PR-NET-OSM-061

MANAGEMENT OF FAULTS ON HIGH VOLTAGE OVERHEAD LINES

OPERATIONAL SAFETY MANUAL - SECTION 7.4

Scottish & Southern Electricity Networks

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1 Introduction

This **Approved** procedure provides guidance on the actions to be taken on site by **SSEN-D** employees and contractors on the detection of a potential risk of failure or in response to a fault on, or disruptive failure of, **High Voltage** overhead lines connected to the Distribution **System**.

2 Scope

2.1 The scope of this document applies to:

- Requirements to safeguard operational staff when they respond to faults or disruptive failures on Distribution **High Voltage** overhead lines
- **Incidents** where a third-party might have caused the fault or disruptive failure, e.g. trespassers
- Management of the Fire Service and firefighting
- SF6 procedures where SF6 might have been released from switchgear or where SF6 pole mounted switchgear has caught fire
- Overhead line equipment that is suspected of having faulted or is in imminent risk of failure

2.2 This scope does not apply to:

- Restoration of supplies
- Management of faults or work on damaged or faulty underground **Plant** and **Apparatus**
- Management of neutral faults
- Response to **System** faults
- Loss of partial **Earthing**
- Investigation and reporting of asset failures

3 References

The documents detailed in Table 3.1 - Scottish and Southern Electricity Networks Documents, and Table 3.2 – External Documents, should be used in conjunction with this document.

Table 3.1 - Scottish and Southern Electricity Networks Documents

Reference	Title
PR-NET-OSM-006	SSEN Distribution Operational Safety Rules – Operational Safety Manual – Section 1.1
PR-NET-OSM-028	Switching Terminology and Approved Abbreviations - Operational Safety Manual - Section 4.4
PR-NET-OSM-020	Manual Reclosing of Circuits Post Trip, Sequence Operation and Lockout - Operational Safety Manual – Section 2.10
PR-NET-OSM-058	Management of Work and Access to Poles - Operational Safety Manual – Section 7.1
PR-NET-OSM-059	Management of Work and Access to Towers Operational Safety Manual – Section 7.2
PR-NET-OSM-050	Access to and Operation of Plant and Apparatus containing SF6 Gas - Operational Safety Manual – Section 6.8

Reference	Title
PR-NET-OSM-080	Reporting and Investigation of Asset Failures - Operational Safety Manual – Section 12.9
PR-NET-OSM-081	Response to Low Conductor Reports - Operational Safety Manual – Section 12.10
PR-NET-OSM-082	Fire Fighting Operations at OH Structures and Operational Premises
PR-NET-OPS-058	Requirements for Management and Handling of Sulphur Hexafluoride (SF6) Related Activities
WI-NET-OSM-002	Personal Protective Equipment and Workwear for Live Environments
N/A	SSEN SHE Handbook (Held in Safety, Health and Wellbeing SharePoint Site)

Table 3.2 – External Documents

Reference	Title
ENA ER G28/4	National Equipment Defect Reporting Scheme (NEDeRS)

4 Definitions

4.1 The words printed in bold text within this document are either headings or definitions. Definitions used within this **Approved** Procedure are defined within the list presented immediately below, or within section 2 of the **Operational Safety Rules**.

4.2 **Incident**

Event that has caused or is expected to cause damage to **Plant** or **Apparatus**.

4.3 **Operational Safety Rules (OSR)**

SSEN-D set of rules, as read with related documents and procedures, that provide generic safe systems of work on the **System** therefore ensuring the health and safety of all who are liable to be affected by any **Danger** that might arise from the **System.**

4.4 **Operator**

SSEN-D employee or any appropriately **Authorised Person** working on behalf of **SSEN-D**.

5 General Responsibilities

5.1 Persons who are required to operate and undertake work on the **System**, **Shall** have a thorough understanding of the work and ensure on site risks are suitably assessed and appropriate control measures put in place before, during and after all activities.

5.2 Persons must ensure that, at all times during the work (or associated testing), **General Safety** arrangements are maintained and that other work areas are not adversely affected by the activities for which they are responsible.

6 Authorisation

6.1 It **Shall** be the responsibility of the individual to ensure that any actions performed are within the bounds of their Competency and authorisation level.

