

EXPLOSIVES USAGE U/G HIF AUDIT - 17/06/2003 02:55:59 PM

1. RECORDS

Point	Standard	Guideline
1.1	The manager has appointed a person to train and assess the competency of persons who handle, charge and fire any explosive or blasting agent at the mine.	Intent: To verify manager has nominated an 'appointed person' to train and assess persons who use explosives. As required by MSIA regulation 8.12. Personnel: Underground manager; 'appointed person' . Method: Check Record Book, or appointments register, for confirmation. Must be acknowledged by 'appointed person' .
1.2	Persons who handle, charge or fire any explosive or blasting agent have been trained, and assessed by written test and found to be competent.	Intent: To verify that persons have been trained as required by MSIA regulation 8.12. Personnel: Underground manager; 'appointed persons' and people who use explosives. Method: Interview personnel who use explosives; check training manual/literature; training records; examples of completed written assessment tests.
1.3	A book (or register) is maintained at the mine which contains a list of those persons who have been trained and deemed competent to use explosives.	Intent: To verify that there is a register of persons who have been trained and deemed competent to use explosives at the mine as required by MSIA regulation 8.12. Personnel: Underground manager; 'appointed person'. Method: Verify existence of book or register. Check contents to ensure entries are up-to-date.

2. DRILLING PRECAUTIONS

Point	Standard	Guideline
2.1	Prior to drilling, the work face is washed down and butts are cleaned and examined for misfires.	Intent: To verify that the face is appropriately prepared and examined before drilling is commenced. As required by MSIA regulation 8.21. Personnel: Stope and development miners. Method: Inspect a selection of current stope and development workplaces and assess standard of face preparation.
2.2	No hole is drilled in any butt or within 15cm of the edge of any butt.	Intent: To verify that there is adequate distance between the edge of a butt and any bored hole. As required by MSIA regulation 8.21. Personnel: Stope and development miners. Method: Inspect a selection of current stope and development workplaces and check position of bored holes versus butts.

2.3	Drilling is not carried out in a face containing a charged hole or misfire unless the person is instructed to do so by the U/G Manager or his representative.	<p>Intent: To verify that miners know that they must not bore any hole in a face containing a butt unless instructed by the U/G Manager or his representative. As required by MSIA regulation 8.21.</p> <p>Personnel: Stope and development miners. Method: View the written procedures. Check miner' s knowledge re boring of any hole in a face containing a misfire or charged hole (answer must include fact that hole can only be bored if instructed by U/G Manager or his representative).</p>
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3. WORKINGS APPROACHING EACH OTHER (MSIA REG. 10.27)

Point	Standard	Guideline
3.1	There is identification of development and stoping workplaces which may intersect any existing excavation. This includes pillar formation.	<p>Intent: To verify that mine planning includes an assessment as to whether stoping and development work is likely to intersect any other mine opening. If any intersection is to occur then this must be clearly highlighted on design drawings and the daily work plans used by the mine foreman and supervisor. As required by MSIA regulation 10.27.</p> <p>Personnel: Underground manager; planning engineer; foreman; supervisor; surveyor. Method: Check with above mentioned personnel as to how they identify and highlight headings advancing towards existing openings. Have one or more examples shown to you.</p>
3.2	Check surveys are carried out.	<p>Intent: To verify that any development or stoping workplace which is destined to intersect another excavation is surveyed during the course of mining to ensure accurate position of the face is known. As required by MSIA regulation 10.27.</p> <p>Personnel: Survey staff. Method: Check that survey work is conducted and relevant plans and sections are kept up to date. Check that drawings are made available to shift supervisors and miners.</p>
3.3	Probe drilling ahead of the advancing face is carried out to check for the proximity of the excavation and the presence of any accumulated water.	<p>Intent: To verify that probe holes are drilled from the workplace to confirm the presence of, and the break-through distance to, the other excavation and if water and gases etc are present. As required by MSIA regulation 10.27.</p> <p>Personnel: Underground manager; foreman; supervisor; miners. Method: View procedures. Check with supervisors and miners that probe drilling is undertaken. Check that there are extension steels available to enable probing in advance of the normal face cut and that plugs are available should accumulated water be tapped.</p>
3.4	Checks for misfires are made in the opening ahead of the advancing face.	<p>Intent: To verify that the break-through position is examined (where possible) to ensure that any drill hole will not intersect any misfire. As required by MSIA regulation 10.27.</p> <p>Personnel: Underground manager; foreman; supervisor; miners. Method: View procedures. Interview personnel involved if such checks for misfires take place.</p>

