Natural Resources Canada
Ressources naturelles Canada

Blasting Explosives and Initiation Systems

Storage, Possession, Transportation, Destruction and Sale

Explosives Regulatory Division
Explosives Safety and Security Branch
Minerals and Metals Sector

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Canada

Table of Contents

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Please consult our web site regularly to obtain more information and documentations on the Explosives Regulatory Division, such as:

- The *Explosives Act* and Regulations;
- Full Quantity-Distance Tables along with recent rulings;
- Bulletins and directives letters on:
  - Zone licences for blasting explosives;
  - Restricted usage of Type 6 magazines for stand-alone, overnight and unattended storage;
- Application Form 10 to obtain a magazine licence; and
- Other explosives-related information.

1. INTRODUCTION

All explosives are DANGEROUS. While some are more dangerous than others, most will explode; will cause serious physical harm, including death; and will cause significant damage unless stored and handled properly.

Proper storage serves two purposes. The first is SAFETY. The storage of explosives has a much deeper relationship to safety in their use than is commonly realized. Improper storage of blasting explosives, detonating cord, and initiation systems (detonators, fuse and igniters) can be the cause of misfires, incomplete detonation, and of charges burning in the borehole.

The second purpose is SECURITY. Every effort must be made by means of substantial construction and strong locks to prevent access to the interior of magazines and to discourage, as much as possible, those persons seeking explosives for criminal purposes.

This booklet reviews the basic principles of the storage and handling of blasting explosives, detonators, initiation systems, and related explosive accessories. It also summarizes some of the legal aspects of their storage and sale. These principles and the law are detailed in Canada's *Explosives Act*, which, by a system of licences and permits, controls the authorization, manufacture, importation, sale, and storage of all explosives, as well as some aspects of their transportation by road. This Act is enforced by Inspectors of Explosives with the assistance of the appropriate police forces. This booklet is intended primarily for use by blasters in giving a general overview of explosives regulations and standards.

It is wise to consult the Explosives Regulatory Division during the early planning stages, and definitely before purchasing or constructing a magazine or establishing a magazine area, since buildings and sites not meeting the established norms will be UNACCEPTABLE for licensing and use.

2. MAGAZINE SITE

2.1 Surveillance

In practical terms, it is impossible to design a magazine that is completely impregnable to determined thieves with modern tools and equipment, given sufficient time. Therefore, the aim must be to survey magazines sufficiently frequently to deny thieves this opportunity.

All storage sites should have some form of regular and recorded surveillance, unless the magazines are empty. The surveillance could be daily site visits at irregular times, the alternative being some form of electronic surveillance. Records of time and date of site visits should be available to inspectors and the police. Directive letter #61 outlines these requirements.

Any magazine site that suffers a break-in or attempted break-in must increase surveillance. Additionally, if criminal activity in the area increases, as indicated by nearby magazine break-ins or police information, then the surveillance level must be increased.

2.2 Magazine Location

A magazine should be situated so that the accidental explosion of its contents is not likely to cause any serious damage to other buildings or injury to persons. The minimum distances by which a magazine must be separated from other buildings or places are dependent on the maximum quantity of explosives stored in the magazine at any one time. In Canada, the Quantity-Distance Table, compiled from a study of the effects of recorded explosions, are taken as a guide in approving the site for a magazine containing given amounts and types of explosives.

It is emphasized that these are minimum distances. Greater distances should be observed wherever possible and greater distances in specific cases may be mandatory. Refer to Appendix A for a summary of the Quantity-Distance Table.

When it is impractical or uneconomical to store all the explosives in one magazine sited in accordance with the Quantity-Distance Table for blasting explosives, judicious selection, siting, and barricading of magazines might provide the solution by establishing a magazine area that may be shared by different construction companies and may accommodate a much larger weight of explosives in a number of magazines.

The purpose of a barricade is to protect the magazine adjacent to it from direct missile attack emanating from another magazine or a nearby explosion. However, to ensure that the explosives will not be initiated by sympathetic detonation or flash from an explosion, magazines must be separated by at least the distance given in the Quantity-Distance Table for barricaded magazines (D2).

2.3 Environmental Considerations

If any magazine is situated within 30 metres (m) of a body of water, an environmental assessment of the site is required. Therefore, contact an Inspector of Explosives for further details.

