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Safety & occupational health – Investigation and reporting of accidents and incidents

Director,
United Nations Mine Action Service (UNMAS)
1 United Nations Plaza,
New York, NY 10017
USA

Email: mineaction@un.org
Telephone: +1 (212) 963 0691

Website: www.mineactionstandards.org

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Director
United Nations Mine Action Service (UNMAS)
1 United Nations Plaza,
New York,
USA

Email: mineaction@un.org
Telephone: +1 (212) 963 0691

Contents

Foreword	v
Introduction	vi
1. Scope	7
2. References	7
3. Terms, definitions and abbreviations	7
4. Accident and incident reporting and investigation requirements	8
4.1. Categorisation of severity of harm	8
4.2. Reporting and investigation requirements	8
4.3. Near misses	9
4.4. Level and independence of investigation	9
4.5. Investigations by state authorities	10
5. Planning and preparation	11
5.1. Immediate response	11
5.2. Immediate report	12
5.3. Initial report	12
6. Conducting the investigation	12
6.1. Allocating resources to the investigation	12
6.1.1. Competence	13
6.1.2. Field investigation team composition	13
6.2. Terms of reference	14
6.2.1. Communication with the media after an accident	14
6.3. Gathering information	15
6.3.1. Physical safety	15
6.3.2. Handling physical evidence	16
6.3.3. Handling bodies and body parts	17
6.3.4. Releasing the site	18
6.3.5. Witness handling	18
6.3.6. Documentary evidence	19
6.3.7. Information security and privacy	19
6.4. Analysing the information	19
6.4.1. Causal analysis	19
6.4.2. Root cause	20
6.4.3. Human aspects	20
6.4.4. Slips, lapses, mistakes and violations	21
6.4.5. Other factors affecting human aspects	21
6.4.6. Confidence levels	21
6.5. Identifying risk control measures	22
6.5.1. Likelihood that an adverse event will happen again	22
6.6. Cognitive bias	23
7. Detailed investigation report and follow-up	23
7.1. Reporting and dissemination	23
7.2. Follow up and improvement	24
7.3. Analysis of trends	24
8. Responsibilities	24

8.1.	National Mine Action Authority	24
8.2.	Investigation initiating authority	24
8.3.	Lead investigator	25
8.4.	Mine action organisations	25
8.5.	Mine action employees	26
	Annex A (Normative) References.....	27
	Annex B (Informative) Example of an immediate report (may be verbal)	28
	Annex C (Informative) Example of an initial written report	29
	Annex D (Informative) Example terms of reference for an investigation.....	31
	Annex E (Informative) Example evidence log format	34
	Annex F (Informative) Example format for a detailed investigation report.....	35
	Appendix 3 to Annex F (Informative) Example of an injury data sheet (see note 1).....	40
	Amendment record.....	42

Foreword

International standards for humanitarian demining programmes were first proposed by working groups at an international technical conference in Denmark, in July 1996. Criteria were prescribed for all aspects of demining, standards were recommended and a new universal definition of 'clearance' was agreed. In late 1996, the principles proposed in Denmark were developed by a UN-led working group and the International Standards for Humanitarian Mine Clearance Operations were developed. A first edition was issued by the UN Mine Action Service (UNMAS) in March 1997.

The scope of these original standards has since been expanded to include the other components of mine action and to reflect changes to operational procedures, practices and norms. The standards were re-developed and renamed as International Mine Action Standards (IMAS) with the first edition produced in October 2001.

The United Nations has a general responsibility for enabling and encouraging the effective management of mine action programmes, including the development and maintenance of standards. UNMAS, therefore, is the office within the United Nations responsible for the development and maintenance of IMAS. IMAS are produced with the assistance of the Geneva International Centre for Humanitarian Demining.

The work of preparing, reviewing and revising IMAS is conducted by technical committees, with the support of international, governmental and non-governmental organisations. The latest version of each standard, together with information on the work of the technical committees, can be found at <http://www.mineactionstandards.org/>. Individual IMAS are reviewed at least every three years to reflect developing mine action norms and practices and to incorporate changes to international regulations and requirements.

Introduction

The aim of this standard is to detail specifications and guidance on the minimum requirements for the investigation and reporting of demining accidents and incidents.

Mine action organisations and National Mine Action Authorities (NMAAs) are responsible for investigating and reporting accidents and incidents in a clear, comprehensive, evidence-based and timely manner. Investigations are carried out to find out what happened, identify lessons, and take action to reduce the likelihood of reoccurrence.

There are professional, legal and moral obligations on staff at all levels in mine action to reduce the likelihood of harm to the lowest practicable level. Thorough and competent investigation as well as effective reporting of accidents and incidents play an essential part in meeting this objective.

An investigation involves the identification, collection, recording, and analysis of evidence. All factual conclusions concerning any accident or incident shall always be based strictly on evidence.

Investigation of accidents and incidents is a significant responsibility and should be carried out to the highest standards practicable. Organisations should consider not only training and practicing their personnel in evidence based investigation techniques but also detailing clear procedures in a Standard Operating Procedure (SOP).

Safety & occupational health - Investigation and reporting of accidents and incidents

1. Scope

This International Mine Action Standard (IMAS) provides specifications and guidance to National Mine Action Authorities (NMAAs) and mine action organisations on the minimum requirements for the reporting and investigation of accidents and incidents. It includes definitions for the categorisation of accidents and incidents.

This standard is primarily intended for the investigation and reporting of demining accidents and incidents that occur at the demining workplace. Demining refers to activities which lead to the removal of Explosive Ordnance (EO) hazards, including technical survey, mapping, clearance, marking, post-clearance documentation, community mine action liaison and the handover of cleared land.

This standard is not designed to be applicable to incidents away from the workplace (see terms, definitions and abbreviations below) or for investigation into accidents and incidents associated with other aspects of mine action operations (such as those associated with negative environmental impact). Nevertheless, the principles of evidence-based investigation and analysis set out in this standard are relevant to the investigation of such incidents and accidents.

This standard does not apply to investigations carried out to satisfy national or police requirements, although the relevant authority may choose to adopt elements when appropriate. A mine action investigation reports, whether Immediate, Initial or Detailed, will possibly be taken into consideration by the national police.

2. References

A list of normative references is given in Annex A. Normative references are important documents to which reference is made in this standard and which form part of the provisions of this standard.

3. Terms, definitions and abbreviations

A complete glossary of all the terms, definitions and abbreviations used in the IMAS series of standards is given in IMAS 04.10.

In the IMAS series of standards, the words 'shall', 'should' and 'may' are used to indicate the intended degree of compliance.

- a) 'shall' is used to indicate requirements, methods or specifications which are to be adopted in order to satisfy the standard in full;
- b) 'should' is used to indicate the preferred requirements, methods or specifications; and
- c) 'may' is used to indicate a possible method or course of action.

The term 'Accident' refers to an undesired event that results in harm.

The term 'Incident' refers to an event that gives rise to an accident or has the potential to lead to an accident.

The term 'Demining Accident' refers to an accident at a demining workplace involving an Explosive Ordnance mine, and or ERW hazard (c.f. mine accident).

The term 'Demining Incident' refers to an incident at a demining workplace involving an Explosive Ordnance hazard (c.f. mine incident).

The term 'Mine Accident' refers to an accident away from the demining workplace involving an Explosive Ordnance hazard.

The term 'Mine Incident' refers to an incident away from the demining workplace involving an Explosive Ordnance hazard.

The term 'Hazard' refers to any potential source of harm.

The term 'Immediate Cause' refers to the most obvious reason why an adverse event happens. Immediate causes are typically unsafe acts or conditions. There may be several immediate causes associated with any one adverse event.

The term 'Underlying Cause' refers to those causal aspects that lead to immediate causes, but that are not root causes. Underlying causes are typically management, organisational, job or personal factors.

The term 'Root Cause' refers to an initiating event or aspect from which all other causes or issues arise. Root causes are generally management, planning or organisational in nature.

The term 'Near Miss' refers to an incident that, while not causing harm, had the potential to cause injury or ill health.

4. Accident and incident reporting and investigation requirements

4.1. Categorisation of severity of harm

Real or potential consequential harm shall be categorised as:

- fatal: One or more work related deaths;
- major injury/ill health: Fractures (other than fingers and toes), amputations, loss of sight, a burn or penetrating injury to the eye, an injury or acute illness resulting in unconsciousness, requiring resuscitation or requiring admittance to hospital for more than 24 hours, injuries specific to women, such as miscarriage and pregnancy-related complications;
- serious injury/ill health: Where the person affected is unfit to carry out his or her normal work for more than three consecutive days;
- minor injury: All other injuries, where the injured person is unfit for his or her normal work for less than three days; or
- damage only: Damage to property, equipment, the environment or production losses.

4.2. Reporting and investigation requirements

The following accidents and incidents shall be reported to the NMAA and investigated in accordance with the requirements of this standard:

- accidents at a demining workplace that result in serious injury, major injury or fatality to any person or persons;
- the discovery of a mine or other explosive hazard located in an area previously recorded as released, or marked as being ready for land release, regardless of whether harm has resulted; and
- incidents at an operations workplace resulting in significant damage to property, equipment or the environment, as defined by the NMAA or other appropriate authority.

