Eskom	Task Manual	Technology

Title: **BUILD LV LINES UNDER DEAD MV LINES ON SAME STRUCTURE**

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Compiled by	Approved by	Authorized by
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Date: 03/04/2017	Date: 02/05/17	Date: 2/5/17

Supported by SCOT/SC

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SCOT/SC Chairperson

Date: 02/05/17

PCM Reference: **240-41836800**

SCOT Study Committee Number/Name: **Maintenance**

Content

1. Introduction

The document was compiled to conform or align with OHSAct requirements in ensuring that procedures for "Build LV Lines under Dead MV Lines on Same Structure" tasks are available. The task manual stipulates a procedure which seeks to ensure that personnel using the ladder are doing it in a safe manner and the associated risks and hazards are minimised.

This Task Manual documents the procedure to Build LV Lines under Dead MV Lines on Same Structure so as to ensure that the task is executed in a safe manner and damage to equipment or injuries to staff are prevented / avoided.

2. Supporting clauses

2.1 Scope

2.1.1 Purpose

The purpose of this document is to provide persons carrying out "Build LV Lines under Dead MV Lines on Same Structure" 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,

[4] SANS10280-1: Overhead power lines for conditions prevailing in South Africa -Safety;

[5] DPC_34-227: Rev. 0, Pre-Task Planning and feedback process;

[6] 240-78692652: Rev. 4, Procedure for the application and maintenance of portable earth's.

[7] 240-114967625: Rev 0, Operating Regulations for High Voltage Systems;

[8] EPL_32-747: Rev 0, Safety, Health, Environment, And Quality (SHEQ) Policy,

[9] 240-86100853: Rev. 0, Standard for Barricading Prohibited Area and Live Chamber,

[10] EPC_32-418: Rev 0, Working AT Heights;

[11] 240-70413713: Rev 0, Assessment Procedure for HV Authorisation;

[12] DST_34-1462: Rev 1, Standard For The Selection, Care, Use, Inspection And Maintenance Of Conductive and Non-Conductive Ladders;

[13] DST_34-1441: Rev 1, Routine Inspection And Maintenance Of Sub-transmission And Distribution Lines.

[14] DST_240-69125290: Rev 0, Standard for the Use of Equipontential Earth footplates;

[15] Manufacturers manual

2.2.2 Informative

[16] DPC_34-380: Rev 0, Identifying, Analysing, Documenting and Observing dangerous and hazardous tasks.

[17] EPC_32-418; Rev 0, Working At Heights Procedure.

[18] 240-44175132: Rev. 0, Eskom Personal Protective Equipment Specification,

[19] DST_34-1462: Rev 1, Standard For The Selection, Care, Use, Inspection And Maintenance Of Conductive And Non-Conductive Ladders;

[20] DST_34-908: Rev. 0, Procedure for Barricading;

[21] DPC_34-925: Rev 1, Procedure for refusal to work on the grounds of health, safety and environmental concerns;

[22] DST_34-1131: Rev 2, Distribution Standard On Fall Arrest Systems;

[23] DPC_34-1402: Rev 0, Procedure For Using A Fall Arrest System;

2.3 Definitions

2.3.1 General

All definitions appropriate to the document should be included here. Refer to definitions listed in recognised industry glossaries such as NRS 000 and the IEV, and use these wherever appropriate.

All definitions in ORHVS and OHSAct 85 of 1993 including the following are applicable:

Definition	Description
Dangerous/hazardous task:	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.
Directive:	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.
Risk Assessment:	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.
Task Analysis:	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.

2.3.2 Disclosure classification

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

2.4 Abbreviations

Abbreviation	Description
ABC	Aerial Bundle Conductor
CCC	Change Control Committee
IPC	Insulation Piercing Clamps

Abbreviation	Description
ORHVS	Operating Regulations for High Voltage Systems
PTO	Principal Technical Officer
STO	Senior Technical Officer
TO	Technical Officer
TSU	Technical Service Unit
VMC	Vehicle Mounted Crane
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

Not applicable.

