

Health and Safety Executive - HM Mines Inspectorate

Major Hazard Topic Inspection Guide

ELECTRICAL POWER SYSTEMS

1. Purpose

This document sets out how inspectors will assess operators' compliance with the relevant statutory provisions in respect of electrical power systems (EPS). The requirement for a suitable electrical power system and supply impacts on most of the major hazard controls.

Previous incidents have included:

- Maltby – a short circuit in the main 11 kV substation caused total loss of power for an extended period disrupting normal ventilation resulting in withdrawal of men.
- Kellingley – a short circuit occurred at the dedicated booster fan 6.6 kV substation resulting in total loss of underground booster fans for an extended period.
- Welbeck – a short circuit occurred in an 11 kV surface substation causing significant flash damage to the switchgear necessitating major replacement and a prolonged period of downtime.
- Delayed restoration of supply at numerous sites when arrangements between the mine and the district network operator (DNO) have failed.

The operator should have adequate arrangements to minimise the effects of any fault and ensure that safety critical plant is unaffected.

2. Scope

The inspection will focus on the key hazards and the associated safety management systems for managing the risks. The format of the inspection will follow the established Plan, Do, Check, Act structure, as defined in HS(G) 65 and summarised in HSE leaflet INDG 275.

The inspection will be undertaken in line with the HID Regulatory Model and will explore the following elements:

- has the mine operator completed suitable and sufficient assessments?
- has the mine operator identified where EPS are used to control and prevent hazards?
- has the mine operator identified the hazards associated with EPS failure?
- are there suitable standby arrangements for safety critical systems?
- have suitable preventative and mitigating barriers been put in place?
- have roles and responsibilities been allocated for the control measures identified?
- is there a suitable competency management system in place?
- are the control and mitigation measures being monitored and reviewed?

3. The intervention

The intervention team can if necessary ask the mine operator to provide copies of documentation in advance of the site visit. The on-site part of this stage of the intervention could take a day or more depending on the scope. Once the documentation has been reviewed the intervention team will

select a part of the mine to inspect and evaluate the effectiveness of the safety management arrangements and risk control systems.

EPS are key components of:

- ventilation systems
- mine water pumping
- methane extraction
- monitoring and control facilities
- winding systems
- transport systems
- telecommunication and emergency systems

Maintaining a secure electrical supply for safety critical plant and systems is paramount. The design, selection and protection of the distribution equipment and its protection settings should be organised to minimise the effects of any power disturbance both on and off site.

Inspectors should determine how well the mine operator is controlling the risks by assessing:

- the adequacy of the information that the mine operator has obtained to determine the EPS
- the adequacy of the assessment of this information by the mine operator to identify the appropriate selection and application of EPS
- the adequacy of the control measures, and in the event of EPS failure, to ensure adequate standby arrangements operate. This should describe the method of work and the rules to be applied
- how well the procedures required have been implemented i.e. the arrangements in place (management, inspection, monitoring) to ensure that the rules are applied and enforced
- the effectiveness of the arrangements to ensure that EPS performs as specified
- that if EPS inadequacies are indicated a system is in place to implement remedial action and review the original design.

4. Reporting findings and conclusions

Inspectors will summarise the outcome of the inspection with the operator, management team and the safety representatives at the mine whilst on site.

This summary will include the team's assessment on how the operator is complying with the relevant provisions, priorities for any further action and the operators' performance score in accordance with the **Performance Assessment Table** shown below.

Where further action is required to achieve compliance this will be taken in accordance with HSE's Enforcement Policy Statement.

5. Key legislative requirements for mines

Health & Safety at Work etc Act 1974

Section 2(1), 3(1)

