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MAINTENANCE**

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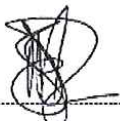
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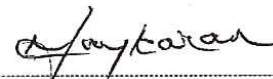
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## **1. Introduction**

This task manual was compiled to conform or align with NRS 082 and OHSa requirements in ensuring that the equipment in Eskom Distribution network are maintained, the risks and hazards associated with task are minimized or mitigated.

This task manual was compiled from the analysis that was done on critical tasks that are being performed when maintaining network equipment in order to identify risks and hazards associated so that they could be addressed or remedied.

This document states the procedure for STAY ASSEMBLY MAINTENANCE thereby ensuring that work is performed safely and risks and hazards are minimised.

## **2. Supporting clauses**

### **2.1 Scope**

#### **2.1.1 Purpose**

The purpose of this document is to provide persons carrying out “STAY ASSEMBLY MAINTENANCE” (Stay repairs under dead conditions and tensioning under live conditions) tasks with a step by step description of how to do the task, including the most critical hazards and technical specifications associated with the task.

#### **2.1.2 Applicability**

This document shall apply throughout Eskom WIRES business and contractors employed by Eskom.

### **2.2 Normative/informative references**

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs.

#### **2.2.1 Normative**

- [1] ISO 9001, Quality Management Systems;
- [2] OHSAct: Occupation Health and Safety Act 85 of 1993 and Regulations;
- [3] NRS 000, NRS definitions:\_ Part 1: Compilation of NRS and other definitions used in the Electricity Supply Industry;
- [4] 240-62196227, Life-saving rules;
- [5] SANS10280-1: Overhead power lines for conditions prevailing in South Africa -Safety;
- [6] 240-114967625, Operating Regulations for High Voltage Systems;
- [7] 240-78692652, Procedure for the application and maintenance of portable earth's;
- [8] 240-65216546, Standard For Portable Earthing;
- [9] EPL\_32-747, Safety, Health, Environment, And Quality (SHEQ) Policy;
- [10] 240-86100853, Standard for Barricading Prohibited Area and Live Chamber;
- [11] 240-125121012, Usage Of Extension, Single, "A" Frame Ladders, Two Step Platform Or Pole Climbing Equipment;
- [12] 240-77858900, Operating A Vehicle Mounted Crane With A Bucket Attached;
- [13] EPC\_32-418, Working AT Heights;
- [14] 240-125124036, Standard For The Selection, Care, Use, Inspection And Maintenance Of Conductive And Non-Conductive Ladders;

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- [15] 240-70822772, Maintenance inspection and supplemental treatment of treated wood utility Poles;
- [16] DMN\_34-2208, Access to work sites;
- [17] DST\_240-69125290, Standard for the Use of Equipontential Earth footplates;
- [18] 240-125121012, Usage Of Extension, Single, "A" Frame Ladders, Two Step Platform Or Pole Climbing Equipment;
- [19] 240-68701299, Tensioning Of Slack Stay Wires On Energised Overhead Lines;
- [20] DMN34-183, Backfill And Compacting Of Excavations;
- [21] 05TB-023, Guy Strain Insulator Approval; and
- [22] Manufacturers manual

## **2.2.2 Informative**

- [23] 240-120054284, Personal Protective Equipment Standard;
- [24] 240-43848327, Employees' Right of Refusal to Work in an Unsafe Situation Procedure; and
- [25] DGL\_34-256, Scheduling of driving activities.

## **2.3 Definitions**

### **2.3.1 General**

All definitions in ORHVS, NRS 000, IEV and OHSAct 85 of 1993 including the following are applicable:

