

Health and Safety Executive - HM Mines Inspectorate
Major Hazard Topic Inspection Guide
STORAGE, TRANSPORTATION, HANDLING & USE OF
EXPLOSIVES IN MINES

1. Purpose

This document sets out how inspectors will assess operators' compliance with the relevant statutory provisions in respect to managing the risks associated with the safe storage, transportation and use of explosives at mines.

The Explosives Regulations 2014 defines an **unplanned** explosion as one that was either not intended to happen or was intended but exceeded its expected extent or severity. One example of this would be the ignition of dangerous concentrations of flammable gas during shot firing. Such an explosion is classed as major hazard in the mining sector. An unplanned explosion below ground, particularly in a coal mine could lead to a potentially more powerful coal dust explosion that could kill many people and possibly lead to the loss of the mine. In none coal mines unplanned explosions could result in a major fire or even a large explosion from vehicles transporting ANFO (Ammonium Nitrate Fuel Oil).

At a mine where explosives are stored and used, an unintentional explosion is a reportable Dangerous Occurrence under RIDDOR, Schedule 2, Part 1, 5. Explosives: *'Any unintentional— fire, explosion or ignition at a site where the manufacture or storage of explosives requires a licence or registration.....'*

2. Scope

The inspection will focus on the key hazards above 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 principal focus is on mines where explosives and detonators are purchased, stored and used on a regular basis. The types of explosives and detonators used will depend on whether they are explosives suitable for use in places classified as hazardous under regulation 7(1) of DSEAR.

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

- has the mine operator identified the hazards associated with the storage, transportation, handling and use of explosives at the mine?
- has the mine operator completed suitable and sufficient risk assessments?
- have effective 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 that is relevant to the control measures?
- are the control and mitigating 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.

Inspectors should consider the following topics during the intervention, taking into account the particular type of mine and its risk profile:

- The explosives and detonator storage facilities provided on the surface at the mine.
- The explosives and detonator storage facilities provided underground at the temporary storage facility, sometimes referred to as the reserve station.
- Temporary storage facilities for mines using ANFO.
- Any explosives manufacturing facilities that may operate at a mine i.e. mixing ANFO.
- The bulk transportation or scheme of transit of explosives, detonators and ANFO from the surface to the temporary storage facility. This should include assessing the competence and authorisation of those involved in the operation.
- The bulk transportation of explosives, detonators and ANFO from the temporary storage facility to point of use. This should include assessing the competence and authorisation of those involved in the operation.
- The method of work to ensure that the explosives, detonators and ANFO are being handled and used correctly where shot firing operations take place.
- The accuracy of the records that are kept of the types and the amount of explosives, detonators and ANFO used.
- The competence of those appointed to undertake shot firing operations at the mine.
- The equipment provided for use in shot firing, including ANFO charging vehicles and those used for bulk transportation of explosives and detonators.

Assistance may be required from mines electrical inspector on:

- the use, testing and maintenance of exploders;
- circuit continuity testing equipment;
- earthing of ANFO charging vehicles.
- use of radios in and around explosives.

Inspectors should note that the Explosives Inspectorate carry out a number of visits to surface explosives storage facilities before they issue or renew a storage license. If there is underground storage of explosives for more than 24 hours then this will also be required to be included in the arrangements for the storage licence. The Explosives Inspectorate visits are undertaken in collaboration with the local police force and the Local Authority. Further information is provided on the overlap with the Explosives Inspectorate in the document [SPC/TECH/SI1/03 'Explosives Use at Mines'](#). Certain issues including theft, illegal manufacture of explosives, and non-compliance with license conditions are covered within this document.

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 the risk ranking score is such that the team decides specific follow-up action is warranted they should outline the nature of that action and an approximate timescale over which they intend to conduct the follow-up.

