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

1.1 Product identifier
- Trade name: Cast Boosters, Seismic
- Article number: No other identifiers 1145
- Other product identifiers:
  - Geoprome®
  - Geoprome® dBX™
  - Geoseis® CTF

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

1.3 Details of the supplier of the Safety Data Sheet
- Manufacturer/Supplier:
  - Dyno Nobel Inc.
  - 2795 East Cottonwood Parkway, Suite 500
  - Salt Lake City, Utah 84121
  - Phone: 801-364-4800
  - Fax: 801-321-6703
  - E-Mail: dnna.hse@am.dynonobel.com

1.4 Emergency telephone number:
- CHEMTREC
  - 1-800-424-9300 (US/Canada)
  - +01 703-527-3887 (International)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
- Classification according to Regulation (EC) No 1272/2008
  - Exploding bomb
  - Expl. 1.1 H201 Explosive; mass explosion hazard.

- Classification according to Directive 67/548/EEC or Directive 1999/45/EC
  - E: Explosive
  - R2: Risk of explosion by shock, friction, fire or other sources of ignition.

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.
Trade name: Cast Boosters, Seismic

- **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.

- **Additional information:**
  0 percent of the mixture consists of component(s) of unknown toxicity
  There are no other hazards not otherwise classified that have been identified.

- **2.2 Label elements**
  - **Labelling according to Regulation (EC) No 1272/2008**
    The product is additionally classified and labelled according to the Globally Harmonized System within the United States (GHS).
    The product is classified and labelled according to the CLP regulation.
  - **Hazard pictograms**
    - GHS01

- **Signal word** Danger
- **Hazard statements**
  H201 Explosive; mass explosion hazard.
- **Precautionary statements**
  - P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
  - P250 Do not subject to grinding/shock/friction.
  - P280 Wear protective gloves/protective clothing/eye protection/face protection.
  - P373 DO NOT fight fire when fire reaches explosives.
  - P370+P380 In case of fire: Evacuate area.
  - P372 Explosion risk in case of fire.
  - P401 Store in accordance with local/regional/national/international regulations.
  - P501 Dispose of contents/container in accordance with local/regional/national/international regulations.
- **Hazard description:**
  - **WHMIS-symbols:** Explosive products are not classified under WHMIS.
  - **NFPA ratings (scale 0 - 4)** Not available.
  - **HMIS-ratings (scale 0 - 4)** Not available
- **HMIS Long Term Health Hazard Substances**
  None of the ingredients are 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.

SECTION 3: Composition/information on ingredients

- **3.2 Mixtures**
  - **Description:** Mixture of substances listed below with nonhazardous additions.
  - **Dangerous components:**
    - **CAS:** 78-11-5
      - **EINECS:** 201-084-3
      - **Index number:** 603-035-00-5
      - **pentaerythritol tetranitrate (PETN)**
      - **E R3**
      - **Unst. Expl., H200**
    - **CAS:** 118-96-7
      - **EINECS:** 204-289-6
      - **Index number:** 609-008-00-4
      - **2,4,6-trinitrotoluene (TNT)**
      - **T R23/24/25; E R2; N R51/53**
      - **R33**
      - **Expl. 1.1, H201**
      - **Acute Tox. 3, H301; Acute Tox. 3, H311; Acute Tox. 3, H331**
      - **STOT RE 2, H373**
      - **Aquatic Chronic 2, H411**
    - **CAS:** 7429-90-5
      - **EINECS:** 231-072-3
      - **Index number:** 013-001-00-6
      - **aluminium powder (pyrophoric)**
      - **F R15-17**
      - **Pyr. Sol. 1, H250; Water-react. 2, H261**

- **Additional information:**
  - For the wording of the listed risk phrases refer to section 16.
  - For the listed ingredients, the identity and exact percentages are being withheld as a trade secret.