6.2 Competence and authorisation certificates **Shall** be retained personally and be made available upon request.

7 Personal Protective Equipment

7.1 Persons who are required to work or carry out **Switching** on or near the **System Shall** wear suitably **Approved** Personal Protective Equipment (PPE). Furthermore, where warning labels or signs identify the existence of a particular hazard, additional and appropriate PPE **Shall** be worn

7.2 As a minimum, PPE **Shall** meet the requirements of WI-NET-OSM-002.

8 Access Requirements

Access to all **SSEN-D** poles, towers and structures connected to the **System**, **Shall** comply with the requirements of the **Operational Safety Rules** and PR-NET-OSM-058 Management of Work and Access to Poles - Operational Safety Manual – Section 7.1, and PR-NET-OSM-059 Management of Work and Access to Towers Operational Safety Manual – Section 7.2.

9 Risks Following Faults of Overhead Line Equipment

9.1 Following a fault occurring on the overhead line **System**, a number of risks are liable to be present within the local environment. They **Shall** be fully assessed and understood by the **Operator** who first attends the scene and by subsequent support staff. This is to ensure that they can take the appropriate action to safeguard themselves and also provide suitable guidance to Emergency Services personnel if they arrive on site. Section 14 of this **Approved** procedure details the requirements when interacting with the Fire Service.

9.2 The predominant risks which should be assessed include, but are not limited to:

- Burning oil-filled equipment or poles – There is a risk of extreme heat, and explosion. Noxious fumes and smoke may affect breathing and obscure vision
- Downed or low **Conductors** that may be **Live** – **Safety Distances Shall** be maintained. Immediate steps should be taken to make the equipment **Dead** remotely, and prove the **Conductors Dead**, see PR-NET-OSM-020 Manual Reclosing of Circuits Post Trip, Sequence Operation and Lockout - Operational Safety Manual – Section 2.10
- Compromised insulators and / or **Earthing** that could lead to the pole or tower becoming **Live**
- A **Control Engineer** or automatic operation of an Auto-Reclose scheme might inadvertently make **Plant** and **Apparatus Live**
- General risk of debris falling from height that might have been scattered across the area underneath the overhead lines
- Structural damage to buildings in the vicinity – Access may need to be limited or prohibited until an appropriate survey has been undertaken
- Environmental oil spills causing potential pollution to water courses etc. – Spill kits **Shall** be employed to provide temporary absorption and bunding. Environment Agency notification **Shall** be in accordance with the **SSEN-D** Environmental Safety Manual **Approved** procedure

10 Procedure for Reclosing Overhead Lines that have Locked Out

10.1 On receipt of a circuit trip, the **Control Engineer Shall** use the information sources available to carry out a dynamic risk assessment to determine risks to staff, contractors, the public and the **System** before reclosing on overhead **Systems**, in accordance with the requirements of PR-NET-OSM-020 Manual Reclosing of Circuits Post Trip, Sequence Operation and Lockout - Operational Safety Manual – Section 2.10.

10.2 When assessing information sources, the **Control Engineer** may need information from site, including but not limited to:

- Progress of hot glove or **Live** line work in the vicinity
- **High Voltage Switching** in progress
- Temporary **System** arrangements or abnormalities
- Weather conditions, e.g., storms or lightning etc
- Land use in the vicinity of tripped circuit, where known, e.g., arable, horticultural etc
- Information available from emergency services
- Information provided by the general public
- Public activities in the vicinity of the circuit, where known, e.g., carnivals, harvesting, fishing etc

10.3 Where Arc Suppression Coils (ASCs) are equipped on the **System**, consideration **Shall** be given to closing the ASC bypass circuit-breaker.

11 Procedure where a Potential Imminent Risk of Failure is Identified

11.1 Where an **Operator** identifies that there is a potential imminent risk of a disruptive failure of any **Plant** or **Apparatus** connected to the overhead **System**, the **Operator Shall**:

- Take the necessary actions to safeguard themselves and others from the imminent **Danger**
- Vacate the area immediately, which may include withdrawing to a safe location, forming a safety zone etc
- Prevent access to the area
- Prevent local operation of any **Plant** or **Apparatus** by themselves or other persons except in emergency situations (PR-NET-OSM-026 HV Switching and Earthing – Operational Safety Manual - Section 4.2)
- Inform the **Control Engineer** of the **Danger** without delay
- Where applicable, the **Operator Shall** inform the landowner or their nominated representative of the potential risk of failure and any access requirements needed
- If necessary, request the assistance of suitably experienced staff, e.g., **Senior Authorised Person**, at the relevant voltage level, to attend site
- Consider the quality and continuity of the customers' supply

11.2 The person on site who has the most experience in managing the risk from the **System**, **Shall** take charge of the **Working Party** and liaise with the **Control Engineer** along with any other third-party organisations, e.g. landowners, members of the public, emergency services, other utilities etc.