The Mines Regulations 2014

Regulation 7 General duties of the mine operator

Regulation 8 Co-operation

Regulation 9 Health and Safety document

Regulation 10 Management structure

Regulation 11 Competence

Regulation 12 Instructions, rules and schemes

Regulation 13 Permits to work

Regulation 15 Maintenance and inspection of equipment

Regulation 19 Fire protection – general duty

Regulation 20 Fire protection plan

Regulation 21 Application of regulations 22 and 23

Regulation 22 Explosive atmospheres

Regulation 23 Ignition risks

Regulation 37 Equipment in relevant shafts and outlets

Regulation 38 Safety features of winding apparatus

Regulation 39 Inspection, maintenance and testing

Regulation 40 Signalling and communication

Regulation 41 Transport systems

Regulation 43 Ventilation

Regulation 46 Lighting

Regulation 51 Auxiliary equipment

Regulation 53 Duties of the mine operator with regard to escape and rescue

Regulation 54 Escape and rescue plan

Regulation 55 Emergency equipment and communication systems

Management of Health & Safety at Work Regulations 1999

Regulation 3 Risk assessment

Regulation 5 Health and safety arrangements

Provision and Use of Work Equipment 1998

Regulation 4 Suitability of work equipment

Regulation 5 Maintenance

Electricity at work regulations 1989

Dangerous substances and explosive atmospheres (DSEAR) 2002

Regulation 5 Risk assessment

Regulation 7 Places where explosive atmospheres may occur

Regulation 9 Information, instruction and training

Electricity at work: safe working practices (HSG 85) 2015

Keeping electrical switchgear safe (HSG 230) 2015

Electrical safety in mines (HSG 278) 2015

(HID CI/SI inspection Manual)

http://intranet/operational/ld1_4_inspection_manual/ld1_4inspr-08.htm

Performance scores

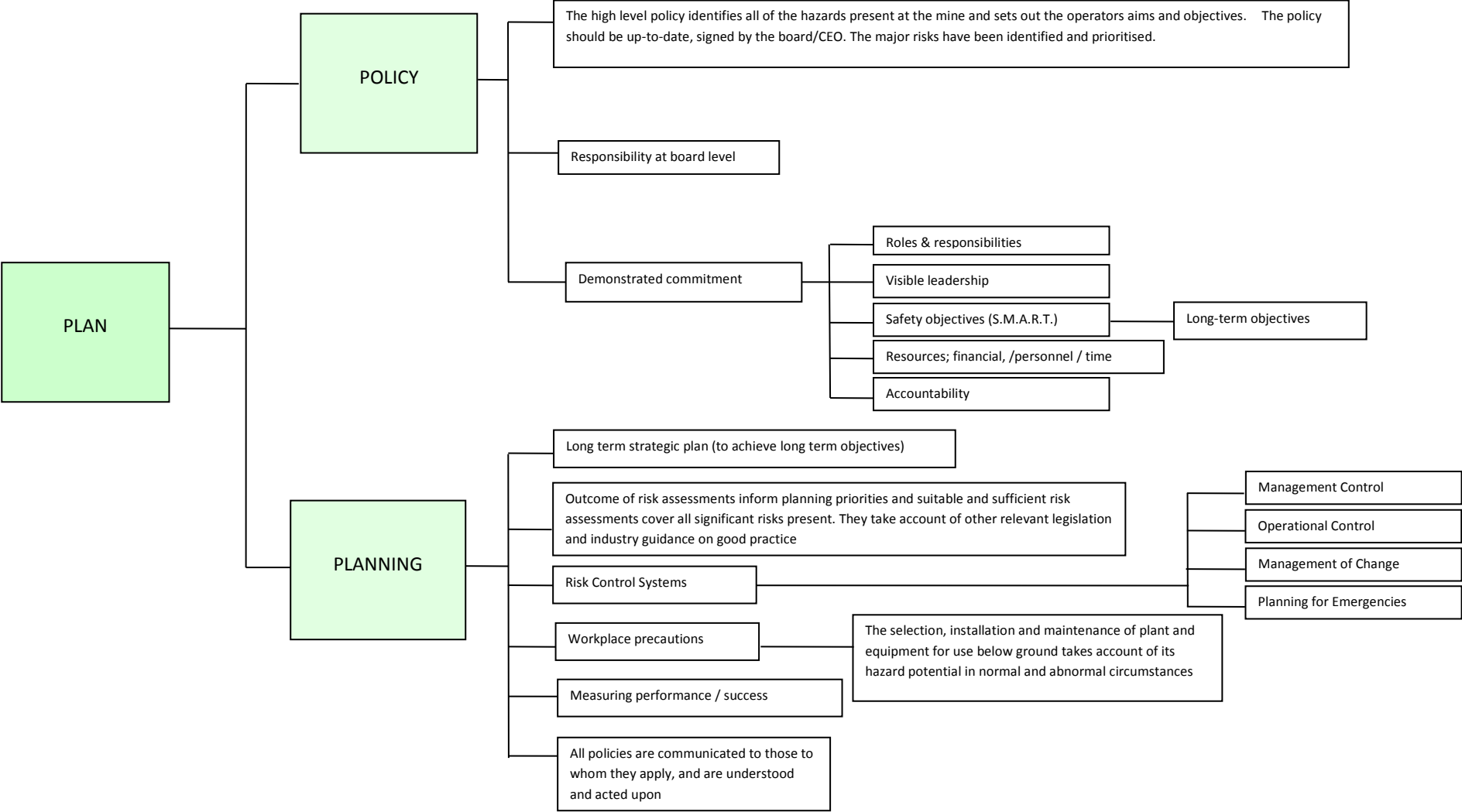
Following the intervention, Inspectors should performance score the mine operator's degree of compliance in accordance with the Table below.