SECTION 4: First aid measures

- **4.1 Description of first aid measures**
  - **General information:** No special measures required.
  - **After inhalation:**
    - Unlikely route of exposure.
    - Supply fresh air; consult doctor in case of complaints.
  - **After skin contact:**
    - Generally the product does not irritate the skin.
    - Wash with soap and water.
    - If skin irritation is experienced, consult a doctor.
  - **After eye contact:**
    - Remove contact lenses if worn.
    - Rinse opened eye for several minutes under running water. If symptoms persist, consult a doctor.

(Contd. on page 4)
Trade name: Cast Boosters, Seismic

- After swallowing:
  Unlikely route of exposure.
  Do not induce vomiting; call for medical help immediately.

- 4.2 Most important symptoms and effects, both acute and delayed
  Blast injury if mishandled.

- Hazards
  Danger of blast or crush-type injuries.

- 4.3 Indication of any immediate medical attention and special treatment needed
  Product may produce physical injury if mishandled. Treatment of these injuries should be based on the blast and compression effects.

SECTION 5: Firefighting measures

- 5.1 Extinguishing media
  DO NOT fight fire when fire reaches explosives.

- Suitable extinguishing agents: None.
  For safety reasons unsuitable extinguishing agents: None.

- 5.2 Special hazards arising from the substance or mixture
  DO NOT ATTEMPT TO FIGHT FIRES INVOLVING EXPLOSIVE MATERIALS. Evacuate all personnel to a predetermined safe location, no less than 2,500 feet in all directions. Can explode or detonate under fire conditions. Burning material may produce toxic vapors. It is recommended that users of explosives material be familiar with the Institute of Makers of Explosives Safety Library publications. Explosive; mass explosion hazard.

- 5.3 Advice for firefighters
  Protective equipment:
  Wear self-contained respiratory protective device.
  Wear fully protective suit.

  Additional information
  In case of fire: Evacuate area. Fight fire remotely due to the risk of explosion.
  Individual devices will randomly explode. Mass explosion of multiple devices is possible under certain conditions. Burning material may produce toxic and irritating vapors. In unusual cases, shrapnel may be thrown from exploding devices under containment. See 2012 Emergency response Guidebook for further information.

SECTION 6: Accidental release measures

- 6.1 Personal precautions, protective equipment and emergency procedures
  Evacuate area.
  Wear protective clothing.
  Ensure adequate ventilation
  Keep away from ignition sources.
  Protect from heat.
  Isolate area and prevent access.

- 6.2 Environmental precautions: No special measures required.

- 6.3 Methods and material for containment and cleaning up:
  Pick up mechanically.
  Send for recovery or disposal in suitable receptacles.
  Dispose unusable material as waste according to item 13.
SECTION 7: Handling and storage

7.1 Precautions for safe handling
Open and handle receptacle with care.
Handle with care. Avoid jolting, friction and impact.
Use only in well ventilated areas.
Do not subject to grinding/shock/friction.

Information about fire - and explosion protection:
Keep ignition sources away - Do not smoke.
Protect from heat.
Prevent impact and friction.
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:
Store in a cool location.
Avoid storage near extreme heat, ignition sources or open flame.

Information about storage in one common storage facility:
Store away from foodstuffs.
Store away from oxidising agents.

Further information about storage conditions:
Store under lock and key and with access restricted to technical experts or their assistants only.
Keep away from heat.

7.3 Specific end use(s)
No further relevant information available.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters
Ingredients with limit values that require monitoring at the workplace:

<table>
<thead>
<tr>
<th>118-96-7 2,4,6-trinitrotoluene (TNT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEL (USA)</td>
</tr>
<tr>
<td>Long-term value: 1,5 mg/m³</td>
</tr>
<tr>
<td>Skin</td>
</tr>
<tr>
<td>REL (USA)</td>
</tr>
<tr>
<td>Long-term value: 0,5 mg/m³</td>
</tr>
<tr>
<td>Skin</td>
</tr>
<tr>
<td>TLV (USA)</td>
</tr>
<tr>
<td>Long-term value: 0,1 mg/m³</td>
</tr>
<tr>
<td>Skin; BEI-M</td>
</tr>
</tbody>
</table>

(Contd. on page 6)


