

# Safety Data Sheet



## 1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

**Product Name:** ANFO

**Other name(s):** Ammonium nitrate/fuel oil, ANFO 94/6

**Recommended Use of the Chemical and Restrictions on Use** Blasting explosive.

**Supplier:** Orica Australia Pty Ltd  
**ABN:** 99 004 117 828  
**Street Address:** 1 Nicholson Street  
Melbourne 3000  
Australia

**Telephone Number:** +61 3 9665 7111  
**Facsimile:** +61 3 9665 7937  
**Emergency Telephone:** 1 800 033 111 (ALL HOURS)

Please ensure you refer to the limitations of this Safety Data Sheet as set out in the "Other Information" section at the end of this Data Sheet.

## 2. HAZARDS IDENTIFICATION

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

This material is hazardous according to Safe Work Australia; HAZARDOUS SUBSTANCE.

### Classification of the substance or mixture:

Explosives - Division 1.1  
Eye Irritation - Category 2A  
Carcinogenicity - Category 2

**SIGNAL WORD:** DANGER



### Hazard Statement(s):

H201 Explosive; mass explosion hazard.  
H319 Causes serious eye irritation.  
H351 Suspected of causing cancer.

### Precautionary Statement(s):

#### Prevention:

P201 Obtain special instructions before use.  
P202 Do not handle until all safety precautions have been read and understood.  
P210 Keep away from heat / sparks / open flames / hot surfaces. No smoking.  
P250 Do not subject to grinding / shock / friction / fire or other sources of ignition.  
P264 Wash hands thoroughly after handling.  
P280 Wear protective gloves / protective clothing / eye protection / face protection.

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## Response:

P308+P313 IF exposed or concerned: Get medical advice/attention.

P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P337+P313 If eye irritation persists: Get medical advice/attention.

P370+P380 In case of fire: Evacuate area.

P372 Explosion risk in case of fire.

P373 DO NOT fight fire when fire reaches explosives.

## Storage:

P401 Store in accordance with AS2187.1 in a well ventilated magazine.

P405 Store locked up.

## Disposal:

P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

**Poisons Schedule (SUSMP):** None allocated.

## 3. COMPOSITION AND INFORMATION ON INGREDIENTS

Components	CAS Number	Proportion	Hazard Codes
Ammonium nitrate	6484-52-2	>90%	H272 H319
Fuels, diesel	68334-30-5	<10%	H227 H304 H351 H411
Ingredients determined not to be hazardous	-	<1%	-

## 4. FIRST AID MEASURES

For advice, contact a Poisons Information Centre (e.g. phone Australia 131 126; New Zealand 0800 764 766) 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 discoloration 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 contact occurs, remove contaminated clothing and wash skin with running water. If irritation occurs seek medical advice. Nitrates can be absorbed through cut, burnt or broken skin. Launder contaminated clothing before reuse.

### Eye Contact:

If in eyes, hold eyelids apart and flush the eye continuously with running water. Continue flushing until advised to stop by a Poisons Information Centre or a doctor, or for at least 15 minutes.

### Ingestion:

Rinse mouth with water. If swallowed, do NOT induce vomiting. Give a glass of water. Seek medical advice.

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## Indication of immediate medical attention and special treatment needed:

Explosive material. Shrapnel from detonation may cause burns, wounds and bruises - treat symptomatically. Treat symptomatically and as for exposure to hydrocarbon solvents. Treat as for exposure to nitrates. May cause methemoglobinemia. For ammonium nitrate: 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 methaemoglobin 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.

## 5. FIRE FIGHTING MEASURES

### Suitable Extinguishing Media:

Do not fight fires involving explosives.

**Hazchem or Emergency Action Code:** E

### Specific hazards arising from the substance or mixture:

Explosive material. Avoid all ignition sources. 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.

### Special protective equipment and precautions for fire-fighters:

In case of a small fire, if actual explosive is not burning, carefully remove as much explosive as possible to a safe distance. Fire fighters to wear self-contained breathing apparatus if risk of exposure to vapour or products of combustion. However, if explosive is burning, evacuate area immediately. Do NOT fight fire. On burning under confined or semi-confined conditions, some oxides of nitrogen and/or carbon monoxide will be present. Brown fumes indicate the presence of toxic oxides of nitrogen.

A major fire may involve a risk of explosion. An adjacent detonation may also involve the risk of explosion. Mass explosion hazard.

