Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and GHS

Printing date 04.04.2013 *Revision: 29.03.2013*

1 Identification of the substance/mixture and of the company/undertaking

· **1.1 Product identifier**

· **Trade name: MODEL 3441 37/40mm OC Powder Barricade Projectile**

· **Article number:** *Model 3441*

· **1.2 Relevant identified uses of the substance or mixture and uses advised against**
No further relevant information available.

· **Application of the substance / the preparation** *Explosive product.*

· **1.3 Details of the supplier of the Safety Data Sheet**

· **Manufacturer/Supplier:**
Combined Systems, Inc.
388 Kinsman Rd.
Jamestown, PA 16134
Phone: (724) 932-2177

· **1.4 Emergency telephone number:**
ChemTel Inc.
(800)255-3924, +1 (813)248-0585

2 Hazards identification

· **2.1 Classification of the substance or mixture**

· **Classification according to Regulation (EC) No 1272/2008**
The following Hazard Statements are applicable only to the EU regulations and not the US GHS regulation: H360Df, H412.
The following hazard statements are applicable only to OSHA (USA) regulations and not the specific CLP regulation: H360.



H360: May damage fertility or the unborn child



GHS01 exploding bomb

Expl. 1.4	*H204*	*Fire or projection hazard.*



GHS08 health hazard

Repr. 1B	*H360Df*	*May damage the unborn child. Suspected of damaging fertility.*



GHS07

Acute Tox. 4	*H312*	*Harmful in contact with skin.*
Acute Tox. 4	*H332*	*Harmful if inhaled.*
Aquatic Chronic 3	*H412*	*Harmful to aquatic life with long lasting effects.*

(Contd. on page 2)

Safety Data Sheet
according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and GHS

Printing date 04.04.2013 *Revision: 29.03.2013*

Trade name: MODEL 3441 37/40mm OC Powder Barricade Projectile

(Contd. of page 1)

· **Classification according to Directive 67/548/EEC or Directive 1999/45/EC**



Xn; Harmful

R20/21/22-40-48: *Harmful by inhalation, in contact with skin and if swallowed. Limited evidence of a carcinogenic effect. Danger of serious damage to health by prolonged exposure.*



E; Explosive

R3: *Extreme risk of explosion by shock, friction, fire or other sources of ignition.*

R33: *Danger of cumulative effects.*

· **Information concerning particular hazards for human and environment:**
The product has to be labelled due to the calculation procedure of the "General Classification guideline for preparations of the EU" in the latest valid version.

· **Classification system:**
The classification is according to the latest editions of the EU-lists, and extended by company and literature data.
The classification is in accordance with the latest editions of international substances lists, and is supplemented by information from technical literature and by information provided by the company.

· **2.2 Label elements**

· **Labelling according to Regulation (EC) No 1272/2008**
The product is classified and labelled according to the CLP regulation.

· **Hazard pictograms**



GHS01 GHS07 GHS08

· **Signal word** *Danger*

· **Hazard-determining components of labelling:**
glycerol trinitrate
Oleoresin Capsicum
dibutyl phthalate
diphenylamine

· **Hazard statements**
H204 *Fire or projection hazard.*
H312+H332 *Harmful in contact with skin or if inhaled.*
H360Df *May damage the unborn child. Suspected of damaging fertility.*
H412 *Harmful to aquatic life with long lasting effects.*

· **Precautionary statements**
P210 *Keep away from heat/sparks/open flames/hot surfaces. - No smoking.*
P250 *Do not subject to grinding/shock/friction.*
P261 *Avoid breathing dust/fume/gas/mist/vapours/spray.*
P281 *Use personal protective equipment as required.*
P373 *DO NOT fight fire when fire reaches explosives.*
P304+P340 *IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.*
P372 *Explosion risk in case of fire.*

(Contd. on page 3)

Safety Data Sheet
according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and GHS

Printing date 04.04.2013 *Revision: 29.03.2013*

Trade name: MODEL 3441 37/40mm OC Powder Barricade Projectile

(Contd. of page 2)

P302+P352 IF ON SKIN: Wash with plenty of soap and water.

· **Additional information:**
Can become highly flammable in use.
Restricted to professional users.

