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EXPLOSIVE PROTOCOLS FOR AVALANCHE CONTROL

1. REQUIREMENTS

1.1 All active avalanche control programs, which employ explosives, will have procedures as required by OHSR 21.85. These procedures **shall be submitted** to WorkSafeBC for acceptance. The procedures will be part of an Active Avalanche Safety Program and be an appendix to the Avalanche Safety Plan. These procedures must receive written acceptance from the Board prior to any avalanche control blasting activities being conducted. This is in accordance with *O.H.&S. Regulation, section 21.85* which states in part that:

(1) Explosive charges must not be placed manually on site by workers or projected by any means for the purpose of avalanche control, until the proposed work procedures have been submitted to and accepted by the Board.

1.2 These procedures along with others appendices within the Avalanche Safety Plan will enable the Blaster of Record to effectively conduct operations. Such examples are but not limited to;

- Avalanche Atlas (Terrain Zoning and Risk Assessments)
- Explosive Storage, transportation and use

1.3 In order to obtain maximum consistency with *Part 21 of the O.H.&S. Regulation,* the following protocols have been developed to establish and assist employers and avalanche control personnel to develop minimum standards for blasting procedures. All written submissions shall be **detailed** and shall fully outline all work procedures for each method of avalanche control blasting.

1.4 These protocols shall be incorporated into any submission to the Board regarding avalanche control blasting and any application for a blasting variance for avalanche control.

Note: *A copy of the Explosive Protocols for Avalanche Control may be obtained from Certification Services at 1-604-276-3090, or toll free at 1-800-621-7233. It may also be viewed on line at* *http://www2.worksafebc.com/Topics/CertificationTraining/Home.asp*

2. GENERAL

2.1 Avalanches occur in nature when snow loads exceed the strength of the snowpack structure. Artificial loads such as explosive detonations can be applied to the snowpack in order to artificially trigger an avalanche. Artificial triggers allow avalanche safety personnel to cause avalanches at a specific time when it is safe to do so.

2.2 Active Avalanche Safety Programs may include the use of explosives to mitigate or control the avalanche hazard within a defined avalanche risk zone.

- Definition from OHSR 4.1.1 defines Active Avalanche Safety Program as;

  means a program for monitoring daily, or more frequently if conditions warrant, the weather, snow and avalanche conditions, determining temporal fluctuations of avalanche hazards and implementing safety measures, closures or other methods specified in the program to reduce avalanche risk that has not been mitigated through use of passive measures

2.3 The use of explosives is **one** method of applying stress to the snowpack's instability. Explosives do not provide the same loading of stress onto the snowpack as other control trigger mechanisms but they may be ideal for some snowpack conditions. The range of terrain types as well as the workplace operational requirements necessitates the use of various delivery methods to optimize the effectiveness of the explosives.

2.4 The explosives delivery methods employed in a control area are chosen on the basis of the general terrain, snowpack, effectiveness, cost and operational conditions.

2.5 The primary explosive methods in avalanche control are:

1) Hand charging, cornice control blasting and case charges
2) Avalaunchers
3) Helicopter deployment
4) Military ordnance
5) Remote controlled charges

3. AVALANCHE CONTROL BLASTING PERSONNEL

3.1 All avalanche control operations, using explosives shall be conducted under the direct authority of the Blaster of Record responsible for blasting in that area. The Blaster of Record will be in possession of a **valid** WorkSafeBC blasting certificate for Avalanche Control endorsed for the scope of work being performed. *(O.H.& S. Regulation, section 21.5)*

3.2 A blaster may be assisted by persons who do not hold blaster certificates, but the blaster must have authority over the assistants and must exercise visual supervision over them and be responsible for their work during explosive loading, priming, fixing or firing. (*O.H.&S. Regulation, section 21.5 3)*