3. Requirements

3.1 Pre-job planning:

a) Confirm the validity of all the required authorisations of people that will be involved in the task.

b) Assess/identify the specific resources / equipment which is necessary for the site and that includes:

- Traffic signs
- Red flags
- Road cones
- Amber rotating lights
- Vehicles / Workmen ahead traffic signs
- Reflective vests / bibs
- Determine a strategy to control members of the public
- Suitable barricading device.
- Determine a strategy to control members of the public;

c) Notify the relevant stake holders such as the following of the proposed work:

- Traffic;
- Land owner/s;
- Confirm with traffic department if they will control the traffic at the work site; and
- If traffic officers will be on site to control the traffic determine and document traffic control measures that will be implemented. Ensure that all parties involved sign the traffic control agreement.
- Railway Authority
- Telecommunication Authority

d) Ensure adequate communication is available at the work site.

e) Do an assessment at the site to determine the scope of work and the resources that would be required ie.

- People;
- Equipment;
- PPE; and
- Barricading.

Note 1: Ensure that the personnel are trained and competent to perform the task allocated to them and they are familiars to the area or environment: Lack of knowledge / area / environment / equipment will lead to damage to equipment and injuries to staff.

f) Ensure that all tools and equipment are in a serviceable condition in accordance with manufacturer's specification.

g) Ensure that the correct material is available.

h) Ensure that other related documents (CTAs, work instructions, environmental documents etc.) are made available.

Note 2: Substandard/unserviceable/incorrect tools, equipment or material used.

Note 3: Ensure that repairs of any identified defects or replacement of substandard/unserviceable/incorrect tools, equipment or material are done.

3.1.1 Spares and Materials

a) Bill of material from scope of work package.

3.1.2 Tools and Equipment

a) Standard tool set;

b) Earth Resistance tester;

c) Stringing equipment;

d) Ladders;

e) Vehicle mounted crane;

f) Compressors and accessories;

g) Petrol drilling machine;

h) Hand/Hydraulic compactor;

i) Water pump;

j) Shoring equipment;

k) Wheelbarrow;

l) Excavation barricading material;

m) Drilling machine (Auger/Air drill); and

n) Vehicle mounted crane with bucket.

3.1.3 Equipment Transportation

a) 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 & DST 34-1710.

a) Work at heights

3.2 Work execution

3.2.1 Plant isolation

Note 1: Ensure that the supply has been isolated and earthed in accordance with procedure prior to performing tasks analysis allocated.

Note 2: All work has to be executed under the supervision of a responsible person in terms of standards or procedures.

Note 3: All steps as identified in analysis of HV operating are applicable.

Note 4: Ensure that no tools, equipment and or material will fall and all steps as identified in the analysis of physical material handling are applicable.

Note 5: Ensure that live equipment are isolated and earthed in accordance with 240-114967625 (ORHVS) and HV operating task analysis / task manual.

Note 6: Ensure that the line has been handed over before commencing with work preparation.

a) Ensure that the plant is isolated and earthed and where required, handed over (works permit) in accordance with 240-114967625.

3.2.2 On-site Risk assessment

Note 1: If cranes with man-bucket/cradle are used in conjunction with this task all the steps as identified in the task analysis of operating a vehicle mounted crane with a bucket attached is applicable.

Note 2: Ensure good visibility with additional lights/lighting where necessary.

Note 3: Ensure that task's risks and hazards are identified, analysed, minimised or removed, counting safety measure developed (procedures) PPE provided.

Note 4: Ensure that appropriate PPE and safety equipment are identified, inspected and worn/used during execution of the task.

a) Conduct an onsite risk assessment prior to commencement of work and continuous as per DPC_34-227 during the task execution.

3.2.3 Safety and Preparation

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

Note 2: Maintain and ensure that light / lighting is sufficient during task execution

Note 3: Work may only commence once the instruction has been given by person supervising the task.