2.4 Ammonium Nitrate

When stored with or adjacent to other explosives, half the weight of ammonium nitrate must be treated as an explosive and be included in the licence limits for the magazine. For example, if 250 kilograms (kg) of ammonium nitrate is stored along with 25 kg of dynamite, the total quantity of 150 kg must be considered as blasting explosives for the assessment of quantity-distances.

It should be noted that the mixing of ammonium nitrate and fuel oil (ANFO) to form an explosive is legal only if the user has a valid factory licence or manufacturing certificate. Contact ERD to obtain application forms.

2.5 Initiation Systems Magazine

When initiation systems are kept in a magazine, no other blasting explosive shall be kept in that magazine. The term "initiation systems" includes the different types of electric, non-electric, and electronic detonators, with or without the fuse, shock tube or detonating cord attached, as well as detonating relays and electric squibs for fuse starters.

Since the initiation system is the trigger needed to release the energy of blasting explosives and is the key to their use for criminal purposes, every effort must be made to prevent unlawful access.

If local conditions necessitate locating the initiation system magazine close to the blasting explosives magazine, it should be at least 50 m from it. This distance may be reduced at the discretion of an Inspector if the quantity of detonators stored is small. Type 9 magazines (two-compartment magazines) may be authorized by an Inspector.

2.6 Detonating Cord and Boosters

Since detonating cord and boosters contain PETN, TNT, or similar high explosives, their explosive potential must always be borne in mind. They must always be stored in a blasting explosives magazine (never with detonators) and kept in closed cases. Cut ends of detonating cords should be sealed with masking or other suitable tape to prevent loss of explosives.

2.7 Other Materials and Equipment

Only materials and equipment, such as pallet movers, that do not increase the risk of fire or explosion and that are needed for handling explosives in the magazine or for the operation of the magazine may be brought into the magazine.

2.8 Fuse Lighters, Igniter Cord, and Connectors

Fuse lighters, igniter cord, and igniter cord connectors are explosives, but present more of a fire hazard than an explosion risk. For this reason, these items must not be stored in either a blasting explosives or an initiation system magazine but, rather, in a separate, dry, secure location.

2.9 Protection Against Lightning

Locating a magazine at the base of a high bank will reduce the possibility of it being struck by lightning. Grounding the magazine is advisable in areas subject to severe electrical storms. Upon the approach of thunderstorms, the magazine must be closed and all personnel must be evacuated from the immediate area.

2.10 Proximity to Electrical Transmission Lines

All overhead cables should stop at least 15 m from the magazine in order to divert a potential lightning strike and then proceed underground to the exterior of the magazine.

For power lines exceeding 15 kilovolts (kV) or that serve a national grid or are otherwise vital, consult the *Quantity-Distance Principles User's Manual*.

For the installation of any electrical equipment on the outside or inside of a magazine, including communication devices or alarm systems, consult the *Storage Standards for Industrial Explosives* or an Inspector.

2.11 Wireless Communication Devices

Wireless communication devices such as cellular phones, mobile radios, pagers, GPS units, etc., must not be brought inside an initiating system magazine. A good practice is to leave such items outside all magazines.

2.12 Portable Electrical Devices

All portable electrical devices used in magazines, including bar code readers, calculators and lighting, must be watertight, dust tight, and impact resistant.

2.13 Protection Against External Fires

Fire is a hazard that must always be borne in mind when considering explosives storage. To guard against it, the grounds surrounding a magazine must be maintained free from bush, weeds, dry grass, and other combustible material for a distance of at least 8 m. A magazine built of concrete blocks or clad in fire-resistant material affords added fire protection.

All material used to raise a magazine above ground level (to facilitate truck offloading, for example) must be of non-combustible materials.

2.14 Signs

Suitable signs must be posted at all explosives storage sites so that the public is warned of the hazard. Ideally, the signs should not be posted in a manner that would attract undue attention.

Conditions vary from location to location and the following is suggested as a guideline:

WALK-IN TYPE MAGAZINES

A warning sign that is readable at a distance of 8 m must be posted on each usual approach to the magazine. The sign must be positioned so that it does not attract unwanted attention and minimizes the possibility that a bullet shot in the direction of the sign would hit the magazine.

The following words or words to the same effect must appear on the warning sign:

EXPLOSIVES
Authorized Personnel Only
No Smoking
Violators will be charged under the *Explosives Act*

PORTABLE MAGAZINES

Portable magazines located on logging sites, construction sites, or within city limits may require warning signs. Depending on the area where the portable magazines are located, signage requirements may depend on local and provincial/territorial regulations. Contact your regional inspectors for details and guidance.