3.5	A record of this check is made.	<p>Intent: To verify that a record is made of any inspection carried out and the result of that inspection. As required by MSIA regulation 10.27.</p> <p>Personnel: Underground manager; foreman; supervisor.</p> <p>Method: Check that a record of the inspection is made in a log, record book, or shift record sheet. Must identify who carried out the inspection; what the inspection revealed; and what action (if any) was taken.</p>
3.6	The breakthrough round is only fired when persons who may be affected by the blast have moved to a safe position.	<p>Intent: To verify that the safety of employees is ensured when the connection is made. As required by MSIA regulation 10.27.</p> <p>Personnel: Underground manager; foreman; supervisor; miners.</p> <p>Method: View procedure. Interview personnel and ascertain what actions are implemented when a break-through round is to be fired. Check that breakthrough position is clearly marked and guarded or signposted against entry at blasting time. Is the airflow circuit likely to be altered in any way as a result of the connection?</p>

4. CHARGING OPERATIONS

Point	Standard	Guideline
4.1	Only the equipment and personnel required for the charging operation are present in the workplace.	<p>Intent: To verify that only the personnel and charging equipment needed for the charging activities are present at the face.</p> <p>Personnel: Charge crew; miners.</p> <p>Method: View procedure. Inspect workplaces where charging operations are being carried out.</p>
4.2	Each hole is cleaned out before it is charged.	<p>Intent: To verify that each hole is cleaned of drill cuttings and sludge before there is any attempt to place explosive in the hole. As required by MSIA regulation 8.23.</p> <p>Personnel: Charge crew; miners.</p> <p>Method: View procedure. View charging operation to confirm action.</p>
4.3	Only wooden or other non-metallic tamping rods are used.	<p>Intent: To verify that explosive is not tamped into any hole with any form of metallic rod or pole. As required by MSIA regulation 8.23.</p> <p>Personnel: Charge crew; miners.</p> <p>Method: View procedure. Inspect examples of tamping rods used at the mine.</p>
4.4	Cartridges of explosives are never forced into blast holes.	<p>Intent: To verify that blast hole diameter is greater than explosive cartridge diameter and that cartridges can be easily placed into the holes. As required by MSIA regulation 8.23.</p> <p>Personnel: Charge crew; miners.</p> <p>Method: View procedure. Determine blast hole bit range and compare with the diameter of the explosive cartridges used for the shot. Ideally, the hole diameter should be 10-20% larger than the explosive.</p>
4.5	Only those holes that are intended to be fired in that blast are charged.	<p>Intent: To verify that all holes charged in a pattern are fired in a single blast. As required by MSIA regulation 8.23.</p> <p>Personnel: Charge crew; miners.</p> <p>Method: View procedure. In long hole stope firing in particular, check that no holes or rows of holes are charged outside of those holes that will be fired in the next blast.</p>