### Trade name: Cast Boosters, Seismic

| EL (Canada) | Long-term value: 0.1 mg/m³  
| Skin       |  |
| EV (Canada) | Short-term value: 0.2 mg/m³, 0.02 ppm  
| Long-term value: 0.1 mg/m³, 0.01 ppm |

<table>
<thead>
<tr>
<th>7429-90-5 aluminium powder (pyrophoric)</th>
</tr>
</thead>
</table>
| PEL (USA) | Long-term value: 15*; 15** mg/m³  
| *Total dust; ** Respirable fraction |
| REL (USA) | Long-term value: 10* 5** mg/m³  
| as Al*Total dust**Respirable/pyro powd./welding f. |
| TLV (USA) | Long-term value: 1* mg/m³  
| as Al; *as respirable fraction |
| EL (Canada) | Long-term value: 1.0 mg/m³  
| respirable, as Al  |
| EV (Canada) | Long-term value: 5 mg/m³  
| aluminium-containing (as aluminium)  |

- **DNELs** No further relevant information available.
- **PNECs** No further relevant information available.

### Ingredients with biological limit values:

<table>
<thead>
<tr>
<th>118-96-7 2,4,6-trinitrotoluene (TNT)</th>
</tr>
</thead>
</table>
| BEI (USA) | 1.5 % of hemoglobin  
| Medium: blood |
| Time: during or end of shift  
| Parameter: Methemoglobin (background, nonspecific, semi-quantitative) |

- **Additional information:** The lists valid during the making were used as basis.
- **8.2 Exposure controls**
- **Personal protective equipment:**
  - **General protective and hygienic measures:**
    The usual precautionary measures are to be adhered to when handling chemicals.
    Keep away from foodstuffs, beverages and feed.
    Wash hands before breaks and at the end of work.
    Keep ignition sources away - Do not smoke.
  - **Respiratory protection:**
    Not required under normal conditions of use.
    Respiratory protection may be required after product use.
  - **Protection of hands:**
    Wear gloves for the protection against mechanical hazards according to NIOSH or EN 388.
  - **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.

(Contd. on page 7)
Trade name: Cast Boosters, Seismic

- **Eye protection:**
  - Face protection
  - Safety glasses

- **Body protection:** Impervious protective clothing
- **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.

### SECTION 9: Physical and chemical properties

- **9.1 Information on basic physical and chemical properties**
- **General Information**
- **Appearance:**
  - **Form:** Solid material
  - **Colour:** According to product specification
  - **Odour:** Odourless
  - **Odour threshold:** Not determined.
  - **pH-value:** Not applicable.

- **Change in condition**
  - **Melting point/Melting range:** 80 °C (176 °F) (trinitrotoluene)
  - **Boiling point/Boiling range:** Undetermined.

- **Flash point:** Not applicable.

- **Flammability (solid, gaseous):** Explosive; mass explosion hazard.

- **Auto/Self-ignition temperature:** Not determined.

- **Decomposition temperature:** Not determined.

- **Self-igniting:** Product is not self-igniting.

- **Danger of explosion:** 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 at 20 °C (68 °F):** 1.62 - 1.75 g/cm³ (13,519 - 14,604 lbs/gal)

- **Relative density** Not determined.

- **Vapour density** Not applicable.

- **Evaporation rate** Not applicable.
Trade name: Cast Boosters, Seismic

- Solubility in / Miscibility with water: Variable, dependent upon product composition and packaging.
- Partition coefficient (n-octanol/water): Not determined.
- Viscosity:
  - Dynamic: Not applicable.
  - Kinematic: Not applicable.
- 9.2 Other information No further relevant information available.