2.15 Entrance Gate

The entrance to any site storing a large quantity of explosives should be protected by a sturdy, lockable barrier that will effectively prevent vehicular access. It must be closed at all times and locked whenever the site is unattended.

3. MAGAZINES

3.1 Construction

Magazines for blasting explosives and initiation systems must be built to conform to the *Storage Standards for Industrial Explosives, May 2001*, or the most recent version.

Note: In addition to the Canada Explosives Act and Regulations, for any storage, transport, and sale of explosives in the province of Quebec, please consult the Explosives Act and Regulations of Quebec administered and applied by the Sûreté du Québec.

3.2 Heating

Heating of magazines may be permitted. Details on the installation of heating systems can by found in the *Storage Standards for Industrial Explosives*.

3.3 Housekeeping

Regular follow-up by magazine operators must be made to ensure the following:

- Observance of the "No Smoking - No Matches" rule;
- Magazine reserved exclusively for the storage of explosives;
- Magazine kept scrupulously clean and orderly;
- Habitual use of brooms, mats, and dust pans;
- Proper stacking of explosives below the stacking line; and
- Packaging of explosives properly identified with its ownership identification.

It is important to keep a magazine clean because grit, sand, or abrasive materials can make explosives more sensitive.

There are normally many varieties of initiating systems stored in a magazine, e.g., electric and non-electric detonators, not only of different periods, but of different lengths as well. For this reason, a system of shelves on which each variety can be stored in their original containers and be readily seen and selected is recommended.

3.4 Opening Cases or Packages

Cases of explosives should not be opened in a magazine. The case must be properly closed before returning it to the magazine. Under no circumstance should there be open cases or loose cartridges in a magazine. Whenever possible, a cartridge must be replaced in its original case.

3.5 Empty Cases or Packages

Empty cases or other combustible material must not be allowed to accumulate inside or in proximity to a magazine. All empty explosives packages and packing material must be carefully collected and destroyed because they constitute a potential explosive and fire hazard.

Any packaging or container that is clean and in good condition when it is emptied, and that did not contain nitroglycerine or any other liquid explosive, may be re-used for the same purpose. All markings must be kept accurate for its content.

3.6 Stacking Height

On the interior of the wall of the magazine, a "stacking line" must be painted or otherwise permanently marked with a red line 10 millimetres (mm) wide at a distance at least 15 centimetres (cm) below the height of the bullet-resistant material. This is to prevent a bullet shot from an elevated point from impacting the explosives.

Cases should never be piled too high and never be above the stacking line. A person standing on the floor should be able to handle the top case without difficulty.

3.7 Turnover of Stock

Attention must always be paid to the turnover of stock. The older stock must be used first since most explosives deteriorate with time. Care must be taken not to leave old stock at the back of the magazine when a new supply is brought in.

The presence of corrosion on the metal shells of detonators indicates that deterioration may be advanced and the detonators should be destroyed with care. Damaged detonators should not be used.

In many instances when deteriorated explosives have been found in magazines, the cause has been traced to the return of the explosives to the magazine after they had been temporarily held under unfavourable conditions. This also applies to the return by customers of leftover explosives. Therefore, any person in charge of a magazine must carefully scrutinize all returned explosives.

3.8 Instruction Sheet

Instruction sheets for blasting explosives and initiation systems magazines are available on request. The appropriate sheets must be posted inside each magazine. These sheets should be reviewed frequently by the magazine keeper.

4. LICENSING AND POSSESSION

All explosives magazines, other than at a military establishment and those under provincial control on mine or quarry sites, come under the jurisdiction of Canada's *Explosives Act*.

However, a magazine on a mine or quarry site making sales or using the explosives off the site also comes under federal jurisdiction for those activities. Under the *Explosives Act*, storage falls into two categories:

STORAGE AND POSSESSION FOR USE

The storage and possession of any quantities of blasting explosives and detonators must be covered by a magazine licence (Form 10 - Magazine Licence application). The licence is the permit to possess the quantity of explosives listed in the licence. The licence allows storage, but also possession, even if there is no magazine, for example, for daily deliveries and pickups.

