



Natural Resources
Canada

Ressources naturelles
Canada

G05-02

Requirements for Bulk Mobile Process Units

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

November 2015

Canada^{ca}

Table of Contents

1. INTRODUCTION	1
1.1 Purpose	1
1.2 Intent 1	1
1.3 Other Documents.....	1
1.4 Using the Guidelines.....	2
2. SCOPE, LIMITATIONS, DEFINITIONS AND GENERAL BACKGROUND	3
2.1 Scope 3	3
2.2 General	3
2.3 Definitions and Limitations	3
2.3.1 Mobile Process Unit	4
2.3.2 SME and SMS Mobile Process Units.....	4
3. PROPER UNIT SELECTION.....	5
3.1 Mobile Process Unit & Chassis Selection	5
3.2 Requirements, Transport Canada, ERD & CMVSS	5
MPUs must be clearly marked with the company name and unit number.4.	
	DOCUMENTATION.. 5
4.1 MPU Review.....	6
4.1.1 General	6
4.1.2 Applications.....	6
4.1.3 Revision for licensing acceptance	6
4.1.4 Documents required for MPU review application:	6
4.1.5 Incorporating a MPU into an explosive licence	7
4.1.6 Authorized operations and processes	7
5. PVS AND THEIR EQUIPMENT.....	8
5.1 Chassis.....	8
5.1.1 Chassis requirements for MPU restricted to closed sites	8
5.1.2 Fire suppression system.....	8
5.1.3 Exhaust	8
5.1.3.1 After-treatment devices	9
5.1.4 Tires.....	11
5.1.5 Engine fuel tanks and lines.....	11
5.1.6 Electrical.....	11
5.1.6.1 Wiring.....	12
5.1.6.2 Wiring exempted from conduit requirements	12
5.1.6.3 Junction boxes	12
5.1.7 Brakes and steering.....	13
5.1.8 Placarding and markings	13
5.2 Process Bins & Tanks.....	13

5.2.1	Small and large means of containment.....	13
5.2.1.1	Padlocks for explosives tanks and AN tanks	13
5.2.2	Process fuel oil tank.....	14
5.2.2.1	Venting	14
5.2.3	Ammonium nitrate bin	14
5.2.4	Aluminum bin.....	15
5.2.5	Mobile process vehicle emulsion tank	15
5.2.5.1	Mobile Process Units based on IBCs	16
5.2.5.2	Hatch on emulsion tank.....	17
5.2.6	Gassing solution tank	17
5.3	Delivery Equipment.....	17
5.3.1	Pumps	17
5.3.1.1	Other emulsion or watertel pumps	17
5.3.2	Augers.....	18
5.3.3	AN or ANFO blowers for pneumatic loading	18
5.3.4	Delivery hose reel.....	18
5.3.5	Pneumatic hoses for delivery of ANFO	18
6.	FILLING OUT FORM F05-MPU FOR MOBILE PROCESS UNITS	19
6.1	Common description for Most Explosives Mobile Process Units	19
6.1.1	Identification and general description	19
6.1.2	Automotive	19
6.1.3	General safety and compliance.....	20
6.2	Criteria for Specific Mobile Process Units	20
6.2.1	Ammonium nitrate and AN/FO bins or vessels	20
6.2.3	Other dangerous goods bin if applicable	21
6.2.4	Explosives tank.....	21
6.2.5	Process fuel oil tank.....	21
6.2.6	Gassing solution tank	22
6.2.7	Other tanks.....	22
6.2.8	Progressive cavity pumps	22
6.2.9	Delivery Hose Reel.....	23
6.2.10	Other Explosives Pumps.....	23
6.2.11	Augers.....	23
6.2.12	Controls	23
6.2.13	Hydraulics.....	24
6.2.14	Other information	24
7.	MODIFICATION TO A MPU	24
7.1	Re-chassis	24
7.2	Repairs after Accident	24
8.	GRANDFATHERED EQUIPMENT.....	25
9.	USED EQUIPMENT IMPORTED FROM USA.....	26

Appendix A - **Example of MPU's Description for Form F05-MPU**

Appendix B – B620-09, table 7.1

Appendix C - B620-09, table 7. 3

Appendix D - CAN/CGSB-43.151-2012, table EP17

Appendix E – Mobile Process Unit Declaration

1. INTRODUCTION

1.1 Purpose

A Mobile Process Unit (MPU) delivers and manufactures bulk explosives directly into the borehole. Because loading boreholes mechanically with a bulk explosive is defined as a manufacturing operation, it must be done in accordance with an explosives certificate or licence approved by an inspector.

This document details the construction of MPUs, specifications of an MPU, the application for review of an MPU and incorporation of the MPU into the factory licence (or ANFO Certificate).

This document does not apply to underground loading and underground processes.

“Must” and “will” denote a mandatory requirement. Whenever “should” or “may” appear, companies have the option of following or not following such directives, but must be prepared to defend their decision.

1.2 Intent

ERD has a primary goal of the safety of the public, operators, equipment and the environment.

These guidelines were developed in conjunction with industry, and companies are expected to follow them. Although they are based on explosives and TDG Regulations, they have also been developed as a result of incidents and accidents to make an MPU as safe as practical. Revisions will be made from time to time and alternatives to these requirements may be considered by the Chief Inspector of Explosives

A secondary goal of this document is to standardize their description as a process for inclusion into a factory licence. As described in this document MPUs are reviewed for site licensing acceptance on a Form F05-MPU. The MPU can then be attached to an explosives factory licence Form F05-01B, F05-02B or moved to another licence when the MPU moves from site to site to meet demand. Adding or removing an MPU requires an amendment to the licence.

1.3 Other Documents

Although these guidelines provide the instructions for describing a Mobile Process Unit, they are not a compilation of all legislation or codes issued by federal, provincial and municipal governments to which companies are subject. The following is presented as a guide to other documents or jurisdictions that must be considered and is not meant to be exhaustive:

- *Explosives Act and Regulations 2013*
- Documents issued by and obtainable from the Explosives Regulatory Division (ERD):
 - Guidelines for the Pumping of Water-Based Explosives
 - Guidelines for Bulk Explosive Facilities (G05-01)

- *Explosives – Quantity Distances* CAN/BNQ 2910-510 ERD Directives, issued as required
- Transport Canada (TC) reference documents
 - *Canadian General Standards Board, CAN/CGSB 43.151-2012, "Packaging of Explosives (Class 1) for Transportation", under EP 17*
 - *Canadian General Standards Board, CAN/CGSB 43.146-2002, Intermediate Bulk Container for the Transportation of Dangerous Goods.*
 - *Canadian Standards Association (CSA) B620-09 or latest version*
 - *Canadian Standards Association (CSA) B621-09*
- *Canadian Motor Vehicle Safety Standards (CMVSS)*
- *Cargo Securement standard 10*
- *Transportation of Dangerous Goods Act and Regulations*
- *National Fire Protection Agency, NFPA 17*
- Provincial transport regulations
- Provincial labor and/or safety laws and regulations
- Municipal by-laws and ordinances

1.4 Using the Guidelines

Companies should become familiar with the contents of these guidelines. MPUs will be reviewed based on these guidelines.

The MPU review can be broken down into three elements:

- ERD requirements,
- Transport Canada coded vessels requirements
- Transport Canada CVMSS requirements.

Note: A reviewed Form F05-MPU for a Mobile Process Unit only means that the specified MPU can then be assigned as part of an explosives factory licence or an explosives certificate. In no instance is the MPU Form F05-MPU a stand-alone licence.

2. SCOPE, LIMITATIONS, DEFINITIONS AND GENERAL BACKGROUND

2.1 Scope

Mobile Process Units for explosives are subject to all existing regulations and codes. These guidelines do not supersede any regulation or law, be it federal, provincial/territorial or municipal, or any codes specified in such legislation. Where alternative requirements exist, the more stringent of the two will apply.