4.3. Near misses

NMAAs and mine action organisations should establish systems where near misses may be reported without penalty. It is unlikely that individuals or organisations will report near miss incidents unless certain that no negative consequence will result. Organisations should encourage staff to report near misses and be seen to address possible causal factors that enabled the near miss and not necessarily to take disciplinary action. NMAAs should encourage organisations to report near misses on the same basis.

The following near misses should be reported to the NMAA:

- near miss incidents at an operations workplace with the potential to cause serious injury, major injury or fatality to any person or persons; and
- near miss incidents at an operations workplace with the potential to result in significant damage to property, equipment or the environment, as defined by the NMAA or other appropriate authority.

4.4. Level and independence of investigation

The level and nature of any investigation should be proportionate to the real or potential consequences associated with the accident or incident.

The more serious the accident or incident, the more important it is to demonstrate independence of the investigation. Demonstrable independence in investigations is more likely to secure the confidence of those involved in the event and helps avoid any suspicion of conflict of interest on the part of the investigating organisation.

Experience in other sectors, including transportation, demonstrate that when a serious accident or incident occurs, many different conflicting interests are likely to be involved. It is important, in any mine action investigation where the real or potential severity of harm is high, to take steps to avoid so far as possible, any semblance of conflict of interest on the part of those conducting the investigation. This includes avoiding any suspicion that investigators might have been involved in any way in the event or circumstances in which it occurred. Should such suspicions arise, other interested parties may lose confidence in the investigation.

While the real circumstances associated with mine action accidents and incidents may make it difficult to entirely avoid suspicion of conflicts of interest, the NMAA should take action, so far as it can, to establish and preserve the independence of investigations. In circumstances where an internal investigation is the only investigation practically possible, the mine action organisation should make every effort to maximise the independence of the investigation.

It is also essential that any investigation be conducted in as systematic and transparent way as possible. Conducting an investigation is a considerable responsibility with potentially serious consequences for organisations and individuals. Investigators should be able to show not only that conclusions are strictly aligned with evidence but that all relevant evidence has been identified and collected in a competent manner. Evidence shall be rigorously recorded and secured so that an investigation can be subsequently analysed if required.

1st party investigations are those when an organisation conducts a wholly internal investigation using its own employed personnel and resources. 1st party investigations shall be carried out by appropriately experienced members of the affected mine action organisation who shall not be any persons directly involved in the event under investigation. Persons responsible for quality assurance or control at the worksite where the event occurred should not be tasked with the investigation. For 1st party investigations, the investigating team should be selected by the Senior Management Team of the organisation.

2nd party investigations are those where a relevant authority investigates a mine action organisation, typically an operator. 2nd party investigations should be led by an independent technically qualified person who is experienced in incident and accident investigation, appointed with clear Terms of Reference (ToR) by the NMAA, or the MAC. The Lead Investigator of a 2nd party investigation may co-opt assistance from the NMAA, the MAC or the mine action organisation but should retain responsibility for compiling the resulting report. A mine action Board of Inquiry (BOI) is a form of 2nd party investigation, albeit one where full independence might not be practicable.

3rd party investigations are those carried out by an entirely external organisation using personnel with no association with either the organisation under investigation, the relevant national authority, or the events surrounding the accident or incident. 3rd party investigations shall be led by an independent technically qualified person who is experienced in incident investigation. If requested by a 3rd party investigation, logistical support should be provided by the NMAA or respective mine action organisation.

Investigations into mine action accidents and incidents should be carried out at a level consistent with Table 1 below.

Table 1: Level and independence of investigation

Severity of real or potential harm	Accident	Incident
Fatality	2 nd or 3 rd Party investigation	2 nd or 3 rd party investigation
Serious or major injury	2 nd or 3 rd party investigation	1 st or 2 nd party investigation
Minor injury	1 st or 2 nd party investigation	1 st party investigation
Damage	Dependent on level and nature of damage	Dependent on level and nature of damage

Mine action organisations may conduct a 1st party investigation even when a 2nd or 3rd party investigation has been initiated, or is likely to be initiated, by the NMAA or other authority. A 1st party investigation shall not compromise or interfere in any way with any ongoing or expected 2nd or 3rd party investigation. A 2nd or 3rd party investigation should have primary control of the accident site and all physical and documentary evidence.

The NMAA or other authority may choose to establish a Board of Inquiry (BOI) into a serious mine action incident or accident. Whenever possible, BOIs should comprise three appropriately experienced members of the mine action programme, including at least one who has received training in accident investigation. The principal member should be from the NMAA/MAC, one member from another suitable organisation (for example from a training or monitoring organisation, or another operator etc.) and one member from the mine action organisation involved with the accident or incident who was not directly involved in the event. A BOI may wish to co-opt, contract or otherwise make use of 3rd parties as part of the investigation process.

In circumstances where no NMAA exists, mine action organisations may find that a 1st party investigation is the only means of investigation available. In such instances, mine action organisations shall fully record the circumstances in their internal ToR mandating the investigation. In the absence of any other investigation, mine action organisations should share key findings of 1st party investigation with other operators in country.

4.5. Investigations by state authorities

The national police or security services may be authorised or legally required to investigate some accidents or incidents. An investigation by the national police or security services shall take precedence over an investigation conducted by the NMAA or other mine action organisations. The respective mine action investigation should still take place in such circumstances, unless specifically prohibited by the state authorities.

When an investigation by state authorities occurs, the mine action organisation and the NMAA shall co-operate fully with that investigation. When appropriate, the NMAA should liaise between the mine action organisation and the state authorities to ensure mutual communication and to manage any potential risks associated with the investigation.

5. Planning and preparation

NMAAs and other mine action organisations shall identify and ensure implementation of planning and preparatory action to ensure timely, informative and effective reporting and investigation of mine action incidents and accidents. This planning and preparation shall include:

- defining and communicating through National Mine Action Standards (NMAS) or other documented information, accident and incident reporting requirements, and responsibilities;
- procuring and making available any accident investigation equipment;
- developing and promulgating investigation procedures, including requiring mine action organisations to develop and adopt investigation SOPs;
- establishing competency requirements for accident and incident investigators in accordance with this standard; and
- responding to an accident or incident.

5.1. Immediate response

The individual with responsibility for the management of a worksite on which an accident or incident has occurred, meeting the criteria set out in sections 4.2, 4.3 and/or 4.4 of this standard, shall:

- take action to gain safe access during any casualty evacuation while minimising risk to other personnel on the site;
- ensure that casualties are treated and if required evacuated; and
- submit an immediate report in accordance with section 5.2 of this standard.

If the accident or incident is expected to be subject to investigation in accordance with sections 4.2, 4.3 and/or 4.4 of this standard, the individual with responsibility for the management of a worksite shall:

- make the accident or incident scene secure;
- separate (but not isolate) witnesses and direct them not to discuss the accident or incident amongst themselves prior to providing a statement and/or being interviewed by the Lead Investigator or nominated subordinate;
- take responsibility for ensuring that the site is undisturbed and that evidence is preserved (noting that such action could need to remain effective for hours or days); and
- establish and maintain control of the site until and unless relieved of this responsibility by another individual authorised by the NMAA.

5.2. Immediate report

The individual with responsibility for the management of a worksite on which an accident resulting in serious injury, major injury or fatality occurs shall submit an immediate report, in accordance with Annex B to this standard, to their respective organisation. The organisation shall relay the report to the NMAA as soon as practicable after the event. The immediate report will normally be submitted to the NMAA verbally, but can be submitted in writing.

The purpose of the immediate report is to notify the mine action organisation and higher authorities of the accident, and to support implementation of an effective emergency response.

5.3. Initial report

The organisation with responsibility for the management of a worksite on which an accident resulting in serious injury, major injury or fatality has occurred shall submit an initial report to the NMAA, in accordance with Annex C to this standard, as soon as possible, and within no more than 24 hours, after the event. The initial report shall be submitted in writing.

The initial report is a statement detailing confirmed facts surrounding an accident or incident. It should not include speculation. If information is unavailable the report should make that clear. The initial report should be submitted within no more than 24 hours and should not wait for confirmed information to become available. If information is not known at this stage, the report should be annotated accordingly.

In the event that the accident or incident may indicate a need for immediate precautionary risk control measures at other work sites, then an explanation of the risk identified and the associated measures recommended shall be detailed in the initial report.

Immediate risk control measures should be limited to those risks associated with the accident or incident (such as stopping certain types of activity). Wider risk control measures, including changes to procedures, equipment, training or other aspects of management systems should not be implemented until sufficient investigation, including causal analysis, has taken place.

6. Conducting the investigation

The aim of an accident or incident investigation is to identify probable causes and derive information that improves operational risk management. This is achieved through the rigorous identification, collection, recording and storing of relevant evidence. It is neither a criminal investigation nor an investigation to assist in the assessment of a current or possible future insurance claim.