· **Hazard description:**

· **WHMIS-symbols:**
D2A - Very toxic material causing other toxic effects
F - Dangerously reactive material



· **NFPA ratings (scale 0 - 4)**



Health = 3
Fire = 2
Reactivity = 3

· **HMIS-ratings (scale 0 - 4)**



Health = 3
Fire = 2
Reactivity = 3

· **HMIS Long Term Health Hazard Substances**

None of the ingredients is listed.

· **2.3 Other hazards**

· **Results of PBT and vPvB assessment**

· **PBT:** *Not applicable.*

· **vPvB:** *Not applicable.*

· **Explosive Product Notice**

PREVENTION OF ACCIDENTS IN THE USE OF EXPLOSIVES - The prevention of accidents in the use of explosives is a result of careful planning and observance of the best known practices. The explosives user must remember that he is dealing with a powerful force and that various devices and methods have been developed to assist him in directing this force. He should realize that this force, if misdirected, may either kill or injure both him and his fellow workers.

WARNING - All explosives are dangerous and must be carefully handled and used following approved safety procedures either by or under the direction of competent, experienced persons in accordance with all applicable federal, state, and local laws, regulations, or ordinances. If you have any questions or doubts as to how to use any explosive product, DO NOT USE IT before consulting with your supervisor, or the manufacturer, if you do not have a supervisor. If your supervisor has any questions or doubts, he should consult the manufacturer before use.

3 Composition/information on ingredients

· **3.2 Mixtures**

· **Description:** *Mixture of substances listed below with nonhazardous additions.*

(Contd. on page 4)

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and GHS

Printing date 04.04.2013 *Revision: 29.03.2013*

Trade name: MODEL 3441 37/40mm OC Powder Barricade Projectile

(Contd. of page 3)

· **Dangerous components:**

CAS: 1309-48-4 *EINECS: 215-171-9* *Index number: 025-199-09-0*	*magnesium oxide* *substance with a Community workplace exposure limit*	*>50%*
CAS: 9004-70-0 *EC number: 603-037-0*	*Nitrocellulose, colloided, granular* *E R1-3* *Unst. Expl., H200*	*<10%*
CAS: 55-63-0 *EINECS: 200-240-8* *Index number: 603-034-00-X*	*glycerol trinitrate* *T+ R26/27/28; E R3; N R51/53* *R33* *Unst. Expl., H200* *Acute Tox. 2, H300; Acute Tox. 1, H310; Acute Tox. 2, H330* *STOT RE 2, H373* *Aquatic Chronic 2, H411* *Flam. Liq. 2, H225*	*<10%*
CAS: 8023-77-6 *EINECS: 288-920-0*	*Oleoresin Capsicum* *T R25; Xn R21; Xi R36/37/38* *Acute Tox. 2, H300; Acute Tox. 3, H311* *Skin Irrit. 2, H315; Eye Irrit. 2, H319; STOT SE 3, H335*	*<10%*
CAS: 68611-44-9 *EINECS: 271-893-4*	*silica dimethyl silyate*	*<10%*
CAS: 7440-50-8 *EINECS: 231-159-6*	*copper*	*<10%*
CAS: 10022-31-8 *EINECS: 233-020-5* *Index number: 056-002-00-7*	*barium nitrate* *Xn R20/22* *Acute Tox. 4, H302; Acute Tox. 4, H332*	*<1,0%*
CAS: 12403-82-6 *EINECS: 235-642-2*	*dihydroxy[styphnato(2-)]dilead / lead styphnate* *T R23/25; Xn R40-48-62; E R3; N R50/53* *R33*	*<1,0%*
CAS: 7757-79-1 *EINECS: 231-818-8*	*potassium nitrate* *O R8* *Ox. Sol. 2, H272*	*<1,0%*
CAS: 122-39-4 *EINECS: 204-539-4* *Index number: 612-026-00-5*	*diphenylamine* *T R23/24/25; N R50/53* *R33* *Acute Tox. 3, H301; Acute Tox. 3, H311; Acute Tox. 3, H331* *STOT RE 2, H373* *Aquatic Acute 1, H400; Aquatic Chronic 1, H410*	*<1,0%*
CAS: 1345-04-6 *EINECS: 215-713-4*	*antimony sulphide*	*<1,0%*

(Contd. on page 5)

Safety Data Sheet
according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and GHS