Only 1.5D explosives and/or raw materials for the manufacture of 1.5D explosives may be transported and delivered by Mobile Process Units. The 1.5D explosives carried are UN0331, ANFO and UN0332, Emulsions and watergels. Companies must make sure that the products loaded by MPUs do not become cap sensitive (1.1D) before they are pumped into the borehole.

This guideline is for bulk explosives MPUs that are located on the surface (i.e., not underground). Underground equipment is subject to a number of different requirements.

2.2 General

Transporting and manufacturing explosives with a MPU can be hazardous and should be undertaken with due attention to truck design, tank design, pump design, etc.

Careful attention needs to be taken to select the proper chassis for the MPU to provide sufficient robustness, stability, and safety for the intended purpose so that it can be built to meet *B620 & CMVSS Standards*.

Augers, pneumatic hoses, pumps and their safety devices need to be carefully selected for the intended job.

All new MPUs must at least comply with these minimum instructions. There are situations where older existing MPUs do not meet the current requirements. Some of these situations have been allowed to continue and as such have been grandfathered (refer to section 8 – Grandfathered Equipment).

The Form F05-MPU submitted for review will become the basis for inclusion of the MPU as part of an explosives licence. If this information is not correct, then the licence is invalid and it is no longer legal to operate.

2.3 Definitions and Limitations

These definitions complement those in the *Explosives Act and Regulations*. In case of conflict, the definitions in the *Act and Regulations* prevail. This section also describes limitations imposed on some of the choices.

2.3.1 Mobile Process Unit

“Mobile Process Unit” means a vehicle in which an explosive manufacturing operation is carried out, or a portable machine used to carry out an explosives manufacturing operation, at a factory, satellite site or client site.

MPUs are subject to limitations as required, to ensure public and worker safety. In this document, the term “mobile process unit” includes portable process units which may not necessarily be wheel-mounted. In the case of wheel-mounted units, some requirements for trucks (e.g., exhaust system protection) may not be applicable.

MPUs must be incorporated into a factory licence or ANFO certificate to ensure that the intent (section 1.2) is met.

ANFO Pneumatic Delivery Systems

Pneumatic delivery systems used for cartridge explosives and those used for ANFO, with a carrying capacity of less than 100 kg, such as blast hole chargers and ANOLOADERS, are not subject to these guidelines.

2.3.2 SME and SMS Mobile Process Units.

An SME (Site Mixed Emulsion) and SMS (Site Mix System) MPU carry ingredients that have no explosive properties until they are mixed to manufacture emulsions at the bore hole. These MPUs manufacture explosives at the bench directly into the loading hose and bore hole. The NEQ of these vehicles is very small when travelling or loading, typically less than 25 kg that is contained in the manufacturing system.

3. PROPER UNIT SELECTION

3.1 Mobile Process Unit & Chassis Selection

When the time comes to select the proper chassis for a MPU, it is important to buy a chassis that can carry all the process equipment and still meet *CMVSS* and other Transport Canada requirements. Only when the process and the manufacturer of the process equipment have been carefully chosen will it be possible to specify the chassis, usually in conjunction with the process equipment manufacturer. Failure to buy the correct chassis may make it impossible for the MPU to meet the review requirements and be included on a factory licence.

3.2 Requirements, Transport Canada, ERD & *CMVSS*

* ERD requires all new vehicles to meet all appropriate aspects of the *CMVSS* and *B620* tank requirements, whether on public or closed sites.

* MPUs must meet federal and provincial requirements. Provincial workplace safety requirements cover user safety, including ladders and guardrails, guards on rotating equipment, and pinch points.

* *Canadian Motor Vehicle Safety Standards* cover the running gear of the vehicle, including brakes, tires, general roadworthiness, and daily vehicle checks.

All large means of containment on MPUs are expected to meet TDG standards for construction and placarding, even on closed and gated sites where TDG may not apply. Vehicles built before the current standards came into force (July 1999) may be grandfathered and may still operate under restrictive conditions (refer to section 8 – Grandfathered Equipment regarding non-coded large means of containment).

Vehicles must meet the description submitted with the form F05-MPU Vehicles that do not comply with the original reviewed description form F05-MPU, have significant faults when inspected, are mechanically unfit, or lack the required paper work may have to be removed from service until accurate supporting documentation is supplied or information is provided that shows the required repairs have been made.

MPUs must be clearly marked with the company name and unit number.

4. DOCUMENTATION

4.1 MPU Review

(All of the following applies to new MPUs. Older MPUs and modifications to MPUs are dealt with in section 8.)

4.1.1 General

New MPUs and changes to existing MPUs need to be reviewed by ERD before the equipment can operate under a factory licence or certificate. Guidelines to fill out the review form F05-MPU are in section 6 of this document.

MPUs include not only explosives trucks but also most other mobile explosives borehole loading devices, whether mounted on trucks, trailers or skids, with a hopper capacity of over 100 kg. However, underground equipment is not subject to this approval process, and therefore is not usually submitted to ERD.

4.1.2 Applications

The F05-MPU application form must be submitted for each individual MPU. Applications consist of a completed F05-MPU form, photos and drawings (as detailed at the start of section 6) for each MPU.

4.1.3 Review for licensing acceptance

ERD will issue an individual number which is the ERD file number for each MPU following review and approval in principle of the application information. One copy of the reviewed application will be retained and a second copy will be returned to the applicant for their records. A signed copy of the MPU's reviewed form F05-MPU must be carried on the MPU unless prior special arrangements have been made.

After being reviewed all correspondence regarding a MPU must reference its review number.

4.1.4 Documents required for MPU review application:

- Form F05-MPU
- Pictures of both sides, front, rear and top of MPU
- incomplete vehicle document from the original chassis manufacturer
- intermediate vehicle stage document if required
- final stage vehicle document or letter
- third party as-built review
- if a new tank design, then the third party design review
- coded tank certificates
- center of gravity calculations
- engineered drawings
- *CMVSS* compliance label

4.1.5 Incorporating a MPU into an explosive licence

- 1) Upon completion of the review of Form F05-MPU the MPU can then be assigned to the site licence where it will be operating. All of the information from the form F05-MPU does not have to be transferred to the site licence. Only the ERD review number and the company unit number have to be incorporated to the site licence. All MPUs attached to the site must be listed on the site licence form.

Copies of the MPU form F05-MPU must be available at the site where they are based and on the vehicles themselves.

Each time a MPU changes its base factory location, an updated location list must be sent to ERD headquarters within 2 working day of the change with the change marked. Where moving the MPU changes the operation, types or quantities of explosives at a site, or adversely affects separation distances, the site license will require amendment prior to the change/truck activation.

4.1.6 Authorized operations and processes

Please refer to *ER2013* and the terms and conditions of your factory licence which provides more details on the use of MPUs and what other operations are allowed nearby during borehole loading.

5. PVS AND THEIR EQUIPMENT

5.1 Chassis

5.1.1 Chassis requirements for MPU restricted to closed sites

If the MPU is restricted to a closed site, it must comply with all the same chassis requirements as a MPU which is roadworthy, with the exception of the following:

- it does not need to comply with all public roads safety requirements as long as a certified mechanic signs off on the MPU as being able to perform its work safely, (e.g.: tires, lights, etc.)
- MPU's based upon an off road chassis must be certified by an engineer. The vehicle must respect the manufacturer's specifications as to safety and equipment mounting along with meeting the requirements of all authorities having jurisdiction. Once in use, a certified mechanic must sign off the vehicle on an annual basis ensuring that the MPU is mechanically fit to perform its work safely.

5.1.2 Fire suppression system

Fire extinguishers are always expected to meet *NFPA* codes and standards. A minimum of two fire extinguishers of at least 4-A:40-BC rating must be present on explosives vehicles. In addition, MPUs are also required to have an engineered fire suppression system for the engine compartment.