All employees of mine action organisations shall be encouraged to provide complete and accurate information about the circumstances surrounding the event. Organisations should encourage staff to give opinions about changes that may assist in preventing a similar event re-occurring.

6.1. Allocating resources to the investigation

The investigation team for 1st party investigation should consist of a minimum of two members; 2nd and 3rd party investigation should consist of a minimum number of three members. In all cases, a Lead Investigator shall be nominated and additional staff allocated to the investigation team on the basis of:

- the expected scale of the investigation including the number of locations that will be visited (work sites, head offices, regional offices, etc.);
- the need to safely investigate a potentially hazardous area (possibly requiring deminers, medics, ambulance drivers etc.);

- the need for specialist technical knowledge within the investigation team; and
- the need to conduct and complete the investigation promptly and properly.

6.1.1. Competence

Accident and incident Lead Investigators should:

- be independent of the accident or incident (meaning that, as a minimum within any 1st or 2nd party investigation, they should not have been present on the site at the time of the accident or incident and, if practicable, should not have been in the chain of command responsible for operations at the site);
- have received training in accident investigation (whether mine action sector specific or from more general training providers);
- be competent to safely access the accident site using clearance techniques;
- be familiar with relevant mine action operations;
- have relevant EO technical knowledge;
- have the qualifications, skill, and up to date experience concerning the disposal of EO;
- have an understanding of the organisational operating procedures, national standards and other regulatory aspects relevant to the accident or incident;
- be competent to engage with relevant information management (IM) systems;
- consult those with relevant technical expertise, (e.g. those with clinical qualifications and experience who can advise on the medical response);
- be familiar with, and have an understanding of, human factors relevant to accidents and incidents;
- be able to apply causal analysis to identify causes and make appropriate recommendations;
- be able to write fluently and with precision;
- be aware of potential cognitive bias;
- possess effective inter-personal skills; and
- be timely, efficient, and professional.

The Lead Investigator should, additionally:

- have the ability to coordinate, direct and manage resources during the investigation;
- be mandated to interview witnesses on a formal basis; and
- be able to coordinate the collection of information provided by outside experts and incorporate it into the investigation.

6.1.2. Field investigation team composition

Investigations that include the need to gather physical evidence at the site of an accident should ensure that adequate resources are available to enable safe and efficient site investigation including (in addition to the investigators) but not limited to:

- medic (noting that medical personnel on site at the time of the accident may have travelled to the hospital or other treatment centre with the casualty(ies));
- driver;
- deminer(s); and

- scribe to ensure that comprehensive notes are taken of all aspects of the field investigation including rigorous evidence cataloguing.

6.2. Terms of reference

2nd and 3rd party investigations (including BOIs or independent investigations) shall be initiated by the NMAA by generating ToR and appointing investigators to conduct the investigation. Annex D gives an example of a ToR for a BOI or an independent investigation. The ToR for the investigation should be agreed and issued as soon as possible after receipt of the immediate report, on the same day or within no more than 24 hours of the accident or incident, in order to avoid any delay to the start of the investigation.

The ToR may include authority for the organisation(s) directly involved in the accident or incident, to participate as an observer during any 2nd or 3rd party investigation. The observer should be suitably qualified to advise the investigation on the organisation's SOPs and equipment should it be required.

The ToR should include a clear statement that the accident or incident scene will be wholly controlled by the NMAA, or its nominated Lead Investigator, until it is formally released. Should the national law enforcement authorities undertake an investigation, it should be assumed that they will have primary control of the accident site.

Internal (1st party) accident and incident investigations shall be initiated by mine action organisations for all reportable accidents and incidents without reference to the NMAA. The conduct of a 2nd or 3rd party investigation, including a BOI, shall take precedence over any 1st party investigation. Collection of physical evidence, or other disturbance of the scene of the accident or incident, by the 1st party investigation shall only take place with the agreement of the NMAA.

Where a BOI or an independent investigation is required, a 1st party accident or incident investigation may precede the formal investigation, with the agreement of the BOI or lead external investigator, and its report should form part of the formal investigation report. Internal investigations may be conducted in parallel with independent investigations so long as they do not interfere with, obstruct, delay or otherwise compromise the conduct and quality of any external investigations.

For less severe accidents and incidents the NMAA, or other authority, may determine that a 1st party internal investigation is all that is required. The 1st party mine action organisation shall ensure that its investigation is conducted in accordance with the requirements of this standard.

6.2.1. Communication with the media after an accident

Contact with the media should be managed with great care. Any statements should be provided by a representative or other individual authorised by the mine action organisation or by the NMAA. The affected mine action organisation and the NMAA may be asked to give statements in different jurisdictions after an accident. These organisations should coordinate and ensure that what is released to the media is agreed.

Statements to the media made by mine action organisation and the NMAA shall comply with data protection legislation in the relevant jurisdictions. These organisations should also be mindful of sequencing the release of even basic information. For example names of those deceased shall not be made known to the media until the next of kin have been informed.

Lead Investigators, investigation team members or members of a BOI should not normally communicate with the media during the course of an inquiry. The NMAA may consider giving direction concerning contact with the media by the investigation team within the investigation ToR. Once the conclusions of the report are accepted no communication with the media shall be made until next of kin are informed.

It is not normal for accident reports to be released to the media. Should the NMAA wish to release the final detailed report, all names of those involved in an accident, apart from those deceased, shall be redacted.

6.3. Gathering information

The main task of the Lead Investigator during a site investigation is the safe identification, collection, accurate recording and subsequent analysis of evidence. Investigators shall make all reasonable effort to collect, appropriately handle, retain and secure all evidence and information relevant to the investigation including:

- physical evidence;
- witness statements; and
- documentary evidence (in hard and soft copy form).

It is possible that further information gathering needs will be identified during the accident or incident analysis process. Further evidence will often be gathered away from the accident site. Typically, this would include documentary evidence from the relevant organisations and witness statements from the mine action organisation management staff. Such witness statements can include staff at the organisation headquarters in their country of origin.

The Lead Investigator shall establish and maintain:

- an evidence record / log (an example is provided in Annex E); and
- a narrative log of the investigation detailing as a minimum key activities, decisions and witness interviews.

6.3.1. Physical safety

Maintaining the physical safety of investigators and other people present at the accident or incident site shall take precedence over the collection of evidence. The Lead Investigator shall be responsible for safety on site during the period of the site investigation. Site investigation should not take place during the hours of darkness. During daylight hours the Lead Investigator may suspend the on-site investigation during periods of reduced light.

Prior to deploying to the accident site a full site risk assessment as practicable shall be made. The Lead Investigator shall conduct the risk assessment. The aim of the risk assessment is to determine the nature of the risk and the suitability of clearance assets required to provide access to the accident site. The risk assessment shall be updated once on site and should be updated as required as the task progresses.

The Lead Investigator shall consider the following:

- EO risks including those from Anti-Personnel (AP) mines, (especially minimum metal AP mines), Anti-Vehicle (AV) mines, Improvised Explosive Devices (IEDs) including improvised mines, explosive submunitions and any other EO with sensitive fuzing;
- EO containing a chemical, biological, radiological and nuclear (CBRN) hazards;
- chemical hazards including fuel, lubricants, oils and other substances potentially hazardous to human health;
- biological hazards including those associated with animal and human body parts or corpses;
- physical hazards, such as steep slopes, sharp edged and pointed objects, scrap, debris and other residue; and

- security risks especially if the accident took place in an area requiring enhanced security measures.

Mine action organisations should, if practicable, conduct a site safety brief for the investigation team. This brief should not supersede the Lead Investigator's own risk assessment. The Lead Investigator is not bound by the safety brief and may choose to take precautions beyond those stipulated in a site safety brief.

Investigators shall be issued with, and wear fully and properly, appropriate and effective PPE.

Where necessary, demining or other EO clearance shall take place to create safe access to areas and locations necessary for the gathering of evidence. This should especially be considered if there is reason to suspect the continued presence of one or more AP mines or victim-operated IEDs. Consideration should also be given to Unexploded Ordnance, including explosive submunitions, that remain within the accident scene.

Investigators shall ensure that physical evidence encountered during any clearance activity is recorded as it is found. Evidence shall be preserved, in so far as is practicable, without compromising the safety of clearance staff, investigators or other people at the site.

Under some circumstances the requirement to provide safe access through the deployment of demining assets can take an extended period. The use of animal detection systems (ADS) can accelerate the process of gaining safe access to evidence on and around the scene of an accident or incident. However, investigators should exercise caution in areas of known high EO contamination or where there is potential for the residue from a detonation associated with accident or incident to confuse ADS assets.

In circumstances where there is any doubt about the suitability of electronic detection systems or ADS to detect a given threat, for example an electronic detector searching for minimum metal AP mines, investigators should consider the use of full excavation techniques to create safe access. This will inevitably prolong the time on site, probably to a number of days. In such circumstances the ToR may be revised in order to extend the reporting timelines of the investigation.

In very limited circumstances where time constraints might apply, mechanical assets with manual follow-up may be considered, to assist access to the immediate accident site. If such assets are used, the Lead Investigator shall make every effort to record evidence prior to use (e.g. aerial imagery), and use the asset in such a way as to minimise contamination of the accident site. Mechanical assets may also be used to assist the subsequent clearance of the site once released by the Lead Investigator and the NMAA.