Note 4: Ensure that the line has been handed over before commencing with work preparation.

Note 5: All steps as identified in the analysis of physical material handling are applicable.

Note 6: All work has to be executed under the supervision of a responsible person in terms of standards or procedures.

a) Ensure that the correct Personal Protective Equipment is used all times.

b) Ensure that the apparatus (MV Line) is opened, isolated and earthed, handed over (work permit) in accordance with 240-114967625.

c) Ensure that future point of LV supply is isolated and earthed.

d) Barricading shall be erected in accordance with 240-86100853 where necessary.

e) Layout tools, equipment and material at each work site e.g. Cross arms, insulators and conductors or aerial bundle conductors (ABC) and associated material.

Note 7: All steps as identified in task analysis of "operate a vehicle mounted crane" and "physical material handling" are applicable

f) Position ladders or vehicle mounted cranes with buckets at each work site.

g) Ensure that at no time will team members be permitted to ascend the poles / structures in any manner whatsoever.

h) 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.
- Visually inspect the pole for rot or damages
- 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.

Note 8: Under no circumstances would the climbing shoes be used when the poles have cables attached.

- When the condition and installation of the pole is found to be in order, the intended work may proceed as planned.
- 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.

i) The rotten / damaged wooden pole structure shall not be used as part of a lifting device unless it is secured.

j) Ensure that all tools and equipment to be used have been inspected by a competent person before they are used.

k) The responsible person on site will continually supervise, direct and observe all activities.

l) 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 DST_34-925.

m) Responsible and authorized person must ensure that the work site is prepared and made safe as per the 240-114967625 (ORHVS).

n) Responsible person to sign the permit to work and complete workers register.

o) On-site apply equipontential earthing in accordance with organisational standards and procedure (240-114967625 / ORHVS), 240-78692652 & 240-69125290.

3.2.4 Intermediate structures

Note 1: Work should only commence once the instruction has been given by the person supervising the task.

Note 2: Ensure that appropriate PPE and safety equipment are worn / used during execution of the task.

Note 3: Adhere to spanning sheet info/calculations.

3.2.4.1 Determining of Clearances

Note 1: Adhere to spanning sheet info / calculations.

Note 2: Ensure compliance to specified standard clearances**.**

Note 3: Ensure clearances are calculated correctly.

a) Standard clearances in accordance to the SANS10280-1 must be adhered to.

b) Authorised person to determine ground clearances of the existing line by means of an approved measuring.

c) Determine maximum height of new LV line using survey profile.

d) Calculate close proximity clearances between existing line and new LV line.

e) Compare measurements with Survey profile.

3.2.4.2 Planting structure as per LV span sheet

a) Ensure correct length of structures and compare with spanning sheet.

b) Locate survey pegs.

c) Determine depth and excavate holes.

d) Assemble structures.

Note 1: Ensure correct planting depth.

e) Ensure structures are planted at correct depth, backfilled and compacted.

3.2.5 Installation of a Cross arm

Note 1: Ensure that traffic and or public control is adequate where the ABC crosses the road or is being built in a build-up area and ABC are being installed

Note 2: All steps as identified in the task analysis of “operate a vehicle mounted crane with bucket attached” and “physical material handling” are applicable.

Note 3: Ensure that a proper lifting equipment or rigging method is used for lifting and securing cross arm.

Note 4: Perform work in accordance with the relevant specifications.

Note 5: Falling Tools, equipment and material could cause equipment damage and injuries to personnel.

3.2.5.1 Existing shared structure (VMC with bucket)

a) Inspect the existing poles for soundness in accordance to procedure.

b) Dress the pole in accordance to the scope of work and the procedure

Note 1: The cross arm can be prepared before it is lifted

c) Place tools (snatch block and rope) in bucket.

Note 2: Ensure that fall arrest system is worn and used in accordance to procedure.

d) Raise the bucket to working position.

e) Measure cross-arm attachment height, drill the attachment hole and install the cross-arm assembly.

f) Install or fit earthing accordance to the specifications (Where applicable).