STORAGE FOR SALE

The storage of any quantity of blasting explosives or detonators for sale, as well as any quantity on consignment, must be covered by a vendor's licence (Form 10 - Magazine Licence application). It is an offence under the *Explosives Act* for any person to sell, give away, or otherwise distribute blasting explosives or detonators unless licensed to do so. The licence is also the permit to possess the quantity of explosives listed in the licence.

The annual fee for licences is set by regulation. Issuance of a licence is conditional upon the security and safety afforded to the public by the magazines and on their continual upkeep and state of repair. Anyone desiring to establish magazines and to obtain a licence should apply to the Explosives Regulatory Division indicating the type of magazines proposed, their location, and the maximum quantity to be stored in each one.

When issued, a licence must be retained at the site with the magazines for further inspection by an inspector or police officer. The licence may be kept at the main magazine or in an office near it.

4.1 Classification of Explosives

All explosives have an assigned United Nations (UN) number of four digits, a two-digit Transport of Dangerous Goods class number, and a compatibility group letter. A blasting explosive may be designated by UN 0332, Class 1.5D. The compatibility group indicates which explosives can be transported and stored together. Note that it is prohibited to store explosives of compatibility groups B (mostly detonators) and D (mostly blasting explosives) together.

4.2 Non-Explosive Blasting Accessories

Non-explosive blasting accessories such as connecting wire, blasting machines or exploders, circuit testers, and cap crimpers must not be stored in a magazine containing explosives.

4.3 Local Laws or By-Laws

Prior to storing explosives, it is recommended that local authorities be consulted as the *Explosives Act* does not relieve any person of the obligation to comply with the requirements of any provincial/territorial or municipal law regarding explosives.

4.4 Inventories

A careful inventory must be kept of all receipts of blasting explosives and initiation systems to a magazine and of every issue from it. Care must be taken to ensure that stocks do not exceed the licence limits for the magazine as the law provides for a penalty when limits are exceeded. A sample of inventory control sheets is shown in Appendix B. One inventory sheet per product is recommended.

A magazine keeper who issues explosives to shot firers, blasters, or powdermen/women must keep a record of the amount of blasting explosives and detonators issued. "Returns" must also be carefully recorded. Every precaution must be taken to ensure that no explosives have been "mislaid" or lost as they may be the cause of subsequent accidents. A signature must be obtained for every issue or return of explosives.

A record must be kept of every explosive that is put into and taken out of storage. The record must be retained for at least three years after the date the explosive is taken out of storage.

All stock must be counted at least monthly. Results of the stock counts must be recorded in the inventory book. Unresolved discrepancies must be reported to police and the Explosives Regulatory Division.

Records must be kept in a secure location to preclude loss of records in the event of a theft.

4.5 Explosives Sales Register

In addition to a stock inventory, vendors of explosives are required to maintain a record of all sales. Records of all sales must be retained for at least three years after the date the explosives have been sold.

In these days where explosives are the means of choice to carry out threats, it is important that vendors do not deliver or sell explosives to anyone they do not know, who cannot identify themselves, or who does not have a valid magazine licence.

4.6 Ownership Identification

To assist police forces in the apprehension and conviction of criminals, it is imperative that every outer package or case of blasting explosives or detonators be properly and permanently marked to indicate ownership. It should be realized that in criminal proceedings for theft, proof of latest ownership must be established beyond a reasonable doubt before a conviction can be obtained.

The legal responsibility rests with the vendor of the explosives to mark the case in the next sequentially available rectangle in the identification ladder prior to shipment with one of the following:

- User's magazine licence number; or
- Vendor's magazine licence number when sale is to another vendor; or
- Provincial or territorial magazine licence/permit number.

If a shipment of blasting explosives or detonators arrives at its destination without any marking or with an improper one, the person receiving it is requested either to refuse delivery or to mark it correctly and deal directly with the shipper for any inconvenience or expense incurred.

When full cases of detonators, detonating cords, and boosters are purchased, the shipper is required to mark only the outer case. It is the responsibility of the person opening such a case to mark the inner cartons or spools immediately with the appropriate magazine licence number.

4.7 Reporting of Theft

Every instance of theft of explosives, whether actual, suspected or attempted, must be reported as quickly as possible to both the local police and to the Explosives Regulatory Division; the latter report must be in writing (Form 34 - Eplosives Incident Report). The information should include:

- Place, date and time;
- Magazine information, such as type and tag number;
- Nature, quantity and ownership identification number on explosives stolen;
- Method of entry and property damage; and
- Other pertinent details.

