

## MATERIAL SAFETY DATA SHEET

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### SOLARCAST P

#### CAST BOOSTERS

SAFETY • QUALITY • RELIABILITY



### IDENTIFICATION OF THE MATERIAL AND SUPPLIER

<b>Product Name:</b>	SOLARCAST-P
<b>Packaging:</b>	1.1D
<b>Recommended use of the chemical &amp; restrictions of use:</b>	Initiating System for Booster Sensitive Explosives Charge
<b>Supplier:</b>	Solar Mining Services (Middelburg) 12 April Street Extension 33 Middelburg Mpumalanga South Africa
<b>Supplier:</b>	Solar Mining Services (Sandton) Building A, Upper Grayston Office Park 150 Linden Road Sandton Johannesburg
	<b>Telephone number:</b> +27 (0) 11 883 1110
	<b>Fax:</b> +27 (0) 86 205 4048
	<b>Web:</b> <a href="http://www.solarminingservices.com">www.solarminingservices.com</a>
	<b>Email:</b> <a href="mailto:info@solarminingservices.co.za">info@solarminingservices.co.za</a>

### HAZARDS IDENTIFICATION

This material is hazardous according to criteria of NOHSC; HAZARDOUS SUBSTANCE.

Classified as Dangerous Goods by the criteria of the Code for the Transport of Explosives by Road and Rail;  
DANGEROUS GOODS.

### Risk Phrases:

- Risk of explosion by shock, friction, fire or other sources of ignition.
- Toxic by inhalation, in contact with skin and if swallowed.
- Danger of cumulative effects.
- Irritating to skin.
- Toxic to aquatic organisms.
- May cause long term adverse effects in the aquatic environment.

### Safety Phrases:

- Keep out of the reach of children.
- Do not breathe vapour.
- Avoid contact with skin and eyes.
- This material and its container must be disposed of in a safe way.
- In case of accident or if you feel unwell, seek medical advice immediately (show the label whenever possible).
- Avoid release to the environment.
- Refer to special instructions safety data sheets.

### Poisons Schedule:

None allocated.

## COMPOSITION / INFORMATION ON INGREDIENTS

Component	CAS No.	Proportion	Risk Phrases
Pentaerythritol tetranitrate	78-11-5	0-60%	R3
Cyclonite (RDX, Cyclotrimethylenetrinitramine)	121-82-4	0-60%	R3, R25, R38
Trinitrotoluene (TNT)	118-96-7	35-55%	R2, R23/24/25, R33, R51/53
Ingredients determined not to be hazardous	-	<12%	-
Barium Sulphate	7727-43-7	<10%	-

### **FIRST AID MEASURES**

For advice, contact a Poisons Information Centre or a doctor.

#### **Inhalation:**

Remove victim from area of exposure - avoid becoming a casualty. Remove contaminated clothing and loosen remaining clothing. Allow patient to assume most comfortable position and keep warm. Keep at rest until fully recovered. If patient finds breathing difficult and develops a bluish discolouration of the skin (which suggests a lack of oxygen in the blood - cyanosis), ensure airways are clear of any obstruction and have a qualified person give oxygen through a face mask. Apply artificial respiration if patient is not breathing. Seek immediate medical advice.

#### **Skin Contact:**

If skin or hair contact occurs, immediately remove any contaminated clothing and wash skin and hair thoroughly with running water. A component of this material can be absorbed through the skin with resultant toxic effects. Seek immediate medical assistance. If swelling, redness, blistering or irritation occurs seek medical assistance.

#### **Eye Contact:**

If in eyes, wash out immediately with water. In all cases of eye contamination, it is a sensible precaution to seek medical advice.

#### **Ingestion:**

Immediately rinse mouth with water. If swallowed, do NOT induce vomiting. Give a glass of water. Seek immediate medical assistance.

#### **Medical attention and special treatment:**

Treat symptomatically. Explosive material. PETN is a vasodilator. Maintain blood pressure by fluid administration. May cause methemoglobinemia. Clinical findings: The smooth muscle relaxant effect of nitrate salts may lead to headache, dizziness and marked hypotension. Cyanosis is clinically detectable when approximately 15% of the haemoglobin has been converted to methaemoglobin (ie. ferric iron). Symptoms such as headache, dizziness, weakness and dyspnoea occur when methaemoglobin concentrations are 30% to 40%; at levels of about 60%, stupor, convulsions, coma and respiratory paralysis occur and the blood is a chocolate brown colour. At higher levels death may result. Spectrophotometric analysis can determine the presence and concentration of ethaemoglobin in blood.