3.3 The blaster shall be physically present in the blasting area during all blasting operations. **"Blasting area"** is defined as the area extending at least 50 meter's, in all directions, from any place in which explosives are being prepared, fixed, fired or in which unexploded charges are known or believed to exist *(O.H&S. Regulation, sections 21.1 and 21.5)*

3.4 The blaster must ensure that the danger area is clear of workers and persons; the danger area is to be kept clear during the blasting period. (*O.H.&S. Regulation, section 21.66)*

4. PROCEDURES

4.1 Blasting for the purpose of avalanche control shall be performed by personnel that are trained in avalanche technology and qualified in blasting procedures. Documented proof of training is required. Fully detailed procedures must be available to all personnel and proper instruction must be ongoing for the implementation of the procedures *(Workers Compensation Act - Part 3 - Division 3).* **The minimum entry level of experience would be CAA L1 or equivalent.**

4.2 Where skiing is required, personnel shall be competent skiers.

4.3 There shall be an effective means of two-way communication between blasting crews and personnel guarding the avalanche danger area, and communication contact shall be maintained during all avalanche-blasting activities.

4.4 The procedures for **each** method of avalanche control involving explosives shall be submitted to the Board as required by *O.H.&S. Regulation, section 21.85.* Any change in avalanche procedure or regulatory requirements will require that the amendment be resubmitted to the Board for acceptance.

4.5 These procedures are to be submitted prior to the avalanche season for acceptance. For subsequent years, **only** changes (such as location) and/or amendments (change of product or procedures) need to be resubmitted. Only procedures directly relating to activities being conducted are to be included with the submission. **Once accepted, the employer and blaster must review their procedures annually.**

4.6 Blasting signals are no longer required for avalanche control work but alternate procedures must be submitted and accepted by the Board, *O.H.&S. Regulation, section 21.69(2)*

4.7 Any proposed procedure that is contrary to existing O.H.&S. Regulation **shall not be conducted** until a variance is obtained and available at the work site. The provision of providing equivalent or better protection must be clearly evident in all variance requests.

4.8 The blaster and their assistants **shall be clothed** and **equipped** to safely conduct avalanche blasting, including rescue, in accordance with recommendations of the **Canadian Avalanche Association** or as required by the Board. Such items will be but not limited to; a radio or similar device, transceiver, snow probe, shovel, first aid kit. *Reference to OHSR Part 8 Personal Protective Clothing and Equipment.*

4.9 Annual refresher explosive training should be conducted on location due to the seasonal nature of this work.

5. SUBMISSION OF PROCEDURES

5.1 All procedures will be submitted to WorkSafeBC Certification Services by mail or electronically. Certification Services may be contacted at 604-276-3090. The procedures will be reviewed by WorkSafeBC. A written response will be sent to the employer, in regards to acceptability or with further conditions or requirements. Certification Services/ WorkSafeBC will retain a permanent copy. Changes and amendments will be updated as received or as required.

5.2 Submissions will be detailed, and clearly cover all aspects of work to be conducted.

5.3 Submissions shall not contain any procedure for a blasting activity that is not conducted within that location.

5.4 Procedures shall not contain any activity that is contrary to regulation unless a variance has been granted to allow the proposed method.

5.5 All required authorizations shall accompany a blasting procedure submission. These may contain but are not limited to BC Safety Authority authorization for deployment of explosives from tramways or lifts.

5.6 The general layout should include all work procedures and equipment that a blaster will be exposed to. Any specific company policy should also be included. Some specific details are as below. These are pertinent to each type of blasting endorsement and should be clearly detailed under separate headings as follows:

- Location, general
- Blasting crew: minimum numbers to be used in each application, minimum qualifications, responsibilities and equipment.
- Explosive charges: Products and accessories being used.
- Danger area: parameters of the danger area from the blast and effects of the blast, responsibilities, guarding on site and local area, warning signals and devices.
- Transportation on site: type of containers, means of separating explosives and detonators and accessories, safety precautions and restrictions.
- Charge assembly: location of assembly operation, amount of charges, transportation forward if required, safety precautions, how charge will be assembled.
- Communication procedures: equipment type, who carries what for communication, who is responsible for ensuring security of closure, is maintained. If already contained in the Avalanche Safety Plan reference to the document and section is sufficient.
- Closure procedures: barriers, signage, visual sweeps.
- Charge placement: how charge is placed, any necessary equipment to aid in placing, safety precautions, location of team members during the deployment of the charge.
- Initiation: The Explosive Use Operational Plan should tell WorksafeBC the type of initiation system that will be used; i.e. Safety Fuse, Shock Tube (Non-El), Electric. Blaster must be appropriately certified, and or endorsed.
- Unused charges: how disposed, disassembly if applicable, where activity will be conducted, methods and procedures used for disposal, and required safety precautions.
- Misfired charges: procedures to be used in locating, equipment used, security of the area, where hazard signs will be located and when, recording and reporting,

procedure if not found, it is inadvisable to open an area to the public if a misfired charge may be in that area

- Emergency and evacuation procedures: equipment type, location, designated first aid attendant, evacuation plan for injury. If already contained in the Avalanche Safety Plan reference to the document and section is sufficient.

6. COMPONENTS OF EXPLOSIVE CHARGES/PRIMERS

Definitions:

Primer: an explosive to which detonator or equivalent firing device attached, used to initiate other explosives or blasting agents

Charge: means explosive materials which may or may not contain a primer, and which are placed for the purpose of detonation.

The written procedures shall describe**, in detail**, all safe handling procedures. Product literature regarding the explosive material being used shall be readily available for reference.

6.1 The handling of explosives shall be in accordance with the manufacturers' recommendations. *(O.H.&S. Regulation, section 21.36)*

6.2 Only factory made safety fuse assemblies incorporating a **"static shunt"** shall be used for avalanche control blasting. The assemblies shall be used in accordance with the manufacturer's instructions *(O.H.&S. Regulation, section 21.56 & 21.36)*

6.3 No safety fuse assembly less than 1m (3.3 feet) in length shall be used *(O.H.&S. Regulation, section 21.56)*

6.5 No greater number of primers than the number of shots to be fired on a mission shall be made **at any time**. *(O.H.&S. Regulation, section 21.45 & 21.85)*

6.6 Normally a pull wire fuse lighter shall be used to ignite a safety fuse assembly. All blasters will be completely trained in identification and removing of the igniter cord connector and in the installation of the pull wire fuse lighter. *(O.H.&S. Regulation, section 21.85 and guideline)*

6.7 Any initiation system other than Safety Fuse used for avalanche control must be reviewed by WorkSafeBC Certification Services. Pending on the review it may be necessary for the blasters to

be certified in the initiation system. An example is non electric (shock tube) systems or electrical initiation systems.

6.8 It is recommended that only cast booster be used as primers for avalanche control purposes. In most cases **no unfired** primer will be disassembled. This may not apply to all users if written manufacturer's instructions are available for this practice. *(O.H.&S. Regulation, section 21.36)*

7. STORAGE AND TRANSPORTATION OF EXPLOSIVES

7.1 The storage and transportation of explosives shall be in accordance with the requirements of the **Explosives Act (**Canada) and **The Transport of Dangerous Goods Act** (Canada).

7.2 Explosives transported to the blasting area shall be transported as follows:

- *Explosives must not be primed until the last most practicable moment which means that point in time when the explosives are as close to the control route as possible, in a safe, sheltered location excluded from public access. (O.H.&S. Regulation, section 21.85).*
- Safety fuse assemblies shall be transported or carried in a crush resistant container until such time that is deemed the last most practicable moment. *(O.H.&S. Regulation, section 21.16).*
- Pull wire fuse lighters shall be transported separately from any explosive or safety fuse assembly. They **shall not** be attached to a safety fuse assembly until fuse is ready to be ignited. *(O.H.&S. Regulation, section 21.85).*

Note: Conveyance's applicable Transport Canada/ TDG requirements include; vehicles, helicopters, ATV's, snowmobiles, and snowcats when transporting explosives.