## 6. ACCIDENTAL RELEASE MEASURES

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## Emergency procedures/Environmental precautions:

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

In the case of a transport accident notify the Police, Explosives Inspector and Orica Australia Pty Ltd (Telephone: 1800 033 111 -- 24 hour service Australia) and/or (Telephone: 0800 734 607 -- 24 hour service New Zealand).

## Personal precautions/Protective equipment/Methods and materials for containment and cleaning up:

Handle with care. Wear protective equipment to prevent skin and eye contact and breathing in vapours/dust. Contain - prevent run off into drains and waterways. Collect with non-metallic implements. Use a spark-free shovel. Collect in properly labelled containers, with loose fitting lids, for disposal.

## 7. HANDLING AND STORAGE

### Precautions for safe handling:

Keep out of reach of children. Handle with care. Avoid skin and eye contact and breathing in dust or vapour. Avoid all contact with other chemicals. Do NOT subject the material to impact, friction between hard surfaces nor to any form of heating. Avoid contamination with other materials.

### Conditions for safe storage, including any incompatibilities:

Store material in a well ventilated magazine suitably licensed for Class 1.1D Explosives. Do not store detonators in an explosives magazine. Store away from sources of heat or ignition. Store in a cool, dry, well ventilated place and out of direct sunlight. Store away from strong acids, strong alkalis, nitrites, chlorates, chlorides and permanganates. Store away from incompatible materials described in Section 10. Keep containers closed when not in use - check regularly for spills. Protect containers from physical damage.

Ammonium Nitrate is incompatible with, and must be stored away from, tetranitromethane, dichloroisocyanuric acid, trichloroisocyanuric acid, any bromate, chlorate, chlorite, hypochlorite or chloroisocyanurate or any inorganic nitrite.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**Control Parameters:** No value assigned for this specific material by Safe Work Australia. However, Workplace Exposure Standard(s) for decomposition product(s):

Nitrogen dioxide: 8hr TWA = 5.6 mg/m<sup>3</sup> (3 ppm), 15 min STEL = 9.4 mg/m<sup>3</sup> (5 ppm)

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As published by Safe Work Australia Workplace Exposure Standards for Airborne Contaminants.

TWA - The time-weighted average airborne concentration of a particular substance when calculated over an eight-hour working day, for a five-day working week.

STEL (Short Term Exposure Limit) - the airborne concentration of a particular substance calculated as a time-weighted average over 15 minutes, which should not be exceeded at any time during a normal eight hour work day. According to current knowledge this concentration should neither impair the health of, nor cause undue discomfort to, nearly all workers.

These Workplace Exposure Standards are guides to be used in the control of occupational health hazards. All atmospheric contamination should be kept to as low a level as is workable. These workplace exposure standards should not be used as fine dividing lines between safe and dangerous concentrations of chemicals. They are not a measure of relative toxicity.

Supplier recommended Exposure Standard:

Fuels, diesel: 5 mg/m<sup>3</sup> (stable aerosol) for 8 hour time-weighted average (TWA).

Fuels, diesel: 100 mg/m<sup>3</sup>, SKIN (total hydrocarbons, inhalable) for 8 hour time-weighted average (TWA).

Fuels, diesel: 200 mg/m<sup>3</sup> (vapour) for 8 hour time-weighted average (TWA). \* ACGIH Exposure Standard from supplier.

TWA - The time-weighted average airborne concentration over an eight-hour working day, for a five-day working week over an entire working life.

Skin - ACGIH - The designation of 'Skin' refers to the potential significant contribution to the overall exposure by the cutaneous route, including mucous membranes and the eyes, either by contact with vapours or, of probable greater significance, by direct skin contact with the substance.

These Exposure Standards are guides to be used in the control of occupational health hazards. All atmospheric contamination should be kept to as low a level as is workable. The exposure standards should not be used as fine dividing lines between safe and dangerous concentrations of chemicals. They are not a measure of relative toxicity.

## Appropriate engineering controls:

Ensure ventilation is adequate and that air concentrations of components are controlled below quoted Workplace Exposure Standards. Use in well ventilated areas.

If in the handling and application of this material, safe exposure levels could be exceeded, the use of engineering controls such as local exhaust ventilation must be considered and the results documented. If achieving safe exposure levels does not require engineering controls, then a detailed and documented risk assessment using the relevant Orica Personal Protection Guide information (refer to PPE section below) as a basis must be carried out to determine the minimum PPE requirements.