Transport Canada and provincial/territorial requirements must also be met.

If aluminum is used as part of the formulation, a fire extinguisher compatible with aluminum should be present.

Fire extinguishers must be inspected on a monthly basis and records of inspection must be kept. As well, engineered fire suppression systems must be inspected every 6 months (or sooner if required by other jurisdiction). These systems must be inspected by a qualified and approved facility or person (ref.: *NFPA 17, Chap. 11*).

5.1.3 Exhaust

The exhaust must extend vertically above the vehicle behind the cab and be protected with a heat shield from the box, body, hoppers and tanks. Horizontal portions of exhaust pipes must be positioned so that no explosives storage or explosives handling components are above them. Horizontal portions of exhaust pipes exposed to drips of hydraulic fluid, oil or emulsion must be shielded.

5.1.3.1 After-treatment devices

Environment Canada's *Canadian Environmental Protection Act* (CEPA 1999), effective March 31, 2000 included new authorities to regulate emissions from a range of on- and off-road vehicles and engines. Its purpose is to mitigate adverse environmental and health impacts by reducing or controlling air pollutants such as carbon monoxide (CO), particulate matter (PM), hydrocarbons (HCs), nitrogen oxides (NO_x) and other pollutants.

The introduction of the 2007 model year requires emission control systems to be installed on all heavy-duty vehicle engines. Exhaust emission systems and their locations are not design-restrictive, i.e., each manufacturer is responsible for the design, selection and installation of their systems on all new vehicles they produce, in order to comply with the prescribed emissions standards. ERD is interested in these because the piping configurations and the extreme temperatures they reach during the regenerative process could pose a potential fire hazard to the explosives carried on board.

There are typically four vehicle mounting configurations available for after-treatment devices (ATDs) used by the original equipment manufacturers (OEMs). Two of these would extend well behind the truck cab – see figure 1 & 2. The location of these ATD systems would be under or beside any process equipment, thus posing a potential fire risk or worse, as a result of spills of emulsion or process diesel fuel or when in close proximity to rubber hose reels. Such configurations contravene the *Explosives Regulations*, and the current policy regarding the exercise of due caution where explosives may be exposed to extreme heat. It essentially limits the options available to explosives manufacturers when specifying/purchasing a new chassis.

The only vehicle exhaust configurations permitted without reconfiguring the process equipment on a single chassis are:

Under step mounted, horizontal after-treatment device (ATD) with a pillar mounted vertical tailpipe behind the cab – see Figure 3.

Outboard frame, vertical mounted after-treatment device (ATD) with a top stack, all mounted directly behind the cab – see Figure 4.

If either of the other two configurations extending behind the cab is installed by the OEM, i.e.,

- 1 inboard frame mounted horizontal after-treatment device with horizontal tailpipe – see Figure 1, or
- 2 inboard frame mounted horizontal ATD with pillar mounted vertical tailpipe routed under the frame – see Figure 2,

then the process equipment must be set back on the chassis frame rail so that all of it is aft of the ATD system, or the process equipment must be reconfigured so that no portion is located in, under, beside or over the ATD system, i.e., vertical clearance must be maintained for the full height of the process equipment located directly above the ATD. In the presence of explosives, a

minimum clearance of 30 cm (12 inches) in all directions is highly recommended for all options above.

Note: Each original equipment manufacturer (OEM) stresses the need to maintain adequate clearances from wood, rubber, cloth, electrical wiring, brake hoses and tubing due to the high temperatures – this is also emphasized in the Regulations.

With the advent of these new system configurations, an additional minimum requirement will be to install a portable fire extinguisher in close proximity to the ATD so as to be readily available to an operator in the event of a problem. A metal shield between the ATD and the power take-off (PTO), hydraulic pump and associated hydraulic hoses is strongly encouraged to prevent hydraulic fluid from spraying onto the ATD at any time if a hose delaminates. Additionally, it is highly recommended to locate and direct at least one nozzle of an after-market engineered fire suppression system in the area of the ATD and PTO to suppress a potential fire. Such precautions may ultimately save a very valuable piece of equipment.

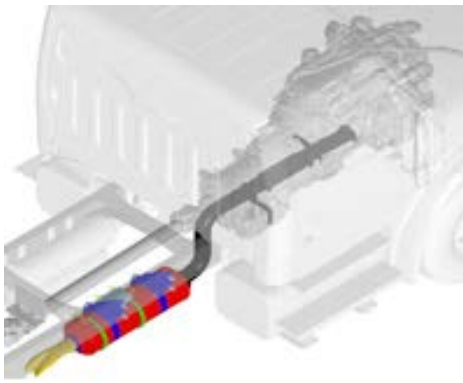


Figure 1

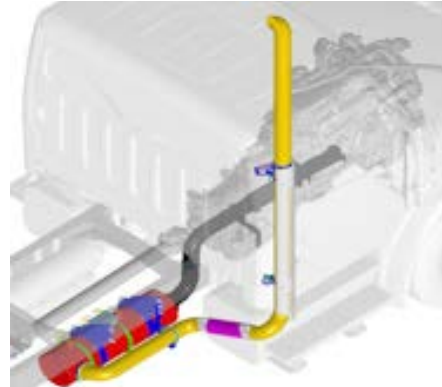


Figure 2

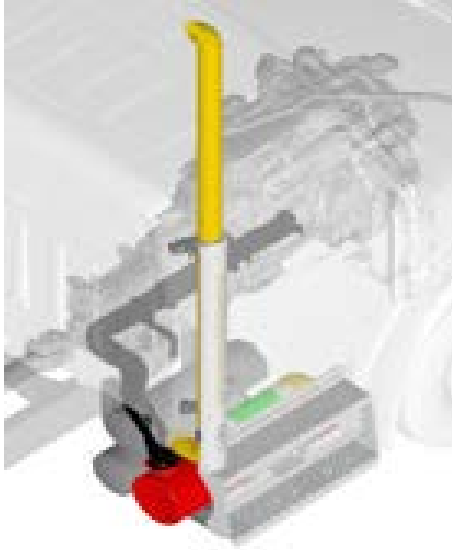


Figure 3



Figure 4

5.1.4 Tires

If the MPU is used on public roads, the tires must meet provincial department of transport safety requirements and the current *CMVSS*.

The combined tire load ratings must exceed the GVWR of the vehicle.

If the MPU is only used on closed sites, a certified mechanic must sign off, as part of the annual inspection, stating that the tires are safe.

5.1.5 Engine fuel tanks and lines

Fuel tanks must meet *CMVSS*.

Transfer lines between dual tanks must have a shut off valve at each tank.

5.1.6 Electrical

The battery must be enclosed in a battery box. To isolate the battery, an easily accessible manual battery disconnect switch, a manual reset breaker, or a factory installed battery isolation device, labelled and located close to the battery, must be provided. The switch or breaker should be located on the positive line. The switch must be rated for the current it will handle.

Note: The factory installed battery isolation device must meet the same intents as the manual devices, i.e. isolate the battery when the MPU is not in use, and disconnect the battery in an incident/accident situation.

Where possible the switch should be located conveniently on the driver side of the vehicle. The switch should be no more than 30 cm from the positive battery terminal and the line to the switch must be protected from rubbing and abrasion that could cause a short circuit.

If it is necessary to keep the truck's engine management system or part of the control system energized most of the time, the battery cut-off switch may be bypassed by a circuit protected by a low amperage fuse. This must be indicated on the Form F05-MPU application.

5.1.6.1 Wiring

All wiring must conform to the *Canadian Electrical Code*.

MPU wiring behind the cab must be in conduit extending into all fittings and junctions. TECK90 XLPE or ACWU90 cable is an acceptable alternative to conduit. Where conduit or cable enters lights, motors, electrical equipment or junction boxes, the wire entries must be sealed and entry fittings designed for the purpose must be used. Sealed wire entry into motors or equipment must meet *EEMAC / NEMA 4x or IP 65*. A short flexible connection is allowed from the motor to a junction box.