SECTION 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.
    Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
- 10.3 Possibility of hazardous reactions
  Danger of explosion.
  Toxic fumes may be released if heated above the decomposition point.
- 10.4 Conditions to avoid Keep ignition sources away - Do not smoke.
- 10.5 Incompatible materials: No further relevant information available.
- 10.6 Hazardous decomposition products:
  Carbon monoxide and carbon dioxide
  Hydrocarbons
  Nitrogen oxides
  Toxic metal oxide smoke

SECTION 11: Toxicological information

- 11.1 Information on toxicological effects
- Acute toxicity:
- LD/LC50 values relevant for classification: None.
- Primary irritant effect:
  - on the skin:
    Not a skin irritant in unused form. Vapors/particles from used product are possibly irritating to skin.
  - on the eye:
    Not an eye irritant in unused form. Vapors/particles from used product are possibly irritating to eyes.
- Sensitisation: No sensitising effects known.
- Subacute to chronic toxicity: No further relevant information available.
- Acute effects (acute toxicity, irritation and corrosivity): Danger of blast or crush-type injuries.
- Repeated dose toxicity: No further relevant information available.
SECTION 12: Ecological information

- **12.1 Toxicity**
  - **Aquatic toxicity:** Toxic for aquatic organisms

- **12.2 Persistence and degradability**
  No further relevant information available.

- **12.3 Bioaccumulative potential**
  No further relevant information available.

- **12.4 Mobility in soil**
  No further relevant information available.

- **Ecotoxicological effects:**
  - **Remark:** Toxic for fish

- **Additional ecological information:**
  - **General notes:**
    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.
    Also poisonous for fish and plankton in water bodies.
    Toxic for aquatic organisms
    Due to available data on eliminability/decomposition and bioaccumulation potential prolonged term damage of the environment can not be excluded.

- **12.5 Results of PBT and vPvB assessment**
  - **PBT:** Not applicable.
  - **vPvB:** Not applicable.

- **12.6 Other adverse effects**
  No further relevant information available.

SECTION 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.
    Damaged materials pose a danger to anyone in the immediate area; consult experts for disposal of damaged products.
    The user of this material has the responsibility to dispose of unused material, residues and containers in compliance with all relevant local, state and federal laws and regulations regarding treatment, storage and disposal for hazardous and nonhazardous wastes. Residual materials should be treated as hazardous.

- **Uncleaned packaging:**
  - **Recommendation:** Disposal must be made according to official regulations.

SECTION 14: Transport information

- **14.1 UN-Number**
  - **DOT, ADR, IMDG**
    - **IATA**
    - **UN0042**
    - **FORBIDDEN**

- **14.2 UN proper shipping name**
  - **DOT, IMDG**
  - **ADR**
    - Boosters, without detonator
    - 0042, BOOSTERS, WITHOUT DETONATOR

(Contd. on page 10)
Trade name: Cast Boosters, Seismic

14.3 Transport hazard class(es)
- DOT, ADR, IMDG

- Class
  - 1.1

- Label
  - 1.1D

14.4 Packing group
- DOT, ADR, IMDG
  - II

14.5 Environmental hazards:
- Marine pollutant:
  - No

14.6 Special precautions for user
- Not applicable.

14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code
- Not applicable.

Transport/Additional information:

- ADR
  - Limited quantities (LQ)
    - 0
  - Excepted quantities (EQ)
    - Code: E0
    - Not permitted as Excepted Quantity
  - Tunnel restriction code
    - 1

- IMDG
  - Limited quantities (LQ)
    - 0
  - Excepted quantities (EQ)
    - Code: E0
    - Not permitted as Excepted Quantity

- IATA
  - UN "Model Regulation":
    - UN0042, BOOSTERS, WITHOUT DETONATOR, 1.1D, II

SECTION 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 are listed.

- Section 313 (Specific toxic chemical listings):
  - 7429-90-5 aluminium powder (pyrophoric)
Trade name: Cast Boosters, Seismic

- **TSCA (Toxic Substances Control Act):**
  All ingredients are listed.

- **Proposition 65 (California):**
  - **Chemicals known to cause cancer:**
    - 118-96-7 2,4,6-trinitrotoluene (TNT)
  - **Chemicals known to cause reproductive toxicity for females:**
    None of the ingredients are listed.
  - **Chemicals known to cause reproductive toxicity for males:**
    None of the ingredients are listed.
  - **Chemicals known to cause developmental toxicity:**
    None of the ingredients are listed.

