SURFACE MEDICAL EMERGENCY

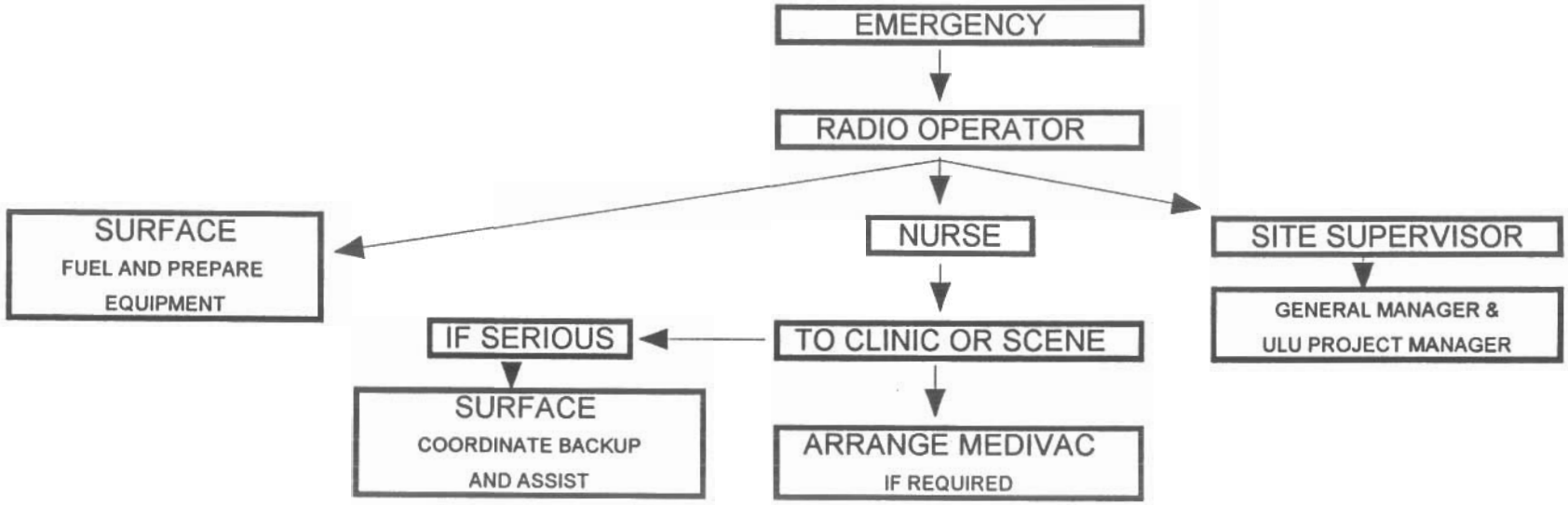
While the organization stresses compliance with the Mine Safety Act and company safe work procedures, potential for industrial accidents exist due to the nature of the environment and job responsibilities.

A registered nurse and fully equipped infirmary, as well as a rescue team, are available to support the treatment of persons.

The Lupin minesite, Yellowknife Hospital, and Medivac center are available to assist as required.

Organization and responsibilities are outlined in this section as well as notification and reporting procedures.

SURFACE MEDICAL EMERGENCY - ULU



EMERGENCY PROCEDURES - ULU

SURFACE MEDICAL EMERGENCY

In the event of a surface medical emergency the following procedures will be followed.

Radio Operator:

1. Record information from caller as per the Surface/Underground Medical Emergency sheets
2. Inform the Site Supervisor and Nurse
3. Follow the Switchboard Operator checklist

Surface Crew:

1. Designate person to fuel and deliver bus to door and wait to transport as required
2. Fuel pick-ups and prepare necessary equipment. Have drivers remain with vehicles and wait for instruction
3. If there are not enough surface crew members to fulfill tasks, then Site Supervisor to request help from other departments
4. Deliver other supplies as requested
5. If requested, have gensets prepared to go to airstrip for lights, etc.

Site Supervisor:

1. Coordinate treatment and movement of people
2. Inform Nurse
3. Inform Surface crew to fuel and prepare equipment
4. Inform General Manager or manager designate at Lupin
5. Inform Ulu Project Manager
6. Inform Loss Control Manager
7. Assure site is secure for investigation

Nurse:

1. As per Health Services checklist

Camp Manager:

1. As per Camp Manager checklist

EMERGENCY PROCEDURES - ULU

SURFACE/UNDERGROUND EMERGENCY CHECKLIST:

1. Record caller's name: _____
2. Caller's location _____
3. Nature of emergency _____
4. Location of emergency _____
5. Name of Injured/ill _____
6. Number of injured/ill _____
7. Types of injuries/illness _____
8. Time 1st call came in _____
9. Notify Nurse and Site Supervisor immediately
10. If mobilization or evacuation is required, notify the Surface Supervisor to have equipment and vehicles readied

INSTRUCT THE CALLER TO STAY WITH THE INJURED/ILL UNTIL HELP ARRIVES

EMERGENCY PROCEDURES - ULU

HEALTH SERVICES CHECKLIST:

1. Report to Health Services Office _____

2. Inform Yellowknife Stanton Hospital @ 403-920-4111 of the situation (if required) _____

3. Prepare to go to site if required _____

4. If the number of casualties is greater than can be accommodated in the infirmary, have Camp Manager prepare beds or move mattresses to control area _____

5. Have necessary medical supplies moved to treatment location _____

6. Request help from other departments as required _____

7. As patient arrive, designate 'first aiders' and helpers to patient. If there are too many patients, key individuals should be given responsibility for a wing of 'first aiders' and patients _____

8. Assign responsible person to monitor the nursing station phone. Instruct that person not to make outside calls unless authorized by Nurse _____

9. Arrange medivac if required _____

SURFACE CREW CHECKLIST

Upon being notified by the Site Supervisor of an emergency situation, the following procedures will be followed:

1. The Surface Supervisor will designate a person to have the bus fueled and readied to transport persons as required
2. All pickups and necessary equipment will be fueled and will standby for further instructions
3. The surface crew will standby to deliver other supplies as required and to assist if needed
4. If requested, prepare emergency genset to be taken to the airstrip for lights etc.

EMERGENCY PROCEDURES - ULU

SWITCHBOARD OPERATOR CHECKLIST:

1. Check with Elect./Systems to verify the telephones have been put on Emergency mode

2. Monitor incoming telephone calls
   - direct calls for the Nursing Station only if related the emergency
   - direct all other calls to the Site Supervisor if related to the emergency

3. Do NOT release any information to outside parties regarding the emergency

4. Record names, phone numbers and times of all incoming calls related to the emergency

5. Record the time the emergency switchboard procedures were canceled (by the Site Supervisor only)

CALL RECORD SHEET: (Use back of sheet if more space is required)

Time:	Caller:	Phone #:	Message:

EMERGENCY PROCEDURES - ULU

TELEPHONE BLOCK PROCEDURE CHECKLIST:

Upon being notified by the Site Supervisor or designate to block the telephones, the following procedures will be followed:

1. All phone extensions from rooms (as per list) and the telephone booth will be disconnected with the telephones being brought to the control area

2. Disconnect the short wave radio

3. If directed, remove lines 2 and 3 (at the control box) so there are no incoming/outgoing lines. Leaving line 1 will allow calls to and from Lupin only

4. Standby to assist as required

5. Do NOT remove the Emergency Block from telephones unless directed by the Site Supervisor or his designate

ULU PHONE EXTENSIONS

21	MAIN DESK
23	SITE SUPERVISOR DESK
25	PHONE BOOTH
26	1ST AID ROOM
27	CAMP SUPERVISOR'S ROOM
28	KITCHEN
29	SITE SUPERVISOR'S ROOM
30	NURSE'S ROOM
31	MAINTENANCE DESK
36	MINE/UNDERGROUND

EMERGENCY PROCEDURES - ULU

CAMP MANAGER CHECKLIST

1. Contact control center to find out the number of persons injured/ill. In consultation with the Nurse - prepare to move mattresses and bedding as directed.