Should an IED hazard be suspected on the accident or incident site, clearance of that site shall be done by those suitably qualified in accordance with IMAS TEP 09.31.

6.3.2. Handling physical evidence

Investigators shall wear appropriate PPE (non-demining) to preserve evidence. This shall include disposable gloves, and may include face masks and disposable coveralls.

Physical evidence shall be:

- identified, marked, referenced and recorded in an evidence log;
- photographed in situ, with reference markers, and if possible with length and colour scales included in images;
- touched only when necessary, using disposable gloves;
- where practicable, bagged using either paper or plastic bags as appropriate to the type of evidence and with the applicable evidence reference marked on the bag;

- recovered, moved and transported so as to avoid or minimise degradation;
- retained in a secure place accessible to the Lead Investigator until the investigation is concluded; and
- further retained by either the NMAA or mine action organisation in a secure place for a period not less than 24 months from the submission of the detailed report.

Any craters resulting from detonations associated with the accident or incident should be measured and their dimensions recorded.

6.3.3. Handling bodies and body parts

The retrieval and further handling of dead bodies should normally be done by local authorities or first responders. On occasions when circumstances prevent immediate management of dead bodies or body parts by local authorities, the site manager or Lead Investigator should ensure that all activities:

- minimise risk to investigators, clearance personnel and others visiting the site of the accident;
- give due consideration to the dignity of the deceased;
- are respectful of the expectations and preferences of the bereaved; and
- reflect the cultural and religious expectations and preferences of the deceased.

Individuals tasked with handling bodies or body parts should:

- undergo training in the handling of bodies and body parts before entering the accident site;
- wear appropriate disposable PPE;
- observe basic hygiene precautions to help reduce the risks of diseases spread through blood and other body fluids, including avoiding wiping the face or mouth with their hands;
- record individual body parts as separate pieces of evidence, referring to an associated Casualty Identification Number (CIN) if it is possible to do so;
- thoroughly clean any vehicles used in the transportation of dead bodies; and
- be offered psychological support.

Investigators should make local authorities aware that larger explosive events, for example an AV mine detonation, can spread body parts over a wide area. If that area includes uncleared ground on a clearance site, retrieval of all body parts can take a considerable time.

Each body may be allocated a unique CIN and be accompanied by a chain of custody label. In the absence of a previously established system for identifying bodies, the NMAA or other authority may decide upon, and promulgate, such a system. The CIN may be included on all photographs of the body and should accompany all data, including forms and associated evidence collected from the body.

Instances of multiple casualties, subject to a large explosion, have in the past led to difficulty in identifying individual body parts. This has been known during AV mine and larger IED detonations. In such circumstances it can be difficult to ensure that the correct body parts are passed to the next of kin. Mine action organisations may consider DNA testing as a means to address this issue.

Bodies that will be buried in a jurisdiction different to where the accident took place may be subject to an autopsy in country prior to being released for repatriation and burial. The mine action organisation shall take responsibility for the repatriation of the human remains of any of their staff. Liaison with the NMAA and other appropriate authorities, along with the respective consular assistance of the nationality involved, should be led by the mine action organisation.

6.3.4. Releasing the site

The site shall remain under the control of the NMAA or authorised Lead Investigator until it is released. The accident or incident scene shall not be released until the Lead Investigator is satisfied that all relevant evidence has been identified, recorded and appropriately processed. In taking the decision to release the site, the Lead Investigator should take into account the possibility of new information collection requirements becoming apparent during the incident or accident analysis process. The Lead Investigator should consider the release of large accident or incident scenes in stages if necessary. The Lead Investigator should conduct a site brief prior to handing over the site back to the mine action organisation or NMAA. This should be recorded in the narrative log of the investigation.

6.3.5. Witness handling

Interviews of witnesses should be conducted by the Lead Investigator. The Lead Investigator should consider being accompanied by someone suitable for the age, gender, culture, language of interviewees. In any case witnesses are entitled to be accompanied by an individual of their choice during an interview. If an interpreter is required, they should be of sufficient competence and experience to accurately translate technical language that may be used in an interview.

Interviews should take place as soon as possible after the accident or incident. So far as is practicable, multiple interviewees should not be allowed to discuss the accident or incident amongst themselves before giving witness statements.

Action to separate witnesses prior to interview should be documented in immediate and initial reports. Circumstances where it has not been possible to separate witnesses prior to interview should be documented in the initial report.

Interviews should take place in private at a location where disturbances are unlikely. Witnesses should be interviewed in a non-accusatory, and fact seeking manner. At the start of the interview, witnesses or other interviewees, should be informed of the basis of the interview, including disclosing how information and evidence established during the interview will be used. Witnesses should understand that their own conduct during an accident or incident may be the subject of the investigation. The interview is not an interrogation and investigators will typically have no authority to compel witnesses to answer. However, employment contracts often require employees to cooperate with an investigation and may state that misleading an investigation will result in disciplinary action.

If the interviewee agrees, interviews should be electronically recorded. All interviews should be transcribed. Recordings of interviews should be held separately from interview transcripts and recorded as separate items in the evidence log.

In cases where a witness is unfit to be interviewed for a certain period after the accident or incident, as a result of physical or mental trauma, investigators should liaise with the appropriate medical authorities to act on the earliest opportunity to conduct the interview.

Witnesses should have the right to be accompanied by a friend or other observer, so long as the other person is independent of the investigation and will not themselves be, or have been, subject to interview in relation to the accident or incident under investigation.

The mine action organisation shall actively enable all of its staff to attend interviews, whether at the accident site in the immediate aftermath of the accident or incident, or at any time during the subsequent ten days.

Witnesses shall be in a fit state to be interviewed. Witnesses recovering in hospital may be interviewed but only if they consent. It is recommended that witnesses are discharged from hospital prior to an interview. Should the length of hospitalisation prohibit the interview of a significant witness, and therefore require an extension of the reporting timelines, the lead investigator may request an extension from the NMAA as required.

6.3.6. Documentary evidence

The lead investigator should make an initial request by email, (or in other written documented form), to the organisation(s) involved in the accident/incident, for relevant documentary evidence immediately upon issue of the ToR for the investigation.

Documentary evidence includes, but is not limited to:

- task orders, contracts, memoranda of understanding (MoUs), environmental assessments, etc.;
- policies, procedures, manuals and work instructions;
- licences, authorisations, accreditations and certificates;
- applicable standards, laws and other regulations;
- site records (including visitors logs, narrative records, survey information, etc.);
- training and qualification records;
- appraisal reports subject to applicable data protection legislation;
- quality, safety and environmental management records; and
- electronic or hard copy correspondence, including e-mail, text messages, written letters, etc. subject to applicable data protection legislation.

Investigators should ensure that any documentary evidence collected and retained during the investigation is clearly identified, including where appropriate, any title, effective date or issue number/level, as well as the issuing or originating authority, agency or individual.

Hard copy documentary evidence should be scanned/photographed and held securely with other electronic documents. Documentary evidence should be backed up electronically.

Investigators should be aware of the sensitivity of certain documentary evidence, (such as appraisals), and should maintain confidentiality in accordance with relevant data protection legislation.

6.3.7. Information security and privacy

Incident and accident investigators shall comply with all applicable data protection legislation. Information relating to an investigation shall be held in confidence by the NMAA, lead investigator and mine action organisation, as detailed in the investigation ToR, and not released without the agreement of the NMAA.

6.4. Analysing the information

6.4.1. Causal analysis

The factual information relating to the accident or incident shall be analysed to identify probable causes. From this, appropriate measures that improve operational risk management should be implemented.

The causes of adverse events are often related to each other, sometimes in complicated ways. Investigators should keep an open mind considering all possible causes. Investigators should avoid rejecting a possible cause until it has been given serious consideration. Investigators should avoid promoting or focusing on one possible cause to the exclusion of others. The investigation process should be thorough, systematic, and objective. All identified causes shall be scrupulously based on the available evidence.

Immediate causes typically fall into two main areas:

- behaviour: Such as failure to follow rules or procedures, incorrect use of equipment, e.g. poor excavation technique etc.; and
- worksite conditions: Including the equipment, materials and environment that workers interact with.

Underlying causes typically fall within one or a combination of:

- management and organisational factors: Shortfalls in policies, resources and procedures leading to ineffective management of risk;
- job factors: Unsuitable working environment, training provided, equipment, procedures and systems; and
- personal factors: Decision-making, behaviour, health, skills, knowledge, experience and aptitude.

Underlying causes almost always relate to management and organisational factors.

A wide range of analytical tools are available to support investigators in understanding why an adverse event occurred. The simplest method is to ask 'why?' repeatedly, initially identifying immediate causes of the adverse event (recognising that there may be more than one immediate cause) and then asking 'why?' again and again to 'drill down' through the underlying causes of each immediate cause and, eventually, to identify root causes. As a minimum, mine action accident and incident investigators should use repeated 'why' questions during the causal analysis. Mine action authorities, organisations and investigators are encouraged to consider other causal analysis tools and methods.