5. TRANSPORT OF EXPLOSIVES

The day-to-day transportation of explosives by dealers, common carriers, construction crews, and individuals in private motorcars is primarily under the jurisdiction of the *Transportation of Dangerous Goods Act*. Transport by rail, marine, and aircraft is also subject to the *Transport of Dangerous Goods Act* and other regulatory acts. Canada's *Explosives Act* also sets some regulations that relate to the transport of explosives.

Every vehicle used to transport explosives must be in sound mechanical condition and capable of safely transporting explosives. The following requirements should be met:

- Equipped with two fire extinguishers readily available for use;
- Electric wiring is insulated and firmly secured;
- Fuel tanks and fuel lines have no leaks;
- Chassis and engine body are clean and free of excess oil and grease;
- Brakes and steering are in good condition;
- Tires are not worn or visibly defective; and
- Explosives Vehicle Certificate if more than 2000 kg are transported.

The portion of a vehicle containing explosives must be kept free of grit, combustible or abrasive material, matches, any spark-producing or flame-producing device, and any substance that could ignite spontaneously.

Detonators must be kept separate from other explosives in a vehicle so that the explosion of one or more detonators will not ignite any of the other explosives. The detonators must be in a completely enclosed container or compartment that protects them from detonation in the case of fire for at least one hour. There must be no access to the detonators from inside the cargo compartment of the vehicle.

A driver of a vehicle must be a minimum of 18 years old, and 21 years old if more than 2000 kg is transported. Two drivers must accompany a vehicle if explosives are to be transported for a period of more than 10 consecutive hours. A vehicle should be equipped with a tracking and communication system to allow the company to locate every vehicle at any time.

Four orange Transport of Dangerous Goods placards are to be displayed on each side of a vehicle while it contains explosives. All explosives of the same compatibility group may be transported together without separation regardless of the hazard division. Consult the Transportation of Dangerous Goods Directorate for specific rules for placarding mixed loads of explosives of different hazard divisions, compatibility groups, and others.

6. DESTRUCTION OF EXPLOSIVES

It is sometimes necessary to destroy explosives. These explosives may be fresh material from containers that have been broken during transportation, usable material for which there is no further use on a job, or may consist of material that has deteriorated or become unfit for use through damage. Deteriorated explosives can be much more hazardous than those in good condition, and hence require special care in handling and disposal.

It is always preferable to contact the manufacturer or vendor of explosives prior to destroying explosives. Manufacturers are in a better position to determine the appropriate destruction methods.

Members of the public who discover abandoned explosives should not attempt to dispose of them, but should contact their local police forces.

The safe methods recommended in the *Guidelines for Disposal of Industrial Explosives* are intended for the use of experienced and competent people, such as technicians or blasters. If large quantities of blasting explosives must be destroyed, and if experienced or competent people are not available to perform the work, or if there is any question about the safety of the undertaking, the handling and destruction of the explosives should be deferred. Consult with a representative of the manufacturer of the explosive or the Explosives Regulatory Division for advice.

Scrap or deteriorated explosives must be packaged according to the Transportation of Dangerous Goods Regulations for transportation to a destruction site.

Since the destruction of explosives may contribute to pollution, particularly when ammonium-nitrate based and watergel explosives are involved, it is advisable to consult the local agency responsible for the environment before proceeding.

6.1 Dynamite and Nitroglycerine Contamination

Nitroglycerine (NG)-based blasting explosives, such as the dynamites, are liable to "sweat." This sweating may be the exudation of nitroglycerine and, although it is greatly increased by storage in a hot, moist atmosphere, it can occur even under good storage conditions. Sweating increases their sensitivity to friction.

Beads of nitroglycerine form on the outside and ends of cartridges, and after a time the exuded nitroglycerine will soak into the bottom and lower sides of the cases, staining them noticeably. The sweating may be observed earlier on cartridges in open cases. In either event, the cartridges in all packages should be examined and, if still serviceable, taken for early use. They should be

issued only if the person receiving them understands their condition. If the sweating observed is so great that the cartridges are unserviceable, they should be destroyed by burning.

The authorization of an Inspector of Explosives must be obtained prior to the transportation of degraded NG explosives. These explosives can be very sensitive to shock and friction, and specific procedures must be followed for packaging and transportation.