Printing date 04.04.2013 *Revision: 29.03.2013*

Trade name: MODEL 3441 37/40mm OC Powder Barricade Projectile

(Contd. of page 4)

CAS: 7440-66-6 EINECS: 231-175-3 Index number: 030-001-00-1	zinc powder -zinc dust (pyrophoric) F R15-17; N R50/53 Pyr. Sol. 1, H250; Water-react. 1, H260 Aquatic Acute 1, H400; Aquatic Chronic 1, H410	<1,0%
CAS: 84-74-2 EINECS: 201-557-4 Index number: 607-318-00-4	dibutyl phthalate T Repr. Cat. 2, 3 R61; Xn R62; N R50 Repr. 1B, H360Df Aquatic Acute 1, H400	<1,0%

· **SVHC**

84-74-2	dibutyl phthalate

· **Additional information:** For the wording of the listed risk phrases refer to section 16.

4 First aid measures

· **4.1 Description of first aid measures**
· **General information:**
Immediately remove any clothing soiled by the product.
Symptoms of poisoning may even occur after several hours; therefore medical observation for at least 48 hours after the accident.
In case of irregular breathing or respiratory arrest provide artificial respiration.
Remove breathing equipment only after contaminated clothing have been completely removed.
· **After inhalation:**
Supply fresh air. If required, provide artificial respiration. Keep patient warm. Consult doctor if symptoms persist.
In case of unconsciousness place patient stably in side position for transportation.
· **After skin contact:**
Immediately rinse with water.
Clean with water and soap.
Do not pull solidified product off the skin.
If skin irritation continues, consult a doctor.
· **After eye contact:**
Remove contact lenses if worn.
Rinse opened eye for several minutes under running water. Then consult a doctor.
· **After swallowing:**
Unlikely route of exposure.
Do not induce vomiting; call for medical help immediately.
Call for a doctor immediately.
· **4.2 Most important symptoms and effects, both acute and delayed**
Coughing
Nausea
Breathing difficulty
Dizziness
Allergic reactions
· **Hazards**
Danger of impaired breathing.
Danger of disturbed cardiac rhythm.

(Contd. on page 6)

Safety Data Sheet
according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and GHS

Printing date 04.04.2013 *Revision: 29.03.2013*

Trade name: MODEL 3441 37/40mm OC Powder Barricade Projectile

(Contd. of page 5)

· **4.3 Indication of any immediate medical attention and special treatment needed**
Treat skin and mucous membrane with antihistamine and corticoid preparations.
If necessary oxygen respiration treatment.
In cases of irritation to the lungs, initial treatment with cortical steroid inhalants.

5 Firefighting measures

· **5.1 Extinguishing media**
· **Suitable extinguishing agents:**
Flood area with water. If no water is available, carbon dioxide, dry chemical or earth may be used. If the fire reaches the cargo, withdraw and let fire burn.
· **For safety reasons unsuitable extinguishing agents:** *None.*
· **5.2 Special hazards arising from the substance or mixture**
During heating or in case of fire poisonous gases are produced.
· **5.3 Advice for firefighters**
· **Protective equipment:**
Wear self-contained respiratory protective device.
Wear fully protective suit.
· **Additional information**
Eliminate all ignition sources if safe to do so.
Evacuate area and fight fire from from the upwind side.
In case of major fire and large quantities: Evacuate area. Fight fire remotely due to the risk of explosion.
Flammability Classification: (defined by 29 CFR 1910.1200) Explosive. Can explode under fire conditions. Individual devices will randomly explode. Will not mass explode if multiple devices are involved. Burning material may produce toxic and irritating vapors. In unusual cases, shrapnel may be thrown from exploding devices under containment. See 2008 Emergency response Guidebook for further information.

6 Accidental release measures

· **6.1 Personal precautions, protective equipment and emergency procedures**
Use respiratory protective device against the effects of fumes/dust/aerosol.
Isolate area and prevent access.
Wear protective clothing.
Remove persons from danger area.
Ensure adequate ventilation
Protect from heat.
Keep away from ignition sources.
· **6.2 Environmental precautions:** *Do not allow to enter sewers/ surface or ground water.*
· **6.3 Methods and material for containment and cleaning up:**
Pick up mechanically.
Send for recovery or disposal in suitable receptacles.
Dispose contaminated material as waste according to item 13.
· **6.4 Reference to other sections**
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.