EMM RISK GAP					
EXTREME	SUBSTANTIAL	MODERATE	NOMINAL	NONE	NONE
TOPIC PERFORMANCE SCORE					
60	50	40	30	20	10
Unacceptable	Very Poor	Poor	Broadly Compliant	Fully Compliant	Exemplary
Far below relevant minimum legal requirements. Degree of non-compliance extreme and widespread. Failure to recognise issues, their significance, and to demonstrate adequate commitment to take remedial action.	Substantially below the relevant minimum legal requirements. Degree of non-compliance substantial. Failures not recognised, with limited commitment to take remedial action.	Significantly below the relevant minimum legal requirements. Degree of non-compliance significant. Limited recognition of the essential relevant components of effective health and safety management, but demonstrate commitment to take remedial action	Meets most of the relevant minimum legal requirements. Degree of non-compliance minor and easily remedied. Management recognise essential relevant components of effective health and safety management, and commitment to improve standards.	Meets the relevant minimum legal requirements. Management able to demonstrate adequate identification of the principal risks, implementation of the necessary control measures, confirmation that these are used effectively and subject to review.	Exceeds the relevant minimal legal requirements. Management committed and proactive in devising and implementing an effective safety management system to achieve 'best practice' and beyond legal requirements. Actively seeks to further improve standards.
EMM INITIAL ENFORCEMENT EXPECTATION					
Prosecution / Enforcement Notice.	Enforcement Notice / Letter.	Enforcement Notice / Letter.	Letter / Verbal warning.	None.	None.