Where nitroglycerine exudation has occurred to such an extent that the liquid has seeped from the cases to the floor, special decontamination must be performed. Contaminated wooden battens, duckboards and false floors should be removed from the magazine and burned. CAUTION: Such contaminated wood can explode. Any free, liquid nitroglycerin must be removed with sawdust or absorbent. The contaminated absorbent must then be burnt.

When removal of contaminated articles is impossible, the stain must be thoroughly cleaned with a special preparation that neutralizes nitroglycerine. NG destroyer may be made by dissolving 500 grams (g) of caustic soda (NaOH) in about 1 litre (L) of water and adding 6.5 L of wood alcohol (CH_3OH) or methylated spirits (a stronger solution is obtainable through your explosives distributor). **Do not spread NG destroyer on free liquid nitroglycerin because it could cause a hazardous chemical reaction.**

Hands and eyes should be protected when this solution is used. Apply generously and allow the solution to remain on the contaminated area for half an hour or longer. Then remove it by washing the floor thoroughly with clean water. All cloths and mops used should be allowed to dry and then be burned. Be sure the floor is perfectly dry before storing other explosives on it.

6.2 Emulsion, Watergel, and Ammonium Nitrate-Based Explosives

These types of explosives are much less sensitive to shock and friction than nitroglycerine explosives. Nevertheless, they are every bit as powerful and all the safety rules must be applied. Any spillage of explosives must be carefully collected and destroyed.

On watergel, wetness on the outside of a film cartridge or segregation of the ingredients indicates that syneresis (gel breakdown) has occurred; therefore, the product will likely fail to shoot. Likewise, an emulsion that has become stiff or crusty, rather than feeling smooth and pliable, has probably become insensitive.

If ANFO is kept too long, fuel oil may leak through the plastic bags and contaminate the magazine. This creates a fire hazard and, if the condition is severe, it may be necessary to replace any contaminated floor sections. If ANFO bags are kept for a long time, these should be rotated or turned over in order to reduce the oil migration through the material to the bottom of the packaging.

Leakage of explosives through their packaging may contaminate the magazine. Spills must be picked up properly, and attention must be paid where spilled emulsion and ANFO could have left an oily residue, which creates a fire hazard. If all explosives cannot be cleaned up (e.g., spills in cracks, porous materials), it may be necessary to replace contaminated flor sections.

6.3 Destruction by Detonation

Often the best method of destruction is to detonate explosives in a blast hole as part of a production blast by introducing them in the borehole under the collar or stemming.

If the explosives are still in good condition to be transported to an agreeable client, small quantities of explosives can be added in the blast hole.

Special care must be taken to not mix different types of explosives to avoid contamination or incompatibility between the explosives to be blasted and the explosives to be destroyed. It is important to discuss the intention of doing the destruction with the client, vendor, or blaster.

6.4 Destruction by Combustion

Burning is one method of destruction. It must be assumed that there is always the chance of an explosion during burning; consequently, a remote location must be chosen so that no damage to property or injury to people will result.

Every precaution must be taken to make certain that only one type of explosive is destroyed at a time. Dynamite, detonating cord, cast boosters, and safety fuses must be examined carefully to ensure that no detonators of any kind are among the explosives to be burned. The presence of only one detonator or of a metallic object will probably lead to detonation. Therefore, initiation devices must never be burned; they should be destroyed separately by being detonated at a carefully selected place.

6.5 Abandoning Explosives

It is a serious offence under the *Explosives Act* to abandon explosives. The explosives involved may have been lost or forgotten, deliberately abandoned, or improperly kept by their owners. Accidents under such circumstances border on criminal negligence for which severe penalties are provided by the Criminal Code, over and above any consequences resulting from an accident. The consequences of a child finding explosives can be disastrous.

6.6 Burying Explosives

Explosives must never be buried. Explosives may retain their properties for a very long time, e.g., nitroglycerine, a component of dynamite, does not degrade with time. Many instances have occurred in which lives have been lost through the explosion of nitroglycerine that had lain for more than twenty (20) years in the ground, in crevices between the rocks, or even under water. Similarly, TNT, often used as an ingredient of some slurry and other blasting explosives, and some other explosives do not lose their explosive force with time.

Storage, Possession, Transportation, Destruction and Sale - March 2008

The Explosives Regulatory Division's main priorities are the security and safety of workers and the public. If you have any questions on or concerns about the storage, possession transportation, destruction, sale, or other aspects of explosives, please do not hesitate to contact ERD headquarters or any of its regional offices listed on page v.