5. ANFO CHARGING

Point	Standard	Guideline
5.1	Manufacturer' s or suppliers literature setting out the safe use of each type of pneumatic loader in use at the mine is available.	Intent: To verify that the documentation setting out the specifications and instructions for the safe use of the pneumatic loading equipment used at the mine is available. As required by MSIA regulation 8.41 Personnel: Underground manager; foreman; supervisors. Method: View procedure. Check availability of appropriate literature. Does it cover the range of loaders used on site?
5.2	Users of the pneumatic loaders have been trained in the correct method of operation in accordance with the literature.	Intent: To verify that personnel who use the pneumatic loaders have been trained in their operation. As required by MSIA regulation 8.41 Personnel: Training officer; supervisor; charge crew; miners. Method: Interview sample of persons who use pneumatic loaders. Seek confirmation via training records. View training literature used by Training officer, foreman, or supervisor.
5.3	Pneumatic loaders are free from defects.	Intent: To verify that the pneumatic loaders are maintained in a good condition. As required by MSIA regulation 8.41 Personnel: Charge crew; miners; supervisor. Method: Visually check a selection of the loaders in use at the mine. Are they in good condition - check for corrosion, particularly around valves and fittings - on pressure loaders check for installation and working condition of the pressure gauge and relief valve. Are pressure loaders subject to regular maintenance check by fitters?
5.4	Pneumatic loaders are effectively earthed via an earth cable when in use.	Intent: To verify that pneumatic loaders are earthed via an earth cable attached to a metallic spike driven into the floor or into a hole in the wall such as a split set collar. As required by MSIA regulation 8.41 Personnel: Charge crew; miners; supervisor. Method: View procedure. Check that earthing cable is fitted to loader. (Note that the provision of an earth "chain" or the use of vehicle outriggers are not acceptable).
5.5	The earth cable is not connected to any water line, compressed air line or electrical earthing system.	Intent: To verify that a correct path to earth is used. As required by MSIA regulation 8.41 Personnel: Charge crew; miners; supervisor. Method: Check how cable is installed to provide path.
5.6	The charging hose is semi-conductive with a resistance of not less than 15000 ohms/metre and not more than 2 megohms for its total length.	Intent: To verify that only semi-conductive hose is used during charging operations. As required by MSIA regulation 8.41 Personnel: Charge crew; miners; supervisor. Method: Check brand of hose in use at the mine and verify resistance specification from manufacturer' s/supplier' s literature. Determine length of charging hose particularly where long-hole blasting is used. Check records of testing.

5.7	The charging hose is free from defects.	Intent: To verify that charging hose is maintained in good condition and is replaced as it becomes worn or damaged. As required by MSIA regulation 8.41 Personnel: Charge crew; miners; supervisor. Method: Visually check condition of charging hose . Is spare hose available if hose is in need of replacement.
5.8	Each person charging anfo removes their gloves and earths themselves before touching any electric detonator.	Intent: To verify that persons charging with anfo do discharge static electricity from their bodies before handling any electric detonator. As required by MSIA regulation 8.41 Personnel: Charge crew; miners; supervisor. Method: Firstly, determine if electric detonators are used at the mine. Check with a number of miners who charge with anfo as to their knowledge of static electricity and do they understand the need to earth their body prior to handling electric detonators. How do they provide that earth?
5.9	Earth continuity tests are done on the pneumatic loaders.	Intent: To verify that pneumatic loader earthing systems are checked. Personnel: Electrical supervisor., manager Method: Interview personnel and view test records in Mine Electrical Record Book etc.

6. FIRING WARNINGS

Point	Standard	Guideline
6.1	A person who intends to fire a blast warns all persons in adjacent workplaces.	Intent: To verify that persons who may be affected by the results of a blast are warned of the impending blast by the person who intends to fire. As required by MSIA regulation 8.25. Personnel: Foreman; supervisors; miners. Method: View procedures. Interview a cross section of u/g personnel as to how they are advised of firings in proximity to their workplace. Interview miners and determine in what manner, and to whom, they issue a blast warning.
6.2	Firing only occurs when all persons who are likely to be affected by the blast fumes have moved clear of likely affected areas.	Intent: To verify that mine personnel retreat to a safe position before a blast is fired. As required by MSIA regulation 8.25. Personnel: Mine personnel. Method: View procedures. Check with selection of u/g personnel as to their movements at firing times. Do they go to the surface or u/g crib rooms, or fresh air bases?
6.3	All entries to the place of firing are guarded, or firing warning notices are erected.	Intent: To verify that entrances to places where firing is intended is guarded by a person or that a prominent warning sign is erected. As required by MSIA regulation 8.25. Personnel: Foreman; supervisor; miners. Method: View procedures. Check evidence of guarding or erection of firing warning notices. Check that there are conspicuous firing warning notices available to be placed by the miner at entrances to his workplace.