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 14 Inspection of the mine

Regulation 15 Maintenance and inspection of equipment

Regulation 28 General duties relating to explosives

Regulation 29 Duties relating to explosives in mines with explosive atmospheres

Regulation 30 Storage of explosives

Regulation 31 Rules

Regulation 54 Escape and rescue plan

Explosives Regulations 2014

Regulation 26 Fire and explosion measures

Regulation 27 Separation distances

Regulation 30 Unauthorised access

Regulation 35 Records in relation to relevant explosives

Regulation 36 Records in relation to civil explosives

Regulation 54 Escape and rescue plan

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

Regulation 6 Inspection

Dangerous Substances and Explosives Atmospheres Regulations 2002

Regulation 5 Risk Assessment

Regulation 6 Elimination or reduction of risks from dangerous substances

Regulation 7 Places where explosive atmospheres may occur

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

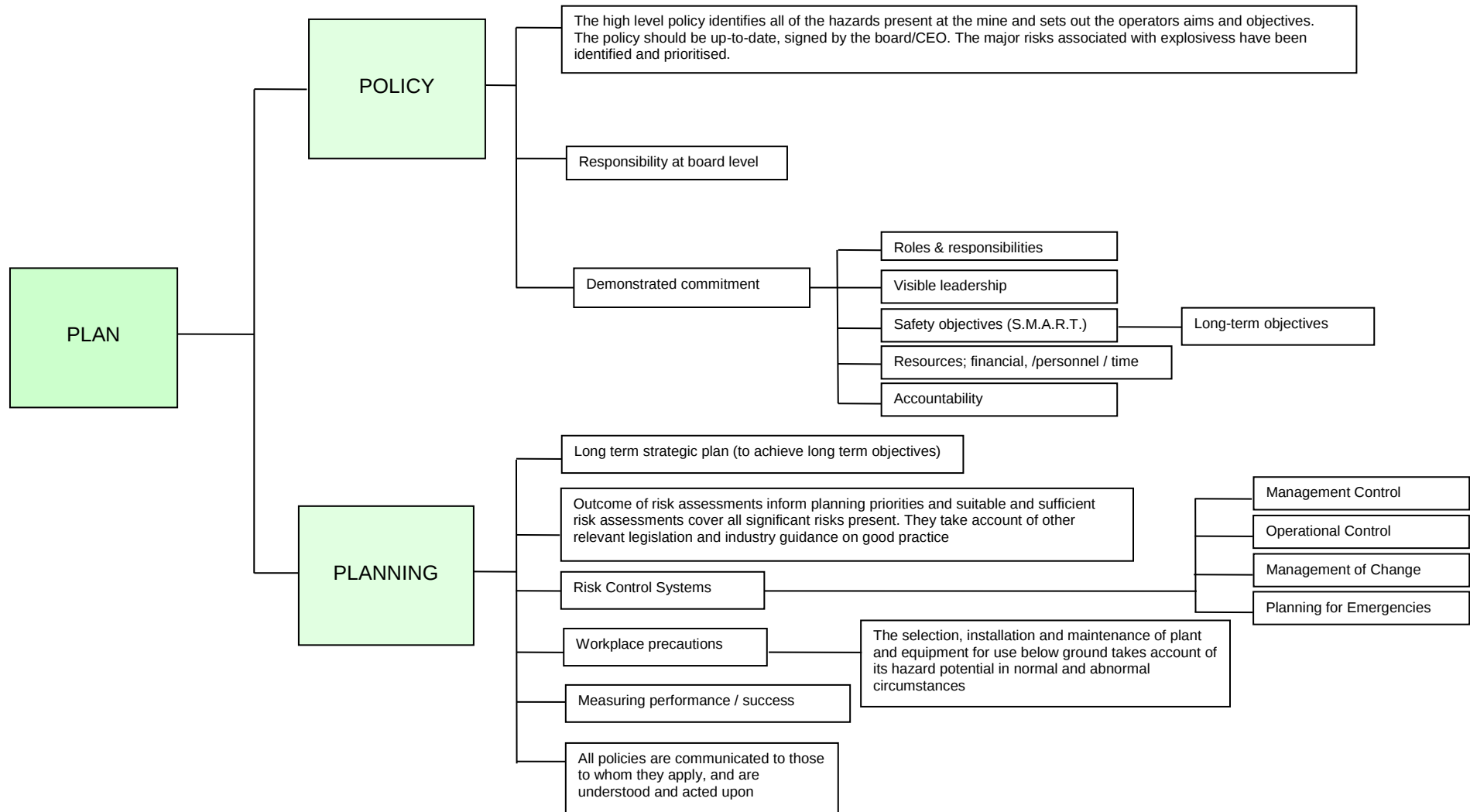
1. There is a health and safety policy that is dated and signed that identifies major hazards, including storage, transportation, handling and safe use of explosives, and sets out the mine operator's aims and objectives.
2. The mine operator has put in place a suitable management structure and set out specific H&S responsibilities for staff at all levels to control the risk of the major hazards present, including explosives.
3. The mine operator and those appointed to the management structure understand the control measures avoid unplanned explosions.
4. The arrangements include clear procedures for those with H&S roles or responsibilities in relation to:
 1. identifying that explosives and detonators are a potential flammable gas ignition source.
 2. how explosives risk assessments, and any rules, will be produced, implemented and reviewed?