(Contd. on page 7)

Safety Data Sheet
according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and GHS

Printing date 04.04.2013 *Revision: 29.03.2013*

Trade name: MODEL 3441 37/40mm OC Powder Barricade Projectile

(Contd. of page 6)

See Section 13 for disposal information.

7 Handling and storage

· **7.1 Precautions for safe handling**
Handle with care. Avoid jolting, friction and impact.
Keep away from heat and direct sunlight.
· **Information about fire - and explosion protection:**
Prevent impact and friction.
Keep respiratory protective device available.
Emergency cooling must be available in case of nearby fire.

· **7.2 Conditions for safe storage, including any incompatibilities**
· **Storage:**
· **Requirements to be met by storerooms and receptacles:**
Avoid storage near extreme heat, ignition sources or open flame.
Provide ventilation for receptacles.
· **Information about storage in one common storage facility:**
Store away from foodstuffs.
Store away from flammable substances.
Do not store together with oxidizing and acidic materials.
· **Further information about storage conditions:**
Store in dry conditions.
Store receptacle in a well ventilated area.
Protect from heat and direct sunlight.
· **7.3 Specific end use(s)** *No further relevant information available.*

8 Exposure controls/personal protection

· **Additional information about design of technical facilities:** *No further data; see item 7.*

· **8.1 Control parameters**

· **Ingredients with limit values that require monitoring at the workplace:**	
1309-48-4 magnesium oxide	
PEL (USA)	*15* mg/m³* *fume; *total particulate*
TLV (USA)	*10* mg/m³* **as inhalable fraction*
EL (Canada)	*Short-term value: 10** mg/m³* *Long-term value: 10* 3** mg/m³* **inhalable fume;**respirable dust and fume*
EV (Canada)	*10 mg/m³* *inhalable*

(Contd. on page 8)

Safety Data Sheet
according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and GHS

Printing date 04.04.2013 *Revision: 29.03.2013*

Trade name: MODEL 3441 37/40mm OC Powder Barricade Projectile

(Contd. of page 7)

7439-92-1 lead	
PEL (USA)	*0,05* mg/m³* *see 29 CFR 1910,1025*
REL (USA)	*0,05 mg/m³* *excluding lead arsenate; See Pocket Guide App. C*
TLV (USA)	*0,05* mg/m³* *and inorganic compounds, as Pb; BEI*
EL (Canada)	*0,05 mg/m³* *R; elemental: IARC 2B, inorganic comp.: IARC 2A*
EV (Canada)	*0,05 mg/m³* *element,inorg.+org. compds., lead chromate as Pb*
55-63-0 glycerol trinitrate	
PEL (USA)	*Short-term value: C 2 mg/m³, C 0,2 ppm* *Skin*
REL (USA)	*Short-term value: 0,1 mg/m³* *Skin*
TLV (USA)	*0,46 mg/m³, 0,05 ppm* *Skin*
EL (Canada)	*0,05 ppm* *Skin*
EV (Canada)	*0,5 mg/m³, 0,05 ppm* *Skin*
84-74-2 dibutyl phthalate	
PEL (USA)	*5 mg/m³*
REL (USA)	*5 mg/m³*
TLV (USA)	*5 mg/m³*
EL (Canada)	*5 mg/m³* *R*
EV (Canada)	*5 mg/m³*
122-39-4 diphenylamine	
REL (USA)	*10 mg/m³*
TLV (USA)	*10 mg/m³*
EL (Canada)	*10 mg/m³*
EV (Canada)	*10 mg/m³*

· **DNELs** *No further relevant information available.*
· **PNECs** *No further relevant information available.*
· **Additional information:** *The lists valid during the making were used as basis.*

· **8.2 Exposure controls**
· **Personal protective equipment:**
· **General protective and hygienic measures:**
Keep away from foodstuffs, beverages and feed.
Wash hands before breaks and at the end of work.

(Contd. on page 9)

Safety Data Sheet
according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and GHS

Trade name: MODEL 3441 37/40mm OC Powder Barricade Projectile

(Contd. of page 8)

Avoid contact with the eyes and skin.
Do not inhale gases / fumes / aerosols.
· **Respiratory protection:**



Respiratory protection required.