7.3 The transportation of explosive materials on any aerial device designed to transport passengers may be allowed with prior approval of the authority having jurisdiction on aerial tramways. This authority **must be submitted** with your procedures (BC Safety Authority 1-866-566-7233)

7.4 Magazines will be secured, located, marked and constructed as per the Explosive Act of Canada. Appropriate licenses and logbooks must be current and available at magazine locations.

8. MISFIRES

DEFINITION: *Means a charge or part of a charge which, on initiation, failed to completely detonate or function, a dangerous condition.* **This does not apply to a charge, which has not been initiated.**

8.1 If an explosive charge/primer is known or suspected to have misfired, the blaster shall ensure that the danger area remains closed and that no one approaches the misfire until at **least 30 minutes** has elapsed since the time at which the detonation should have occurred. *(O.H.&.S Regulation, sections 21.73 and 21.78). Up to date manufacturer product bulletins should be consulted for minimum wait time which may be greater than 30 minutes as referenced in the regulation.*

8.2 The misfired charge/primer is **not to be disturbed at any time.** Placing a second primed charge beside it and then detonating that charge shall destroy it. The new charge shall not touch or disturb the misfired charge *(O.H.&S. Regulation, section 21.77).*

8.3 If the misfired charge/primer is not located, or the area is unsafe to approach, the zone affected shall be cordoned off. Attempts at locating the misfire shall be continued during and after "melt off" until the charge/primer is found and detonated. Explosive trained dogs are a viable option in finding lost explosive materials *(O.H.&S. Regulation, section 21.77)*.

8.4 All misfire shall be recorded in the blasting log (*O.H.&S. Regulation, section 21.4)*.

8.5 Hazard warning signs describing the misfires that may be found shall be designed and posted. These must be located for easy public and worker notice and are required to be in location throughout the year.

8.6 In the event of a misfire or when dealing with a discovered misfired charge/primer, only an experienced, qualified blaster in these operations should handle the counter charging and destruction. The immediate area should be treated as highly hazardous and restricted to the **absolute minimum** personnel that are required to accomplish the task.

9 BLASTING LOG

9.1 The blaster shall record in the blasting log all information regarding the use of explosives and the results of the post-blast examination. This log book must be available at the work site and be fully completed and up to date *(O.H.&S. Regulation, section 21.4)*

10 HAND CHARGING

10.1 The blaster shall have a valid WorkSafeBC Blaster's Certificate Code 1 qualifying them for Avalanche Control and suitably endorsed in hand charging. They shall be familiar with the area and the corresponding avalanche atlas to that area. The blaster shall be familiar with the application of explosive materials in avalanche control, and trained in the proper use of these explosives *(O.H.&S. Regulation, sections 21.5 and 21.66).*

10.2 Any avalanche control blasting team shall consist of a minimum of two persons, one of whom shall be the holder of a valid WorkSafeBC Blaster's Certificate Code 1 endorsed for hand charging**.**

10.3 The following procedures **shall be adhered to:**

a) Explosives, safety fuse assemblies and accessories shall be transported separately from each other prior to priming. Pull wire igniters are to remain separate from explosives and safety fuse assemblies until such time it is placed onto the assembly.

b) Explosives, **must not** be primed until the last most practicable moment which means that point when the explosives are as close to the control route as possible, in a safe, sheltered location excluded from public access , reference 7.2 *(O.H.&S. Regulation, section 21.85)*

c) The blaster shall ensure that the danger area is closed and guarded. Constant communications between all applicable persons and parties must be maintained.