 3. who is responsible for the selection of suitable plant and equipment required?
 4. who is responsible for determining the optimum location of any monitoring?
 5. sufficient resources for implementation?
 6. staff competency to deliver their responsibilities?
5. There should be evidence that mine operator has considered equipment suitability and maintenance in relation to shot firing operations and the transportation of explosives.
6. The H&S document includes measures for the storage, transportation, handling and safe use of explosives and adequate risk control systems have been identified. These should include:
 - written instructions, rules, schemes or plans for explosives including arrangements for dealing with misfires.
 - the suitable safety and security of explosives and detonators during storage and transportation (separate compartments);
 - appropriate records of the explosives and detonators;
 - a system for dealing with explosives or detonators that are damaged;
 - preventing unauthorised access to the explosives store by having adequate physical and key security arrangements;
 - preventing an unplanned fire or explosion i.e. by excluding sources of ignition;
 - limiting the extent of fires or explosions i.e. by considering stock levels required and keeping explosives away from other flammable substances;
 - preventing fires spreading and stopping explosions communicating from one place to another i.e. by having the correct separation distances in place during storage;
 - protecting people (public, workers and emergency services) from the effects of fire or explosion i.e. by having effective evacuation procedures and providing information on a buildings contents to the emergency services;
 - preventing shot firing in the presence of dangerous concentrations of flammable gas.
7. The mine operator has in place a written escape and rescue plan in the event of an explosives emergency situation below ground which is tested periodically.