3.2.5.2 Existing shared structure (ladder / Climbing shoes)

a) Inspect the pole for soundness in accordance to the procedure.

b) Dress the pole in accordance to the scope of work and the procedure.

c) Place tools and snatch block in the pouch.

Note 1: Ensure that fall arrest system is put on and used in accordance to procedure.

Note 2: Rope grab unit shall be used when climbing shoes are used.

d) Place and secure ladder onto the structure.

e) Attach the snatch block onto the pole.

f) Raise / hoist the cross arm up the pole and secure it in position.

g) Install or fit earthing accordance to the specifications (Where applicable).

Note 3: All steps as identified in the task analysis of “operate a vehicle mounted crane with bucket attached”, “work with/on extension/single ladders” and “physical material handling” are applicable.

3.2.6 Installation of bare conductors

Note 1: Ensure that traffic and or public control is adequate where the line crosses the road or is being built in a build-up area and conductors are being installed

Note 2: Ensure that correct equipment (tensioning/gripping/binding/making off) for conductor tensioning is used

Note 3: Ensure that tools, conductor running pulleys and lifting/gripping equipment are not being dropped or thrown to the ground

a) Ascend the structure, fit running out pulleys onto the structure / pole and descend.

b) Apply working earths (running earth) in accordance with standards and procedures.

Note 4: Ensure that the conductors are pulled through very carefully and direct supervision shall be applied / exercised

c) Run out conductors, ascend the structure and fit the conductor into running pulleys.

d) Make off conductor ends at furthest point and secure to insulators.

e) Sag conductors to correct tensioning requirements.

f) Make off conductor ends at tensioning point.

g) Bind in conductors to insulators at all intermediate points.

h) Earth the installation according to design specification.

i) Remove equipment and lower to ground level.

j) Descend ladders to ground level using fall arrest system in accordance with procedure/lower buckets to ground level.

k) Remove ladders / VMC from poles.

Note 6: All steps as identified in task analysis of “operate a vehicle mounted crane with bucket attached” and “work with/on extension/single ladders” are applicable.

Note 7: Ensure that the conductors to and point of supply and load sides are connected in accordance with relevant specifications and standards.

l) Connect conductors to low voltage supply point (feeder side).

Note 8: Ensure that earth is applied whenever one side of the conductor is connected and it is removed in accordance with standards and procedure whenever the work is done and line is being handed-over.

m) Connect conductors to point of supply (load side).

n) Remove working earth in accordance with standards and procedures.

Note 9: Remove working earths in accordance with standards and procedures after binding in.

3.2.7 Installation of ABC (Aerial Bundle Conductor)

Note 1: Ensure that traffic and or public control is adequate where the ABC crosses the road or is being build in a build-up area and ABC are being installed

Note 2: Ensure that correct equipment for conductor tensioning is used.

Note 3: Ensure that tools, conductor running pulleys and lifting/gripping equipment are not being dropped or thrown to the ground.

a) Ascend the structure and attach running out pulleys onto the structure / pole.

b) Run out ABC, raise and fit the cable into running pulleys.

Note 4: When attaching ABC to the suspension clamps use the neutral / earth wire (catenary wire).

c) Terminate the ABC end by attaching it to the furthest strain clamp.

d) Sag ABC to correct tensioning.

e) Attach ABC onto the suspension clamps as per requirements.

f) Install end caps onto the ABC tail ends on all phases.

g) Remove equipment and lower to ground level.

h) Descend ladders to ground level using fall arrest system in accordance with procedure/lower buckets to ground level.

i) Connect conductors to low voltage supply point (feeder side).

j) Remove ladders from poles.

Note 5: All steps as identified in analysis of “operate a vehicle mounted crane with bucket attached” and “work with/on extension/single ladders” are applicable.

Note 6: Ensure that point supply conductors are connected in accordance with relevant specifications and standards.