2. Prepare to have coffee, tea, juice and snacks to the control area

3. Post guard to prevent unnecessary people from entering the treatment area

4. Prepare meals as required

5. Assist as required

Explosives, Blasting, Type B
1.5D UN 0331

ICI Canada Inc.
P.O. Box 200, Station "A"
North York, Ontario
Canada, M2N 6H2

AMEX II / AN/FO (Bulk)

MATERIAL SAFETY DATA SHEET

Date Issued: 91 04 17

Index: EXP 0112/91B

FOR EMERGENCIES INVOLVING CHEMICAL SPILL OR RELEASE, CALL THE ICI CANADA TRANSPORTATION EMERGENCY RESPONSE SYSTEM AT 1-800-561-3636.

PRODUCT IDENTIFICATION

Product Name: ANFO (Bulk)
Chemical Name: Not applicable.
Synonyms: AMEX II (Bulk)
Chemical Family: Explosives.
Molecular Formula: Not applicable.
Product Use: A booster-sensitive explosive used in surface and underground applications.

REGULATORY SECTION

Controlled Products Regulations Classification: This product is an explosive and is not regulated by WHMIS.

OSHA Hazard Communication (29CFR 1910.1200) Classification: Explosive; oxidizer; irritant (eye).

CANADIAN TDG ACT SHIPPING DESCRIPTION

Shipping Name: Explosive, Blasting, Type B
Shipping Class/Division: 1.5D
Product Identification No (PIN): UN0331
Packing Group: II

U.S. DOT Classification: Refer to the "Code of Federal Regulations".

Other Regulations: Not available.

Read the entire MSDS for the complete hazard evaluation of this product.

HAZARDOUS INGREDIENTS OF PRODUCT

Hazardous Ingredients	%(w/w)	ACGIH TLV	CAS No.
Ammonium Nitrate	60-100	Not listed	6482-52-2
Fuel Oil No. 2	5-10	5 mg/m^3	64742-81-0

PHYSICAL PROPERTIES

Physical State: Solid.
Appearance and Odour: Off-white pellets commonly called prills; smell of fuel oil.
Odour Threshold: Not available.
Boiling Range (Deg. C): Not applicable.
Melting/Freezing Point (Deg. C): Approx. 170 Deg. C (for ammonium nitrate).
Vapour Pressure: Not applicable.
Specific Gravity: Not available.
Vapour Density: Not applicable.
Bulk Density: 0.8-0.88 (poured); 0.92-1.10 (pneum-loaded).
Evaporation Rate: Not available.
Solubility: Soluble in water.
% Volatile by Volume: Not available.
pH: Not available.
Coefficient of Water/Oil Distribution: Not available.
Sensitivity to Mechanical Impact: 250 cm (USBM Report 7840) (insensitive).
Rate of Burning: Not available.
Explosive Power: 855 cal./g
Sensitivity to Static Discharge: Insensitive.

REACTIVITY DATA

Stability:
- **Under Normal Conditions:** Stable.
- **Under Fire Conditions:** Flammable.
- **Hazardous Polymerization:** Will not occur.

Conditions to Avoid: High temperatures and friction.
Materials to Avoid: Strong oxidizers.
Hazardous Decomposition or Combustion Products: Thermal decomposition products are toxic and may include hydrocarbons, oxides of carbon and nitrogen.

FIRE AND EXPLOSION DATA

Flash Point (Deg. C) (Method): 60 Deg. C (PMCT D93) for fuel oil.
Autoignition Temperature: 230-265 Deg. C
Flammability Limits in Air (%): **LEL:** Not applicable.
UEL: Not applicable.

Fire Extinguishing Media: See below.

Fire Fighting Procedures: DO NOT FIGHT FIRES INVOLVING EXPLOSIVE MATERIALS. Immediately evacuate all personnel from the area.

Other Fire or Explosion Hazards: Not applicable.

TOXICOLOGICAL AND HEALTH DATA

Recommended Exposure Limit: None established for this product. See "HAZARDOUS INGREDIENTS OF PRODUCT" Section.

Toxicological Data: This product has not been tested.

Ammonium Nitrate LD_{50} (oral,rat) = 4820 mg/kg (1)

Carcinogenicity Data: The ingredient(s) of this product is (are) not classified as carcinogenic by ACGIH (American Conference of Governmental Industrial Hygienists) or IARC (International Agency for Research on Cancer), not regulated as carcinogens by OSHA (Occupational Safety and Health Administration), and not listed as carcinogens by NTP (National Toxicology Program).

Reproductive Effects: No information is available and no adverse reproductive effects are anticipated.

Mutagenicity Data: No information is available and no adverse mutagenic effects are anticipated.

Teratogenicity/Fetotoxicity Data: No information is available and no adverse teratogenic/embryotoxic effects are anticipated.

Synergistic Materials: None known.

EFFECTS OF EXPOSURE WHEN:

. **Inhaled:** Because of the presence of fuel oil, this product may be irritating to the nose, throat and respiratory tract and may cause central nervous system (CNS) depression in cases of extreme exposure. See "Other Health Effects" Section.

. **In contact with the skin:** Prolonged and repeated contact may cause mild irritation.

. **In contact with the eyes:** This product causes irritation, redness and pain.

. **Ingested:** This product causes irritation, a burning sensation of the mouth, throat and respiratory tract and abdominal pain. May cause methemoglobinemia and central nervous system (CNS) depression. See "Other Health Effects" Section.

Other Health Effects: If ingested, Nitrates may be reduced to nitrites by bacteria in the digestive tract. Signs and symptoms of nitrite poisoning include cyanosis (due to methemoglobin formation), nausea, dizziness and increased heart rate.

CNS depression is characterized by headache, dizziness, drowsiness, nausea, vomiting and incoordination. Severe overexposures may lead to coma and possible death due to respiratory failure.

FIRST AID PROCEDURES WHEN:

. **Inhaled:** If respiratory problems arise, move the victim to fresh air. Give artificial respiration ONLY if breathing has stopped. Give cardiopulmonary resuscitation (CPR) if there is no breathing AND no pulse. Obtain medical advice IMMEDIATELY.