Do

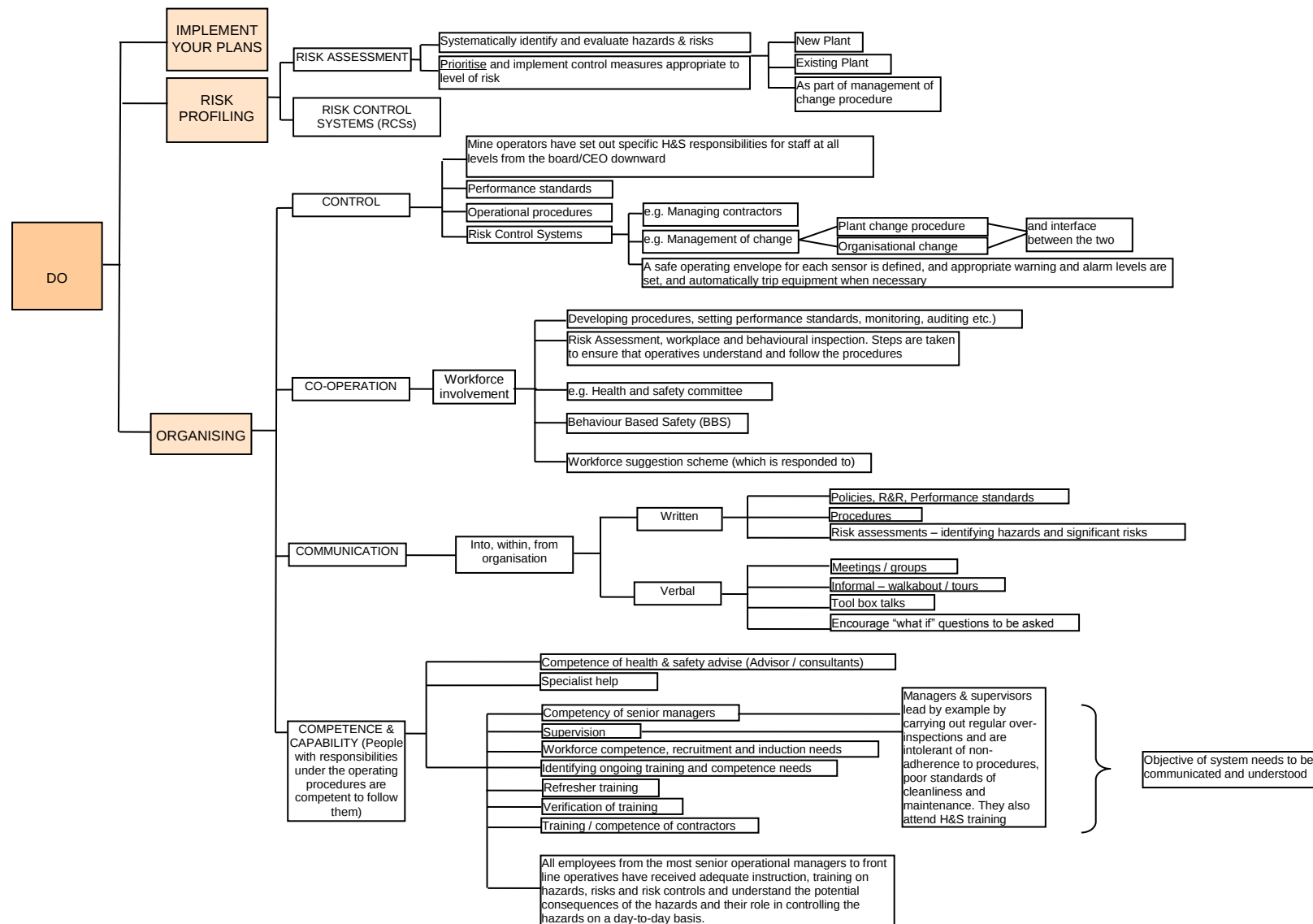
1. The mine operator has current explosive licences/test certificates including:
 - Licence to acquire and keep
 - Licence to manufacture (if relevant)
 - Recipient Competent Authority Transfer Document (approval of transfer of explosives listed by UN numbers)
 - Lightning Protection Test Certificate
2. All procedures are communicated to those to whom they apply, and are understood and acted upon.
3. There are clear arrangements and procedures that identify:
 - those responsible for the selection of explosives, detonators and plant and equipment used for shot firing activities and transporting explosives
 - those responsible for the transportation of explosives from surface storage to point of use
 - how risk assessments and operating procedures will be completed, implemented and reviewed
 - which plant and equipment is used for explosives transportation and shot firing and takes account of its potential to cause an unplanned explosion
 - the arrangements for inspection testing and maintenance of this plant and equipment and the schedules for doing so and includes its potential to cause an unplanned explosion
 - they have sufficient resources to carry out their duties in this respect, lead by example in ensuring that the risk control systems and schemes are properly maintained and are competent to discharge their duties in relation to the control measures identified
4. All employees from the most senior operational managers to front line operatives have received adequate instruction and training on explosives hazards, explosives risks and risk control measures. They must also be competent and understand:
 - the potential consequences of unplanned explosions, particularly below ground
 - the main causes of explosives incidents and where they are most likely to occur
 - their role in preventing unplanned explosions on a day-to-day basis.
5. Adequate arrangements are in place for informing and consulting staff.

Check	1. Are there monitoring systems for: • routine inspection of premises, plant and equipment? • checking management arrangements for preventing an unplanned explosion are implemented and effective? • ensuring staff understand and follow the procedures that are in place to control the risk of an unplanned explosion? 2. Complaints and incidents are investigated? 3. Is there an effective reporting system for near miss incidents? 4. Is there sufficient monitoring of information that could indicate that the likelihood of an unplanned explosion has increased? 5. Are there any arrangements for independent third-party audit? 6. Are structured periodic audit arrangements are in place to ensure arrangements are monitored to measure their performance? 7. 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?