Note: The entry must be liquid-tight and protect the wires from rubbing damage and the connection from strain.

All wiring must be protected by bushings and supports if mechanical damage is likely when it passes through bulkheads or is close to sharp edges.

All wiring must have overcurrent protection.

Notwithstanding the above, wiring connected to ABS braking systems or other motor vehicle control systems originally installed by the truck chassis manufacturer may be left as installed.

5.1.6.2 Wiring exempted from conduit requirements

Class 2 circuits are permitted for very low amperage wiring such as is often used for control circuits. Class 2 circuits are limited voltage and current. Class 2 circuits of 0-20 volts must be limited to less than 5 amps. They present no electrical shock hazard and no significant fire hazard. There are rules governing overcurrent protection, conductors and separation from other circuits. These circuits are usually suitable for instrumentation and control. On MPUs, these circuits could be used for solenoid valves, sensors and transducers and possibly LED lighting. Overcurrent protection of different ratings must not be of an interchangeable type.

MPUs with Class 2 circuits meeting the requirements of Class 2 circuits in section 16 of the *Canadian Electrical Code* are acceptable on MPUs and do not need to meet the above requirements for conduit and cable entry into fittings.

5.1.6.3 Junction boxes

All exterior electrical boxes must be *EEMAC/NEMA 4X* with sealed wire entries.

5.1.7 Brakes and steering

Brakes and steering apparatus must be in good mechanical condition and meet Transport Canada and provincial requirements. Brakes must meet provincial department of transport safety requirements and the current *CMVSS* for service, parking and emergency brakes as per *CMVSS 121*.

5.1.8 Placarding and markings

Placarding and marking of means of containment must conform to the TDG Regulations even when the vehicle is on a closed site. This includes *B620* tank marking as well as safety marks on large and small means of containment.

5.2 Process Bins & Tanks

5.2.1 Small and large means of containment

A small means of containment (capacity of 450 L or less) shall be designed, constructed, filled, closed, secured and maintained so that under normal conditions of transport, including handling, there will be no accidental release of the dangerous goods that could endanger public safety.

All sight glass material (on small means of containment only) should be a strong, resilient (non-brittle) material. There should be a shut-off valve at both ends of the sight glass that must be closed while in transport. Sturdy guards must protect the sight glass on all sides. The container itself may constitute one or more of the guards. A sturdy guard must be installed on the visible side of the sight glass. Expanded metal is an example of such sturdy material. Engineering best practice should be followed to provide physical protection and shut off valves in order to eliminate any chance of a spill and environmental concerns in the event of an accident or rollover. This applies to all process tanks that may contain product that might create an environmental concern if there is any loss of product.

A large means of containment has a capacity greater than 450 litres. Tanks over 450 litres for dangerous goods must be constructed to *B620* or *CGSB 43.146-2002* specifications and marked as such. No sight glasses are allowed on large means of containment.

5.2.1.1 Padlocks for explosives tanks and AN tanks

Padlocks for explosives tanks should have the same features to guard against forced entry by meeting the requirements for padlocks in the *Standard, Explosives – Magazines for Industrial Explosives, CAN/BNQ 2910-500/2015*. They should be made of compatible materials.

5.2.2 Process fuel oil tank

A small means of containment process fuel oil tank must be of metal construction, have a non-spill air vent with filter, a fusible fill cap, and shut-off valves at all outlets. Site gauges may be used as described in Section 5.2.1

Large means of containment for process fuel must be built to *TC/DOT 406 standards*. As per *TC406* sight glasses for level indication are not allowed.

TDG Regulations state that the containers must be selected and used in accordance with *Standard CAN/CSA B621*, Selection and Use of Highway Tanks, Portable Tanks, Cargo Compartments and Containers for the Transportation of Dangerous Goods, Classes 3, 4, 5, 6.1, 8 and 9. This standard prescribes that diesel tanks built after December 31, 2002, must conform to the *TC 406* tank specification under *CSA B620*, or its *CFR 49, DOT 406* equivalent, when mounted on the frame of a truck or trailer.

ERD would require that it have a fuseable cap, shut-off valve on all piping and non-spill relief venting.

Annual periodic inspections of *TC406* tanks are required. See Appendix B & C.

5.2.2.1 Venting

Proper venting, sized for the volume of the process fuel tank, must be provided as per *B620*.

Safety vent: To prevent tank internal pressure from rupturing the tank body, seams or bottom opening if exposed to fire;

Air vent: Non-spill air vent (such as a ball check or spring release) that will ensure that, in a rollover situation, fuel is confined to the tank and will allow air in to prevent the tank from collapsing when the fuel is pumped out.

The air vent may be combined with the safety vent or be a separate item. Both mechanisms must be able to withstand the hydraulic pressure exerted from within during normal operation, as well as in a rollover situation.

5.2.3 Ammonium nitrate bin

AN bins should be stainless steel or aluminum where in contact with the product and should have one-inch stainless steel grating in the hatch openings. All hatches and any outlets from which AN could be collected must be lockable and must be locked when not attended or when on public roads. When on mine or quarry roads and attended, this is not required. The hatch design should prevent water ingress. All nuts used to assemble the bin should be tack-welded to the bin or locked to prevent them from coming loose.

5.2.4 Aluminum bin

The bin holding aluminum should be non-rusting and sealed against water. Stainless augers must be used for aluminized products.

5.2.5 Mobile process unit emulsion tank

ERD has adopted the *Canadian Standards Association (CSA) B620-09* reference document, entitled *Highway Tanks and Portable Tanks for the Transportation of Dangerous Goods for non-pressurized tanks*. Production units used for the transport and mixing/pumping of emulsion or watergel/slurry must meet *B620-09, TC 412 or TC423* requirements as referenced in *CAN/CGSB-43.151-2012*, Packing of Explosives (Class 1) for Transportation under explosives packing methods *EP 17*, Note 2 and be rated for 5 psi. This includes, but is not limited to, meeting the appropriate design and working pressures, plus venting and pressure relief, rollover and spill protection, in addition to guarding the discharge valve and providing a substantial bumper.

Surfaces in contact with product should be made of stainless steel. Where insulation is used, the insulation requirement for *TC423 in B620* is followed even for *TC412* tanks. *TC 423* requirements are listed below.

For insulation, the exterior of the tank will be covered by insulation, a vapor barrier, and a metal jacket. The vapor barrier protects the insulation from weather and spills. It must be smooth and flexible and have a flame spread rating of 25 or less.

Insulation is covered in *B620*; it must be compatible with the lading. It must be rigid and non-porous. It must be at least 2" thick and not separate from the tank, as separations would create spaces where product could be trapped.

It must meet at least one of these requirements:

1. It must be non-combustible in accordance with *ASTM/ULC/CAN*
2. It must have a fire endurance rating of at least 15 min.
3. It must have a flame spread rating of 25 or less.

In addition to complying with the requirements of *B620* for all coded vessels, ERD will also ensure all vehicles, assembled or altered in multiple stages, conform to the applicable *CMVSS*. This Transport Canada (TC) requirement calls for appropriate lighting, demonstration of centre of gravity calculations, correct selection of chassis for GVWR and GAWR ratings concerning weight distribution, plus adequate braking for a fully loaded vehicle, to name a few of its provisions. It is part of the National Safety Mark (NSM) process administered by Transport Canada and applies to all intermediate and final-stage manufacturers who assemble or alter a vehicle prior to its sale to the first purchaser, whether imported to or originating in Canada.

Annual periodic inspections of *TC412* and *TC423* tanks are required. See Appendices B & C.

ERD requires that all MPUs based on truck chassis meet Transport Canada standards even if they are confined to close private mine sites.