#### **Treatment:**

1. Give 100% oxygen.
2. In cases of (a) ingestion: use gastric lavage, (b) contamination of skin (unburnt or burnt): continue washing to remove salts.
3. Observe blood pressure and treat hypotension if necessary.
4. When methaemoglobin concentrations exceed 40% or when symptoms are present, give methylene blue 1 to 2 mg/kg body weight in a 1% solution by slow intravenous injection. If cyanosis has not resolved within one hour a second dose of 2 mg/kg body weight may be given. The total dose should not exceed 7 mg/kg body weight as unwanted effects such as dyspnoea, chest pain, vomiting, diarrhoea, mental confusion and cyanosis may occur. Without treatment methaemoglobin levels of 20-30% revert to normal within 3 days.

5. Bed rest is required for methaemoglobin levels in excess of 40%.
6. Continue to monitor and give oxygen for at least two hours after treatment with methylene blue.
7. Consider transfer to centre where haemoperfusion can be performed to remove the nitrates from the blood if the condition of the patient is unstable.
8. Following inhalation of oxides of nitrogen, the patient should be observed in hospital for 24 hours for delayed onset of pulmonary oedema.

Further observation for 2-3 weeks may be required to detect the onset of the inflammatory changes of bronchiolitis fibrosa obliterans.

Liver and kidney damage are possible complications. Effects may be delayed.

## **FIRE FIGHTING MEASURES**

### **Hazards from combustion products:**

On burning under confined or semi-confined conditions, some oxides of nitrogen and/or carbon will be present. Brown fumes indicate the presence of toxic oxides of nitrogen. On burning will emit toxic fumes, including those of oxides of sulphur.

### **Precautions for fire fighters and special protective equipment:**

Explosive material. Avoid all ignition sources. Risk of explosion by shock, friction, fire or other sources of ignition. A major fire may involve a risk of explosion. In case of small fire where the actual explosive is not involved, carefully remove explosives to a safe distance, otherwise evacuate area immediately and allow to burn. Do NOT fight fire.

**Hazchem Code:** E

## **ACCIDENTAL RELEASE MEASURES**

### **Methods for containment:**

Collect loose or spilled solid material for storage or transport to secured magazine.

### **Methods for cleaning up:**

Review fire and explosion hazards before proceeding with clean up. Remove and protect ignition sources. Wear protective equipment during clean up. Mop up water using non-sparking tools. It is suggested that only personnel trained in Emergency Response should respond. Verify complete account of product(s). Notify authorities and follow applicable spill reporting requirements.

### **Emergency procedures/Environmental precautions:**

Shut off all possible sources of ignition. Clear area of all unprotected personnel. Wear protective equipment to prevent skin and eye contact. If contamination of sewers or waterways has occurred advise local emergency services.

**Personal precautions/Protective equipment/Methods and materials for containment and cleaning up:**  
Collect and seal in properly labeled containers. In the case of a transport accident, notify the Police, Explosives Inspector and Solar MS.

### HANDLING AND STORAGE

**Conditions for safe storage:**

Store material in a well ventilated magazine suitably licensed for Class 1.1D Explosives. Store away from sources of heat or ignition. Store away from incompatible materials described in Section 10. Keep containers closed when not in use - check regularly for spills.

**Precautions for safe handling:**

Handle with care. Avoid skin and eye contact. Do NOT subject the material to impact, friction between hard surfaces nor to any form of heating. Avoid contamination with other materials. Do not drill into explosive. Keep out of reach of children.

### EXPOSURE CONTROLS/PERSONAL PROTECTION

**Occupational Exposure Limits:**

No value assigned for this specific material by the Occupational Health and Safety Act. However, Exposure Standard(s) for constituent(s):

2,4,6-Trinitrotoluene (TNT): 8hr TWA = 0.5 mg/m<sup>3</sup>, Sk Cyclonite: 8hr TWA = 1.5 mg/m<sup>3</sup>, Sk Barium sulphate: 8hr TWA = 10 mg/m<sup>3</sup>

**Engineering Measures:**

Full-handling precautions should be taken at all times.