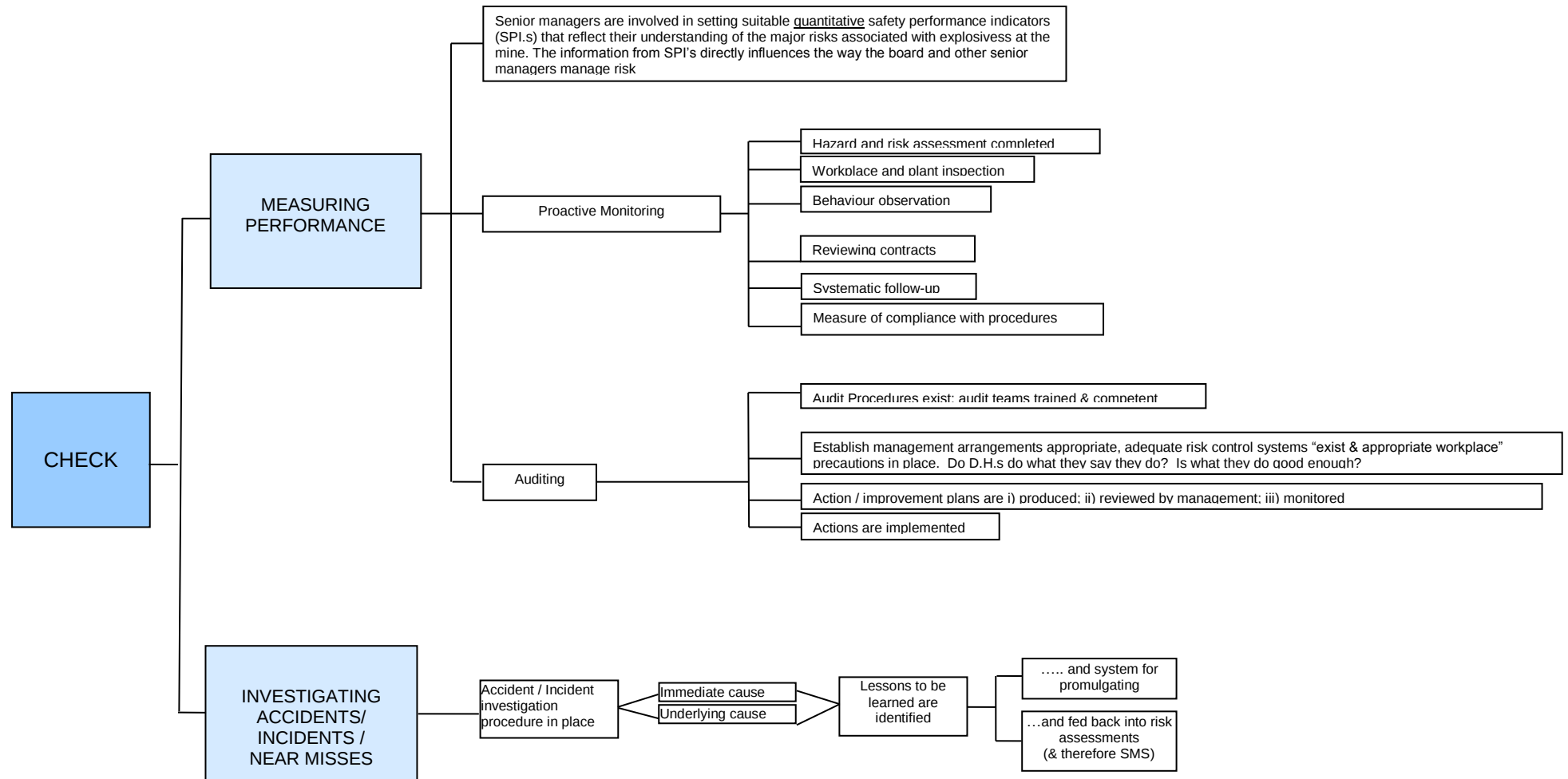
Appendix 2



Appendix 2



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