In addition, all shops that assemble or alter used process equipment or re-install it on a new chassis for their own use must demonstrate, as part of the authorization process, that the final assembly meets all applicable *CMVSS*. This latter requirement will require confirmation, in writing, by a professional engineer who is proficient in the required standards.

Note 1: When the integrity of the production tank is at risk and/or where the tank and chassis/trailer are assembled separately, ERD reserves the right to have the entire design reviewed by a third-party Transport Canada Authorized Design Agency to ensure compliance with either CFR 49, DOT 412 standards or B620, TC 412 or TC 423 standards, all at the licensee's expense. The assembly shop must be registered with Transport Canada, with the reviewer considering the entire design package, not just the tank by itself, as required by B620. ERD further reserves the right to have the assembly inspected, at the licensee's expense, by the third-party reviewer to ensure the package meets the applicable standards.

Note 2: Highway tanks used for the transport of emulsion/watergel/slurries only are addressed separately in CAN/CGSB-43.151-2012, EP 17. See Appendix D.

Note 3: With CAN/CGSB-43.151-2012 after January 1, 2017 TC423 tanks will be required on new vehicles instead of TC412. Current TC 412 designs for explosives could be registered as TC423's with no changes. See Appendix D.

5.2.5.1 Mobile Process Units based on IBCs

Several companies operate MPUs which pump emulsion into boreholes from IBCs (intermediate bulk containers). For loading where Q/D is a problem these small vehicles can be very useful. The design should be discussed with ERD before construction but must meet these requirements.

IBCs must meet *CAN/CGSB-43.151-2012 Packing of Explosives (Class 1) for Transportation*. These are Code 31 IBCs and require periodic testing at a registered facility. Details of testing and design may be found in *CAN/CGSB-43.146*. They may be up to 3000 litres in capacity.

No more than 4 IBCs may be transported on a MPU. (They will be transported on the vehicle, unloaded at a licensed transfer site close to the loading area, with one left on the vehicle for loading holes so that the NEQ on the vehicle is as small as possible).

Only one IBC can be on the vehicle and hooked up to the pump during borehole loading.

The IBCs must be properly fixed to the vehicle, i.e., not strapped but bolted or clamped with properly engineered attachments that meet Cargo Securement standard 10.

The IBC lid and valve must be locked when not being filled or emptied unless decontaminated.

5.2.5.2 Hatch on emulsion tank

All hatches, discharge valves and outlets must be lockable and must be locked when containing explosives and not attended or when on public roads. When on mine or quarry roads and attended, this is not required. Hatches must be designed as per *B620*. There should be an one-inch wire mesh basket in the opening and adequate drainage around the hatch.

5.2.6 Gassing solution tanks

The gassing solution tank must be made of material compatible with the solution. Proper pressure relief must be fitted if required. Hosing is not to be used as relief. If containing dangerous goods it should be marked according to TDG Regulations and requirements for small or large means of containment must be met.

5.3 Delivery Equipment

5.3.1 Pumps

Pumps (make, model and safety devices) used for pumping explosives or AN liquor must be approved by ERD. Companies should abide by the recommendations of the Pumping Guidelines (a copy of the guidelines may be obtained from ERD). A hazard review and/or testing of the pump-explosives combination may be required prior to pump approval. Each progressive cavity pump must have its own log of all maintenance and other work done on it, and a log is recommended for other pumps.

Records may be requested during inspections by ERD or prior to the issuing of the licence. Pumps and process units that do not have available up-to-date logs or records must be removed from service until either the required preventive maintenance has been performed or the required records are available.

If a progressive cavity pump is used, there should be two independent safety devices, one of them being a device detecting no-flow pumping conditions.

A testing program must be in place for all safety shut-down systems. Pump maintenance and testing program log must be available. Pumps for which the safety systems are found to be non-functional must be removed from service until corrected. Pumps may not be put into service until safety systems have been tested, and testing must be repeated on a regular basis.

Maintenance and/or repairs that require disassembly of progressive cavity pumps used to pump explosives must be carried out by qualified technicians.

5.3.1.1 Other emulsion or watergel pumps

Pumps other than progressive cavity pumps may require less instrumentation, but should be instrumented in accordance with their potential for self-heating when deadheaded or running dry. The exact nature of the instrumentation must be based on a hazard analysis and/or testing and/or the

Pumping Guidelines. The “Guidelines for the Pumping of Water-based Explosives” is available from ERD for a nominal fee. They are also available electronically upon request from ERD.

5.3.2 Augers

Augers must have outboard bearings with 25 mm spacing between the end of the auger and the bearing. The 25 mm spacing must be an air gap between the mounting bolts that secure the bearing to the end of the auger. That air gap allows for visual inspection of the integrity of the seal at the end of the auger and also allows AN prills not to be trapped and forced into the bearing and/or the grease of the bearing. For vertical auger arrangement, for the bottom bearing, a fling disc must be installed between the end of the auger and the bearing to ensure that if the seal fails, the AN will not fall into the bearing by gravity alone. The augers should also have reverse flights or paddle sweepers to keep product from the auger seals. Augers should have stainless steel contact surfaces, sealed shafts to prevent build-up of explosives inside, and drive guard(s), including at the free ends of the bearings. Mild steel augers are not permitted if aluminum is present.

5.3.3 AN or ANFO blowers for pneumatic loading

The blower (make, model and capacity) for AN or ANFO transfer and its location in relation to the AN tank and fuel oil tank must be described on Form F05-MPU.

5.3.4 Delivery hose reel

There should be a drip tray under the delivery hose reel, a holder for the loose end of the delivery hose to catch product dripping from the hose, and a hydraulic counterbalance valve to prevent free-wheeling. It should have the appropriate safety guards attached.

5.3.5 Pneumatic hoses for delivery of ANFO

Pneumatic ANFO deliveries must be made using semi-conductive hose. The hose must have an electrical resistance high enough to limit the flow of stray current to safe levels, yet not so high as to prevent drainage of static electric charges to ground. A hose of not more than 2,000,000 Ω resistance over its entire length and of not less than 1000 Ω per foot meets the requirement. A system resistance between 10,000 Ω and 2,000,000 Ω is satisfactory and will still bleed off static, but slowly enough not to be hazardous. A too-conductive hose provides a low-resistance electrical path to the borehole for stray and galvanic currents. Wires placed in the hose, incorporated into the hose, or attached to it will dissipate static too quickly and the spark could initiate a detonator.

Note: Loading ANFO into a liner that is not static resistant may also lead to a build-up of a charge. This may occur when ANFO is poured into a hole from a bag, tote or auger. Take the appropriate precautions by grounding vehicles and loaders and using static-resistant conductive or dissipative liners. For more information refer to the ISEE Blasters Handbook, Chapter 18, Control of Static Electricity in Pneumatic Loading.

6. FILLING OUT FORM F05-MPU FOR MOBILE PROCESS UNITS

When completing the Form F05-MPU, each section/subsection should be filled out using the same sequential order as is listed on the Form F05-MPU Instructions. Where a section does not apply, leave the section/subsection heading in place with “Not Applicable” written next to it.

6.1 Common Description for Most Explosives Mobile Process Units

6.1.1 Identification and general description

- a) Unit number; licence plate number if applicable.
- b) Make, model and year of chassis.
- c) Serial number of chassis.
- d) Gross Vehicle Weight Rating (GVWR), kg or lbs.
- e) Type of process (e.g., ANFO, emulsion pump truck with gassing)
- f) Type of products made or materials carried on the truck listed by the UN classification number and maximum effective explosives quantity (NEQ) for Q/D purposes.