Wear positive pressure NIOSH or European EN149 vapor respirators when deploying product in large quantities.
· **Protection of hands:**



Protective gloves

The glove material has to be impermeable and resistant to the product/ the substance/ the preparation.
Due to missing tests no recommendation to the glove material can be given for the product/ the preparation/ the chemical mixture.
Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation
· **Material of gloves**
The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer. As the product is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application.
· **Penetration time of glove material**
The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.
· **Eye protection:**
Contact lenses should not be worn.



Safety glasses

· **Limitation and supervision of exposure into the environment**
No further relevant information available.
· **Risk management measures**
Organizational measures should be in place for all activities involving this product.
See Section 7 for additional information.

9 Physical and chemical properties

· **9.1 Information on basic physical and chemical properties**
· **General Information**
· **Appearance:**

Form:	*Powder*
Colour:	*Grey*

(Contd. on page 10)

Safety Data Sheet
according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and GHS

Printing date 04.04.2013 *Revision: 29.03.2013*

Trade name: MODEL 3441 37/40mm OC Powder Barricade Projectile

(Contd. of page 9)

· **Odour:**	*Pungent, makes eyes water*
· **Odour threshold:**	*Not determined.*
· **pH-value:**	*Not applicable.*
· **Change in condition**	
Melting point/Melting range:	*Undetermined.*
Boiling point/Boiling range:	*Undetermined.*
· **Flash point:**	*Not applicable.*
· **Flammability (solid, gaseous):**	*Not determined.*
· **Ignition temperature:**	*Not determined.*
· **Decomposition temperature:**	*Not determined.*
· **Self-igniting:**	*Product is not self-igniting.*
· **Danger of explosion:**	*Extreme risk of explosion by shock, friction, fire or other sources of ignition.*
· **Explosion limits:**	
Lower:	*Not determined.*
Upper:	*Not determined.*
· **Vapour pressure:**	*Not applicable.*
· **Density:**	*Not determined.*
· **Relative density**	*Not determined.*
· **Vapour density**	*Not applicable.*
· **Evaporation rate**	*Not applicable.*
· **Solubility in / Miscibility with water:**	*Soluble.*
· **Partition coefficient (n-octanol/water):**	*Not determined.*
· **Viscosity:**	
Dynamic:	*Not applicable.*
Kinematic:	*Not applicable.*
· **9.2 Other information**	*No further relevant information available.*

10 Stability and reactivity

· **10.1 Reactivity**
· **10.2 Chemical stability**
· **Thermal decomposition / conditions to be avoided:**
No decomposition if used and stored according to specifications.
· **10.3 Possibility of hazardous reactions**
Danger of explosion.
Reacts with strong acids.
· **10.4 Conditions to avoid** *No further relevant information available.*

(Contd. on page 11)

Safety Data Sheet
according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and GHS

Printing date 04.04.2013 *Revision: 29.03.2013*

Trade name: MODEL 3441 37/40mm OC Powder Barricade Projectile

(Contd. of page 10)

· **10.5 Incompatible materials:** *No further relevant information available.*
· **10.6 Hazardous decomposition products:**
Hydrocarbons
Leadoxide vapour
Bariumoxide vapour
Nitrogen oxides
Carbon monoxide and carbon dioxide
Irritant gases/vapours
Poisonous gases/vapours

11 Toxicological information

· **11.1 Information on toxicological effects**
· **Acute toxicity:**

· **LD/LC50 values relevant for classification:**		
55-63-0 glycerol trinitrate		
Oral	*LD50*	*115 mg/kg (mouse)*
		105 mg/kg (rat)
Dermal	*LD50*	*29 mg/kg (rat)*
		280 mg/kg (rabbit)
8023-77-6 Oleoresin Capsicum		
Oral	*LD50*	*47,2 mg/kg (mouse)*
		3000 mg/kg (rat)
Dermal	*LD50*	*512 mg/kg (mouse)*
122-39-4 diphenylamine		
Oral	*LD50*	*1120 mg/kg (rat)*

· **Primary irritant effect:**
· **on the skin:** *Irritant to skin and mucous membranes.*
· **on the eye:** *Irritating effect.*
· **Sensitization:**
Sensitizing effect through inhalation is possible by prolonged exposure.
Sensitizing effect by skin contact is possible by prolonged exposure.
· **Additional toxicological information:**
The product shows the following dangers according to the calculation method of the General EU Classification Guidelines for Preparations as issued in the latest version:
Harmful
Danger through skin adsorption.
· **Sensitisation:** *Sensitization possible by inhalation and/or dermal contact.*
· **Repeated dose toxicity:**
Repeated exposures may result in skin and/or respiratory sensitivity.
May cause damage to organs through prolonged or repeated exposure .