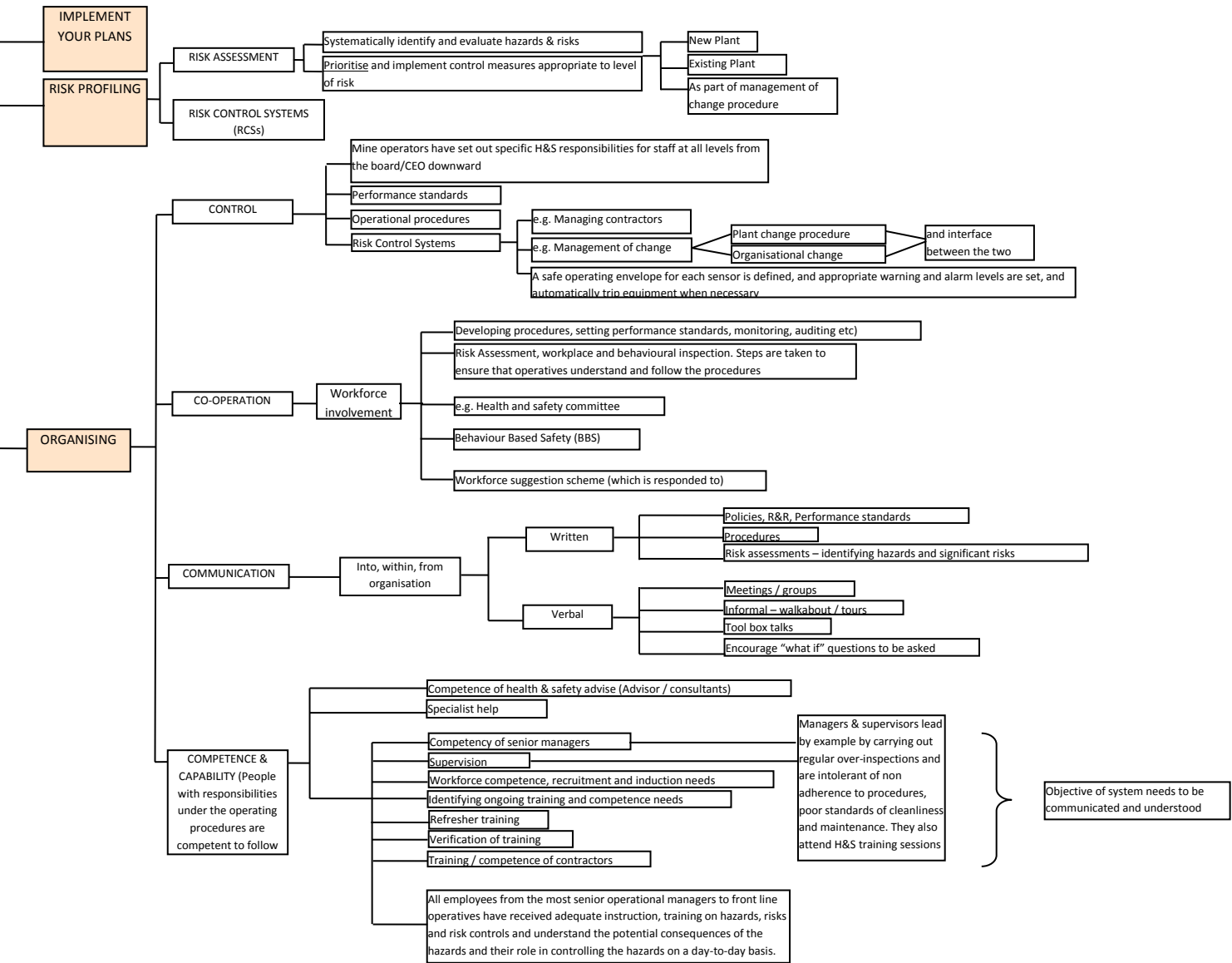
Plan	1. There is a health and safety policy that is dated and signed that identifies major hazards, including EPS, and sets out the mine operator's aims and objectives. 2. The mine operator has put in place a suitable management structure and set out specific H&S responsibilities for staff at all levels to control the risk of the major hazards present, including EPS. 3. The mine has a suitable, secure incoming supply of sufficient capacity and standby emergency arrangements. 4. The mine operator and those appointed to the management structure understand EPS principles and requirements. 5. The arrangements include clear procedures for those with H&S roles or responsibilities in relation to EPS systems. 6. Managers and supervisors at all levels accept their responsibilities in relation to EPS and lead by example in ensuring that risk control measures are properly maintained. 7. All employees from the most senior operational managers to front line operatives have received adequate instruction and training on EPS hazards, risks and risk control measures and understand: • that changes to EPS need to be carefully evaluated and any affected area is fully recommissioned • the function of consultation between managers and workers in the drawing up the method of work • the role of monitoring in identifying the adequacy of EPS arrangements • the potential consequences of any EPS failure. 8. The mine operator has in place arrangements for ensuring that EPS forming part of the escape and rescue arrangements is periodically tested. 9. Adequate arrangements are in place for informing and consulting staff (Safety Reps + Safety Committees Regs 1977).

Do	1. The mine operator has put in place a suitable management structure and set out specific H&S responsibilities for staff at all levels: • how EPS assessments will be completed, implemented and reviewed? • who is responsible for the selection of suitable plant and equipment? • who is responsible for determining the optimum location of any monitoring and protection? • who is responsible for determining the system protection settings? • who defines the frequency of the inspection and monitoring regimes? • do managers and supervisors have sufficient resources to implement the plan? • are staff competent to deliver their responsibilities? • any periodic independent oversight applied. 2. How is the workforce involved in the design and construction of EPS methods of work? 3. Are all procedures and any changes communicated to those to whom they apply? 4. The control measures required by the risk assessment have been implemented? 5. Is there an effective system for reporting of deficiencies in risk assessments and operating procedures? 6. There is an effective system for upwards reporting of deficiencies in assessments, design documents and control measures?
Check	1. Are there monitoring systems for: • inspection of the mine, its plant and equipment? • checking management arrangements exist to ensure that EPS performs as specified and are effective? • ensuring staff understand and follow the procedures that are in place to control EPS risks? 2. Complaints and incidents are investigated?. 3. Is there an effective reporting system for any EPS defect? 4. Are there any arrangements for independent third-party audit? 5. Are structured periodic audit arrangements are in place to ensure arrangements are monitored to measure their performance? 6. Is the audit programme risk-based and targeted at major hazard risk control and safety management systems?
Act	1. Are there effective arrangements for reviewing performance? 2. Has an improvement plan been established? 3. Have procedures been reviewed and amended as a result of accident/incident outcomes? 4. Has remedial action addressed deficiencies identified? 5. What safety performance indicators are in place?