6.4.2. Root cause

Root cause analysis is likely to require consideration of an organisation's or programme's management systems. The root causes of many adverse events are often failings at managerial level. Investigation into management aspects should draw on documentary evidence and interviews with individuals responsible for health and safety, as well as other relevant aspects of mine action management systems, within the affected organisations and/or programme. The broader regulatory regime within which an organisation operates should also be scrutinised. This includes the NMAA framework within which organisations in country work.

6.4.3. Human aspects

Investigators should seek to retain the trust of all those involved in the investigation including the subjects of that investigation. Laying all the blame on one person is rarely fair or justified and is likely to be counter-productive. Even where a human failing is identified as being a contributory factor to an accident or incident, other underlying and root causes are likely to be relevant. Such causes will invariably have helped create the circumstances in which such a failing can occur.

Unless there is compelling evidence of malicious violation of rules or procedures, or of direct sabotage of safety precautions, disciplinary action is unlikely to be helpful and may discourage openness and honesty during current and future investigations into accidents and incidents.

The reporting of near misses should be encouraged through verbal and written communication including clear reassurances that those reporting near misses will not be blamed, punished or otherwise suffer adverse consequences. NMAAs and other mine action organisations may wish to consider anonymised near miss reporting systems to encourage participation.

NMAAs, managers and investigators should support a fair and just system where individuals are held to account for their behaviour, but are not unduly blamed.

6.4.4. Slips, lapses, mistakes and violations

If investigators identify human failures as a relevant aspect during an investigation they should categorise them as:

Slips	A familiar task carried out without thinking about it resulting in a correct action implemented incorrectly.
Lapses	An action performed out of sequence or a step missed out.
Rules-based mistakes	The wrong rule or procedure is applied to a given situation.
Knowledge-based mistakes	A person is faced with an unfamiliar situation and reaches the wrong conclusion about what to do.
Violations	A deliberate intentional failure to follow rules or procedures.

6.4.5. Other factors affecting human aspects

Investigators should consider a range of factors affecting human behaviour including:

- job factors: The level of attention required for the task; whether the individual's attention was divided, or there were distractions at the time of the accident or incident; whether the procedures were adequate; whether enough time was available for the task;
- human factors: The physical ability of the individual for the task, the level of competence (aptitude, skills and knowledge) of the individual, tiredness, stress, morale, ill health, alcohol or drugs;
- organisational factors: Work related pressure, tight deadlines, availability of sufficient resources, quality of supervision, organisational culture including the management culture and its attitude towards health, safety and risk management; and
- plan and equipment factors: Clarity and simplicity of controls and operating procedures; error/failure detection and indication; workplace layout.

6.4.6. Confidence levels

Investigations encounter both direct and circumstantial evidence. Direct evidence establishes a fact. It requires no further reasoning or inference to reach a conclusion. Circumstantial evidence requires reasoning or inference in order to reach a conclusion.

Investigators should consider the level of confidence associated with the conclusions they reach. The wording used in the investigation report should reflect the associated level of confidence in line with Table 2 below.

Table 2: Descriptions of confidence levels with indicative probabilities

Certain	There is little or no doubt	>90%
Likely	There is a high level of confidence	75-90%
Possible	It is about as likely that this is correct as that it is not	40-60%
Unlikely	There is a low level of confidence	10-25%

Remote	There is little or no confidence	<10%
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6.5. Identifying risk control measures

Risk control measures should be identified and included in the recommendations section of the detailed investigation report. In managing risks to human health and safety, the following hierarchy of controls (consistent with the risk control options set out in IMAS 07.14) should be applied:¹

- elimination: Remove the material or process causing the hazard;
- substitution: Replace a material or process that produces a hazard with something that does not or is less hazardous;
- engineering controls: Modify the working environment to enclose or isolate hazards (such as through the use of protective work or remote controlled equipment);
- administrative controls: Modify the way people work or behave – changing policies, procedures, improving organisational culture, providing new or modified training, installing additional signs and warnings;
- personal protective equipment: Protect workers from injury or infection. PPE reduces workers exposure to hazards when engineering and administrative controls are impractical or ineffective. PPE has the limitation that it does not remove or modify the hazard, meaning that workers may be exposed to that hazard if the PPE fails or is used improperly.

Actions to control other risks, such as those associated with environmental impact or other damage to property and assets, should be managed in accordance with IMAS 07.14.

When identifying risk control measures investigators and other managers should note the potential for the implementation of one risk control to create other new or different risks. Additional risk control action should be identified and implemented where necessary to ensure that any new or residual risks are tolerable.

6.5.1. Likelihood that an adverse event will happen again

The likelihood that an adverse event will reoccur reflects the nature of the accident or incident, the size of the affected organisation, project or programme, how common the associated activity and circumstances were and the nature of the underlying and root causes identified during the investigation.

Table 3: Narrative descriptions of reoccurrence likelihoods²

Certain	The event will happen again and soon
Likely	The event will reoccur, but not as an everyday event
Possible	The event may occur from time to time
Unlikely	It is not expected that the event will happen again in the foreseeable future
Remote	The event is so unlikely that it is not expected to happen again

¹ After ISO 45001:2018 Occupational Health and Safety management systems – requirements with guidance for use.

² HSG245 Investigating accidents and incidents, UK Health and Safety Executive (2004)

The likelihood of reoccurrence should be taken into account when determining the urgency and applicability of recommended risk controls and the extent and nature of communication with affected organisations and programmes.

6.6. Cognitive bias

Cognitive bias may be defined as “the way a particular person understands events, facts, and other people, which is based on their own particular set of beliefs and experiences and may not be reasonable or accurate.”³ Lead Investigators should be mindful of their own potential for cognitive bias and actively seek to question the basis of their own conclusions in regards to an investigation. Lead investigators may also seek to have their detailed report critically reviewed by a suitably qualified and experienced individual or team prior to submission. Such a review shall maintain the strict confidentiality of the investigation and be mandated by the investigation ToRs.

7. Detailed investigation report and follow-up

The credibility of the investigation and the extent to which its conclusions and recommended risk control measures are accepted and adopted by relevant organisations depends greatly on the quality of the investigation report. A suggested structure for the detailed investigation report is provided in Annex F to this standard. The detailed investigation report format is suitable for use in 1st, 2nd and 3rd party investigation. Report writers should consider every element of the recommended report format. Where additional information is relevant and necessary to ensure that readers understand the reasoning of the investigators it should be included.

A draft of the detailed investigation report should be shared with those individuals and organisations directly involved in the incident or accident and those referred to in the report text. In particular any individuals or organisations that have been criticised, or that may perceive themselves to have been criticised, shall be given the opportunity to comment before the report is finalised and submitted to the NMAA or other authority.

7.1. Reporting and dissemination

Copies of all accident or incident reports shall be held by the NMAA and the respective mine action organisation.

The NMAA, or an organisation acting on its behalf, should disseminate information on accidents and incidents to mine action organisations in country. In the absence of a NMAA, mine action organisations should make this information available to other mine action organisations operating in the country. Information about the identification of new hazards or other unanticipated risks should be disseminated without delay.

In the event of a fatality or major injury a full copy of the report shall be made available to the next of kin of the deceased or the injured personnel. This shall be done prior to release to other individuals and organisations.

If reports are shared beyond the mine action organisation in question, and the next of kin, the NMAA or other authority shall redact details identifying individuals and organisations. Any sharing of reports shall comply with relevant data protection legislation.

To allow others to learn from accidents and incidents, redacted reports or anonymised elements of reports should be shared. As a minimum, the following information should be widely distributed by the NMAA to mine action organisations in country:

³ Cambridge English Dictionary. May 2020.

- the circumstances contributing to, and any harm resulting from, the event;
- an analysis of the information collected during the investigation; and
- the conclusions and recommendations derived during the investigation process.

7.2. Follow up and improvement

The NMAA should ensure that recommended risk controls are implemented by affected mine action organisations and programmes. Additional checks should be incorporated into mine action monitoring systems in accordance with IMAS 07.40. Checks should:

- confirm the implementation of recommended controls by affected organisations; and
- monitor the effectiveness of such measures in preventing reoccurrence of similar accidents or incidents.

7.3. Analysis of trends

Opportunities to analyse accident and incident data, to identify and investigate trends, should be identified and pursued. The results of accident and incident trend analysis should be widely disseminated within the mine action sector.

8. Responsibilities

8.1. National Mine Action Authority

The NMAA, or an organisation acting on its behalf shall:

- a) establish and maintain procedures for the reporting and investigation of accidents and incidents, including near misses, that are based on this standard and other relevant standards or national regulations;
- b) when information not available to the investigators becomes known at a later time, review the findings of the formal investigation and, when appropriate, re-open the investigation to take the new evidence into account; and
- c) require mine action organisations conducting field operations to develop, maintain and implement accident investigation procedures.