(Contd. on page 12)

Safety Data Sheet
according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and GHS

Printing date 04.04.2013 *Revision: 29.03.2013*

Trade name: MODEL 3441 37/40mm OC Powder Barricade Projectile

(Contd. of page 11)

12 Ecological information

· **12.1 Toxicity**
· **Aquatic toxicity:** *The product contains materials that are harmful to the environment.*
· **12.2 Persistence and degradability** *The product is partially biodegradable. Significant residuals remain.*
· **12.3 Bioaccumulative potential** *May be accumulated in organism*
· **12.4 Mobility in soil** *No further relevant information available.*
· **Additional ecological information:**
· **General notes:**
This statement was deduced from the properties of the single components.
The product contains heavy metals. Avoid transfer into the environment. Specific preliminary treatments are necessary
Due to available data on eliminability/decomposition and bioaccumulation potential prolonged term damage of the environment can not be excluded.
Water hazard class 3 (German Regulation) (Self-assessment): extremely hazardous for water
Do not allow product to reach ground water, water course or sewage system, even in small quantities.
Danger to drinking water if even extremely small quantities leak into the ground.
· **12.5 Results of PBT and vPvB assessment**
· **PBT:** *Not applicable.*
· **vPvB:** *Not applicable.*
· **12.6 Other adverse effects** *No further relevant information available.*

13 Disposal considerations

· **13.1 Waste treatment methods**
· **Recommendation**
Must not be disposed together with household garbage. Do not allow product to reach sewage system.
· **Uncleaned packaging:**
· **Recommendation:** *Disposal must be made according to official regulations.*

14 Transport information

· **14.1 UN-Number**	
· **DOT, ADR, IMDG, IATA**	*UN0303*
· **14.2 UN proper shipping name**	
· **DOT, IMDG, IATA**	*Ammunition, Smoke*
· **ADR**	*0303, Ammunition, Smoke*

(Contd. on page 13)

Safety Data Sheet
according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and GHS

Printing date 04.04.2013 *Revision: 29.03.2013*

Trade name: MODEL 3441 37/40mm OC Powder Barricade Projectile

(Contd. of page 12)

· **14.3 Transport hazard class(es)**

· **DOT, ADR, IMDG, IATA**



· **Class**	*1.4*
· **Label**	*1.4G*
· **14.4 Packing group**	
· **DOT, ADR, IMDG, IATA**	*II*
· **14.5 Environmental hazards:**	
· **Marine pollutant:**	*No*
· **14.6 Special precautions for user**	*Not applicable.*
· **EMS Number:**	*F-A,S-Q*
· **14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code**	*Not applicable.*
· **Transport/Additional information:**	*DOT PHMSA Explosives EX9802115*
· **UN "Model Regulation":**	*UN0303, 0303, 1.4G, II*

15 Regulatory information

· **15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture**
· **United States (USA)**
· **SARA**

· **Section 355 (extremely hazardous substances):**

None of the ingredients is listed.

· **Section 313 (Specific toxic chemical listings):**

55-63-0	*glycerol trinitrate*

· **TSCA (Toxic Substances Control Act):**

All ingredients are listed.

· **Proposition 65 (California):**

· **Chemicals known to cause cancer:**

None of the ingredients is listed.

· **Chemicals known to cause reproductive toxicity for females:**

84-74-2	*dibutyl phthalate*

· **Chemicals known to cause reproductive toxicity for males:**

84-74-2	*dibutyl phthalate*

(Contd. on page 14)

Safety Data Sheet
according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and GHS

Printing date 04.04.2013 *Revision: 29.03.2013*

Trade name: MODEL 3441 37/40mm OC Powder Barricade Projectile

(Contd. of page 13)

· **Chemicals known to cause developmental toxicity:**
Present in trace quantities: Lead, dibutyl phthalate.