- **Carcinogenic Categories**

- **EPA (Environmental Protection Agency)**
  - 118-96-7 2,4,6-trinitrotoluene (TNT) C
  - 121-82-4 perhydro-1,3,5-trinitro-1,3,5-triazine (RDX) C
  - 2691-41-0 octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX) D

- **IARC (International Agency for Research on Cancer)**
  - 118-96-7 2,4,6-trinitrotoluene (TNT) 3

- **TLV (Threshold Limit Value established by ACGIH)**
  - 7429-90-5 aluminium powder (pyrophoric) A4
  - 121-82-4 perhydro-1,3,5-trinitro-1,3,5-triazine (RDX) A4

- **NIOSH-Ca (National Institute for Occupational Safety and Health)**
  None of the ingredients are listed.

- **Canada**

  - **Canadian Domestic Substances List (DSL)**
    All ingredients are listed.
  - **Canadian Ingredient Disclosure list (limit 0.1%)**
    None of the ingredients are listed.
  - **Canadian Ingredient Disclosure list (limit 1%)**
    - 118-96-7 2,4,6-trinitrotoluene (TNT)
    - 7429-90-5 aluminium powder (pyrophoric)

- **Other regulations, limitations and prohibitive regulations**
  This product has been classified in accordance with hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations.

- **Substances of very high concern (SVHC) according to REACH, Article 57**
  None of the ingredients are listed.
15.2 **Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

### SECTION 16: Other information

**Disclaimer**
Dyno Nobel Inc. and its subsidiaries disclaim any warranties with respect to this product, the safety or suitability thereof, the information contained herein, or the results to be obtained, whether express or implied, including without limitation, any implied warranty of merchantability or fitness for a particular purpose and/or other warranty. The information contained herein is provided for reference purposes only and is intended only for persons having relevant technical skills. Because conditions and manner of use are outside of our control, the user is responsible for determining the conditions of safe use of the product. Buyers and users assume all risk, responsibility and liability whatsoever from any and all injuries (including death), losses, or damages to persons or property arising from the use of this product or information. Under no circumstances shall either Dyno Nobel Inc. or any of its subsidiaries be liable for special, consequential or incidental damages or for anticipated loss of profits.

**Relevant phrases**

- H200 Unstable explosives.
- H201 Explosive; mass explosion hazard.
- H250 Catches fire spontaneously if exposed to air.
- H261 In contact with water releases flammable gases.
- H301 Toxic if swallowed.
- H311 Toxic in contact with skin.
- H331 Toxic if inhaled.
- H373 May cause damage to organs through prolonged or repeated exposure.
- H411 Toxic to aquatic life with long lasting effects.
- R15 Contact with water liberates extremely flammable gases.
- R17 Spontaneously flammable in air.
- R2 Risk of explosion by shock, friction, fire or other sources of ignition.
- R23/24/25 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.
- R51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

**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 Harmonised System of Classification and Labelling of Chemicals
- ACGIH: American Conference of Governmental Industrial Hygienists
- EINECS: European Inventory of Existing Commercial Chemical Substances
- ELINCS: European List of Notified Chemical Substances
- CAS: Chemical Abstracts Service (division of the American Chemical Society)
- 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)
### Trade name: Cast Boosters, Seismic

- **LC50**: Lethal concentration, 50 percent
- **LD50**: Lethal dose, 50 percent
- **Expl. 1.1**: Explosives, Division 1.1
- **Unst. Expl.**: Explosives, Unstable explosives
- **Pyr. Sol. 1**: Pyrophoric Solids, Hazard Category 1
- **Water-react. 2**: Substances and Mixtures which, in contact with water, emit flammable gases, Hazard Category 2
- **Acute Tox. 3**: Acute toxicity, Hazard Category 3
- **STOT RE 2**: Specific target organ toxicity - Repeated exposure, Hazard Category 2
- **Aquatic Chronic 2**: Hazardous to the aquatic environment - Chronic Hazard, Category 2

### Sources

SDS Prepared by: ChemTel Inc.

1305 North Florida Avenue
Tampa, Florida USA 33602-2902
Toll Free North America 1-888-255-3924 Intl. +01 813-248-0573
Website: www.chemtelinc.com