The NMAA, or an organisation acting on its behalf should:

- a) disseminate the findings of all formal investigation reports to mine action organisations in country and ensure that any medical outcomes not available to be referenced in the investigators' report are appended to it and an updated report is disseminated; and
- b) ensure that risk controls identified during any investigation, and accepted by the NMAA, are fully and effectively implemented.

8.2. Investigation initiating authority

The authority initiating a formal investigation (whether NMAA or other mine action organisation) shall ensure that:

- a) the investigation starts and is concluded within 10 working days unless exceptional circumstances require a specific time limited extension;
- b) a competent lead investigator is nominated, appointed and authorised to conduct the investigation;

- c) the persons selected to conduct a formal investigation had no involvement with the event and have the appropriate experience and skills needed to conduct the investigation;
- d) generate a ToR for an investigation as quickly as practicable and no more than 24 hours after the incident has occurred;
- e) when a ToR is generated, a copy of the ToR is provided to the mine action organisation(s) that may be asked to assist with the formal investigation;
- f) in order to preserve evidence, the accident or incident site remains undisturbed until after the person(s) leading the investigation has authorised its release;
- g) a complete, clear and accurate investigation report is submitted within 10 working days of the event and that it includes a complete record of the facts leading to conclusions and, when appropriate, recommendations designed to prevent recurrence; and
- h) when the event being investigated has involved one or more human casualties, the report includes details of the injuries sustained, the medical response, and whatever prognosis is available for each injured person at the time the report is compiled.

8.3. Lead investigator

The lead investigator shall ensure that:

- a) witnesses are identified and the collection of their statements organised;
- b) physical evidence at and around the site of the accident or incident is photographed, including through the use of UAVs where appropriate and permitted, catalogued in an evidence log, preserved, and stored until subsequent release to a competent authority;
- c) equipment associated with the accident or incident is checked, and recorded as evidence as required;
- d) that any bodies and body parts are not only inspected and appropriately handled, but that human remains are identified as best as practicable and released as soon as possible to the appropriate authorities;
- e) other relevant aspects of the scene of the accident or incident are inspected and recorded;
- f) relevant aspects of the working and surrounding context and environment are inspected and recorded;
- g) relevant documents and records are acquired and reviewed;
- h) a complete, clear and accurate investigation report is submitted as soon as reasonably practicable, and within no more than 10 working days, after the event and that it includes a complete record of the facts leading to conclusions and, when appropriate, recommendations designed to prevent recurrence; and
- i) information related to this investigation is kept in strictest confidence and not released to any entity/organisation outside the investigation team unless authorised in advance by the NMAA.

8.4. Mine action organisations

Mine action organisations shall:

- a) report accidents and incidents as required in this standard in a timely manner;
- b) secure and control the accident or incident site until relieved of the responsibility by the lead investigator or other individual authorised by the NMAA;
- c) take immediate photographs of an accident or incident site, and then preserve the area until the site is released by the person leading any formal investigation;

- d) provide access and, when necessary, administrative and technical support to accident and incident investigators;
- e) make available to persons conducting any formal investigation the original worksite records, SOPs, training records, communications logs and other documentation;
- f) assist persons appointed to formally investigate accidents and incidents;
- g) in the absence of a NMAA, make the findings of investigations available to other mine action organisations operating in the country;
- h) ensure that risk controls identified during any investigation, accepted by the NMAA, and applicable to the mine action organisation, are fully and effectively implemented; and
- i) establish systems where employees can report near misses and recommendations for safety improvements. These systems may be anonymous.

8.5. Mine action employees

Mine action employees shall:

- a) apply appropriate standards and SOPs designed to minimise the risk of accidents and incidents;
- b) report perceived weaknesses in equipment, training and procedures;
- c) report accidents and incidents (including near misses) to their managers; and
- d) assist in the investigation of accidents and incidents.

Annex A (Normative) References

The following normative documents contain provisions, which, through reference in this text, constitute provisions of this part of the standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of the standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid ISO or EN:

- a) IMAS 04.10 Glossary of mine action terms, definitions and abbreviations;
- b) IMAS 07.12 Quality Management in Mine Action;
- c) IMAS 07.14 Risk management in mine action; and
- d) IMAS 07.40 Monitoring of mine action organisations.

The latest version/edition of these references should be used. GICHD hold copies of all references used in this standard. A register of the latest version/edition of the IMAS standards, guides and references is maintained by GICHD, and can be read on the IMAS website: (See www.mineactionstandards.org). NMAA, employers and other interested bodies and organisations should obtain copies before starting mine action programmes.

Annex B
(Informative)
Example of an immediate report (may be verbal)

From:	Organisation name. See note 1 Date & time report submitted.
To:	Appropriate authority.
Subject:	Immediate report of an operations accident.
a.	Callsign or team identifier.
b.	Time of accident.
c.	Name of accident task site/nearest town if mobile task.
d.	Grid reference of accident location.
e.	Type of accident (e.g. explosion).
f.	Number of casualties.
g.	Names of casualties. (Identification numbers may also be used).
h.	Brief description of injuries and treatment for each casualty if practicable.
i.	Time of evacuation.
j.	Receiving medical facility.
k.	Any other assistance required.
l.	Contact details for personnel accompanying casualties.
m.	Contact details for individual responsible for the accident site.

Note: 1 The highlighted information should be sent by radio or telephone as soon as it is known. An immediate report should normally be sent within an hour of an accident and often much sooner.

Annex C
(Informative)
Example of an initial written report

From:	Organisation name. See notes 1, 2 and 3.	Date report submitted.
To:	Appropriate Authority.	
Subject:	Accident or incident initial written report	
Part one – background		
1.	Organisation name.	
2.	Organisation sub unit, site office/project number, team name/number.	
3.	Name of Worksite Supervisor	
4.	Location of accident or incident (province, district, village, task no, grid reference).	
5.	Date and time of the event.	
Part two – details of incident or accident		
6.	Provide a general description of what is confirmed about the event. If certain details are as yet unavailable, the report should reflect that.	
Part three – known explosive hazards involved		
7.	If possible provide basic details of any explosive ordnance that was known to be involved in the event. If not confirmed simply state not yet known.	
Part four – details of injuries		
8.	Provide basic details of any persons (including non-demining staff) injured as a result of the event. Include names, gender, age, occupation, basic description of injuries. Also include details of all persons with minor injury(ies).	
Part five – medical and emergency support		
9.	Provide basic details of the medical and emergency support (treatment, communications, evacuation transport, receiving medical facility). If known provide a basic timeline of the MEDEVAC.	
Part six – equipment/property/infrastructure/PPE damage		
10.	If practicable briefly describe any equipment, property or infrastructure damaged as a result of the event.	
11.	If practicable briefly describe any PPE involved in the incident.	
Part seven – any other relevant information		
12.	Include any other factual information relevant to the event that have not already been covered.	
Part eight – initial recommendations (if appropriate)		
13.	There may be initial recommendations based on available information. Where there is evidence to suggest a previously unknown risk, or a risk that may affect other organisations, the reasoning behind such recommendations should be detailed.	
Signature of Initial Written Report Author		
Name of Initial Written Report Author		

- Note: 1 An initial written accident or incident report shall be prepared as soon as practicable after the event has occurred (and within 24 hours). The report should be completed by a senior representative from the mine action organisation involved.
- Note: 2 In some situations the initial written accident or incident report may be the only formal record of the event.
- Note:3 The initial report shall not speculate as to the circumstances surrounding the incident/accident. It is simply a statement detailing what is confirmed about the accident or incident within 24 hours of the event.

Annex D (Informative) Example terms of reference for an investigation

NMAA/MAC name

Address

Date

File reference (unique accident/incident identification number)

Name of recipient(s)

Address

APPOINTMENT TO CARRY OUT A FORMAL INVESTIGATION

Reference:

- A. Programme name national mine action standards.
- B. Accident/incident preliminary written report. (Copy attached, when available.)

1. You [name of Lead Investigator] are hereby appointed by [name and appointment] of the NMAA/MAC to investigate the circumstances surrounding the mine action accident/incident that occurred on [time and date] at [location]) involving [organisation name or other identifier]. You may ask others to assist as part of your investigation team as appropriate. You should include a member of the mine action organisation(s) involved in the event as an observer. You have full authority over the investigation site on arrival until it is released by you back to the NMAA. You have authority to collect physical evidence from the scene as well as documentary evidence from the organisations involved. You have the authority to interview witnesses.

2. This accident/incident involved [give a brief description of the event].

3. Your formal investigation and report are to determine and record the following:

- a) all evidence relevant to this accident/incident.
- b) details of the task(s) being carried out at the time of the event;
- c) when and where the event occurred;
- d) how the event occurred including a description of the events that led up to the event and the people, equipment and procedures involved;
- e) the nature and extent of any injuries to people or damage to equipment, property or infrastructure that resulted from the event;
- f) why the event occurred and whether it could have been avoided or the consequences mitigated by taking appropriate measures;
- g) any remedial action that may be necessary to prevent future events of this nature occurring; and
- h) any other matters that the Lead Investigator considers relevant to the event.