7. FIRING TIMES (MSIA REGULATION 8.27)

Point	Standard	Guideline
7.1	Firing times are designated by the underground manager.	Intent: To verify that the underground manager has set times at which firing can take place. As required by MSIA regulation 8.27. Personnel: Underground manager. Method: Determine the firing times at the mine and whether those times have been set, in writing, by the u/g manager. Sight documentation.
7.2	Firing times are prominently displayed in conspicuous places at the mine.	Intent: To verify that firing times are highlighted to mine personnel. As required by MSIA regulation 8.27 Personnel: Underground manager. Method: Check that times are displayed in prominent positions. Times should be displayed on the general notice board outside the shift supervisors' office and at the shaft brace and portal entrance.
7.3	The firing times are made known to persons employed underground	Intent: To verify that employees are made fully aware of the mine firing times. As required by MSIA regulation 8.27 Personnel: Employees; foreman; supervisor. Method: Check that u/g employees are told of the firing times at the point of induction. Interview several employees to determine their knowledge of the times.
7.4	There is a procedure for the removal of obstructions in ore passes etc using explosives outside of the designated firing times.	Intent: To verify that the use of explosives is governed by a procedure when used outside of the designated firing times. As required by MSIA regulation 8.27 Personnel: U/G manager and supervisor. Method: View the procedure and interview personnel.
7.5	There is a procedure for the firing of independently ventilated headings outside of the designated firing times.	Intent: To verify that independent firing is governed by a written procedure. As required by MSIA regulation 8.27 Personnel: U/G manager and supervisor. Method: View the procedure and interview personnel.

8. POST FIRING INSPECTION

Point	Standard	Guideline
8.1	There is a written procedure that provides a safe system of entry and inspection before resuming normal work after blasting.	Intent: To verify that there is a formal procedure that sets out actions to be followed to ensure safe entry and inspection of a workplace after firing has taken place. As required by MSIA regulation 9.22. Personnel: Underground manager; supervisors; miners. Method: View written procedure.
8.2	Re-entry times are calculated and monitored by the Ventilation Officer.	Intent: To verify that there is a formal procedure that sets out minimum re-entry times for each workplace after firing has taken place. As required by MSIA regulation 9.22. Personnel: Underground manager; Ventilation Officer, miners. Method: View written procedure. Determine validity of re-entry time calculations.

8.3	Underground employees are trained in that procedure.	Intent: To verify that training in that procedure is provided to mine personnel. As required by MSIA regulation 9.22. Personnel: Underground personnel, Training officer; supervisor. Method: Interview sample of underground personnel. View training records for verification.
8.4	The procedure is adhered to by employees.	Intent: To verify that the procedures are followed by employees. As required by MSIA regulation 9.22. Personnel: Foreman; supervisor. Method: Check with u/g manager and supervisors if any employee has been counselled for breach of procedure? Any report of a fuming at the mine? Check accident record book in first-aid room of any employee reporting side-effects of blasting fumes. Observe re-entry procedures.

9. MISFIRES (MSIA REGULATION 8.43 8.44 8.46 TO 8.48)

Point	Standard	Guideline
9.1	There is a written procedure in place for dealing with misfires.	Intent: To verify that there is a procedure that sets out actions to be followed in the event of a misfire. Personnel: Underground manager; supervisors; miners. Method: View written procedure.
9.2	Underground employees have been trained in the procedure.	Intent: To verify that training in that procedure is provided to mine personnel. Personnel: Underground personnel; Training officer; supervisor. Method: Interview sample of underground personnel. View training records for verification.
9.3	A person who confirms or suspects a misfire makes a report to the U/G Manager or supervisor.	Intent: To verify that misfire occurrences are reported. Personnel: U/G Manager, miners; supervisor. Method: View written procedure. Confirm with supervisors that reports are made.
9.4	The relieving person is notified of a misfire if it occurs at the end of the shift.	Intent: To verify that any information in relation to a misfire is conveyed to personnel commencing work in that workplace on the next shift. Personnel: U/G Manager, miners; supervisor. Method: View written procedure. Check with shift work miners if they do get notified of any misfire via supervisor or cross-shift colleague.
9.5	Inspections carried out for misfires and any actions taken as a result of a misfire are recorded in the Record Book or a register kept for that purpose.	Intent: To verify that a record of the misfire is made. Personnel: Underground manager; foreman; supervisor. Method: View written procedure. Check contents of Record Book or register to confirm any entries.