<b>Definition</b>	<b>Description</b>
<b>Authorised person</b>	means a person, whether an employee or another person, who has been authorised in terms of these regulations
<b>Authorized</b>	A person who is trained and has been proven competent to carry out rotten pole replacement in terms of this standard. This authorization shall be in writing.
<b>Dangerous/hazardous task</b>	A specific element of work, which has produced and/or which possesses the potential to produce major loss or harm to people, assets, processes/production and/or the environment when performed properly.
<b>Directive</b>	A document which sets out a management objective, the appropriate policy if deemed necessary, as well as the functional accountability for activities to achieve that objective and the interface between functions affected by, or responsible for the execution of, such activities.
<b>Responsible person</b>	means a person, who has been authorised to be responsible for ensuring that the work on the apparatus covered by work permit can be, carried out with safety and within the terms of these regulations
<b>Risk Assessment</b>	This process involves the combined functions of hazards identification, risk analysis, risk evaluation, determining the risk control strategy/s and the identification of the risk control measures that will be implemented during the task execution.
<b>Rotten Wooden Pole/unsound pole:</b>	A pole that has been rejected after assessment and that shall be replaced. An unsound pole is a class 4 pole or a class 3 pole that will not be stubbed by the region (refer to 240-70822772 for classification of poles).
<b>Task Analysis</b>	The systematic examination of all dangerous/hazardous tasks (work) in order to identify and quantify all the potential and existing inherent hazards that employees are exposed to while the tasks are being executed.

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Definition	Description
Only persons who have satisfied the designated person on terms of the Occupational Health and Safety Act (Act 85 of 1993) (General Machinery Regulation 2(1)) that their knowledge is adequate to perform specific duties on specified plant and that their knowledge of these regulations is sufficient may be authorised.	

### 2.3.2 Disclosure classification

**Controlled disclosure:** controlled disclosure to external parties (either enforced by law, or discretionary).

## 2.4 Abbreviations

Abbreviation	Description
CDP	Career Development Programme
CNC	Customer Network Centre
CO	Construction Official
CTA	Critical Task Analysis
DCP	Dynamic Cone Penetrometer
GMR	General Machinery Regulation
ORHVS	Operating regulations for high voltage systems
OTS	Officer Technical Support
PCO	Principal Construction Official
PPE	Personal Protective Equipment
PTO	Principal Technical Officer
SCO	Senior Construction Official
STO	Senior Technical Officer
TCIF	Technology Change Information Forum
TO	Technical Officer
TSU	Technical Services Unit
WCO	Works-Coordinator

## 2.5 Roles and responsibilities

The designated person or his delegate shall ensure that this procedure is implemented and adhered to. The authorised / responsible person is responsible for the safe execution of all work and activities as set out in this procedure.

## 2.6 Process for monitoring

Document number	Document title
240-45920887	Process Control Manual (PCM) for Manage Maintenance Base.
240-52380420	Steering Committee of Technologies (SCOT) Standards Development and Change Implementation Procedure

## 2.7 Related/supporting documents

- a) 240-68701299, Tensioning Of Slack Stay Wires On Energised Overhead Lines;
- b) Training module (TO 004).

## 3. Requirements

### 3.1 Pre-job planning:

**Note 1:** Confirm validity of all the required authorisations of people that will be involved in the task.

**Note 2:** Not identifying correct tools, equipment, material, etc may cause delays, damage and injuries – no substandard / unserviceable/incorrect tools, equipment or material should be used.

**Note 3:** Ensure that appropriate PPE and safety equipment are identified, inspected and worn/used during execution of the task.

- a) Do an assessment at the site to determine the scope of work and the resources that would be required (people, equipment, PPE, etc.);
- b) Plan work and resources required for the task;

**Note 4:** Ensure that communication is available at the work site.

- c) Ensure that communication at the work site will always be available in case of emergency;
- d) Ensure that vehicle is adequately equipped (fire extinguisher, first aid box, tools and equipment, etc);
- e) Ensure that all tools and equipment are in a serviceable condition in accordance with manufacturer's specification;
- f) Ensure that the correct material / spares are available;
- g) Ensure that other related documents (CTAs, task manuals, environmental documents etc.) are made available; and

**Note 5:** Ensure that repairs of any identified defects or replacement of substandard/unserviceable/incorrect tools, equipment or material are done properly.

- h) Ensure that equipment is transported as per relevant CTA / TASK MANUAL or procedure to worksite.

#### 3.1.1 Spares and Materials

- a) Preform wrap / guy grip;
- b) Stay thimble;
- a) Guy Grip;
- b) Stay Insulator;
- c) Long rod; and
- d) Stay rod.

#### 3.1.2 Tools and Equipment

- a) Standard approved tool set;
- b) 1.5 ton Lever Hoist (MV);
- c) ¾ ton Lever Hoist (LV);
- d) Pulling Eye for stay rod;
- e) Stay rod tensioning device;

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- f) Steel grip (come along);
- g) Chain;
- h) Stay thimble; and
- i) Wire grip.