. **In contact with the skin:** Wash affected areas thoroughly with soap and water. If irritation, redness, or a burning sensation develops and persists, obtain medical advice.

. **In contact with the eyes:** Immediately flush eyes with running water for a minimum of 20 minutes. Hold eyelids open during flushing. If irritation persists, repeat flushing and obtain medical attention.

. **Ingested:** If victim is alert and not convulsing, rinse mouth out and give 1/2 to 1 glass of water to dilute material. DO NOT induce vomiting. If spontaneous vomiting occurs, have victim lean forward with head down to avoid breathing in of vomitus, rinse mouth and administer more water. Obtain medical attention IMMEDIATELY.

Emergency Medical Care: Treat symptomatically.

PREVENTATIVE MEASURES

Recommendations listed in this section indicate the type of equipment which will provide protection against overexposure to this product. Conditions of use, adequacy of engineering or other control measures, and actual exposures will dictate the need for specific protective devices at your workplace.

Engineering Controls: General ventilation is recommended.

Respiratory Protection: A NIOSH/MSHA-approved respirator, if required.

Skin Protection: Gloves made from rubber should be impervious under conditions of use. User should verify impermeability under normal conditions of use prior to general use. The use of coveralls is recommended.

Eye Protection: Use chemical safety goggles when there is potential for eye contact.

Other Personal Protective Equipment: Locate safety shower and eyewash station close to chemical handling area.

Handling Procedures and Equipment: This product is an explosive and should only be used under the supervision of an experienced blaster.

Storage Temperature (Deg. C): See below.

Storage Requirements: This product is not stored.

Other Precautions: Avoid breathing in dust and vapours. Avoid contact with eyes, skin or clothing. Wash thoroughly with soap and water after handling. Wash contaminated clothing thoroughly before re-use.

ENVIRONMENTAL PROTECTION DATA

Steps to be Taken in the Event of a Spill or Leak: Stop and contain the spill. Eliminate all sources of ignition. Clean up using non-sparking tools. Collect contaminated soil and water for treatment or disposal. Do not contaminate domestic or irrigation water supplies, lakes, streams, ponds, or rivers. Notify applicable government authority if release is reportable or could adversely affect the environment.

Environmental Effects: Harmful to aquatic life at low concentrations.

Deactivating Chemicals: Not applicable.

Waste Disposal Methods: Burn under supervision of an expert at a government-approved explosive burning ground or destroy, by detonation in boreholes, with explosives in accordance with applicable local, provincial and federal regulations. Call upon the services of an ICI Canada Technical Representative.

ADDITIONAL INFORMATION AND SOURCES USED

1. RTECS-Registry of Toxic Effects of Chemical Substances, On-line search, Canadian Centre for Occupational Health and Safety RTECS database, Vol I-V, 1985-1986 edition, Doris V. Sweet, Ed., National Institute for Occupational Safety and Health, U.S. Dept. of Health and Human Services, Cincinnati, 1987.
2. Supplier's Material Safety Data Sheets.

The information contained herein is offered only as a guide to the handling of this specific material and has been prepared in good faith by technically knowledgeable personnel. It is not intended to be all-inclusive and the manner and conditions of use and handling may involve other and additional considerations. No warranty of any kind is given or implied and ICI Canada Inc. will not be liable for any damages, losses, injuries or consequential damages which may result from the use of or reliance on any information contained herein. This Material Safety Data Sheet is valid for three years.

Date Issued: 91 04 17
Date Revised: 91 04 17
MSDS Index No: EXP 0112/91B

Prepared By: Safety, Health and Environment (416) 229-8252

Detonators, electric, *for blasting*
1.1B UN 0030

ICI Canada Inc.
P.O. Box 200, Station "A"
North York, Ontario
Canada, M2N 6H2

ELECTRIC DETONATOR OR ELECTRIC BLASTING CAP

MATERIAL SAFETY DATA SHEET

Index: CXU 0004/90A

Date: 91 08 05

FOR EMERGENCIES INVOLVING CHEMICAL SPILL OR RELEASE, CALL THE ICI CANADA TRANSPORTATION EMERGENCY RESPONSE SYSTEM AT 1-800-561-3636.

HAZARD SUMMARY (29 CFR 1910.1200)

Physical Hazards: Explosive.

Health Hazards: This is a packaged product that will not result in exposure to the contents under normal conditions.

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1. PRODUCT IDENTIFICATION

Product Name: Electric Detonator or Electric Blasting Cap.

Product Class: Explosive initiator.

SHIPPING DESCRIPTION / UNITED NATIONS (U.S. DOT)

Shipping Name: Detonators, Electric (DETONATORS, CLASS A)
Shipping Class/Division: 1.1B (EXPLOSIVE, CLASS A)
Product Indentification No (PIN): UN0030
Packing Group: II

COMPOSITION

An aluminum or copper shell containing:

Ignition Composition
Pentaerythritol Tetranitrate (PETN)
Lead Azide
(May include a lead sheathed delay element(s); may include a delay composition.)

---

2. PHYSICAL PROPERTIES

Description: Ingredients are housed in an aluminum or copper shell. Used for initiation of explosive mixtures.

3. FIRE AND EXPLOSION DATA

Flash Point (method): Not applicable.
Autoignition Temperature: Explodes at 177°C
Flammability Limits in Air (%): Not applicable.

Fire Extinguishing Media: See below.

Fire Fighting Procedures: DO NOT FIGHT FIRES INVOLVING EXPLOSIVE MATERIALS. Immediately evacuate all personnel from the area.

Other Fire or Explosion Hazards: Explosive with mass detonation hazard.

4. REACTIVITY DATA

Stability:
Under Normal Conditions: Can explode on impact.
Under Fire Conditions: May explode if heated.
Hazardous Polymerization: Will not occur.

Conditions to Avoid: Heat, impact, radio frequency energy, stray current, static electricity.

Materials to Avoid: Not applicable.

Hazardous Decomposition or Combustion Products: Vapours of NO_x, CO and lead fumes.

5. TOXICOLOGICAL AND HEALTH DATA

Toxicological Data: This is a manufactured article and may release hazardous products during detonation. Detonation products include NO, NO_2, CO, SO_2 and lead fumes.

Recommended Exposure Limits:

	OSHA PEL	ACGIH TLV
Nitrogen Dioxide	5 ppm-ceiling	3 ppm.
Nitric Oxide	25 ppm	25 ppm
Carbon Monoxide	50 ppm	50 ppm
Sulfur Dioxide	5 ppm	2 ppm
Lead	0.05 mg/m^3	0.15 mg/m^3

6. PREVENTIVE MEASURES

Handling Procedures and Equipment: All personnel should keep clear during detonation. Avoid inhalation of smoke and vapours.

Storage Temperature (°C): Ambient temperatures.

Storage Requirements: Product should be stored in a cool dry environment and not stored in close proximity to high explosive material.

Other Precautions: This product is an explosive. Meet all legal requirement for shipping and magazining.

7. ENVIRONMENTAL PROTECTION DATA

Steps to be Taken in the Event of a Spill or Leak: Pick up by hand. Use normal precautions taken for handling explosives.