Note 7: Ensure that earth is applied whenever one side of the conductor is connected and it is removed in accordance with standards and procedure whenever the work is done and line is being handed-over**.**

Note 8: Ensure that correct equipment (tensioning/gripping/binding/making off) for conductor tensioning is used

Note 9: Ensure that tools, conductor running pulleys and lifting/gripping equipment are not being dropped or thrown to the ground

Note 10: Apply working earths in accordance with standards and procedures after binding in.

3.2.8 Energizing plant

Note 1: Ensure that people, tools and equipment are removed from workplace prior to restoring supply.

a) Ensure that plant is handed back (works permit signed off) where required and reenergising done in accordance with EPC_32-846.

3.2.9 Task Wrap Up

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

b) Complete and submit the required documentation.

NOTE 1: Ensure that the work site is properly cleaned on completion of work as material laying around may result in injuries to the public and damage to the image of Eskom.

NOTE 2: Redundant material shall be disposed of in accordance with statutory and organisational requirements and procedures.

3.3 Related/Supporting Documents

3.3.1 Related Documents

a) Specifications;

b) Critical task analysis; and

c) Training module.

3.3.2 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

d) In / Out commission sheet / Stores return

4. Authorization

This document has been seen and accepted by:

Name and surname	Designation
Prince Moyo	Power Delivery Engineering GM
Colin Smith	Design Base Maintenance Manager
Archie Jaykaran	SCOT/SC Chairperson
Solly Matebula	Specialized and Maintenance Manager (GOU)
Reggie Moleko	Specialized and Maintenance Manager (FS OU)
Lumka Godlwana	Technical Support Manager (LOU)
Ian Mcfadden	Technical Support Manager (KZN OU)
Rodney Pretorius	Technical Support Manager (NW OU)
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5. Revisions

This revision “240-123764964”supersedes and replaces all revisions of 34-102.

Date	Rev	Compiler	Remarks
May 2017	1	DM Ntombela	Registered and changed the ref number to 240-123764964” Changed the format and changed clause numbering
Dec 2009	1	JE Van Wyngaard	Document published as DMN_34-102

Date	Rev	Compiler	Remarks
May 2009	0A	JE Van Wyngaard	Changed the format, the document type and changed numbering. -Added Key words and Bibliography Sections, revised the body content and introduced Foreword section. 1.2 Revised Applicability section 2. Normative/Informative References 3. Definitions, Abbreviations 4.2 Pre-job Planning 4.3. Spares and Materials 4.4. Tools and Equipment 4.5. Personal Protective Equipment
Jan 2007	0	JE Van Wyngaard	Original issued as DMN_34-102

6. Development team

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

Name	Designation	Region
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D LeRoux	Officer Technical Support	WC OU
M Mavuso	Officer Technical Training	TX CG HV Plant
A Haynes	Senior Advisor	TX WP&CS
A Toulson	Officer Technical Support	TS GOU
D Sadler	Middle Manager HV Plant	TX WP&CS
K Krafft	Senior Consultant	PDE-DBO
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7. Acknowledgements

Not applicable.

Annex A – Task Observation

(Informative)

Eskom Distribution	FORM TITLE	OBSERVATION FORM		
	FORM NUMBER	240-123764964	REV DATE	<As required or n/a>
	DOCUMENT TITLE	Build LV Lines under Dead MV Lines on Same Structure		

1. OBSERVER'S PARTICULARS

Task observer's name: _____

Task observed: Build LV Lines under Dead MV Lines on Same Structure_____

Section / department: _____

Location: _____

Occupation: _____

Is there a procedure / task manual for this task? YES ☐ NO ☐

Date: _____

Task Manual ref. 240-123764964 _ _ _____

Time with task: _____

Work order no.: _____

2. REASON FOR OBSERVATION

Planned: ☐ Follow-up: ☐

Name of employee being observed:

3. TASK OBSERVATION

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			

	Tools equipment:				6. Carry out the task as per task manual 240-123764964			
	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)