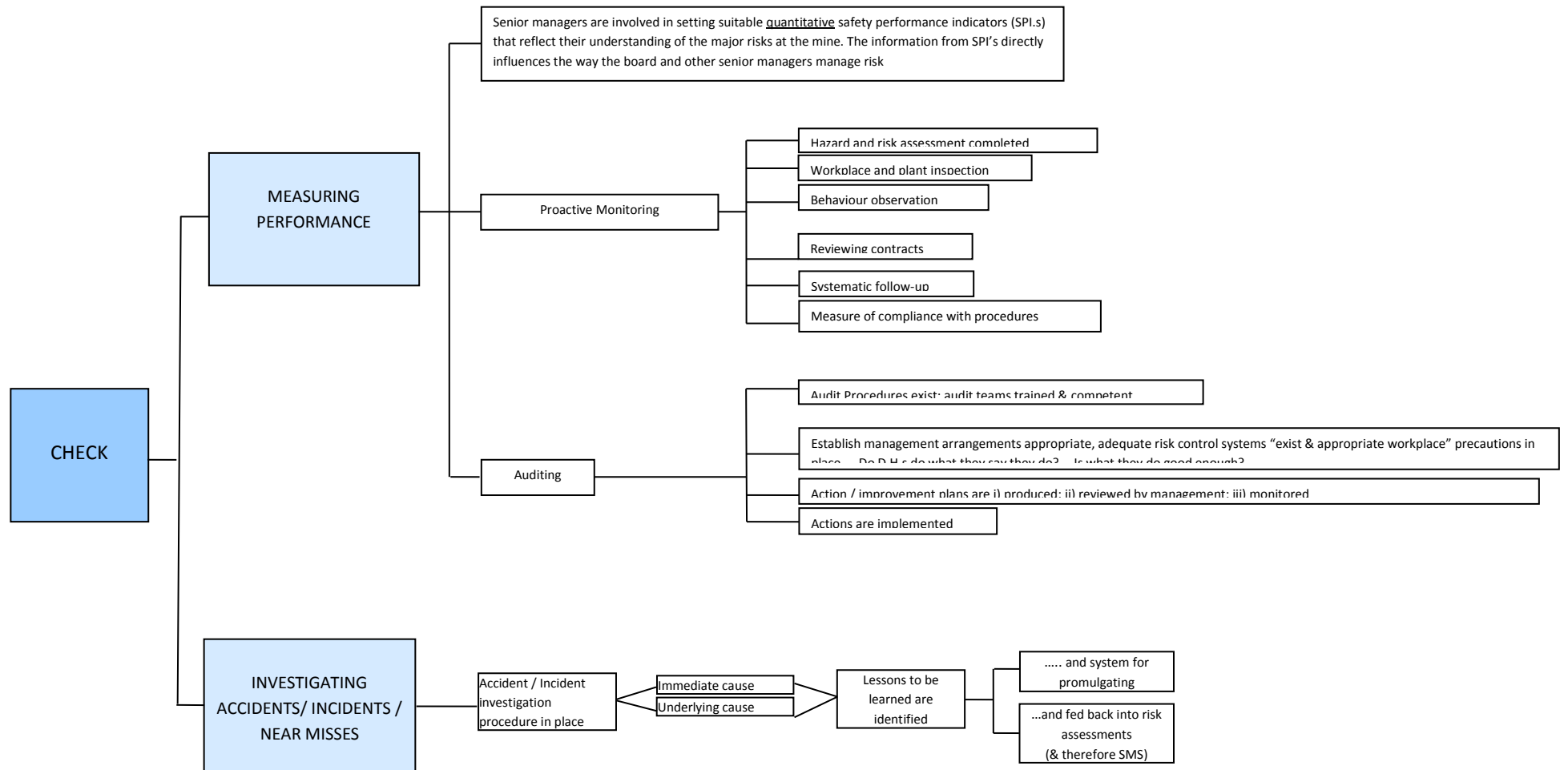
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