Environmental Effects: None known.

Deactivating Chemicals: Not applicable.

Waste Disposal Methods: Return to ICI or contact ICI Technical Representative to arrange for destruction by detonation under ICI supervision.

8. ADDITIONAL INFORMATION AND SOURCES USED

1. **Documentation of the Threshold Limit Values and Biological Exposure Indices, 5th ed.**, American Conference of Governmental Industrial Hygienists Inc., Cincinnati, 1986.
2. Grayson, Martin, Ed., **Kirk-Othmer Concise Encyclopedia of Chemical Technology, 3rd ed.**, John Wiley and Sons, New York, 1985.

Date issued: August 1986
Date revised: 91 08 05
MSDS index no: CXU 0004/90A

Prepared By: Safety, Health and Environment (416) 229-8252

ICI Canada Inc.
P.O. Box 200, Station "A"
North York, Ontario
Canada, M2N 6H2

ROCK BOLT CUTTER

MATERIAL SAFETY DATA SHEET

Date Issued: 91 07 18

Index: EXP 0129/91C

FOR EMERGENCIES INVOLVING CHEMICAL SPILL OR RELEASE, CALL THE ICI CANADA TRANSPORTATION EMERGENCY RESPONSE SYSTEM AT 1-800-561-3636.

PRODUCT IDENTIFICATION

Product Name: ROCK BOLT CUTTER
Chemical Name: A mixture of pentaerythritol tetranitrate (PETN) and trinitrotoluene (TNT).
Synonyms: Not applicable.
Chemical Family: Nitrate esters, aromatic nitrates.
Molecular Formula: Not applicable.
Product Use: A charge used in underground mining for cutting rock bolt or rock cable.

REGULATORY SECTION

Controlled Products Regulations Classification: This product is an explosive and is not regulated by WHMIS.

OSHA Hazard Communication (29CFR 1910.1200) Classification: Irritant (eye and skin); oxidizer; explosive.

CANADIAN TDG ACT SHIPPING DESCRIPTION

Shipping Name: Boosters
Shipping Class/Division: 1.1D
Product Identification No (PIN): UN0042
Packing Group: II

U.S. DOT Classification: Refer to the "Code of Federal Regulations".

Other Regulations: Not available.

Read the entire MSDS for the complete hazard evaluation of this product.

HAZARDOUS INGREDIENTS OF PRODUCT

Hazardous Ingredients	%(w/w)	ACGIH TLV	CAS No.
Pentaerythritol Tetranitrate (PETN)	40-70	Not listed.	70-11-5
Trinitrotoluene	30-60	0.5 mg/m^3 (skin)	118-96-7

(Pentolite is the name given to the high explosive mixture of PETN and TNT.)

PHYSICAL PROPERTIES

Physical State: Solid.
Appearance and Odour: Pentolite is a yellow to brown solid. Granular or in mold.
Odour Threshold: Not applicable.
Boiling Range (Deg. C): Not available.
Melting/Freezing Point (Deg. C): 75-82
Vapour Pressure: Not available.
Specific Gravity: 1.60-1.66
Vapour Density: Not available.
Bulk Density: Not available.
Evaporation Rate: Not available.
Solubility: Negligible in water (less than 0.1%); soluble in acetone.
% Volatile by Volume: Not available.
pH: Not applicable.
Coefficient of Water/Oil Distribution: Not available.
Sensitivity to Mechanical Impact: Not available.
Rate of Burning: Not applicable.
Explosive Power: Not available.
Sensitivity to Static Discharge: Not available.

REACTIVITY DATA

Stability:
- **Under Normal Conditions:** Stable.
- **Under Fire Conditions:** Flammable.
- **Hazardous Polymerization:** Will not occur.

Conditions to Avoid: High temperatures and/or rapid heating.
Materials to Avoid: Strong acids, alkalies and oxidizers.
Hazardous Decomposition or Combustion Products: Thermal decomposition products are toxic and may include oxides of carbon and nitrogen.

FIRE AND EXPLOSION DATA

Flash Point (Deg. C) (Method): Not applicable.
Autoignition Temperature: Not available.
Flammability Limits in Air (%): **LEL:** Not applicable.
UEL: Not applicable.

Fire Extinguishing Media: See below.

Fire Fighting Procedures: DO NOT FIGHT FIRES INVOLVING EXPLOSIVE MATERIALS. Immediately evacuate all personnel from the area.

Other Fire or Explosion Hazards: Not applicable.

TOXICOLOGICAL AND HEALTH DATA

Recommended Exposure Limit: None established for this product. See "HAZARDOUS INGREDIENTS OF PRODUCT" Section.

Toxicological Data: This product has not been tested.

Pentaerythritol Tetranitrate LD50 (oral,mouse) = 25500 mg/kg (3)

Trinitrotoluene LD_{50} (oral,rat) = 795 mg/kg (1)

Carcinogenicity Data: The ingredient(s) of this product is (are) not classified as carcinogenic by ACGIH (American Conference of Governmental Industrial Hygienists) or IARC (International Agency for Research on Cancer), not regulated as carcinogens by OSHA (Occupational Safety and Health Administration), and not listed as carcinogens by NTP (National Toxicology Program).

Reproductive Effects: No information is available and no adverse reproductive effects are anticipated.

Mutagenicity Data: No information is available and no adverse mutagenic effects are anticipated.

Teratogenicity/Fetotoxicity Data: No information is available and no adverse teratogenic/embryotoxic effects are anticipated.

Synergistic Materials: None known.

EFFECTS OF EXPOSURE WHEN:

. **Inhaled:** Inhalation is not a likely route of exposure at normally encountered temperatures and is thus not applicable.

. **In contact with the skin:** This product may cause irritation.

. **In contact with the eyes:** This product causes irritation, redness and pain.

. **Ingested:** Ingestion of large amounts may cause nausea, gastrointestinal upset and abdominal pain. May cause central nervous system (CNS) depression, methemoglobinemia, accelerated heart rate and low blood pressure. Prolonged and repeated contact may cause liver damage and kidney damage. See "Other Health Effects" Section.

Other Health Effects: If ingested, nitrates may be reduced to nitrites by bacteria in the digestive tract. Signs and symptoms of nitrite poisoning include cyanosis (due to methemoglobin formation), nausea, dizziness and increased heart rate.

PETN is a vasodilator. It promotes periphral pooling of the blood and decreases venous return to the heart. This results in an overall lowering of the blood pressure.

Initial manifestation of methemoglobinemia is cyanosis, characterized by navy blue, almost black lips, tongue, and mucous membranes, with skin colour being slate gray. Further manifestation is characterized by headache, weakness; dyspnea, dizziness, stupor, respiratory distress and death due to anoxia.

Chronic TNT exposure has been shown to cause liver damage in man.

Signs and symptoms of kidney damage generally progress from oliguria, to blood in the urine, to total renal failure.

It is our belief that, under conditions of normal occupational exposure, this product should not pose such hazards to the worker.

FIRST AID PROCEDURES WHEN:

. **Inhaled:** If respiratory problems arise, move the victim to fresh air. Give artificial respiration ONLY if breathing has stopped. Give cardiopulmonary resuscitation (CPR) if there is no breathing AND no pulse. Obtain medical advice IMMEDIATELY.