### PERSONAL PROTECTIVE EQUIPMENT

**Eye/Face Protection:**

Safety glasses with side-shields are recommended to prevent eye contact.

**Skin Protection:**

Long sleeved clothing. Impervious gloves.

**Respiratory protection:**

Use a NIOSH-approved respirator or equivalent during post-detonation clean-up operations.

**Hygiene Measures:**

Handle in accordance with good industrial hygiene and safety practice.

**Individual protection measures, such as Personal Protective Equipment (PPE):**

The selection of PPE is dependent on a detailed risk assessment. The risk assessment should consider the work situation, the physical form of the chemical, the handling methods and environmental factors.

SMS Personal Protection Guide: - OVERALLS, SAFETY SHOES, SAFETY GLASSES, GLOVES.



Containment of charge prevents exposure. Wear protective clothes: Overall, safety shoes, gloves and eye protection when handling. Wash hands and exposed skin before meals and after work.

**PHYSICAL AND CHEMICAL PROPERTIES**

<b>Appearance</b>	Tan to Brown
<b>Odour</b>	None
<b>Viscosity</b>	No information available
<b>Physical State</b>	Solid
<b>Melting Point/Range</b>	80°C/ 176°F
<b>pH</b>	No data available
<b>Flammable Limits</b>	<b>(upper):</b> No data available
<b>Flammable Limits</b>	<b>(lower):</b> No data available
<b>Explosion Power</b>	No data available
<b>Specific Gravity</b>	1.5-1.8 g/cc
<b>Water Solubility</b>	Negligible
<b>Other Solubility</b>	No information available
<b>Vapour Pressure</b>	Not available
<b>Oxidizing Properties</b>	No information available
<b>Partition Coefficient(n-octanol/water)</b>	No data available

**STABILITY AND REACTIVITY**

**Chemical stability:**

Extreme risk of explosion by shock, friction, fire or other sources of ignition. Heat, particularly under confinement, may cause a mass explosion. Detonation may occur from impact, friction or excessive heating.

**Conditions to avoid:**

Avoid exposure to heat, sources of ignition and open flame.

**Incompatible materials:**

Incompatible with combustible materials. Incompatible with oxidising agents. Incompatible with reducing agents. Incompatible with alkalis. Incompatible with acids.

**Hazardous decomposition products:**

Oxides of carbon. Oxides of nitrogen. Oxides of sulphur.

**Hazardous reactions:**

Explosive material. Explosion may result due to shock, friction, fire and other sources of ignition. Hazardous polymerisation will not occur.

### **TOXICOLOGICAL INFORMATION**

No adverse health effects expected if the product is handled in accordance with this Safety Data Sheet and the product label. Symptoms or effects that may arise if the product is mishandled and overexposure occurs are:

**Ingestion:**

Swallowing can result in nausea, vomiting, weakness, dizziness, headaches, jaundice, cyanosis, pallor, liver damage, blood effects and convulsions. May cause central nervous system effects.

**Eye contact:**

May be an eye irritant.

**Skin contact:**

Contact with skin will result in irritation. Component/s of this material can be absorbed through the skin with resultant toxic effects. See effects as noted under 'Ingestion'. May cause skin sensitisation in sensitive individuals. Repeated or prolonged skin contact may lead to allergic contact dermatitis.

**Inhalation:**

Breathing in dust may result in respiratory irritation. Inhalation can result in sneezing, coughing, sore throat and systemic effects like those listed under INGESTION.

**Long Term Effects:**

Available evidence from animal studies indicate that repeated or prolonged exposure to a component of this material could result in effects on the blood system, central nervous system, bone marrow, eye, kidneys and liver. Repeated or prolonged skin contact may cause dermatitis.