6.1.2 Automotive

- a) Is an annual mechanical fitness completed by a certified mechanic?
- b) Is the exhaust extended vertically behind the cab and discharged above the vehicle production equipment and is it further protected with a heat shield so as not to cause burning, charring or damage to the electrical wiring, fuel system, ingredient hoppers, fuel tanks or any combustible part of the vehicle? Does the exhaust have an ATD (sec. 5.1.3.1)
- c) Is there a protective shield between the under-chassis exhaust system and any hydraulic pumps in close proximity?
- d) Are the vehicle chassis fuel tanks, other than on pick-up trucks, heavy duty UL approved?
- e) If dual fuel tanks are fitted, the line between the two tanks must have shut off valves at each end. The shut-off valves must be accessible to the operator and secured against chaffing, kinks or other causes of mechanical damage.
- f) Are the electrical wiring and lighting systems aft of the truck cab completely enclosed in sealed conduit or comprised of TECK 90 cable with connectors directly into the fixtures? If not, are the exceptions Class 2 circuits? Is all wiring adequately supported and bushed when passing through metal holes to minimize abrasion?
- g) Are the battery circuits equipped with a well labeled manual disconnect switch, easily accessible to the operator, connected to the positive side of the battery and located within approximately 30 cm. (1 ft.) of the battery?

6.1.3 General safety and compliance

- a) Is the vehicle equipped with fire extinguishers? Fire extinguishers must meet *NFPA* Codes and Standards. A minimum of two fire extinguishers of at least 4-A:40-B,C rating must be present on explosives vehicles. In addition, MPUs are also required to have an engineered fire suppression system for the engine compartment. All fire extinguishers must be tagged in accordance with Codes and Standards to demonstrate testing is current.

If aluminum is to be used, a fire extinguisher compatible with aluminum should be present.

- b) Are applicable *TDG* safety placards on all four sides of vehicle?
- c) Are there lockable hatch covers? Are the padlocks of good quality? (padlocks, not containing brass / bronze or copper)
- d) No brass, bronze or copper permitted in contact with AN or explosives. Exposed brass, bronze or copper which is not in contact, such as in instrumentation or on extinguishers, is to be painted over.

6.2 Criteria for Specific Mobile Process Units

Form F05-MPU requires here a brief description stating the location of the major components such as the bins, tanks etc. starting at the front of the vehicle and moving backward so as to give a fair representation of what is being submitted for approval.

MPU's application for review must include the following photographs: Right side, left side, front, back, top and a picture of the tank specification plate. For complex truck additional photographs, flow diagrams or a general assembly should be attached to assist the description above. Annotated photos and/or detailed drawings of the pump safety system or any other unusual, complicated or more hazardous equipment should accompany the Form F05-MPU.

6.2.1 Ammonium nitrate and AN/FO bins or vessels

Note on the form:

- a) The number of AN bins.
- b) The total carrying capacity in tons or kilograms
- c) The material used to make the AN bins, i.e., mild steel, stainless steel, aluminum. If mild steel, note the protective finish.

6.2.2 Pneumatic AN or ANFO transfer units

- ▶ Vane (star) feed pneumatic systems feed the AN or ANFO through an airlock valve into the blow hose for loading the holes. An air blower is normally used instead of a compressor.

- d) If an air lock/pneumatic feed system is used, describe the blower (make and capacity) for AN or ANFO transfer.
- e) State the discharge hose size and confirm that it is semi-conductive. All flanged joints must maintain electrical continuity.
 - ▶ Semi-conductive hose must not have metal wire in its construction. It must have a resistance of at least 10,000 ohms and less than 2,000,000 ohms over its entire length, with a resistivity per foot of at least 1000 ohms. This hose will bleed off static slowly without giving a shock to the operator or more importantly to the detonator in the borehole. For more information refer to the *ISEE Blasters Handbook, Chapter 18, Control of Static Electricity in Pneumatic Loading*.

6.2.3 Other dangerous goods bin if applicable

- a) State the capacity of the bin
- b) Confirm that the bin is non-rusting and sealed against water.

6.2.4 Explosives tank

- a) Tank capacity
- b) Construction material (product contact surfaces should be stainless steel unless grandfathered).
- c) The standard that the tank meets.

Emulsion or slurry tanks built after July 1999 and before January 1, 2017 must meet *TC (DOT) 412 or TC 423 requirements of CAN/CGSB-43.151-2012, Packing of Explosives (Class 1)* for Transportation under explosives packing method *EP 17*. From January 1, 2017 on the tanks must meet *TC 423* requirements. See Appendix D.

- d) Where an RIBC is used, confirm that the design and use of the RIBC conforms to Annex B of *CAN/CGSB-43.151-2012, Packaging of Explosives (Class 1)* for Transportation as cited under *EP 17*. Other units must be approved through both Transport Canada and ERD as having an equivalent level of safety. See Appendix D.
- e) Tank serial number (for new tank)
- f) Manufacture's design number and ERD design number
- g) Third party designated agency (third party review) file number for new tank design and as-built review.

6.2.5 Process fuel oil tank

- a) What is the tank capacity in gallons or litres?

If capacity is greater than 450 L, confirm that it is a *TC406* coded tank and indicate the following:

- Tank serial number (for new tank)
- Manufacturer's design number, for new tank

For tanks under 450 liters:

- b) Is non-spill and pressure release venting fitted to the process oil supply tank? Non-spill fusible tank caps minimize spills in a rollover situation and vent to prevent a pressure rise when exposed to fire.
- c) Are there shut-off valves at all outlets?
- d) Are manual or self-closing valves fitted on all sight gauge level indicators? Note that sight gauge level indicators are not permitted on *TC406* tanks, and only permitted on small means of containment when very well protected against mechanical damage (and may not be allowed on fuel tanks).
- e) Describe fuel pump and nozzle oil injection system.

6.2.6 Gassing solution tank

- a) State the capacity of tank in gallons or litres.
- b) Is construction plastic or stainless steel?
- c) Is the tank non-spill with venting or, if a pressurized system, pressure relief type?

6.2.7 Other tanks

- a) Note size (capacity or dimensions or both?).
- b) State type of tank and materials contained.
- c) Provide tank details.

6.2.8 Progressive cavity pumps

The use of pump safety features shall be guided by the "Guidelines for the Pumping of Water Based Explosives" to control out-of-limit conditions unless supported by a hazard review and/or test data which demonstrates otherwise. If instrumented, state what is included and the location around and/or in the pump.

- a) State the make, type, size and reference number.
- b) State the seal type and other pertinent features such as the number of stages of a progressive cavity (PC) pump, type of joint connectors if any or outboard bearings.
- c) Pump safety systems. List all the safety features, including details of controls used, set points, bursting disk pressures, RPM limits, etc.
- d) If a temperature sensor is used in the pump shutdown system, state how far it is from the end of the rotor. The optimum distance is 12 mm and it must be within 50 mm to function correctly.

Note: PC pumps are a known hazard and when full of explosives have been known to explode if run in a no-flow condition for long enough (more than ten minutes). The safety system must be designed to prevent this possibility.

- e) Is there a pump control program? State the test and maintenance schedule or how the pump is kept in a safe state.

6.2.9 Delivery Hose Reel

- a) Give general details including reel and hose size.

6.2.10 Other Explosives Pumps

The use of pump safety features shall be guided by the “Guidelines for the Pumping Water Based Explosives” to control out-of-limit conditions unless supported by a hazard review and/or test data which demonstrates otherwise. If instrumented, state what is included and the location around and/or in the pump, as well as any downstream shearing or static mixing.

- a) Give the make, type and reference number.
- b) State the pump size and other pertinent features such as power source or motor type, outboard bearings, type of seals (mechanical, packing gland, etc.)
- c) Pump Safety Devices. List any safety features, including details of controls used, set points, bursting disk pressures, RPM limits, etc. Reference hazard studies or other safety documents that demonstrate that the pump system will be safe as installed.
- d) Note the location of any temperature, pressure or flow sensors plus any relief mechanisms, all in relation to the pump inlet and outlet as measured in cm or inches.
- e) Is there a pump control program? Note the test and maintenance schedule or how the pump is kept in a safe state.