### **3.1.3 Equipment Transportation**

Ensure that equipment is transported as per relevant CTA / TM or procedure to worksite.

### **3.1.4 Personal Protective Equipment**

All personal protective equipment shall be in accordance with 240-44175132 and PPE identified from Risk assessment (EPC\_32-747) performed.

- a) Gloves ("Class 3 " Live Work gloves with Protectors);
- b) Overalls;
- c) Safety Goggles;
- d) Hard Hat;
- e) Safety Boots; and
- f) Work at heights.

## **3.2 Work execution**

**NOTE 1:** When plant isolation is required section 3.2.1 below must be carried out and observed.

### **3.2.1 Plant isolation**

- a) No work should commence before line has been handed over (works permit) in accordance with the ORHVS (240-114967625) or authorised person supervising the task has given permission for task commencement; and
- b) Ensure that the plant is isolated and earthed and where required, handed over (works permit) in accordance with 240-114967625.

**Note 1:** All steps as identified in analysis of HV Operating is applicable.

**Note 2:** All existing controls as identified in analysis of HV Operating is applicable.

**Note 3:** All recommendations as identified in analysis of HV Operating is applicable.

**Note 4:** Any identified defects or substandard / unserviceable / incorrect tools, equipment or material shall be corrected / repaired or replaced before using them.

### **3.2.2 On-site Risk assessment**

**Note 1:** Perform a proper risk assessment before task commencement and continuously during task execution in accordance with the prescribed procedure.

- a) Conduct an onsite risk assessment prior to commencement of work and continuous during the task execution as per EPC\_32-520; and

**Note 2:** Identify and analyse risks and hazards associated with the task, eliminate, minimise, develop measures against – i.e. compile procedures or provide PPE to safeguard maintenance staff.

**Note 3:** During completion of risk analysis take into consideration the condition of structure and the stays assembly.

**Note 4:** Do not approach lines where low hanging conductors are present.

**Note 5:** Ensure that public is controlled at and around work site.

- b) Ensure that when visiting the work site the general inspection is done as per DMN\_34-2208.

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### **3.2.3 Safety and Preparation**

- a) Where required ensure that the apparatus is opened, isolated and earthed, handed over (work permit) or a close proximity hand over with ARC switched OFF in accordance with 240-114967625;
- b) Ensure that at no time will team members be permitted to ascend the poles / structures in any manner whatsoever;
- c) Ensure that the correct Personal Protective Equipment is used all times;
- d) Where necessary ensure that barricading shall be erected in accordance with 240-86100853 and a correct and adequate supervision is implemented as per 240-86640998;
- e) Check and inspect all protective safety equipment;
- f) The following measures shall be taken / followed before working on any structures:
  - Identify the type of the structures to worked on i.e wood, steel etc.;
  - Identify the terrain (site) in which the pole is located;
  - Check the lines in the vicinity for low hanging live conductors (i.e. line crossings etc.);
  - Check if the pole has been classified (classification tag), if not, check for anomalies on the pole as per 240-70822772;
  - Check if the pole has been planted at the correct depth as per 240-75883906 and if there is a cable installed on the pole; and
  - Check the stay rod for any indication of extraction from ground.

**Note 1:** Under no circumstances would the climbing shoes be used when the poles have cables attached.

- g) Check the line structures on both side of the structure with the slackened stay and the affected structure for:
  - Rot on wooden structure;
  - Rusted bolts, columns and braces in case of steel structure;
  - Concrete deterioration on concrete structure; and
  - Damage to the line hardware etc.
- h) Inspect the stay insulator on the structure with slackened stay for damage / abnormalities;
- i) Inspect conductor joints on both sides of the affected structure for broken strands, flash marks etc;
- j) Inspect the pole top and all the guy grips for proper assembly and or any damages;
- k) Inspect the tools and equipment for serviceability prior to use;