## 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.

Orica Personal Protection Guide No. 1, 1998: C - OVERALLS, SAFETY SHOES, CHEMICAL GOGGLES, GLOVES.



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Wear overalls, chemical goggles and impervious gloves. Always wash hands before smoking, eating, drinking or using the toilet. Wash contaminated clothing and other protective equipment before storage or re-use.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

<b>Physical state:</b>	Granular Solid .
<b>Colour:</b>	Off-white or Pink
<b>Odour:</b>	Slight , Kerosene
<b>Solubility:</b>	Partially soluble in water.
<b>Specific Gravity:</b>	0.8 @ 20°C
<b>Relative Vapour Density (air=1):</b>	N Av
<b>Vapour Pressure (20 °C):</b>	N Av
<b>Flash Point (°C):</b>	>61
<b>Flammability Limits (%):</b>	N Av
<b>Autoignition Temperature (°C):</b>	N Av
<b>Melting Point/Range (°C):</b>	N Av
<b>Boiling Point/Range (°C):</b>	N Av
<b>Decomposition Point (°C):</b>	N Av
<b>pH:</b>	N Av
<b>Viscosity:</b>	N Av
<b>Evaporation Rate:</b>	N Av

## 10. STABILITY AND REACTIVITY

<b>Reactivity:</b>	Explosive.
<b>Chemical stability:</b>	Explosive material. Avoid shock, heat, mechanical impact, friction between hard surfaces, electrostatic discharge and impingement. Confinement of burning material could result in detonation. Avoid contact with other chemicals including strong acids, alkalis or oxidising agents. Detonation may occur from heavy impact or excessive heating, particularly under confinement.
<b>Possibility of hazardous reactions:</b>	Explosive material. A major fire may involve a risk of explosion. An adjacent detonation may also involve the risk of explosion. Heating can cause expansion or decomposition of the material, which can lead to the containers exploding. Explosion may result due to shock, friction, fire and other sources of ignition. Explosion creates the potential for shrapnel.
<b>Conditions to avoid:</b>	Avoid exposure to heat, sources of ignition, and open flame. Avoid build up of static electricity. Avoid friction. Avoid contact with combustible substances. Avoid contact with other chemicals.
<b>Incompatible materials:</b>	Incompatible with nitrites , chlorates , chlorides and permanganates . Incompatible with strong acids. Incompatible with strong alkalis. Incompatible with combustible materials. Incompatible with moisture. Ammonium nitrate is a powerful oxidising agent; it is incompatible with tetranitromethane, dichloroisocyanuric acid, trichloroisocyanuric acid, bromates, chlorates, chlorites, hypochlorites, perchlorates, permanganates, chloroisocyanurate, nitrites, powdered metals.
<b>Hazardous decomposition products:</b>	Oxides of carbon. Oxides of nitrogen. When heated to decomposition (unconfined) ammonium nitrate produces nitrous oxide, white ammonium nitrate fumes and water. When mixed with strong acids, and occasionally during blasting, it produces an irritating toxic brown gas, mostly of nitrogen dioxide. When molten may decompose violently due to shock or pressure.

## 11. 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, diarrhoea, and abdominal pain. Swallowing large amounts may result in headaches, dizziness and a reduction in blood pressure (hypotension).
- Eye contact:** An eye irritant.
- Skin contact:** Contact with skin may result in irritation. Will have a degreasing action on the skin. Repeated or prolonged skin contact may lead to irritant contact dermatitis. Can be absorbed through cut, broken, or burnt skin with resultant adverse effects. See effects as noted under 'Inhalation'. Shrapnel from detonation may cause burns and wounds to the skin and eyes.
- Inhalation:** Material may be irritant to the mucous membranes of the respiratory tract (airways). Breathing in vapour can result in headaches, dizziness, drowsiness, and possible nausea. Blasting may produce a toxic brown gas of nitrogen dioxide. Inhalation of the gas may result in chest discomfort, shortness of breath and possible pulmonary oedema, the onset of which may be delayed.
- Absorption of ammonium nitrate by inhalation, ingestion or through burnt or broken skin may cause dilation of blood vessels by direct smooth muscle relaxation and may also cause methaemoglobinaemia.

**Acute toxicity:** No LD50 data available for the product. For the constituent AMMONIUM NITRATE:  
Oral LD50 (rat): 2217 mg/kg.