. **In contact with the skin:** Wash affected areas thoroughly with soap and water. If irritation, redness, or a burning sensation develops and persists, obtain medical advice.

. **In contact with the eyes:** Immediately flush eyes with running water for a minimum of 20 minutes. Hold eyelids open during flushing. If irritation persists, repeat flushing and obtain medical attention.

. **Ingested:** If victim is alert and not convulsing, rinse mouth out and give 1/2 to 1 glass of water to dilute material. DO NOT induce vomiting. If spontaneous vomiting occurs, have victim lean forward with head down to avoid breathing in of vomitus, rinse mouth and administer more water. Obtain medical attention IMMEDIATELY.

Emergency Medical Care: Medical conditions that may be aggravated by exposure to this product include cardiovascular disorders.

Do not give vasopressor drugs (e.g. epinephrine, ephedrine etc.) as there may be danger of cardiac arrhythmia.

PREVENTATIVE MEASURES

Recommendations listed in this section indicate the type of equipment which will provide protection against overexposure to this product. Conditions of use, adequacy of engineering or other control measures, and actual exposures will dictate the need for specific protective devices at your workplace.

Engineering Controls: General ventilation is recommended.

Respiratory Protection: A NIOSH/MSHA-approved respirator, if required.

Skin Protection: Use gloves made of material which has been found by user to be impervious under conditions of use.

Eye Protection: Safety glasses with side shields are recommended to prevent eye contact.

Other Personal Protective Equipment: The use of proper hearing protection when firing the charge is recommended.

Handling Procedures and Equipment: This product is an explosive and should only be used under the supervision of an individual trained in its use.

Storage Temperature (Deg. C): See below.

Storage Requirements: Store in a ventilated secure magazine, at ambient temperatures.

Other Precautions: See above.

ENVIRONMENTAL PROTECTION DATA

Steps to be Taken in the Event of a Spill or Leak: Stop and contain the spill. Eliminate all sources of ignition. Clean up using non-sparking tools. Collect contaminated soil and water for treatment or disposal. Do not contaminate domestic or irrigation water supplies, lakes, streams, ponds, or rivers. Notify applicable government authority if release is reportable or could adversely affect the environment.

Environmental Effects: Harmful to aquatic life at low concentrations.

Deactivating Chemicals: Not applicable.

Waste Disposal Methods: Burn under supervision of an expert at a government-approved explosive burning ground or destroy, by detonation in boreholes, with explosives in accordance with applicable local, provincial and federal regulations. Call upon the services of an ICI Technical Representative.

ADDITIONAL INFORMATION AND SOURCES USED

1. **RTECS-Registry of Toxic Effects of Chemical Substances**, On-line search, Canadian Centre for Occupational Health and Safety RTECS database, Vol I-V, 1985-1986 edition, Doris V. Sweet, Ed., National Institute for Occupational Safety and Health, U.S. Dept. of Health and Human Services, Cincinnati, 1987.
2. Clayton, G.D. and Clayton, F.E., Eds., **Patty's Industrial Hygiene and Toxicology, 3rd ed., Vol. IIA,B,C**, John Wiley and Sons, New York, 1981.
3. **Supplier's Material Safety Data Sheets.**
4. Gosselin, R.E., et al., Eds., **Clinical Toxicology of Commercial Products**, 5th ed., Williams and Wilkins, Baltimore, 1984.
5. **"CHEMINFO"**, through **"CCINFOdisc"**, Canadian Centre for Occupational Health and Safety, Hamilton, Ontario, Canada.

Date Issued: 91 07 18
Date Revised: 91 07 18
MSDS Index No: EXP 0129/91C

Prepared By: Safety, Health and Environment (416) 229-8252

Material Safety Data Sheet
Conforms to Requirement of 29CFR 1910.1200

Atlas Powder Company
15301 Dallas Parkway Suite 1200 Dallas, Texas 75248-4629

DYNAMITES AND GELATINS - ALL GRADES

PREPARED BY: Paul E. Therriault

REVISION DATE: December, 1990

EMERGENCY TELEPHONE NUMBERS:

East of the Mississippi: 717/386-4121
West of the Mississippi: 417/624-0212
Chemtrec: 800/424-9300

PRODUCT IDENTIFICATION:

Hazardous Ingredients:	CAS. NO.	RTECS NO.	TSCA LISTED	OSHA PEL
Nitroglycerin (NG)	55-63-0	QX2100000	Y	1.0 mg/m^3 skin
Ethylene Glycol Dinitrate (EGDN)	628-96-6	KW5600000	Y	1.0 mg/m^3 skin
Ammonium Nitrate (AN)	6484-52-2	BR9050000	Y	N/A
Sodium Nitrate (SN)	7631-99-4	WC5600000	Y	N/A

SECTION 313 REPORTABLE MATERIAL % BY WEIGHT

PRODUCT	NITROGLYCERINE % BY WEIGHT	PRODUCT	NITROGLYCERINE % BY WEIGHT
Power Primer	2.9	Hi Prime	3.3
Giant Gelatin	2.9	SeisPrime	16.7
Gelmax	2.1	Florigel 330	2.2
Kleen Kut	2.0	Dynashear	5.0
POWERditch	2.7	Petrogel	5.1
Coalites	1.0	Petrogel A	16.7
Gel Coalite Z	3.2	Geldyne	3.0
Gel Coalite 3	1.8	Forcite 75	4.0
Farmex Ditching	5.0	Powerfrac	3.0
Oilwell 3C	6.6	Xactex	3.0
Oilwell 100%	27.7	Geogel	16.7
Extra dynamite	1.5		

TYPICAL PHYSICAL AND CHEMICAL PROPERTIES:

	NG	EGDN	AN	SN
Vapor Pressure - 20°C	.0003*	.05*	0	0
Flash Point °C	nd	217(d)	d	nd
Melting Point °C	13.2	-20	165	317
Boiling Point °C	d	d	190	nd
Specific Gravity	1.591	1.48	1.725	2.265
Molecular Weight	277.1	152.1	83	85
Odor	Pungent	Pungent	None	None
Appearance	Yellow Oil	Colorles	White solid	White solid

nd = no data d = dissociates

Solubility in water: Salts are soluable in water, but the nitrated esters (NG and EGDN) are only slightly soluble.

Appearance and odor: A mixture of absorbants, white oxidizing salts. Tan color with white granules. Slightly sweet odor.

FIRE AND EXPLOSION DATA:

DOT: CLASS A EXPLOSIVE

DO NOT ATTEMPT TO FIGHT FIRES INVOLVING EXPLOSIVES. Immediately evacuate the area for a minimum of one mile. May detonate when exposed to sparks or open flame. Avoid smoke from fire as carbon monoxide or nitric oxides may be generated.

REACTIVITY DATA

Stability: Stable under normal conditions. May explode when subjected to fire or shock.
Hazardous decomposition or by products: Gases produced are nitrogen oxides and carbon oxides.
Hazardous polymerization: Will not occur

HEALTH DATA:

Ventilate magazines before entering. Nitroglycerine is a vasodilator and can cause headache, dizziness, weakness and nausea.