6.2.11 Augers

- a) State size and construction materials.
- b) Describe the auger location, i.e., overhead (installed at front or rear) or side discharge. Confirm that there is a minimum of 25 mm (1 inch) open exposed off-set for auger stub shaft bearings.

6.2.12 Controls

- a) Electrical standards. Are the process controls in *EEMAC 4 (CEMA 4)* enclosures or better with sealed wire entries?
- b) State the location of the controls, i.e., in the cab, on the fender, on the end of the auger, and whether hydraulic, electric over hydraulic (PLC in cab), actuated via hand-held push-button station, or via radio frequency (RF) remote control, etc.

Note: If pump operation is controlled remotely via RF, it must be demonstrated that the frequency will not initiate a detonator using IME #20 as a guideline and supported by a hazard review by a consultant qualified in the field.

6.2.13 Hydraulics

- a) State the location of the hydraulic reservoir and any other significant details.

6.2.14 Other information

- a) What other information is required to describe the truck?
- b) Other equipment not on the MPU which is required to operate the system (such as portable pumps or dewatering equipment).

7. MODIFICATION TO A MPU

7.1 Re-chassis

A chassis remount and/or modification to a tank are covered in *B620*. If meeting the prescribed conditions, a remount can be done by a registered assembler of that particular tank. If there are modifications to the tank beyond the conditions set out in *B620*, then the work can only be done by a registered modifier of that tank. These actions may require the services of a professional engineer or a registered design engineer and the modifications may need to be submitted to a designated agency for review. Any modifications beyond the conditions set out in *B620* will require inspection, testing and certification, as well as marking and adding a modification plate to the tank as called for in *B620*.

For the emulsion tank, to retain its *TC412* or *TC423* designation the mounting to the new chassis must be reviewed by an engineer registered with Transport Canada for tank design. Details can be found in *B620*. ERD will require a copy of the revised design verification.

Unless modifications to the vehicle are extensive, it is unlikely that ERD will require a third party as-built inspection of the rebuilt vehicle.

7.2 Repairs after Accident

After any accident that involves *TC 406* or *TC 412* or *TC423* tanks, a tank inspection will be required as per *B620* before the tank can be returned to service.

Any repairs to a tank shall be made in compliance with its original design by a registered repair facility. Overlay tank patches are not permitted. It must be decontaminated and a sign-off document supplied to the repair facility.

8. GRANDFATHERED EQUIPMENT

Equipment built before July 1999 may have been grandfathered. Grandfathered equipment may still be used under the following conditions.

- 1) Non-spec emulsion tanks are confined to closed mine sites and not allowed off site unless decontaminated.
- 2) All non-spec dangerous goods tanks over 450 liters must be inspected annually as *TC306* tanks (see Appendices C & D).
- 3) After a chassis replacement, all equipment must meet the standards in place for the year the chassis was manufactured. This restricts the replacement chassis to pre-July 1998 for non-spec emulsion tanks and pre-July 1999 for *TC (MC, DOT) 306* tanks. It is the intention of ERD that non-spec tanks and *TC306* tanks which often do not meet code will be phased out as the availability of old chassis disappears.
- 4) Vehicles already approved with a third extinguisher mounted to discharge onto likely fire sources in the engine compartment, such as the alternator or hydraulic pump, are grandfathered. Engineered systems will be required when the cab and chassis of currently authorized vehicles are replaced.
- 5) Tanks brought into service after July 1998 but before the end of July 1999 must conform to *TC (MC/DOT) 306, 406 or 412*. This includes, but is not limited to, meeting the appropriate design and working pressures for the particular TC (or MC/DOT) standard, venting and pressure relief, rollover and spill protection plus an appropriate discharge valve meeting the standards. Tanks older than this have been grandfathered and must be periodically tested as per TC requirements (see Appendix B & C).
- 6) Tanks brought into service prior to July 1999 in Canada have been grandfathered, but those that do not meet the requirements of *TC (MC/DOT) 306, 406 or 412* coded vessels built to earlier published *B620 or CFR 49 (USA) standards* will be limited to private property use only, e.g., mines after January 1, 2010, according to the terms of the ERD licence.
- 7) Fuel tanks are not grandfathered and, if the tank is over 450 liters, it must conform to *TC406*.
- 8) MPU that do not comply with the engineered fire extinguisher system of section 5.1.2 and are already active under a factory license, must only update the fire extinguisher system if there are major modification to the MPU.

9. USED EQUIPMENT IMPORTED FROM USA

A MPU imported from the US will have to meet *CMVSS* and *B620* tank requirements in place on the date when the vehicle is first imported into Canada or on the date when it is submitted for review for its acceptability for loading explosives in Canada. This will mean that the vehicle will have to be finished by a TC registered final manufacturer. It is required that the emulsion tank design has a design review and an as-built inspection by a TC registered third party inspector. This means that it will be very difficult and may not be possible to import a vehicle that was not built for Canada and have it accepted as satisfactory by ERD.

15. Hydraulics (Ref. section 6.2.13)	same
16. Other information (Ref. section 6.2.14)	

FOR EXISTING TRUCKS PLEASE SUPPLY PHOTOS OF ALL 4 SIDES & TOP. PLEASE ANNOTATE THE DRAWINGS OR ADD A DIAGRAM OF THE TRUCK LABELLING MAJOR COMPONENTS SUCH AS TANKS, AUGERS & PUMPS ETC. A FLOW DIAGRAM MAY BE REQUIRED FOR COMPLEX TRUCKS.

NEW TRUCKS SHOULD HAVE ENGINEERING DRAWINGS AS WELL AS ABOVE.

Stick to the numbers. Even if you do not have a section 6 aluminum bin, section 7 explosives tank must stay section 7! Where possible please follow the subsection letters as in the Guide for Form 4 for process vehicles

APPENDIX B

(This table is a reproduction of Table 7.1 from *B620-09*. The latest version of *CSA B620* should be used as the official reference.)

Table 7.1
Periodic Inspection and test intervals
 (See Clauses 7.1.1, C.1, C.2, and C.6)

Description of Tank	Clause 7.2.1 External Inspection (V)	Clause 7.2.2 Internal Inspection ⁽¹⁾ (I)	Clause 7.2.3 Lining Inspection	Clause 7.2.5 Leakage test (K)	Clause 7.2.7 Pressure test, hydrostatic or pneumatic (P)	Clause 7.2.11 Structural Inspection
TC 306 or TC 406	1 year	5 years ⁽²⁾	—	1 year	5 years ⁽³⁾	—
TC 306 Crude or TC406 Crude tanks	2.5 years	5 years	—	2.5 years	5 years ⁽³⁾	
TC 307 or TC 407	1 year	5 years	—	1 year	5 years	—
TC 312 or TC 412	1 year	5 years	—	1 year	5 years ⁽³⁾	—
TC 423	1 year	1 year	—	1 year	5 years	5 years
TC 350	6 months	1 year	—	1 year	2 years	—
TC 350 Crude Tanks	1 year	1 year		1 year	2 years	—
TC 331	1 year	5 years	—	1 year ⁽⁴⁾	5 years ⁽⁴⁾	—
TC 338	1 year	—	—	—	5 years	—
TC 341	1 year	10 years	—	—	10 years	—
TC 11 portable	1 year	10 years	—	1 year	5 years	—
TC 44 portable	1 year	5 years	—	1 year	5 years	—
TC 51 portable	2.5 years	5 years	5 years	—	5 years	—
TC 56 and 57 portable	2.5 years	—	—	—	2.5 years	—
TC 60 portable	2 years	Initial: 4 years. Next 8 years: every 2 years. After 12 years: annually	Initial: 4 years. Next 8 years: every 2 years. After 12 years: annually		Initial: 4 years. Next 8 years: every 2 years. After 12 years: annually	—

Note: See an official copy of *CSA B620* for the **Notes**.