84-74-2	*dibutyl phthalate*
7439-92-1	*lead*

· **Carcinogenic Categories**

· **EPA (Environmental Protection Agency)**

None of the ingredients is listed.

· **IARC (International Agency for Research on Cancer)**

None of the ingredients is listed.

· **TLV (Threshold Limit Value established by ACGIH)**

1309-48-4	*magnesium oxide*	*A4*
122-39-4	*diphenylamine*	*A4*

· **NIOSH-Ca (National Institute for Occupational Safety and Health)**

None of the ingredients is listed.

· **OSHA-Ca (Occupational Safety & Health Administration)**

None of the ingredients is listed.

· **Canada**

· **Canadian Domestic Substances List (DSL)**

All ingredients are listed.

· **Canadian Ingredient Disclosure list (limit 0.1%)**

122-39-4	*diphenylamine*

· **Canadian Ingredient Disclosure list (limit 1%)**

1309-48-4	*magnesium oxide*
7440-50-8	*copper*

· **National regulations:**

· **Other regulations, limitations and prohibitive regulations**

· **Substances of very high concern (SVHC) according to REACH, Article 57**

84-74-2	*dibutyl phthalate*

· **15.2 Chemical safety assessment:** *A Chemical Safety Assessment has not been carried out.*

16 Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

· **Relevant phrases**
H200 Unstable explosives.
H225 Highly flammable liquid and vapour.
H250 Catches fire spontaneously if exposed to air.
H260 In contact with water releases flammable gases which may ignite spontaneously.
H272 May intensify fire; oxidiser.

(Contd. on page 15)

Safety Data Sheet
according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and GHS

Printing date 04.04.2013 *Revision: 29.03.2013*

Trade name: MODEL 3441 37/40mm OC Powder Barricade Projectile

(Contd. of page 14)

H300 *Fatal if swallowed.*
H301 *Toxic if swallowed.*
H302 *Harmful if swallowed.*
H310 *Fatal in contact with skin.*
H311 *Toxic in contact with skin.*
H315 *Causes skin irritation.*
H319 *Causes serious eye irritation.*
H330 *Fatal if inhaled.*
H331 *Toxic if inhaled.*
H332 *Harmful if inhaled.*
H335 *May cause respiratory irritation.*
H360Df *May damage the unborn child. Suspected of damaging fertility.*
H373 *May cause damage to organs through prolonged or repeated exposure.*
H400 *Very toxic to aquatic life.*
H410 *Very toxic to aquatic life with long lasting effects.*
H411 *Toxic to aquatic life with long lasting effects.*

R1 *Explosive when dry.*
R15 *Contact with water liberates extremely flammable gases.*
R17 *Spontaneously flammable in air.*
R20/22 *Harmful by inhalation and if swallowed.*
R21 *Harmful in contact with skin.*
R23/24/25 *Toxic by inhalation, in contact with skin and if swallowed.*
R23/25 *Toxic by inhalation and if swallowed.*
R25 *Toxic if swallowed.*
R26/27/28 *Very toxic by inhalation, in contact with skin and if swallowed.*
R3 *Extreme risk of explosion by shock, friction, fire or other sources of ignition.*
R33 *Danger of cumulative effects.*
R36/37/38 *Irritating to eyes, respiratory system and skin.*
R40 *Limited evidence of a carcinogenic effect.*
R48 *Danger of serious damage to health by prolonged exposure.*
R50 *Very toxic to aquatic organisms.*
R50/53 *Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.*
R51/53 *Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.*
R61 *May cause harm to the unborn child.*
R62 *Possible risk of impaired fertility.*
R8 *Contact with combustible material may cause fire.*

· **Abbreviations and acronyms:**
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
GHS: Globally Harmonized System of Classification and Labelling of Chemicals
ACGIH: American Conference of Governmental Industrial Hygienists
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
WHMIS: Workplace Hazardous Materials Information System (Canada)
DNEL: Derived No-Effect Level (REACH)
PNEC: Predicted No-Effect Concentration (REACH)

(Contd. on page 16)

Safety Data Sheet

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Printing date 04.04.2013 *Revision: 29.03.2013*

Trade name: MODEL 3441 37/40mm OC Powder Barricade Projectile

(Contd. of page 15)

LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent

· **Sources**

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