d) The pull wire lighter shall only be placed on the safety fuse assembly immediately prior to deploying the charge, reference 7.2

e) Skiers shall come to a full stop before deploying a primer.

f) After activating the pull wire igniter the blaster will determine if the fuse is lit or miss-lit, and then deploy the charge.

g) When a safety fuse assembly fails, **or appears to have failed** to ignite, it is in a indeterminate state termed a miss-lit charge. **No second attempt to light** the fuse will be made. **The charge must be treated as if the fuse is lit**. When a primer is declared to be miss-lit it shall be deployed in one of the following manners;

   a) At the original intended target, or
   b) In a predetermined location that will enable the blaster safe access to the primer in the event that it fails to detonate (misfire). The deployment location **shall not** compromise the safety of personnel nor inhibit them from reaching the safe area.

Personnel will wait in the safe area for the expected fuse burn time to elapse. After the expected time of fuse burn has expired without detonation the primer **becomes a misfire** and the misfire procedures including the applicable additional wait time, are followed.

h) The blaster shall move to a safe area after throwing/placing the primer and be effectively in the safe area before detonation *(O.H.&S. guideline, section 21.85 3)*.

i) Should a primer misfire, it shall be located and destroyed **in accordance** with acceptable misfire procedures.

j) Primers shall not be dropped or thrown from any ski lift or aerial passenger device without prior approval of the authority having jurisdiction on aerial tramways (BC Safety Authority) and WorkSafeBC.

k) The use of double primed or dual initiated explosive charges is recommended if personnel may be placed in a hazardous position when required to handle a misfired charge.

l) Procedures shall be established for securing primers on steep terrain or hard crusted snow, and

m) The results of each blast shall be recorded in the blasting log

n) Disassembly of **unfired** charges will only be permitted while using products where there is written instructions from the manufacturer that allows the removal of detonators from explosive product.

11 CORNICE BLASTING

11.1 A cornice operation shall consist of at least two persons, one whom shall be certified WorkSafeBC blaster Code1 Avalanche Control with the cornice endorsement.

11.2 Every precaution shall be taken to remain off of the cornice roof. If absolutely necessary to advance near the **safe line** marked by the Blaster of Record on the cornice, the worker **shall** be on an effective belay at all times.

11.3 It is the employer's responsibility to ensure that all equipment intended for cornice control is in good working condition and used in accordance with manufacturers recommendations *(WCA 115. 2 d) and O.H.&S. Regulation, section 8.2)*.

11.4 Workers are to be trained in the use of climbing equipment using procedures and techniques for such terrain. *(WCA 115.2 e)*.

11.5 Detonating cord branch lines **shall not** be interconnected or attached to trunk lines until all holes are loaded, unless otherwise exempted by WorkSafeBC by a variance. Variances will be considered on a site-specific basis. i.e. criteria for granting the variance may be the unavailability of a safe side to the cornice.

11.6 The worker when required to work near the "safe line" will advance to the cornice but behind the safe line on the safe side to the hole or placement location, **on belay**, and set the charge. The worker will move away from the cornice area while laying out the detonating cord branch line from the charge to the trunk (main) line. In most cases there will be no need to seek a variance for hookup as the trunk (main) line should be located in the safe area.

No worker should be required to advance beyond the (theoretical) safe line. When in doubt use more explosives!

11.7 Explosives primed with detonators will not be used during cornice blasting when a worker is required to approach the "safe line". **Any work procedure going beyond the safe line is by variance only**. This will reduce the hazard to a worker involved in an unscheduled cornice collapse.

11.8 Detonating cord trunk (main) lines will only have the detonator attached at the last moment prior to firing.

11.9 In all cornice work, care shall be taken to remove the possibility of the explosive products becoming entangled in the worker's belay.

12 AVALAUNCHERS

12.1 The employer shall establish written procedures for the operation of the avalauncher and the training of the crew. Maintenance and operating procedures shall be in accordance with safe working practice and manufacturer's instructions *(O.H.&S. guideline, section 21.85 (1)-2)*.