10. ELECTRICAL BLASTING ACCESSORIES (MSIA REG. 8.32 TO 8.36)

Point	Standard	Guideline
10.1	All electric blasting accessories including exploders, circuit testers, and detonators are of a type approved by the Chief Inspector of Explosives.	Intent: To verify that only approved electric blasting accessories are used at the mine. Personnel: Underground manager. Method: Obtain list of make/model of all electric blasting accessories used at the mine. Crosscheck list against accessories that have CIE approval.

10.2	The exploders and testers are tested and maintained in good condition.	Intent: To verify that the blasting accessories are tested and maintained. Personnel: Underground manager. Method: Check at mine for a register of the accessories and the record of checks/calibrations against each unit. Inspect accessories u/g and ascertain whether in good condition.
10.3	Dedicated shot firing cables are used.	Intent: To verify that cables serve no other purpose than for shot firing. Personnel: Foreman; supervisor; electrician; miners. Method: Check if cable is purchased specifically for shot firing purposes. During u/g inspection check that cables are installed for the single purpose of shot firing.
10.4	The shot firing cables are positioned such that they are not likely to come into contact with lighting or power cables.	Intent: To verify that shot firing cables are separated from all other electrical conductors. Personnel: Foreman; supervisor; electrician; miners. Method: Check that cables are not run out on the same services that contain lighting or power cables.

11. ELECTRIC FIRING

Point	Standard	Guideline
11.1	There is a procedure in place that provides for safe connecting up, testing and firing.	Intent: To verify that there is a procedure in place that covers the connecting, testing and firing of shots in the mine. Personnel: Underground manager; supervisors; miners. Method: View written procedure document.

12. MAINS FIRING

Point	Standard	Guideline
12.1	A procedure for mains firing system is in place at the mine.	Intent: To verify if there is a mains firing system in use at the mine. As required by MSIA regulation 8.39. Personnel: Underground manager. Method: Sight mains firing system and procedure.
12.2	All persons are cleared from the underground workings prior to any blast being fired via a mains system.	Intent: To verify that no person remains underground when there is to be firing via a mains system. As required by MSIA regulation 8.39. Personnel: Underground manager; supervisor; employees. Method: View the procedure.
12.3	The voltage and current used are adequate for the number of detonators and type of circuit.	Intent: To verify that the mains system capacity is sufficient to initiate all detonators in the blast circuit As required by MSIA regulation 8.39. Personnel: Underground manager; electrician; blasting engineer. Method: Check that documentation is available to demonstrate that the installed system is adequate for proposed blasts.
12.4	The voltage used does not exceed 415 volts.	Intent: To verify that the mains system does not exceed 415 volts. As required by MSIA regulation 8.39. Personnel: Underground manager; electrician; blasting engineer. Method: Have electrician confirm system voltage.

12.5	The firing and isolating, short circuit and lockout system is in accordance with the recommendations of the detonator manufacturer or supplier.	Intent: To verify that the system specifications meet the requirements of the detonator manufacturer or supplier. As required by MSIA regulation 8.39. Personnel: Underground manager; electrician; blasting engineer. Method: Check that manufacturer' s/supplier' s literature is available. What checks are made by electrical personnel to confirm that system is installed and maintained in accordance with manufacturer' s/supplier' s specifications?
12.6	Current flow in the circuit is limited to 25 milliseconds via a cut-out relay.	Intent: To verify that the mains system includes a cut-out relay to limit current flow to 25ms. As required by MSIA regulation 8.39. Personnel: Underground manager; electrician; blasting engineer. Method: Check with electrician or blasting engineer that current flow is restricted to 25ms via a cut-out relay. Check system documentation.
12.7	The authorised shot firer has personal custody of the keys to the firing, isolating and short-circuiting boxes.	Intent: To verify that the keys to the mains system are in the hands of an authorised person only. As required by MSIA regulation 8.39. Personnel: Underground manager and shotfirer. Method: Has an authorised shot firer been appointed? Determine who retains keys?
12.8	The shot firing cables are disconnected immediately after firing any charge.	Intent: To verify that shotfiring cables are disconnected from the mains system immediately after a blast. As required by MSIA regulation 8.39. Personnel: Blasting engineer; shotfirer. Method: View procedure. Confirm with shotfirer or blasting engineer that this action does occur.
12.9	The firing box is locked at all times except at the time of firing.	Intent: To verify that access to the firing box is not available except when firing is to take place. As required by MSIA regulation 8.39. Personnel: Blasting engineer; shotfirer. Method: View procedure. Check that box is locked.