**Serious eye damage/irritation:** Irritant.

**Chronic effects:** No information available for the product. Available evidence from animal studies indicate that repeated or prolonged exposure to a component of this material could result in effects on the skin. This material contains within the diesel oil component of this formulation polycyclic aromatic hydrocarbons (PAHs). Some PAHs have been implicated as potential skin carcinogens in humans under conditions of poor personal hygiene, prolonged or repeated skin contact and exposure to sunlight. Toxic effects are unlikely to occur if good personal hygiene is practised.

**Carcinogenicity:** For diesel: This material has been classified by the International Agency for Research on Cancer (IARC) as a Group 3 agent. The agent is not classifiable as to its carcinogenicity to humans.

Diesel fuel has been shown to be carcinogenic in animal tests and has caused mutations in vitro. Repeated dermal exposures to high concentrations in test animals resulted in reduced litter size and litter weight, and increased foetal resorptions at maternally toxic doses.

In humans and animals methaemoglobinaemia has occurred under untreated circumstances following the ingestion of nitrates.

## 12. ECOLOGICAL INFORMATION

**Ecotoxicity** Avoid contaminating waterways.

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## Aquatic toxicity:

May cause long term adverse effects in the aquatic environment.  
For diesel: Floats on water. Spills may form a film on water surfaces causing physical damage to organisms. Oxygen transfer could also be impaired.

Ammonium nitrate was evaluated at 5, 10, 25 and 50 mg (NH<sub>4</sub><sup>+</sup>)/L.  
The fertility of *Daphnia magna* was decreased at 50 mg/L. Post embryonic growth of crustacea was impaired at 10, 25 and 50 mg/L.

## 13. DISPOSAL CONSIDERATIONS

### Disposal methods:

Refer to Waste Management Authority. Dispose of contents/container in accordance with local/regional/national/international regulations. 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 Orica Australia Pty Ltd and/or Orica New Zealand Pty Ltd.

## 14. TRANSPORT INFORMATION

### Road and Rail Transport

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



**UN No:** 0082  
**Transport Hazard Class:** 1.1 D Explosive  
**Proper Shipping Name or Technical Name:** EXPLOSIVE, BLASTING, TYPE B  
**Hazchem or Emergency Action Code:** E

### Marine Transport

Classified as Dangerous Goods by the criteria of the International Maritime Dangerous Goods Code (IMDG Code) for transport by sea; DANGEROUS GOODS.

**UN No:** 0082  
**Transport Hazard Class:** 1.1 D Explosive  
**Proper Shipping Name or Technical Name:** EXPLOSIVE, BLASTING, TYPE B

**IMDG EMS Fire:** F-B  
**IMDG EMS Spill:** S-Y

### Air Transport

TRANSPORT PROHIBITED under the International Air Transport Association (IATA) Dangerous Goods Regulations for transport by air in Passenger and Cargo Aircraft, and Cargo Aircraft Only.

## 15. REGULATORY INFORMATION

### Classification:

This material is hazardous according to Safe Work Australia; HAZARDOUS SUBSTANCE.



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## Classification of the substance or mixture:

Explosives - Division 1.1  
Eye Irritation - Category 2A  
Carcinogenicity - Category 2

## Hazard Statement(s):

H201 Explosive; mass explosion hazard.  
H319 Causes serious eye irritation.  
H351 Suspected of causing cancer.

**Poisons Schedule (SUSMP):** None allocated.

All the constituents of this material are listed on the Australian Inventory of Chemical Substances (AICS).

## 16. OTHER INFORMATION

American Conference of Governmental and Industrial Hygienists. In: 'Threshold Limit Values and Biological Exposure Indices'. American Conference of Governmental and Industrial Hygienists Inc., 2008.

'Registry of Toxic Effects of Chemical Substances'. Ed. D. Sweet, US Dept. of Health & Human Services: Cincinnati, Supplier Safety Data Sheet; 2015.

Probe Analytical report (Flash Point Determination), Request No. 950761, June, 1995.

This safety data sheet has been prepared by Ixom Operations Pty Ltd Toxicology & SDS Services.

## Reason(s) for Issue:

5 Yearly Revised Primary SDS  
Alignment to GHS requirements  
Alignment to Safe Work Australia requirements  
Alignment to NOHSC requirements

This SDS 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 Orica Limited cannot anticipate or control the conditions under which the product may be used, each user must, prior to usage, assess and control the risks arising from its use of the material.

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

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