12.2 The operating crew of an avalauncher shall consist of at least two persons, one whom shall be certified WorkSafeBC blaster Code1 Avalanche Control with an avalauncher endorsement.

12.3 Each avalauncher crew member shall be completely familiar with the operation of the avalauncher and the interaction of all moving parts.

12.4 A shot card with name or number of each target, including elevation and pressure required shall be established.

12.5 The shot, by name or number on the slide, pressure, elevation, release or no release and recording of misfires, shall be recorded in the blasting log.

12.6 A written procedure for locating and disposing of misfires shall be established.

12.7 Avalauncher projectiles shall **only be primed at the gun site** and the primed avalauncher projectiles shall not be dismantled nor returned to the magazine.

12.8 Fire from Precaution: All persons and explosives will behind an approved barrier when firing is occurring **and/ or** firing will be done from a safe, remote distance. No unnecessary personnel shall be in close proximity to the avalauncher when it is being operated.

12.9 Any experimental explosive rounds shall be fired from a safe remote distance, and only with prior Board acceptance.

13 MILITARY ORDNANCE, REMOTE-CONTROLLED CHARGES, OR OTHER AVALANCHE CONTROL PROCEDURES THAT USE EXPLOSIVES

13.1 Persons coming within the inspectional jurisdiction of WorkSafeBC and wishing to use military ordnance, remote-controlled type charges or other avalanche control procedures using explosives shall obtain written acceptance from the **Board prior to employing such devices.**

13.2 Disposal guidelines for misfired ammunition and warheads that have failed to detonate (dud) is under Section 15 of these protocols.

13.3 Only competent blasters will undertake this scope of work. The blaster must have an endorsement for ammunition disposal EOD (Explosive Ordnance Disposal) which is restricted to 105mm and 106mm munitions.

14 HELICOPTER DEPLOYMENT

14.1 The blaster shall have a valid WorkSafeBC Blaster's Certificate Code 1 Avalanche Control and endorsed for helicopter deployment. The blaster shall be familiar with the area the avalanche atlas specific to the area of operations. The blaster shall have available a timing device and a blasting log.

14.2 The minimum crew is two, which includes the blaster and the pilot. It is recommended that three persons are used; however this may be restricted by the type of aircraft being used. Any additional tasks undertaken by the pilot must not interfere with the pilot's ability to operate the aircraft safely.

14.3 Air operators require their TDG training program to be authorized by Transport Canada. Pilots flying aircraft with explosives must be TDG certified. If available such authorization should be submitted to WorkSafeBC with the avalanche control procedures.

14.4 Pilots and blasters, and assistants forming an air crew shall ensure that familiarization in regards to procedures and equipment is conducted prior to each mission. Including identifying locations for deployment of miss-lit charges.

14.5 Primers are to be made up prior to entering the helicopter. Charges shall be made up at the *last most practicable moment* and as close to the helicopter as safety permits. Coordination with the helicopter crew is mandatory in selecting an appropriate preparation area.

14.6 No primer is to be assembled or dismantled in a helicopter.

14.7 Primers shall be transported, within the helicopter, in a container that is secured but capable of being easily jettisoned. The transport container **shall not** have any internal exposed metal. http://www.tc.gc.ca/tdg/clear/part12.htm

14.8 The use of double primed or dual initiated explosive charges is recommended if personnel may be placed in a hazardous position when required to handle a misfired charge.

14.9 The blaster and assistant (s) shall be suitably restrained by seat belts designed and attached to prevent them from falling from the helicopter.

14.10 Any point used to restrain a person using a safety harness and lifeline must be certified as required by Transport Canada (FAR 27.865).

14.11 There shall be direct radio communication between the blasting personnel, the pilot and the ground personnel (guards).