LISTINGS:

	NTP Annual Report on Carcinogens	IARC Monographs	OSHA Carcinogen
NG/EGDN	No	No	No
Ammonium Nitrate	No	No	No
Sodium Nitrate	No	No	No

EMERGENCY AND FIRST AID PROCEDURES

FIRST AID - Wash exposed skin with soap and water. If eyes are exposed, flush with water for fifteen minutes. If inhaled, remove to fresh air and consult a physician if symptoms persist. If ingested, consult a physician.

PROCEDURES FOR CLEAN UP OF SPILLS AND LEAKS:

Contact manufacturer for emergency cleanup and disposal procedures. Keep crowds at a distance. In the event of a major spill, contact Chemtrec at 800/424-9300. Completely isolate the spill area and absorb with a material such as sawdust or wood pulp. Sweep up gently with non sparking and non static generating tools and place material in a non-combustible container. Destroy the contaminated material at an environmentally approved facility. NOTE: Recovered spill residues are hazardous waste and must be disposed of in accordance with all applicable Federal, State and local Regulations.

No smoking or open flames. Avoid skin contact and breathing of fumes.

PRECAUTIONS FOR SAFE HANDLING AND USE:

Exposure can occur through inhalation and skin absorption. Wear protective clothing and gloves when handling products. Wash exposed skin with soap and water. Launder clothes daily. Use cotton gloves over thin latex gloves. Latex and cotton gloves should be changed every 2 hours; cotton gloves should be changed more frequently if they become soiled. The cotton gloves may be laundered and reused. NG will eventually penetrate the latex, but they will afford temporary protection. NG will also penetrate natural and synthetic rubber gloves. Clothing should not have pockets and shoes should have rubber non sparking conductive soles. No metal should be on clothing or shoes.

CONTROL MEASURES:

VENTILATION: Avoid exposure to vapors. Provide local exhaust to minimize vapor concentration and dust inhalation. Ventilate magazine prior to entry.

PERSONAL PROTECTIVE EQUIPMENT: Wear suitable protective clothing and gloves to prevent skin contact. Immediately remove and launder wet clothing. An organic vapor respirator is recommended in cases of vapor exposure.

EYE PROTECTION - Safety glasses with side shields.

STORAGE: Follow BATF standards for storage (27 CFR 151 Subpart 3) and OSHA Standards for Storage and Use (29 CFR 1910.109). See Institute of Makers of Explosives Publications for information.

Explosives, Blasting, Type E
1.1D UN 0241

ICI Canada Inc.
P.O. Box 200, Station "A"
North York, Ontario
Canada, M2N 6H2

SUPERFRAC 4000 & 7000

MATERIAL SAFETY DATA SHEET

Date Revised: 91 07 25

Index: EXP 0127/91C

FOR EMERGENCIES INVOLVING CHEMICAL SPILL OR RELEASE, CALL THE ICI CANADA TRANSPORTATION EMERGENCY RESPONSE SYSTEM AT 1-800-561-3636.

PRODUCT IDENTIFICATION

Product Name: SUPERFRAC 4000 & 7000
Chemical Name: Not applicable.
Synonyms: Not applicable.
Chemical Family: Doped emulsion explosives.
Molecular Formula: Not applicable.
Product Use: A detonator-sensitive emulsion explosive, used in surface and underground applications.

REGULATORY SECTION

Controlled Products Regulations Classification: This product is an explosive and is not regulated by WHMIS.

OSHA Hazard Communication (29CFR 1910.1200) Classification: Explosive; oxidizer; irritant (eye, skin).

CANADIAN TDG ACT SHIPPING DESCRIPTION

Shipping Name: Explosive, Blasting, Type E
Shipping Class/Division: 1.1D
Product Identification No (PIN): UN 0241
Packing Group: II

U.S. DOT Classification: Refer to the "Code of Federal Regulations."

Other Regulations: Not available.

Read the entire MSDS for the complete hazard evaluation of this product.

HAZARDOUS INGREDIENTS OF PRODUCT

Hazardous Ingredients	%(w/w)	ACGIH TLV	CAS No.
Ammonium Nitrate	60-100	Not listed.	6484-52-2
Sodium Nitrate	5-10	Not listed.	7631-99-4
Aluminum *	1-5	5 mg/m^3 (pyro powders)	7429-90-5
Glass Microspheres	3-7	10 mg/m^3 (fibrous glass dust)	Not available.

* Only SUPERFRAC 7000 contains Aluminum.

PHYSICAL PROPERTIES

Physical State: Very viscous liquid.
Appearance and Odour: Odourless, orange-coloured.
Odour Threshold: Not available.
Boiling Range (Deg. C): Not applicable.
Melting/Freezing Point (Deg. C): Not applicable.
Vapour Pressure: Not applicable.
Specific Gravity: 1.00 - 1.50
Vapour Density: Not applicable.
Bulk Density: 1000 - 1100 kg/m^3
Evaporation Rate: Not applicable.
Solubility: Not soluble in water.
% Volatile by Volume: Not applicable.
pH: 4.0 - 6.0
Coefficient of Water/Oil Distribution: Approx. 94:6
Sensitivity to Mechanical Impact: Greater than 1 meter.
Rate of Burning: Does not sustain burning at atmospheric pressure.
Explosive Power: ASV 325 - 400 kJ/100 g
Sensitivity to Static Discharge: Not sensitive.

REACTIVITY DATA

Stability:
- **Under Normal Conditions:** Stable.
- **Under Fire Conditions:** Flammable.
- **Hazardous Polymerization:** Will not occur.

Conditions to Avoid: Heat, impact and friction.
Materials to Avoid: Strong oxidizing and reducing agents.
Hazardous Decomposition or Combustion Products: Thermal decomposition products may include small quantities (ppm) of carbon and nitrogen oxides.

FIRE AND EXPLOSION DATA

Flash Point (Deg. C) (Method): Not applicable.
Autoignition Temperature: Ammonium nitrate will spontaneously decompose at approx. 259 Deg. C.
Flammability Limits in Air (%): **LEL:** Not applicable.
UEL: Not applicable.

Fire Extinguishing Media: See below.

Fire Fighting Procedures: DO NOT FIGHT FIRES INVOLVING EXPLOSIVE MATERIALS. Immediately evacuate all personnel from the area.

Other Fire or Explosion Hazards: Not applicable.

TOXICOLOGICAL AND HEALTH DATA

Recommended Exposure Limit: None established for this product. See "HAZARDOUS INGREDIENTS OF PRODUCT" Section.

Toxicological Data: This product has not been tested.

Ammonium Nitrate LD_{50} (oral,rat) = 4820 mg/kg (1)

Sodium Nitrate LD_{50} (oral,rabbit) = 1960-2680 mg/kg (4)

Carcinogenicity Data: The ingredient(s) of this product is (are) not classified as carcinogenic by ACGIH (American Conference of Governmental Industrial Hygienists) or IARC (International Agency for Research on Cancer), not regulated as carcinogens by OSHA (Occupational Safety and Health Administration), and not listed as carcinogens by NTP (National Toxicology Program).