### **Toxicological Data:**

No LD50 data available for the product. For the constituent Trinitrotoluene:

**Oral LD50 (rat):** 795 mg/kg; 607 mg/kg (1)

**Oral LD50 (mice):** 660 mg/kg (1)

**Oral LD50 (rat):** 100 mg/kg for RDX (component of mixture)

Workers exposed to oral doses of the component RDX (unspecified amounts) have experienced convulsions, disorientation, nausea, restlessness, muscle twitching and lethargy. Rats exposed to an oral dose of 40 mg/kg/day for six months developed myocardial degeneration, blood disorders, renal dysfunction, enlarged adrenals and cataracts. (2)

For TNT, evidence from studies on exposed workers has shown increased incidences of cataracts following chronic exposure. Blood effects observed in exposed workers include aplastic anaemia, leucocytosis, leucopenia and methaemoglobinaemia. 2,4,6-Trinitrotoluene is mutagenic in bacteria with and without metabolic activation. This material has been classified by the International Agency for Research on Cancer (IARC) as a Group 3 agent. Group 3 - The agent is not classifiable as to its carcinogenicity to humans. Data available is insufficient for an assessment to be made. (3)

PETN is absorbed slowly through the lungs and gastrointestinal tract but not appreciably through the skin. Vasodilatory agent, therefore causes dilation of the blood vessels and a reduction in blood pressure. Exposure to high doses may cause methaemoglobinaemia. Negative in AMES test for mutagenicity.

### **ECOLOGICAL INFORMATION**

#### **Eco toxicity:**

Avoid contaminating waterways.

#### **Aquatic toxicity:**

Toxic to aquatic organisms. May cause long term adverse effects in the aquatic environment.

### **DISPOSAL CONSIDERATIONS**

#### **Disposal methods:**

Refer to Waste Management Authority. Dispose of material through a licensed waste contractor. Small quantities of damaged or deteriorated explosives may be destroyed by inclusion in a blast hole containing good explosive(s). For large quantities of damaged or deteriorated explosives notify SMS.

#### **Waste Disposal Method:**

Burn under supervision of an expert at an explosive burning ground or destroy by detonation in boreholes, in accordance with applicable local, provincial and federal regulations. Call upon the services of an SMS Technical Representative.



**Contaminated Packaging:**

No information available.

**TRANSPORT INFORMATION**

**Road and Rail Transport:**

Classified as Dangerous Goods by the criteria of the Code for the Transport of Explosives by Road and Rail; DANGEROUS GOODS.

<b>UN No</b>	0042
<b>Class-primary</b>	1.1 D Explosive
<b>Proper Shipping Name</b>	BOOSTERS
<b>Hazchem Code</b>	E
<b>Marine Transport</b>	Classified as Dangerous Goods by the criteria of the International Maritime Dangerous Goods Code (IMDG Code) for transport by sea; DANGEROUS GOODS. UN No: 0042
<b>Class-primary</b>	1.1 D Explosive
<b>Proper Shipping Name</b>	BOOSTERS
<b>Air Transport</b>	TRANSPORT PROHIBITED under the International Air Transport Association (IATA) Dangerous Goods Regulations for transport by air in passenger aircraft and cargo aircraft.



**REGULATORY INFORMATION**

**Classification:**

This material is hazardous according to criteria of OHSA; HAZARDOUS SUBSTANCE.

**Hazard Category:**

T: Toxic.

E: Explosive.

N: Dangerous for the Environment.

**Risk Phrase(s):**

**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.

**R33:** Danger of cumulative effects.

**R38:** Irritating to skin.

**R51/53:** Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

**Safety Phrase(s):**

- S2:** Keep out of the reach of children.  
**S23:** Do not breathe vapour/mist/aerosol.  
**S24/25:** Avoid contact with skin and eyes.  
**S35:** This material and its container must be disposed of in a safe way.  
**S45:** In case of accident or if you feel unwell, seek medical advice immediately.  
(show the label whenever possible).  
**S61:** Avoid release to the environment. Refer to special instructions Safety Data Sheets.

**Poisons Schedule:**

None allocated.

**OTHER INFORMATION**

This Material Safety Data Sheet has been prepared by SMS.

**Reason(s) for Issue:**

Revised MSDS for SMS South Africa

This MSDS summarises to our best knowledge at the date of issue, the chemical health and safety hazards of the material and general guidance on how to safely handle the material in the workplace. Since SMS cannot anticipate or control the conditions under which the product may be handled, each user must, prior to handling, assess and control the risks arising from its use of the material.

If clarification or further information is needed, the user should contact their SMS representative or SMS at the contact details on page 1.

SMS's responsibility for the material as sold is subject to the terms and conditions of sale, a copy of which is available upon request.