**Note 2:** All steps as identified in analysis of HV Operating are applicable.

**Note 3:** Maintain and ensure that light / lighting is sufficient during task execution.

- l) The rotten / damaged wooden pole structure shall not be used as part of a lifting device unless it is secured;
- m) When the condition and installation of the pole is found to be in order, the intended work may proceed as planned;
- n) Where the pole is suspect the appropriate method shall be implemented to stabilize the pole before working on i.e. using PML, Cherry picker, Ladder, VMC, Support rope or Climbing Shoes;
- o) Ensure that all tools and equipment to be used have been inspected by a competent person before they are used;
- p) The responsible person on site will continually supervise, direct and observe all activities;



- 
- q) Work men to be reminded that they have “the right to refuse” if they consider the work to be too dangerous or do not have the correct equipment or skills to safely complete the activity as per 240-43848327;
  - r) Responsible and authorized person must ensure that the work site is prepared and made safe as per the 240-114967625 (ORHVS);
  - s) Responsible person to sign the permit to work and complete workers register; and
  - t) On-site apply equipotential earthing in accordance with organisational standards and procedure (240-114967625 / ORHVS), 240-78692652 & 240-69125290.

**Note 4:** Ensure that the stay rod installation is done in accordance to D-DT-0350, TO-004 & ATO-05.

### **3.2.3.1 Stay Wire Tensioning**

**Note 1:** Removing the guy grips without taking up tension may result in the stay sliding back to the structure.

**Note 2:** Over tensioning the stay wire may result in the structure breaking or overloading some structures on the line.

**Note 3:** Re-using the short guy grips or releasing the tension device before making off the stay wire may result in stay wires slipping and poles breaking.

**Note 4:** Not observing the structure and not controlling the tension while releasing the tension device may also result in stay wires slipping and poles breaking.

**Note 5:** Beware of over tensioning the stay wire as the structure or conductor may break and the guy grip could also slip.

- a) Where necessary apply a shunt earth on the stay wire (from stay rod to the stay wire:\_ bottom side of the stay insulator);
- b) Apply / install the pulling device and the wire grip onto the stay wire;
- c) Install the pulling eye onto the stay rod;

**Note 6:** Only steel wire grip shall be used.

**Note 7:** Ensure that the safe electrical clearances between the stay wire and the live conductors are maintained at all times.

- d) Tension the stay wire until the pole / structure is vertical / plumb; ensure that the stay rod is not pulled out from the ground;
- e) Loosen and remove the installed (old) guy grip;

**Note 8:** The guy grips removed / dismantled from stays shall not be used again, only new one shall be used as a replacement.

**Note 9:** Ensure that only a new guy grip is used when reassembling the stay assembly.

- f) Install a new guy grip over the thimble (if the thimble is damaged replace with the new one).

**Note 10:** Ensure that the stay wire guy grip is made off / secured before the tensioning device is removed.

- g) Slowly release the tensioning device and remove it from the stay assembly; and
- h) Tie down the end of the stay wire onto the stay rod.

### **3.2.3.2 Stay Rod Replacement**

**Note 1:** The structure must be secured / supported / anchored before the guy grips can be removed.

- a) Support the structure before disconnecting the stay wire from existing anchor;
- b) Disconnect and control the stay wire;
- c) Secure the loose end of the stay wire at the foot of the structure;
- d) Excavate and remove the defective stay rod see the module;
- e) Clean and prepare the excavated hole for the new stay rod;
- f) Install the new stay rod as per D-DT-0350; and
- g) Refer to stay wire tensioning section (3.2.3.1 above) when tensioning needs to be done.

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### **3.2.3.3 Removal of stay insulator**

**Note 1:** Use correct tools and equipment for task allocated.

**Note 2:** Beware of the equipment and tools falling from elevated position.

**Note 3:** All steps as identified in analyses of working with and on extension/single ladders and operating a vehicle mounted crane is applicable.

**Note 4:** Substandard/unserviceable tools and material shall not be used

- a) Place tools and equipment (snatch block and rope) in pouch / bucket;
- b) Position and secure ladder, stabilize the aerial device or put on the climbing shoes;

**Note 5:** All recommendations as identified in analyses of working with and on extension/single ladders and operating a vehicle mounted crane is applicable.

