visibility and other relevant factors in each area should be taken into account.

- Circular of the Regional Superior Mining Office of Nordrhein-Westfalen: 1981-08-24: Guidelines for rope-hauled suspended monorail transport.- Section 3.7.
- Becker Mining Systems - Risk analysis-1999-07-05 - Klaus Weyand. - Section M16

8.4.3 In order to prevent persons from being injured because of accidents caused by a misinterpretation of signals, the COP must address the use of visual and/or audible signals, including the codes for the signals used for communication.

- Circular of the Regional Superior Mining Office of Nordrhein-Westfalen: 1981-08-24: Guidelines for rope-hauled suspended monorail transport- Section 3.13, 4.6 and 4.7.

8.5 Maintenance

8.5.1 In order to prevent accidents due to failure or malfunctioning of any part of the monorail system, the COP must address -

- the scheduling of maintenance, inspections and over inspections; and
- the use of pre-use checklists to identify components critical for the safe operation of the monorail system and the keeping of such checklists for at least three months.

- Circular of the Nordrhein - Westfalen Regional Mining Authority of 1979-03-22: Directives for suspended monorail systems with diesel locomotives. - Section 4.
- Circular of the Regional Superior Mining Office of Nordrhein-Westfalen: 1981-08-24: Guidelines for rope-hauled suspended monorail transport.- Section 4.7, 4.8, 4.10, 4.11, 5.1, 5.2 and 5.3.
- The installation, maintenance and safe use of overhead monorail transport systems for underground use. SANS 10335 - Section 6.1 to 6.3
- Becker Mining Systems - Risk analysis-1999-07-05 - Klaus Weyand. - Section M20

8.5.2 In order to prevent accidents as a result of defective monorail systems, the COP must set out the conditions under which the monorail system should not be used, e.g. "go", "go but" or "no go" options.

8.5.3 In order to prevent persons from being injured due to lack of repairs or inappropriate repairs to the monorail ystem, the COP must set out appropriate procedures for any repairs that could endanger persons. In this regard manufacturers' repair manuals should be consulted.

8.5.4 In order to prevent persons from being exposed to health and safety hazards caused by rigging, welding, exposure to toxic liquids or fumes, dust, fire, fuel handling or the use of hazardous substances associated with the operation and maintenance of monorail systems, the COP must set out measures to prevent persons from being exposed to such hazards. The aspect of emergency preparedness should specifically be dealt with. Where these aspects are covered in another COP, cross references to such other COPs should at least be supplied.

- General provisions of the Nordrhein-Westfalen Regional Mining Authority -1976-06-08: Standard for the construction of automotive locomotives with diesel engines for suspended monorail systems. General provisions and Section 7.

- Circular of the Nordrhein - Westfalen Regional Mining Authority of 1979-03-22: Directives for suspended monorail systems with diesel locomotives. - Section 1.

8.5.5 In order to ensure that maintenance work is done in an environment where the risks related thereto can be controlled and to ensure that the maintenance work is of a proper standard, the COP must address the circumstances under which maintenance work, and which type of maintenance work, can be done in established working bays, in workshops or in controlled environments in the field or at the face.

- Circular of the Nordrhein - Westfalen Regional Mining Authority of 1979-03-22: Directives for suspended monorail systems with diesel locomotives. - Section 2.7.

8.6 Use of competent operators

8.6.1 In order to ensure that persons are not placed at risk because of incompetent persons operating monorail systems, the COP must address:-

- the criteria and procedures to recruit,
- select and ensure that only competent persons operate or drive monorail systems;
- awareness education and training, in terms of the interaction with the monorail sytem, for persons working or travelling in close proximity to the monorail system (compare section 10 of the MHSA);
- the keeping of records relating to the training of operators of monorail systems; and
- procedures for the discretionary authorisation of competent persons to operate or drive monorail systems under prevailing site specific conditions.