APPENDIX C

(This table is only a reproduction of table 7.3 from *B620-09*. The latest version of *CSA B620* should be used as the official reference.)

Table 7.3
Pressures for Periodic Retesting
 (See Clauses 5.2.5, 7.2.7.7, and 7.2.7.8)

Tank specification	Pressure, kPa (psi)
TC 306 or MC 306	21 kPa (3 psi) or design pressure, whichever is greater
TC 307 or MC 307	275 kPa (40 psi) or 1.5 x design pressure, whichever is greater
TC 312 or MC 312	21 kPa (3 psi) or 1.5 x MAWP, whichever is greater
TC 331, MC 330, or MC 331	1.5 x design pressure
TC 406	34.5 kPa (5 psig) or 1.5 MAWP, whichever is greater
TC 407	275.8 kPa (40 psig) or 1.5 x MAWP, whichever is greater
TC 412	1.5 x MAWP
TC 423	1.5 x MAWP
TC 338 or TC 341	According to calculation in Clause 5.2.5
TC 350	155 kPa (22.5 psig) or 1.5 x MAWP, whichever is greater
TC 11	According to calculation in Clause 6.4.11 c)
TC 51 or DOT 51	1.5 x MAWP
TC 60 or DOT 60	415 kPa (60 psi)
TC Type 1, 2 and 3	1.5 x MAWP

** ERD Retesting requirements for Mobile Process Units: *TC412* & *TC423*; MAWP= 5 psi.

APPENDIX D

(This table is only a reproduction of *table EP17* from *CAN/CGSB-43.151-2012*. The latest version of *CAN/CGSB-43.151-2012* should be used as the official reference.)

EP 17		
Inner packagings and arrangements	Intermediate packagings and arrangements	Outer packagings and arrangements
Not necessary	Not necessary	IBCs: <ul style="list-style-type: none"> - metal (11A, 11B, 11N, 21A, 21B, 21N, 31A, 31B, 31N) - flexible (13H2, 13H3, 13H4, 13L2, 13L3, 13L4, 13M2) - rigid plastics (11H1, 11H2, 21H1, 21H2, 31H1, 31H2) - composite (11HZ1, 11HZ2, 21HZ1, 21HZ2, 31HZ1, 31HZ2) Highway Tanks UN Portable Tanks
Division, Compatibility group and UN number: 1.5D: UN 0331, 0332 Special provisions: none <i>Additional requirements:</i> <ol style="list-style-type: none"> 1. IBCs for solids UN code 11, 13 and 21 shall be used for solids only. 2. UN 0331 and 0332 explosives may be transported <ol style="list-style-type: none"> a) in a highway tank that conforms to the requirements for specification TC 423 in accordance with CSA B620; b) in a highway tank that conforms to the requirements for specification TC 407 or TC 412 having a marked MAWP equal to or less than 241 kPa (35 psi), manufactured before January 1, 2017; c) until January 1, 2017, in a highway tank that is part of a Mobile Process Unit (MPU) designed to transport, manufacture and load explosives into boreholes in conformance with an explosives licence or certificate issued for the MPU under the Explosives Act and Regulations and conforms to the requirements for specification TC 406; or d) in a highway tank that was loaded in the United States of America (US) in accordance with the requirements of 49 CFR. 3. UN 0331 and 0332 explosives may be transported in a UN portable tank if the tank has stainless steel shell and heads and has a minimum test pressure that is equal to or more than 150 kPa (21.75 psi) but that is equal to or less than 600 kPa (87 psi). <p style="margin-top: 10px;">NOTE: A pumping system, if installed on a MPU in conformance with an explosives licence or certificate issued for the MPU under the <i>Explosives Act and Regulations</i>, must comply with the safety requirements set out in the Natural Resources Canada (NRCAN) publication <i>Guidelines for Pumping of Water Based Explosives</i> and be approved by the Explosives Regulatory Division of NRCAN. Pumping systems are not permitted on transport tanks that are not licenced as MPUs.</p>		

APPENDIX E

Mobile Process Unit (MPU) Declaration F05-12

Licence/File No:	Company:	Date:
Unit No:	Located at:	Company Representative:
Authorization No:	Type of Process:	Signature:
<i>This Form must be completed and signed off by a competent representative of the explosive company and returned to ERD.</i>		
Component/Requirement. Check against licence description.	Check if OK	Notes, comments and actions required
1. PRODUCTS MADE or CARRIED BY THE TRUCK		
Ammonium Nitrate (AN)		Quantity (Kg/L):
Fuel oil (FO)		Quantity (Kg/L):
Emulsion		Quantity (Kg/L):
Gassing solution		Quantity (Kg/L):
2. AUTOMOTIVE		
2.1 Annual mechanical fitness check by a certified mechanic. (If it is a vehicle which is confined to a closed site, a certified mechanic still has to sign off on the vehicle stating that the vehicle is fit to perform its duties in a safe fashion.)		Date of last inspection:
2.2 Truck exhaust: Horizontal portions of exhaust shielded from drips of hydraulic fluid, oil or emulsion?	Y / N	
2.3 All wires aft of cab in conduit?	Y / N	
3. GENERAL SAFETY and COMPLIANCE		
3.1 Engineered fire suppression system for engine compartment. (note date of last inspection/maintenance by a certified person – every 6 months)		Date of last inspection:

Component/Requirement. Check against licence description.	Check if OK	Notes, comments and actions required
3.2 Fire extinguishers (2 X 4A: 40 BC)?	Y / N	
3.3 UN placards on all 4 sides of truck for each dangerous good?	Y / N	
3.4 Lockable hose caps and valves on explosives bins and tanks?	Y / N	
3.5 No brass or copper exposed to AN or explosives?	Y / N	
3.6 Wires and hoses are protected from rubbing and impact?	Y / N	
3.7 Company name plus logo and unit number on vehicle, easily read?	Y / N	
4. AMMONIUM NITRATE or ANFO BIN		
4.1 Locking hatch covers?	Y / N	
5. AN / ANFO BLOW LOADERS		
5.1 <u>Semi</u> -conductive hose for blow loading holes. (no wire allowed in hose)	Y / N	Note make and model.
6. EXPLOSIVE TANK		
6.1 Stainless steel (product contact surfaces)?	Y / N	
6.2 TC tank specifications and inspection information.		Date of last inspection: V: I: P: K:
6.3 Hatch – Lockable?	Y / N	
7. PROCESS FUEL OIL TANK		
7.1 How many litres?		
7.2 Shut-off valves at all outlets?	Y / N	
7.3 Manual or self-closing valves on sight gauge level indicator. Is the sight gage tube protected?	Y / N	
7.4 Meets CSA B620 if over 450 litres. TC406. (If >450 L, it must be inspected annually – VKIP)		Date of last inspection: V: I: P: K:
8. EXPLOSIVES PUMP		
8.1 Make, type, size, identification number, etc.		

Component/Requirement. Check against licence description.	Check if OK	Notes, comments and actions required
8.2 List the safety devices fitted and date last tested.		
8.3 When was the pump last tested?		
8.4 Pump maintenance logbook?	Y / N	
9. OTHER EXPLOSIVES PUMP if fitted		
9.1 Make, type, size, identification number, etc.		
9.2 List the safety devices fitted and date last tested.		
9.3 When was the pump last tested?		
9.4 Pump maintenance logbook?	Y / N	
10. AUGERS		
10.1 Outboard bearings with stand-off spacing at ends?	Y / N	
11. OTHER COMMENTS		
11.1 Is the truck clean of excess grease, oil and/or other combustibles?	Y / N	
11.2 Wash bay and garage for truck available?	Y / N	
11.3 Is this MPU compliant with ERD-G05-02 "Requirements for Bulk Mobile Process Units"?	Y / N	