4. When investigating the event the following factors are to be considered:

- a) the level of training and experience of all those involved in the event, including supervisory and managerial staff. This should also cover the dates and subjects covered during initial, continuation, or refresher training;
- b) the work routines being followed prior to and at the time of the event including work start and finish times and rest period routines;
- c) the dates of the last leave period or day off work for all people involved in the event;
- d) the dates and results of recent monitoring (internal and external) of the team involved in the event;
- e) the procedures being used to conduct the activities being carried out at the time of the event and whether they were being conducted correctly using the appropriate equipment;

- f) the climatic conditions on site at the time of the accident;
 - g) the personal protective equipment (PPE) that was used by the people involved in the event, and whether that PPE was used correctly;
 - h) consider whether any PPE used appears to have successfully reduced the injurious consequences of the event; and
 - i) the medical and emergency support available to those involved in the event and whether this support was adequate, identifying any areas where improved medical support could have reduced the consequences of the event.
5. Consider whether any of the following could have caused or been a contributory cause of the event or the severity of its consequences;
- a) any shortcoming in command and control;
 - b) any shortfall in training of the people involved, including supervisory staff;
 - c) neglect, carelessness or misconduct by any of the people involved;
 - d) deficiencies in the procedures and/or the way they were used;
 - e) people having been given inappropriate or confusing instructions;
 - f) inadequate area marking;
 - g) deliberate non-compliance with instructions or procedures;
 - h) the use of alcohol, drugs or prescribed medication;
 - i) incorrect use of equipment;
 - j) the medical response in the case of injury(ies);
 - k) any pressure to work quickly;
 - l) the health of anyone involved in the event;
 - m) malfunctioning of equipment or materials, including explosives,
 - n) any deficiencies in basic support to those at the worksite; and
 - o) management deficiencies, including all levels of the organisation.
6. The report shall record the facts surrounding the event in sufficient detail to justify the conclusions drawn from the investigation and any recommendations arising from those conclusions.
7. The following documents should be included with the report whenever relevant:
- a) a copy of the document appointing an investigator to carry out a formal investigation [this document];
 - b) a copy of the written preliminary report from the organisation involved in the event;
 - c) a full log of all evidence, (each item of evidence should have an ID code);
 - d) witness statements;
 - e) sketches, diagrams, location and site plans as appropriate;
 - f) photographs highlighting important aspects of the event such as site conditions, injuries to casualty(ies), and damage to equipment, property or infrastructure;
 - g) task documentation, which may include survey reports, land release plans and sundry demining worksite documentation;
 - h) extracts from the organisation's SOPs when appropriate;
 - i) medical records and/or coroner's reports; and
 - j) any further documentary evidence gathered during the investigation.

8. The investigation report should be submitted by [insert a time and date that should be within ten days of the event whenever practicable]. In the event that the completed report is not able to be submitted on the date indicated, specific permission for an extension shall be obtained from the NMAA. In such an event an interim report outlining the progress of the investigation shall be submitted. Further interim reports should be provided at agreed intervals until the completed investigation report is submitted. Any delay beyond ten days shall be deemed exceptional and shall be no longer than required.

9. Information related to this investigation will be kept in the strictest confidence and not released to any entity/organization outside of the investigation team unless authorized in advance by the NMAA.

Signature of appointing authority

Name of appointing authority

Annex E
(Informative)
Example evidence log format

Serial	Evidence ID Code	Date and time Found and Logged	Brief Description	Remarks
1	AI-01/001	11:44 Jan 16, 2020	PMN frag/casing	Bakelite casing of a PMN AP mine believed to have initiated during the accident.
2				
3				
4				
5				
6				
7				
8				
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Annex F (Informative) **Example format for a detailed investigation report**

Accident report reference number *(unique reference usually assigned by the NMAA)*

The report shall detail evidence gathered by the mandated investigator(s) in relation to the accident or incident. All analysis shall be based on this evidence. All conclusions shall similarly be based on evidence. Only where the evidence is unequivocal may a conclusion be termed a fact. Recommendations may be made to reduce the likelihood of reoccurrence of similar events, or other improvements. Reference should also be made to any evidence that appears missing but is believed to exist. If information is not available to answer a question this should be reflected in report. The report should not speculate. If a question listed below is not applicable, this should be reflected in the completed report.

Synopsis

A brief summary of the time, location and events surrounding the accident or incident and the main findings, conclusions and recommendations arising from the investigation. The synopsis will not normally be more than 200-300 words.

1. Factual information

1.1 Date and time of the accident or incident

1.2 Type of accident or incident

Such as 'fatality resulting from detonation of an AP mine during demining', 'serious injury to a farmer following detonation of EO in released land', etc.

Details of any EO associated with the accident or incident (if known).

1.3 Mine action organisation details

Including mine action organisation(s) and identification of any sub-units; brief accreditation history.

1.4 Team and personnel information

Including site manager, medical, management and technical team personnel, other people involved in the accident or incident and any other visitors to the site present at the time of the accident or incident. Identify those who witnessed the event as well as those who were present elsewhere on the site. This information may be given in tabular format.

1.5 Site details and location

Address, map reference, Latitude and Longitude/UTM, etc. as appropriate and available. Map extracts, images of the location, etc., to be included in the main text or attachments as appropriate. Imagery taken by the investigation team by Unmanned Aerial System may be included at this point.

1.6 History of activity at the site

History of operations at the site; start date, progress of activity prior to the accident or incident.

Layout and marking of the site.

Equipment in use at the site including (as applicable) detectors, ADS, mechanical systems, PPE, tools and other items.

Procedures in use at the site (including issue numbers, effective dates, etc.).

Provision of medical support at the site and the medical emergency response plan.

Standards (national and/or international) and other regulations applicable at the site.

Record of internal and external quality management at the site. (How many inspections, how many non-conformities of what degree etc).

A brief summary of relevant operations in country to date by the organisation may also be made if relevant.

1.7 Conditions at the site prior to and at the time of the accident

Including: weather; terrain, soil and vegetation at the site prior to and at the time of the accident or incident.

1.8 Description of the accident or incident

A narrative description of what happened, including details of activities on the day of the accident or incident. Evidence, including witness statements, should be directly referenced. Contradictory evidence leading to discrepancy may be identified at this stage, prior to analysis in section 2.

Details of communications (recorded in written logs, mobile phone systems or other evidence) relating to the accident or incident.

Details of injuries to persons:

Details of any casualty(ies): <i>[Repeat for each casualty.]</i>			
Name:	<i>[Name or unique casualty identification number (CIN)]</i>	Work title:	
Age:		Gender:	
PPE issued:		PPE used:	
Summary of injuries:	<i>[List all injuries, including minor injuries.]</i>		
Summary of the casualty's relevant work experience:	<i>e.g. Deminer X has been working with Team Y in Mine Action Organisation Z for XX years and months. They were deemed a competent and experienced deminer.</i>		

Details of damage to property (including PPE), assets and the environment.

Details of damage to assets or infrastructure: <i>[Repeat for each major item.]</i>	
Describe damage:	<i>[List all equipment damaged.]</i>

1.9 Response to the accident or incident

Details of who did what and when during the response to the accident or incident. Details shall include timings from the accident, through to evacuation, arrival at a medical facility and any onward movement or treatment for each casualty.

This section should include a detailed description of the clinical actions provided at site, in transit, and at the medical facility. If appropriate comment may be made on the effectiveness or otherwise of the medical and emergency support in terms of planning and preparation, medical equipment and supplies, communications, evacuation transport, medical treatment facilities and external support (from other mine action organisations) to the casualty evacuation.

A tabular format may be used to detail this sequence of events.

2. Analysis

Provide a description of any causal analysis approaches adopted during the investigation (e.g. '5-whys', fishbone, fault tree, swiss cheese model, etc.). A repeated 'why-based' analysis should constitute the minimum approach adopted.

The information gathered and background documentation should be examined to determine whether there are any inconsistencies. These may be contradictory statements, or may be variations between the activities prescribed in the approved SOPs and the facts reported or observed at the workplace. All discrepancies should be listed and, when possible, further interviews conducted to try to determine the truth. When a discrepancy cannot be resolved by further explanation, both versions should be recorded in the final report. It should be noted that some inconsistency is relatively common during recollection of traumatic events.

When the investigator decides to set aside or discount a version of events, this should be recorded in the final report along with the reasons for setting it aside.

The investigator should determine the reliability of the information gathered in terms of whether each piece of evidence is certain, likely, possible, unlikely or remote.

When evidence that should be available is missing, has been tampered with after the event, or is not made available when requested, that may be indicative of a desire by people associated with the event to conceal the truth.

Although there may be other explanations for missing evidence, any apparent attempt to mislead or frustrate the investigation process should be clearly recorded in the report and the individuals responsible identified whenever possible.