- Circular of the Nordrhein - Westfalen Regional Mining Authority of 1979-03-22: Directives for suspended monorail systems with diesel locomotives. Section 3.3 and 3.4.
- Circular of the Regional Superior Mining Office of Nordrhein-Westfalen: 1981-08-24: Guidelines for rope-hauled suspended monorail transport.- Section 4.7 and 4.9.
- The installation, maintenance and safe use of overhead monorail transport systems for underground use. SANS 10335 -Section 8.0

PART D: EMPLEMENTATION OF COP

1. IMPLEMENTATION PLAN

1.1 The employer must prepare an implementation plan for its COP that makes provision for issues such as organizational structures, responsibilities of functionaries and programs and schedules for this COP that will enable proper implementation of the COP. (A summary of / and a reference to, a comprehensive implementation plan may be included.)

1.2 Information may be graphically represented to facilitate easy interpretation of the data and to highlight trends for the purpose of risk assessment.

2. COMPLIANCE WITH THE CODE OF PRACTICE.

The employer must institute measures for monitoring and ensuring compliance with the COP.

3. ACCESS TO THE CODE OF PRACTICE AND RELATED DOCUMENTS

3.1 The employer must ensure that a complete COP and related documents are kept readily available at the mine for examination by any affected person.

3.2 A registered trade union with members at the mine or where there is no such union, a health and safety representative on the mine, or if there is no health and safety representative, an employee representing the employees on the mine, must be provided with a copy on written request to the manager. A register be must kept of such persons or institutions with copies to facilitate updating of such copies.

3.3 The employer must ensure that all employees are fully conversant with those sections of the COP relevant to their respective areas of responsibility.

ANNEX "A"
(for information only)

USEFUL REFERENCE DOCUMENTS
(Standards 1 - 10 mentioned below are available from the SABS and the standards 11 - 19 are available from the relevant manufacturers)

1. Force-guided railways in underground mining DIN 20 620-1.

2. Suspended monorail systems for mining: Mounting rails for rope-driven suspended monorail systems - DIN 20 629 Part1.

3. Bolted Couplings for Rope Hauled and Self Propelled Rail Installations - DIN 20 633.

4. Double-end fork turnbuckles - DIN 20 633.

5. Suspension Shackles - DIN 20 635.

6. Suspension Claws Requirements and Testing - DIN 20 636.

7. Calibrated round steel long-link chains for suspensions - DIN 20 637.

8. Suspended monorail transport systems for mining: Permissible loads for I140E rails with 140E/76 rail bonds, rail suspensions and their abutments - DIN 20 622

9. Suspended monorail systems in underground mining: Rails; Straight rails - DIN 20 593 Part 1 and Curved Rails and adapting rails - DIN 20 593 Part 2.

10. The installation, maintenance and safe use of overhead monorail transport systems for underground use. SANS 10335

11. General provisions of the Nordrhein-Westfalen Regional Mining Authority - 1976-06-08 : Standard for the construction of automotive locomotives with diesel engines for suspended monorail systems.

12. Increasing total pull loads for diesel locomotives - 1994-02-23. (To the Nordrhein Westfalen Regional Mining Authority.)

13. Circular of the Nordrhein - Westfalen Regional Mining Authority of 1979-03-22: Directives for suspended monorail systems with diesel locomotives.

14. To the Nordrhein-Westfalen Regional Mining Authorities: Technical requirements for shunting trolleys and climbing trolleys in underground mining: 1989-06-20. (The old 9 and 10 were deleted as they were part of 8)

15. Circular of the Regional Superior Mining Office of Nordrhein-Westfalen: 1981-08-24 : Guidelines for rope-hauled suspended monorail transport.

16. Improving the performance capacity of diesel locomotives by means of drive partitioning - Dr G. Apel.

17. Factors influencing the train resistance of the suspended monorail system - Dr G. Apel, R. Skrzeba and H. Kindermann.

18. Becker Mining Systems Risk analysis-1999-07-05 Klaus Weyand.

19. Safety evaluation of suspended monorail sections in relation to different operating parameters - Martin Tobrock.