Appendix A

QUANTITY-DISTANCE TABLE
FOR STORING BLASTING EXPLOSIVES

The Explosives Regulatory Division has introduced the Quantity-Distance (Q-D) criteria. Any licence, and any zone licence in which the magazine is moved to a new location, must follow the Q-D principles.

USING THE TABLE

Columns D1 to D8

D1 and D3 As these apply primarily to factory operations, they have been deleted here.

D2 This is the distance that is required to separate two magazines, provided there is an effective barricade between them.

D4 This is the required distance between a magazine and a very lightly traveled road (from 20 to 500 vehicles per day; provincially numbered highways do not qualify as lightly traveled roads).

D5 This is the distance required from a magazine to most roads and highways (from 500 to 5000 vehicles per day). Note that there is an overriding minimum distance of 180 m.

D6 This is the distance between unbarricaded magazines.

D7 This column is called Inhabited Building Distance. It applies to very busy roads (more than 5000 vehicles in a 24-hour period) and to buildings where people may assemble. Note that there are minimum distances: 270 m for up to 20 people and 400 m for more than 20 people.

D8 This is the distance from a magazine to a building of vulnerable construction. Vulnerable construction includes highrises, schools, hospitals, etc. Note that this is twice the normal Inhabited Building Distance found in D7. There is an overriding distance of 400 m.

UN CLASSIFICATION SYSTEM FOR BLASTING EXPLOSIVES

Under the United Nations classification system, blasting explosives are either Hazard Division 1.1 or 1.5 (detonator sensitive or booster sensitive). The Table treats them both the same. For quantities larger than 90 000 kg, contact your regional inspector.

Example 1: You want to store 5500 kg. Since there is no entry for 5500 kg, choose the next highest quantity (6000 kg) and find the required storage distances for storing 6000 kg. There is no interpolation for intermediate values.

Example 2: You have measured 500 m to the nearest house and you want to know how much you can store. Since there is no entry for 500 m under D7, find the next lowest distance value, 480 m (480 m allows 10 000 kg if there is no other limiting factor).

DAYTIME STORAGE

The Table does not apply to daytime storage under the jurisdiction of a provincial or territorial Occupational Health and Safety authority.

ABRIDGED TABLE FOR HAZARD DIVISIONS 1.1 AND 1.5

Quantity Distance Metres						
NEQ	D2	D4	D5	D6	D7	D8
(kg)						
50	10	30	180	45	270	400
60	10	32		45		
70	10	33		46		
80	11	35		48		
90	11	36		50		
100	12	38		53		
120	12	40		55		
140	13	42		60		
160	14	44		63		
180	14	46		65		
200	15	47		65		
250	16	51		70		
300	17	54		75		
350	17	57		80		
400	18	59		83		
450	19	62		88		
500	20	64		90		
600	21	68		95		
700	22	72		100		400
800	23	75		105		415
900	24	78		108		430
1000	24	80		113		445
1200	26	86		120		475
1400	27	90		125		500
1600	29	94		130		520
1800	30	98		135		540
2000	31	105	180	140	270	560
2500	33	110	185	163	275	610
3000	35	120	205	163	305	640
3500	37	125	220	170	330	680
4000	39	130	235	178	350	710
5000	42	140	255	190	380	760
6000	44	150	270	203	405	810
7000	46	155	285	213	425	850
8000	48	160	300	233	445	890
9000	50	170	310	235	465	930
10000	52	175	320	240	480	960
12000	55	185	340	255	510	1020
14000	58	195	360	270	510	1080
16000	61	205	375	280	560	1120
18000	63	210	390	295	590	1180
20000	66	220	405	305	610	1220
25000	71	235	435	325	650	1300
30000	75	250	460	345	690	1380
35000	79	265	485	365	730	1460
40000	83	275	510	380	760	1520
50000	89	295	550	410	820	1640
60000	94	315	580	435	870	1740
70000	99	330	610	460	920	1840
80000	105	345	640	480	960	1920
90000	110	360	670	500	1000	2000

Appendix B

SAMPLE FORM OF INVENTORY CONTROL SHEET

EXPLOSIVES INVENTORY

MAGAZINE TAG NO.:

PRODUCT DESCRIPTION*:

DATE	Shipped To/ Received From	STOCK			SIGNATURE
		IN	OUT	BALANCE	

*** Product description, such as brand name, strength, size of cartridge, detonator type, length and period, etc.**