**Note 6:** Ensure that Work at Height System used according to procedures in working above ground level.

- c) Climb ladder / raise aerial device / used climbing shoes to working position, using fall arrest system according to procedures;
- d) Secure snatch block onto the cross arm / anchor point;
- e) Apply / install the Lever Hoist to remove the tension from stay assembly at the stay rod;
- f) Tension the Lever Hoist to release tension on the stay insulator;
- g) Remove guy grip from the top of the stay insulator;
- h) Release tension and remove the lever hoist;
- i) Lower the stay insulator to ground level and remove the bottom guy grip from the stay rod; and
- j) Descend to ground level.

### **3.2.3.4 Install new stay insulator**

**Note 1:** Ensure that the old / used stay insulators are thoroughly inspected before being re-used.

**Note 2:** Do not install a non-standard (under rated) stay insulator.

**Note 3:** Never re-use guy grips.

- a) Fit stay insulator (long rod for MV lines and porcelain for LV) and make off the guy grip at ground level (05TB-023);
- b) Attach the stay insulator onto the pole top make off;
- c) Attach the lever hoist onto the stay rod and stay wire and tension the stay;
- d) Attach the new guy grip onto the stay rod and stay wire;
- e) Release the tension and remove the lever hoist;
- f) Check if the installation is in accordance to construction specifications;
- g) Remove all tools and equipment;
- h) Remove the ladder from pole; and
- i) Ensure that plant is handed back where required and re-energised in accordance with ORHVS.

### **3.2.3.5 Pole top & Guy grip replacement**

**Note 1:** Substandard/unserviceable tools and material shall not be used.

- a) Stabilize the pole before removing old Pole top & Guy grip;
- b) Place tools and equipment (snatch block and rope) in pouch / bucket;
- c) Position and secure ladder or position aerial device where one is used or put on the climbing shoes where they are used;

**Note 2:** All recommendations as identified in analyses of working with and on extension/single ladders and operating a vehicle mounted crane is applicable.

- d) Climb ladder / raise aerial device / used climbing shoes to working position, using fall arrest system according to procedures;
- e) Secure snatch block;
- f) Stabilize the structure;
- g) Apply / install the Lever Hoist to remove the tension from stay assembly at the stay rod;
- h) Remove Guy grip from the stay rod and release the tension on the lever hoist;
- i) Remove the guy grips from the pole top and remove the pole top make off;
- j) Install the new pole top make off and guy grip;
- k) Lower all tools equipment to ground level and descend;
- l) Attach new guy grip at the stay rod and stay wire and release the tension on the lever hoist; and
- m) Remove the ladder / aerial device from the structure / pole.

**Note 3:** All steps as identified in analyses of working with and on extension/single ladders and operating of a vehicle mounted crane is applicable.

### **3.2.4 Re-energise Plant**

- a) Ensure that plant is handed back where required and re-energised in accordance with 240-114967625 (ORHVS).

**Note 1:** All steps as identified in analysis of HV Operating are applicable.

**Note 2:** All existing controls as identified in analysis of HV Operating are applicable.

**Note 3:** All recommendations as identified in analysis of HV Operating are applicable.

### **3.2.5 Task Wrap Up**

- a) Remove all personnel, equipment and redundant material from the site

**Note 1:** Complete and submit the required documentation.

**Note 2:** Ensure that the work site is properly cleaned on completion of work as material that lay around may result in injuries to the public and damage to the image of Eskom.

**Note 3:** Redundant material shall be disposed of in accordance with statutory and organisational requirements and procedures.

## **4. Forms and Records**

The completed report shall be returned to the Work Management Centre together with the work order via Work co-ordinator.

The completed reports / forms must be returned to respective departments for record keeping:

- a) Works order;
- b) Operating Instruction form / Workers register / Permit;
- c) Risk Assessment; and
- d) In / Out commission sheet / Stores return.

## 5. Authorization

This document has been seen and accepted by:

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## 6. Revisions

This revision "240-123764966" supersedes and replaces all revisions of 34-107 & 240-68701299

Date	Rev	Compiler	Remarks
Nov 2018	2	DM Ntombela	Reviewed 240-123764966 to include 240-68701299, clause 3.2.1, 3.2.2, 3.2.3 to 3.2.3.1 has been updated. Changed the format and changed clause numbering.
Apr 2017	1	DM Ntombela	Registered and changed the ref number to 240-123764966" Changed the format and changed clause numbering
Jun 2010	1	JJB Uys & DM Ntombela	Document approved as DMN_34-107 Reformatted the document.
Feb 2006	0	E Fraser	One document was original issues as DMN_34-107

## 7. Development team

The following people were involved in the development of this document:

Name	Designation	Region
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## **8. Acknowledgements**

Not applicable.