Analyse and describe relevant aspects (including causal aspects) under the following headings and subheadings (as applicable – not all aspects will be relevant to every investigation):

2.1 EO analysis (the EO associated with the accident or incident and any aspects of the design (especially fuzing), condition, tactical deployment or function relevant to the investigation)

2.2 Process aspects

2.2.1 Procedural aspects (including marking)

2.2.2 Management and supervision aspects including on site, and at all higher levels

2.2.3 Communications aspects

2.3 Human aspects

2.3.1 Training

2.3.2 Aptitude, skills and knowledge of personnel

2.3.3 Health and welfare of personnel

2.3.4 Job factors

2.3.5 Human/equipment factors (including ergonomics, ease of use, etc.)

2.4 Equipment/technical aspects

2.4.1 Detection equipment/systems (including mechanical and animal detection systems)

2.4.2 Communications equipment

2.4.3 Survey equipment (including UAVs)

2.4.4 Safety equipment (*including PPE*)

2.5 Environmental aspects

Identifying and considering environmental aspects that influenced the accident or incident, its consequences and responses (before and after the event)

2.6 Policy aspects

The suitability and effectiveness of relevant policies and principles relating to planning, operations and decision-making, as well as the response to the event.

2.7 Accident response

Including the effectiveness of the on-site first aid, evacuation and follow-up treatment.

2.8 Reporting

2.8.1 Adherence to reporting procedures as detailed in the SOP

2.8.2 Other investigation reports (*if submitted separately from this report*)

3. Conclusions

3.1 Main findings (*a statement of the main conclusions related to the immediate event*)

3.2 Causal factors (*immediate, underlying and root*)

Indicate confidence levels, as described in this standard, for any conclusions about causal factors.

3.3 Contributory factors (*other aspects that were not causal, but influenced the accident or incident and any response*)

4. Recommendations

Specific recommended risk control measures relevant to each identified causal factor. Risk control measures are those that: avoid a risk; remove the source of a risk; reduce the likelihood of an adverse event; reduce the consequences of an adverse event; or share an associated risk (through the provision of insurance, contract terms, etc.).

Safety risk controls should be adopted using the hierarchy of controls recommended in this standard (elimination; substitution; engineering; administration; PPE).

Note that implementation of a risk control may give rise to other risks. Investigators should consider the possibility of other such risks and, where appropriate, recommend additional controls.

Include any other recommendations arising from the investigation.

Attachments:

A. Investigation Terms of Reference

This section should include any change to the Terms of Reference for example changes to investigation team composition, or the permitted timing of reports.

B. Investigation records

Include the investigation narrative log (including the date that the investigation began and the date when it was completed) and evidence log. List all people in the investigation team and the organisations that they are associated with. State when they visited the site of the event under investigation and how long they spent at the site and interviewing witnesses. If the investigators could not visit the site and/or could not interview witnesses, explain why. State when any other visits to other locations relevant to the investigation took place, who was involved in the visits, when they took place and for how long.

C. Witness statements and interview transcripts

Signed and dated by the witness in each case

D. Operational records

Such as site logs, tasking instructions, equipment maintenance records, extracts from survey reports, as relevant to the investigation and where referenced within the report

E. Other records and evidence

Such as extracts from training records, SOPs, standards, correspondence and other documentation relevant to the investigation or referenced within the report.

F. Causal analysis

If required to explain and maintain the credibility of decisions about the causes identified in the report.

Appendix 3 to Annex F (Informative) Example of an injury data sheet (see note 1)

Mine action organisation name:

Location (province, district, village, task no):

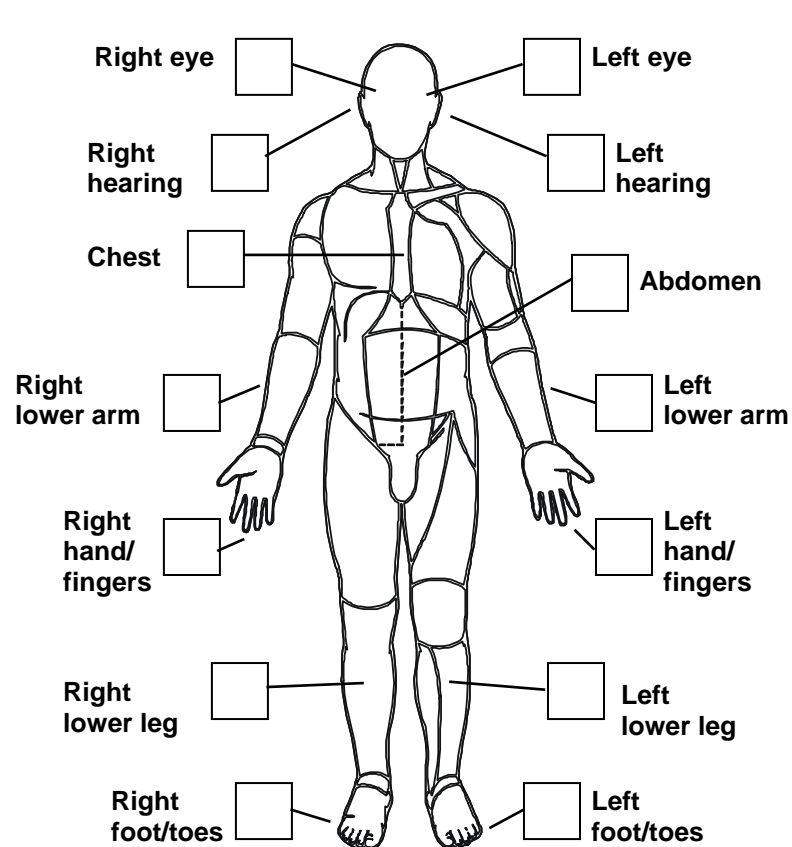
Casualty name or CIN:

Explain the cause of injury (ies): **See note 2**

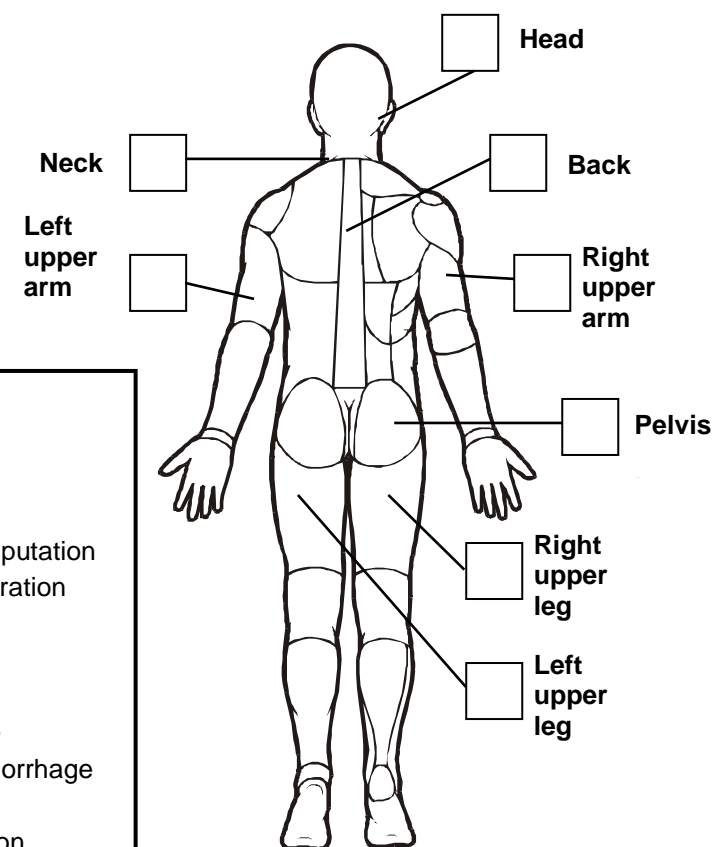
Organisation sub unit, site office/project number, team name/number:

Date and time of incident:

Gender and age:



Legend	
Code	Meaning
A	Abrasions
AM	Amputation
TAM	Traumatic amputation
B	Burn/discolouration
D	Dislocation
F	Fracture
FR	Fragment
H	Haemorrhage
IH	Internal haemorrhage
L	Lacerations
LO	Loss of function



Note: 1 Instructions for completing the form. Place an 'X' in each box indicating parts of the body where there was no noticeable injury. For parts of the body that were injured place the relevant code(s) in the box. Codes are shown in the legend. It may not be possible to indicate all injuries without specialist medical advice.

Note: 2 Cause of injuries should be kept to one phrase for example, 'stepped on PMN mine'; 'secondary fragmentation from POMZ mine'; or 'cut leg using chainsaw'.

Amendment record

Management of IMAS amendments

The IMAS series of standards are subject to formal review on a three-yearly basis, however this does not preclude amendments being made within these three-year periods for reasons of operational safety and efficiency or for editorial purposes.

As amendments are made to this IMAS they will be given a number, and the date and general details of the amendment shown in the table below. The amendment will also be shown on the cover page of the IMAS by the inclusion under the edition date of the phrase *'incorporating amendment number(s) 1 etc.'*

As the formal reviews of each IMAS are completed new editions may be issued. Amendments up to the date of the new edition will be incorporated into the new edition and the amendment record table cleared. Recording of amendments will then start again until a further review is carried out.

The most recently amended IMAS will be the versions that are posted on the IMAS website at www.mineactionstandards.org.

Number	Date	Amendment Details
1		
2		
3		
4		
5		
6		