14.12 No equipment shall be attached to the helicopter skid that could obstruct with the dropping of the charge.

14.13 In case of a miss-lit, the blaster and pilot should deploy the charge in a location allowing access to the charge in the event it does not detonate with sufficient time to enable the aircraft to reach a point of safety before the first anticipated detonation. Reference 10.3 g) and *(O.H.&S. guideline, section 21.85 3)*

14.14 Once the helicopter is in a hover or slow flight and immediately prior to dropping the primer, the pull wire lighter shall be placed on the safety fuse assembly.

14.15 Once the safety fuse is ignited and confirmed to be lit the primer shall be dropped down and away from the helicopter which is in a hover or slow flight. Procedure training should emphasis a 'thumb down' drop.

14.16 Seating arrangements may vary according to the type of helicopter and the procedures of each helicopter company. The employer is to liaise with the air operator to identify and address any concerns within the helicopter deployment procedures.

14.17 After dropping the primer(s) or charges the helicopter shall proceed to a safe area where the blaster can observe and record the results of the blast. Sufficient fuse length shall be used to ensure the aircraft is in the safe area before the first anticipated denotation.

14.18 All details and results shall be recorded in the blasting and avalanche occurrence logs.

14.19 Any misfire shall be handled in accordance with established procedures.

14.20 Information pertaining to crew sizes and duties, explosive handling drills and communications plan to be included with all submissions.

15 FAILED TO FIRE AMMUNITION DISPOSAL

Definitions:

Dud; a fired projectile, which has failed to detonate on impact. To be treated with caution and **NEVER** disturbed while counter charging.

Failed to Fire; failed to fire occurs when the propellant charge fails to operate because one of two conditions;

1) Failure of the primer, flash tube or propellant charge,
2) Mechanical failure of the weapon to fairly strike the primer.

15.1 These protocols are designed to parameter safe procedures which are to be used in the disposal operations for 105mm and 106 munitions. Strict adherence to all pertinent safety rules and regulations must be followed.

15.2 Only competent and appropriately trained blasters will undertake this scope of work. The blaster must have an endorsement for ammunition disposal EOD (Explosive Ordnance Disposal) from WorkSafeBC.

15.3 The location of the gun sites is normally within range of the public road system. The safe radius of a minimum of 1000 Meters shall be secured and maintained to prevent injury from projectile shrapnel.

15.5 All misfire or fail to fire drills will be performed prior to removing the round from the weapon.

15.6 All failed to fire ammunition shall be conspicuously marked and stored in an explosive magazine until such time that is safely destroyed. **At no time** shall the failed to fire round be introduced back into ammunition stockpiles.

15.7 Ammunition will not be unnecessarily moved about, once deposited within the magazine.

15.8 Disposal shall only be carried out when reasonable and practicable and under favorable conditions.

15.9 Disposal Site

- The disposal site shall be located convenient to the storage area to alleviate the requirement of transporting failed to fire ammunition over any extended distance.
- All efforts shall be made to select an area that is remote to the public, does not contain numerous roads or trails and offers a clear working area.
- Adequate blast protection shall be in place. This may be approved structures, temporary shelter from equipment etc. A minimum of 100m from firing point to adequate shelter shall be observed. Blasters must remember the threat of high angle shrapnel.
- The minimum 1000m danger area to be observed.
- Area security and warning signals in accordance with *O.H.&S. Regulation, Section 21.69.*
- Disposal shall be conducted in a logical sequence following manufacturer's recommendations or common ammunition disposal practices.
- The immediate area of the disposal shall be stone free and a bed of sand is recommended.
- It is recommended that gravel berms of approximately 2m in height be erected around the immediate area to contain the blast effect.

15.10 Disposal Procedure

- Detailed procedures for counter charge size, location and priming shall be produced.
- For absolute control it is recommended that electrical initiation be used.
- A blasters logbook must be maintained and available at all disposal sites.
- An area search shall be conducted to ensure complete disposal has been accomplished.