11.3 The person in charge of the **Working Party Shall** carry out a full risk assessment and communicate their findings, along with any control measures to be implemented, to the **Working Party** and the **Control Engineer**. The initial steps to be taken to rectify the issue **Shall** also be discussed where required.

11.4 Any access or operating restrictions **Shall** only be removed after the **Plant** or **Apparatus** has been made safe, the risk of disruptive failure has been removed, or suitable control measures have been implemented.

11.5 Where there is an impact to the quality and continuity of the customers supply, consideration **Shal**l be given to the provision of alternative means of supply.

12 Escape of SF6 Gas or Toxic Gases

In the event of a failure of a SF6 Pole Mounted Circuit Breaker (PMCB), it is possible that SF6 solid and gaseous by-products could be released. The requirements of PR-NET-OSM-050 Access to and Operation of Plant and Apparatus containing SF6 Gas - Operational Safety Manual – Section 6.8, and PR-NET-OPS-051, **Shall** be complied with, in particular:

- All staff who are required to work with SF6 **Shall** be trained and certificated
- When working in or near open SF6 chambers, **Approved** PPE **Shall** be worn which **Shall** include disposable overalls, disposable gloves, respiratory and eye protection
- Any white or grey dust **Shall** be treated as toxic. An **Approved** procedure **Shall** be followed to remove the dust and wash down the area with a neutralising solution

13 Investigative Actions Following the Disruptive Failure of Plant and Apparatus

13.1 Where an **Incident** occurs with no personal injury, then technical investigations **Shall** be undertaken by the Procedures and Investigations Team in accordance with PR-NET-OSM-080 Reporting and Investigation of Asset Failures - Operational Safety Manual – Section 12.9.

13.2 Where a failure occurs and includes personal injury, the technical investigation **Shall** be managed by the Procedures and Investigations Team in parallel with the personal injury investigation conducted by the **SSEN-D** SHE Team.

13.3 Site safety **Shall** be maintained at all times, and it **Shall** be ensured that all assets are protected against further damage and/or the contamination of evidence where possible. The following **Shall** be considered:

- The presence of pressurised components
- Contamination (SF6, Polychlorinated Biphenyls (PCBs) and Oil etc.)
- Structural integrity of any buildings
- Whether the equipment should remain **Live**
- The continuity of earthing systems

13.4 It is vital that once made safe, the failed **Apparatus** remains, where possible, undisturbed until photographic evidence is taken of the product and surrounding area.

13.5 Identification labels **Shall** be added to the photographs and once on-site investigations have been completed, the **Apparatus Shall** be carefully handled, transported, and stored, in accordance with relevant **SSEN-D Approved** procedures and local environmental regulations, to minimise any further damage and prevent contamination. Further advice may be obtained from the SSEN-D Environmental Safety Team (Distribution.Safety.Team@sse.com) if required.

13.6 When an PMCB fails to operate as designed during a **System** event, contributing factors may include a mechanical failure or protection system malfunction. It may be necessary to review protection system elements to determine the investigation conclusion and provide appropriate corrective/preventative actions. Any evidence or reports **Shall** be in a standard format.

13.7 When carrying out major catastrophic failure investigations, a number of contributing factors should be considered including lightning activity, **System** disturbance history, local **Switching** and auto-recloser or testing activity.

13.8 Copies of inspection and maintenance records might also provide an insight into the reason for failure.

13.9 Information held in the Energy Networks Association Engineering Recommendation G28/4 **Shall** be reviewed and might provide guidance on similar failures previously recorded.

14 Management of the Fire Service and Fire Fighting

In all events involving fires near or on Overhead Assets refer to PR-NET-OSM-082 – Fire Fighting Operations at Overhead Structures and Operational Premises - Operational Safety Manual – Section 12.11.

15 Revision History

No	Overview of Amendments	Previous Document	Revision	Authorisation
01	New document created	TBC	1.00	Richard Gough
02				