13. NON-ELECTRIC FIRING

Point	Standard	Guideline
13.1	There is a written procedure in place that provides for a safe system of hook-up, connection and initiation that is in accordance with the manufacturer' s or supplier' s instructions.	Intent: To verify that there is a written procedure in place for the hook-up and initiation of the blasting circuit. Personnel: Underground manager; supervisor; miners; charge crew. Method: View written procedures document.

14. FIRING WITH SAFETY FUSE

Point	Standard	Guideline
14.1	The underground manager has designated in writing the location where fuse capping can be carried out.	Intent: To verify that capping of fuses is only to be carried out in a location designated by the manager. As required by MSIA regulation 8.17. Personnel: Underground manager; charge crew; miners; shotfirer. Method: View procedure. Visit designated location.
14.2	There is a procedure to be followed in carrying out capping of fuses.	Intent: To verify that there is a written procedure for the capping of fuses. Personnel: u/g manager; supervisors; miners; shotfirer. Method: View procedure.

14.3	The minimum length of safety fuse used for firing a charge is 1 metre.	Intent: To verify that minimum length of fuse used at the mine is 1m. As required by MSIA regulation 8.20. Personnel: Shotfirer; charge crew; miners; supervisor. Method: View procedure. Check with persons who make up the rods. Observe examples of rods in main and working party magazines.
14.4	The length of a safety fuse used to fire a charge is sufficient to enable the person firing the charge to reach a place of safety without undue haste.	Intent: To verify that the fuse is cut to a length that allows plenty of time for the person who lights the fuse to retreat to a safe place before the first shots go off. As required by MSIA regulation 8.20. Personnel: Shotfirer; miners; supervisor. Method: Check with persons who light safety fuse as to whether they have ample time to retreat. Do they walk out, or have to run, or obtain a lift?
14.5	The burning rate of the fuse has been verified.	Intent: To verify that the rate of burning of the fuse is checked against that rate specified on the fuse package. As required by MSIA regulation 8.19. Personnel: Shotfirer; miners; supervisor. Method: Sight test results.
14.6	The burning rate is made known to persons using the fuse.	Intent: To verify that the results of the burning rate test are made known to persons who use safety fuse. As required by MSIA regulation 8.19. Personnel: Shotfirer; miners; supervisor. Method: Interview persons who use the fuse to determine how they are informed of the fuse burning rate.
14.7	The burning rate is posted on a notice board located at a conspicuous place at the mine.	Intent: To verify that the burning rate is highlighted at the mine in a prominent position. As required by MSIA regulation 8.19. Personnel: Shotfirer; miners; supervisor. Method: Check contents of noticeboard (for u/g employees) and sight document displaying burning rate of fuse currently in use.
14.8	The firing procedures designate the maximum number of fuses that can be lit individually as a maximum of four using a fuse lighter only.	Intent: To verify the legal limit imposed when using fuses. As required by MSIA regulation 8.31. Personnel: Shotfirer; miners; supervisor. Method: View procedure. Interview personnel.

15. EXTRANEOUS ELECTRICITY PRECAUTIONS

Point	Standard	Guideline
15.1	Hazards which may cause the premature initiation of electric detonators are identified.	Intent: To verify that the hazard of extraneous electricity has been identified. Personnel: Underground manager. Method: Sight documentation addressing hazards such as static electricity, and electromagnetic radiation.
15.2	Written procedures are in place to ensure that persons are not exposed to those hazards.	Intent: To verify that there are written procedures in place that address those hazards. Personnel: Underground manager; foreman; supervisor; nipper. Method: Check that documentation sets out procedures to deal with those hazards.