Reproductive Effects: No information is available and no adverse reproductive effects are anticipated.

Mutagenicity Data: No information is available and no adverse mutagenic effects are anticipated.

Teratogenicity/Fetotoxicity Data: No information is available and no adverse teratogenic/embryotoxic effects are anticipated.

Synergistic Materials: None known.

EFFECTS OF EXPOSURE WHEN:

. **Inhaled:** Inhalation is not a likely route of exposure at normally encountered temperatures and is thus not applicable.

. **In contact with the skin:** Prolonged and repeated contact may cause mild irritation.

. **In contact with the eyes:** This product causes irritation, redness and pain.

. **Ingested:** Ingestion of large amounts may cause nausea, gastrointestinal upset and abdominal pain. May cause methemoglobinemia. See "Other Health Effects" Section.

Other Health Effects: Initial manifestation of methemoglobinemia is cyanosis, characterized by navy blue, almost black lips, tongue, and mucous membranes, with skin colour being slate gray. Further manifestation is characterized by headache, weakness, dyspnea, dizziness, stupor, respiratory distress and death due to anoxia.

If ingested, Nitrates may be reduced to nitrites by bacteria in the digestive tract. Signs and symptoms of nitrite poisoning include cyanosis (due to methemoglobin formation), nausea, dizziness and increased heart rate.

FIRST AID PROCEDURES WHEN:

. **Inhaled:** Inhalation is not a likely route of exposure at normally encountered temperatures and is thus not applicable.

. **In contact with the skin:** Wash affected areas thoroughly with soap and water. If irritation persists, obtain medical advice.

. **In contact with the eyes:** Immediately flush eyes with running water for a minimum of 20 minutes. Hold eyelids open during flushing. If irritation persists, repeat flushing and obtain medical attention.

. **Ingested:** If victim is alert and not convulsing, rinse mouth out and give 1/2 to 1 glass of water to dilute material. DO NOT induce vomiting. If spontaneous vomiting occurs, have victim lean forward with head down to avoid breathing in of vomitus, rinse mouth and administer more water. Obtain medical attention IMMEDIATELY.

Emergency Medical Care: Treat symptomatically.

PREVENTATIVE MEASURES

Recommendations listed in this section indicate the type of equipment which will provide protection against overexposure to this product. Conditions of use, adequacy of engineering or other control measures, and actual exposures will dictate the need for specific protective devices at your workplace.

Engineering Controls: General ventilation is recommended.

Respiratory Protection: A NIOSH/MSHA-approved respirator, if required.

Skin Protection: Gloves made from rubber should be impervious under conditions of use. User should verify impermeability under normal conditions of use prior to general use. Also, the use of coveralls is recommended.

Eye Protection: Use chemical safety goggles when there is potential for eye contact.

Other Personal Protective Equipment: See above.

Handling Procedures and Equipment: These products are explosives and should only be used under the supervision of an experienced blaster.

Storage Temperature (Deg. C): See below.

Storage Requirements: Store in a cool, well-ventilated area (or ventilate before entering) away from strong oxidizing and reducing agents. Keep away from heat, sparks and flame. Keep containers closed. Do not expose sealed containers to temperatures above 50 Deg. C.

Other Precautions: Avoid contact with eyes, skin or clothing. Wash thoroughly with soap and water after handling. Wash contaminated clothing thoroughly before re-use.

ENVIRONMENTAL PROTECTION DATA

Steps to be Taken in the Event of a Spill or Leak: Stop and contain the spill. Eliminate all sources of ignition. Clean up using non-sparking tools. Collect contaminated soil and water for treatment or disposal. Do not contaminate domestic or irrigation water supplies, lakes, streams, ponds, or rivers. Notify applicable government authority if release is reportable or could adversely affect the environment.

Environmental Effects: Water-insoluble and remains explosive. With extended time periods, some ingredients will solubilize.

Deactivating Chemicals: Detergents will break up the emulsions if mixed in.

Waste Disposal Methods: Burn under supervision of an expert at a government-approved explosive burning ground or destroy, by detonation in boreholes, with explosives in accordance with applicable local, provincial and federal regulations. Call upon the services of an ICI Canada Technical Representative.

ADDITIONAL INFORMATION AND SOURCES USED

1. RTECS-Registry of Toxic Effects of Chemical Substances, On-line search, Canadian Centre for Occupational Health and Safety RTECS database, Vol I-V, 1985-1986 edition, Doris V. Sweet, Ed., National Institute for Occupational Safety and Health, U.S. Dept. of Health and Human Services, Cincinnati, 1987.
2. Clayton, G.D. and Clayton, F.E., Eds., Patty's Industrial Hygiene and Toxicology, 3rd ed., Vol. IIA,B,C, John Wiley and Sons, New York, 1981.
3. Supplier's Material Safety Data Sheets.

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Date Revised: 91 07 25
MSDS Index No: EXP 0127/91C

Prepared By: Safety, Health and Environment(416) 229-8252

Cord, detonating
1.1D UN 0065

ICI Canada Inc.
P.O. Box 200, Station "A"
North York, Ontario
Canada, M2N 6H2

DETONATING CORDS

MATERIAL SAFETY DATA SHEET

Index: CXU 0010/90D

Date: 91 08 05

FOR EMERGENCIES INVOLVING CHEMICAL SPILL OR RELEASE, CALL THE ICI CANADA TRANSPORTATION EMERGENCY RESPONSE SYSTEM AT 1-800-561-3636.

HAZARD SUMMARY (29 CFR 1910.1200)

Physical Hazards: Explosive.

Health Hazards: This is a packaged product that will not result in exposure to the contents under normal conditions.

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1. PRODUCT IDENTIFICATION

Product Name: TRUNKLINE, PLAIN, AQUAFLEX, B-LINE, E-CORD, REINFORCED PRIMACORD, SCUF-FLEX, BOOSTER CORD, UNILINE, XTND, XT PRIMACORD, AP-CORD, ATLAS No., ETILINE, ETI-SPECIAL, CORDTEX

Product Class: Detonating cords.

SHIPPING DESCRIPTION / UNITED NATIONS (U.S. DOT)

Shipping Name: Cord, Detonating (CORD, DETONATING)
Shipping Class/Division: 1.1D (EXPLOSIVE, CLASS A)
Product Indentification No (PIN): UN0065
Packing Group: II

COMPOSITION

A cord containing a Pentaerythritol Tetranitrate (PETN) core.

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2. PHYSICAL PROPERTIES

Description: Some cords are covered with PVC plastic and others covered with wax and polyethylene plastic.

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3. FIRE AND EXPLOSION DATA

Flash Point (method): Not applicable.
Autoignition Temperature: PETN explodes at 205-215°C.
Flammability Limits in Air (%): Not applicable.

Fire Extinguishing Media: See below.

Fire Fighting Procedures: DO NOT FIGHT FIRES INVOLVING EXPLOSIVE MATERIALS. Immediately evacuate all personnel from the area.