**Annex A – Task Observation**

(Informative)

	FORM TITLE	OBSERVATION FORM		
	FORM NUMBER	240-123764966	REV DATE	November 2023
	DOCUMENT TITLE	STAY ASSEMBLY MAINTENANCE		

1.	<b>OBSERVER'S PARTICULARS</b>			
	Task observer's name: _____		Task observed: STAY ASSEMBLY MAINTENANCE _____	
	Section / department: _____		Location: _____	
	Occupation: _____		Is there a procedure / task manual for this task? YES <input type="checkbox"/> NO <input type="checkbox"/>	
	Date: _____		Task Manual ref. 240-123764966 _ _ _____	
	Time with task: _____		Work order no.: _____	

2.	<b>REASON FOR OBSERVATION</b>			
	Planned: <input type="checkbox"/> Follow-up: <input type="checkbox"/> Name of employee being observed: _____			

3.	<b>TASK OBSERVATION</b>							
	Did employee adhere to the procedure/practice requirements?							
		Yes	No	N/A		Yes	No	N/A
	Preplanning carried out correctly				4. Use of correct PPE			
	Emergency contacts numbers Obtained				5. Ensure that the panel / equipment to be commissioned is isolated and earthed in accordance with ST_240-114967625			

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Tools equipment:				6. Carry out the task as per task manual 240-123764966			
Used correctly							
In good and safe condition							
Test instrument calibrated							
Toolbox Talk:							
Task manuals used							
Complete Worker's register							
Risk Assessment been done							
Valid work permits available							
Could observed practices / conditions lead to:							
1. Injury:				2. Illness (fumes, gas, etc.)			
Risk of getting caught by				3. Costs (delays)			
Risk of striking against/get struck by				4. Poor quality (non-conformance)			
Risk of fall from same level							
Risk of fall from different level							
Risk of slip, trips and falls							
Risk of electrocution							

4.

NON COMPLIANCE PRACTICE OBSERVATION							
	Yes	No	N/A		Yes	No	N/A
1. Working at unsafe speed				7.Failure to warn			
2. Using unsafe equipment				8. Taking chances			
3. Using equipment unsafely				9. Failure to identify hazards			
4. Unsafe loading, placing & lifting				10.Failure to secure lock-out			

	5. Taking unsafe position				11. Safety signs ignored			
	6. Safety rules ignored							
	NOTE: ALL OBSERVED CLASS HAZARDS SHALL REQUIRE IMMEDIATE INTERVENTION							
5.	OBSERVED DEVIATIONS / NON-CONFORMANCES							
6.	RISK BEHAVIOURS							
7.	PROPOSED CONTROLS							
	Compile a procedure for this task				Issue a standing instruction			
	Revise present procedure				Change work methods			
	Retraining of employees				Professional referral			
	Engineering revision				Coaching			
8.	ANALYSIS							
	IAC – inadequate capability		ABU – abuse or misuse / equip / drugs or alcohol			MAIN – inadequate maintenance		
	KNO – lack of knowledge		NAT – natural factors			EQU – inadequate equipment		
	SKI – lack of skill		LEA – inadequate leadership			STA – inadequate work / train Standards		
	STR – stress		ENG – inadequate engineering			WEA – wear & tear		
	MOT – improper motivation		PUR – inadequate purchasing			CON – inadequate control		



9.	DISCUSSION BETWEEN SUPERVISOR/OBSERVER AND EMPLOYEE	
	1. EMPLOYEE EXPLANATION FOR RISK BEHAVIOUR:	
	2. AGREEMENT TO CHANGE AT RISK BEHAVIOUR:	
10.	FOLLOW-UP ACTIONS	WHEN / WHO

Person being Observed signature: \_\_\_\_\_ Date: \_\_\_\_\_

Signature (Task Observer): \_\_\_\_\_ Date: \_\_\_\_\_

Signature Chairperson Safety Committee: \_\_\_\_\_ Date: \_\_\_\_\_  
(if deviations were found)