Other Fire or Explosion Hazards: May ignite if heated.

4. REACTIVITY DATA

Stability:
Under Normal Conditions: Can explode on impact.
Under Fire Conditions: Will not explode en mass in a hot fire.
Hazardous Polymerization: Will not occur.

Conditions to Avoid: The B-Line cords have limited tensile strength and abrasion resistance. Refer to the Product Bulletin for proper applications and use procedures.

Materials to Avoid: The PVC plastic covering or wax covering will, in time, be affected by diesel oil.

Hazardous Decomposition or Combustion Products: Vapours of NO_x and CO.

5. TOXICOLOGICAL AND HEALTH DATA

Toxicological Data: This is a manufactured article and may release hazardous products during detonation. Detonation products include NO, NO_2, CO, SO_2.

Recommended Exposure Limits:

	OSHA PEL	ACGIH TLV
Nitrogen Dioxide	5 ppm-ceiling	3 ppm
Nitric Oxide	25 ppm	25 ppm
Carbon Monoxide	50 ppm	50 ppm
Sulphur Dioxide	5 ppm	2 ppm

6. PREVENTIVE MEASURES

Handling Procedures and Equipment: Damaged cords can lead to misfired holes - potentially, the most hazardous of all blasting situations. Avoid abrasion of cord on hole collars or casing pipes.

Storage Temperature (°C): Ambient temperatures.

Storage Requirements: Store detonating cords in clean, dry, well-ventilated magazines, and must be stored in compliance with Federal, Provincial, State and Municipal regulations. Must be stored only in magazines licensed for the storage of High Explosives.

Other Precautions: This product is an explosive. Meet all legal requirement for shipping and magazining.

7. ENVIRONMENTAL PROTECTION DATA

Steps to be Taken in the Event of a Spill or Leak: Pick up cautiously as per normal precautions taken in handling explosives.

Environmental Effects: None known.

Deactivating Chemicals: Not applicable.

Waste Disposal Methods: Destroy them by connecting them, in bundles to the back row of a blast. Burning under supervision of an expert at an approved location. Call upon the services of an ICI Technical Representative.

8. ADDITIONAL INFORMATION AND SOURCES USED

1. Documentation of the Threshold Limit Values and Biological Exposure Indices, 5th ed., American Conference of Governmental Industrial Hygienist Inc., Cincinnati, 1986.
2. Grayson, Martin, Ed., Kirk-Othmer Concise Encyclopedia of Chemical Technology, 3rd ed., John Wiley and Sons, New York, 1985.

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Prepared By: Safety, Health and Environment (416) 229-8252

Detonator assemblies, nonelectric, for blasting 1.1B UN 0360

ICI Canada Inc.
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North York, Ontario
Canada, M2N 6H2

DETONATORS - NONEL, ANOLINE, CORDLINE, EXEL CONSTADET, EXEL, EXEL BLASTMASTER, NONEL IREDET, DETINEL, EXEL SHD, EXEL T & D, HANDIDET

MATERIAL SAFETY DATA SHEET

Index: CXU 0005/90D

Date: 91 08 05

FOR EMERGENCIES INVOLVING CHEMICAL SPILL OR RELEASE, CALL THE ICI CANADA TRANSPORTATION EMERGENCY RESPONSE SYSTEM AT 1-800-561-3636.

HAZARD SUMMARY (29 CFR 1910.1200)

Physical Hazards: Explosive.

Health Hazards: This is a packaged product that will not result in exposure to the contents under normal conditions.

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1. PRODUCT IDENTIFICATION

Product Name: NONEL, ANOLINE, CORDLINE, EXEL CONSTADET, EXEL, EXEL BLASTMASTER, NONEL IREDET, DETINEL Delay Detonators, EXEL SHD, EXEL T & D, HANDIDET.

Product Class: Non-electric Delay Detonators.

SHIPPING DESCRIPTION / UNITED NATIONS (U.S. DOT)

Shipping Name: Detonators assemblies, non-electric (DETONATORS, CLASS A)
Shipping Class/Division: 1.1B (EXPLOSIVE, CLASS A)
Product Indentification No (PIN): UN0360
Packing Group: II

COMPOSITION

A signal line containing an explosive charge of PETN (ANOLINE/CORDLINE) or HMX/Al blend (NONEL/EXEL) and a detonator containing:

Pentaerythritol Tetranitrate (PETN)
Lead Azide
(May include a lead sheathed delay element(s); may include a delay composition.)

---

2. PHYSICAL PROPERTIES

Description: Ingredients are housed in an aluminum shell.

3. FIRE AND EXPLOSION DATA

Flash Point (method): Not applicable.
Autoignition Temperature: PETN explodes at 205-215°C
Flammability Limits in Air (%): Not available.

Fire Extinguishing Media: See below.

Fire Fighting Procedures: DO NOT FIGHT FIRES INVOLVING EXPLOSIVE MATERIALS. Immediately evacuate all personnel from the area.

Other Fire or Explosion Hazards: High explosive with mass detonation hazards.

4. REACTIVITY DATA

Stability:
Under Normal Conditions: Can explode on impact.
Under Fire Conditions: May detonate if heated.
Hazardous Polymerization: Will not occur.

Conditions to Avoid: Shock, impact or heat that may detonate the product.

Materials to Avoid: Oxidizing materials.

Hazardous Decomposition or Combustion Products: Vapours of NO_x, CO and lead fumes.

5. TOXICOLOGICAL AND HEALTH DATA

Toxicological Data: This is a manufactured article and may release hazardous products during detonation. Detonation products include NO, NO_2, CO, SO_2 an lead fumes.

Recommended Exposure Limits:

	OSHA PEL		ACGIH TLV	
Nitrogen Dioxide	5	ppm-ceiling	3	ppm
Nitric Oxide	25	ppm	25	ppm
Carbon Monoxide	50	ppm	50	ppm
Sulfur Dioxide	5	ppm	2	ppm
Lead	0.05	mg/m3	0.15	mg /m3

6. PREVENTIVE MEASURES

Handling Procedures and Equipment: All personnel should keep clear during detonation. Avoid inhalation of smoke and vapours.

Storage Temperature (°C): Ambient temperatures.

Storage Requirements: Product should be stored in a cool dry environment and not stored in close proximity to high explosive material.

Other Precautions: This product is an explosive. Meet all legal requirement for shipping and magazining.

7. ENVIRONMENTAL PROTECTION DATA

Steps to be Taken in the Event of a Spill or Leak: Pick up cautiously as per normal precautions taken in handling explosives.

Environmental Effects: None known.

Deactivating Chemicals: Not applicable.

Waste Disposal Methods: Return to ICI or contact ICI Technical Representative to arrange for destruction by detonation under ICI supervision.

8. ADDITIONAL INFORMATION AND SOURCES USED

1. Documentation of the Threshold Limit Values and Biological Exposure Indices, 5th ed., American Conference of Governmental Industrial Hygienists Inc., Cincinnati, 1986.
2. Grayson, Martin, Ed., Kirk-Othmer Concise Encyclopedia of Chemical Technology, 3rd ed., John Wiley and Sons, New York, 1985.

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