ACTION PLAN FOR SPILL OF HYDRATED LIME

Initial Spill

Response

- STOP spill at source if possible
- PREVENT hydrated lime from contacting water
- if lime does contact water, CONTAIN solution to as small an area as possible.

Hazards

- skin irritant

Action for Fire

- no special precautions

Recovery

- spills of hydrated lime on dry surfaces can simply be shovelled into containers
- spills of lime on wet surfaces or exposed to rain should be shovelled into waterproof containers as soon as possible to minimize the quantity of lime being dissolved
- sorbents may be used to contain and recover spilled solutions.

Disposal

- hydrated lime recovered from a spill may be used in the mill if it is of acceptable quality
- solid lime and all lime solutions should be disposed of in the tailings pond.

Properties

- chemical formula Ca(OH)2
- white crystalline powder
- slightly soluble in water.

Environmental

Threat

- toxic to fish and other aquatic life at concentrations in the order of 50mg/l and greater

Containers

- transported and stored in lined paper bags which are palletized and double stretch wrapped.

Supplier

- Dupont

L1299 **MATERIAL SAFETY DATA SHEET** PAGE 1

VAN WATERS & ROGERS LTD. 9800 VAN HORNE WAY RICHMOND, B.C. V6X 1W5
SALES ORDER:
VAN WATERS & ROGERS PRODUCT:
MSDS NUMBER: L1299 VERSION: 2
DATE PRINTED: 28/11/95

ECHO BAY
ATTN: DAVID HOHNSTEIN
FAX #890-8766

WHMIS CODES: E

EMERGENCY ASSISTANCE

For Emergency Assistance Involving Chemicals
Call CHEMTREC (800) 424-9300

PRODUCT INFORMATION

Product Name: HYDRATED LIME VW&R Code: L1299

Common Name/Synonym: Calcium Hydroxide; Calcium Hydrate; slaked lime; caustic lime.
CAS Registry Number: 1305-62-0
Chemical Name: N/D
Chemical Family: N/D
Formula: $Ca(OH)_2$
Molecular Weight: 74.09
Product Use: Cement, water treatment, mining, pulp and paper.

PREPARATION INFORMATION

Date Issued: 10/95
Supercedes: 02/92
Prepared By: MSDS Coordinator. Contact during business hours, Pacific Time (604)-273-1441.

HAZARDOUS INGREDIENTS

Component(s)/CAS No.	% wt.	Exposure Limits, mg/m3 OSHA PEL	ACGIH TLV
Calcium Hydroxide (1305-62-0)	95-100	5	5

Local regulated limits may vary.

PHYSICAL PROPERTIES

Boiling Point: 2850 C
Melting Point: 580 C
Freezing Point: N/D
Specific Gravity (Water=1): 2.3
Vapour Pressure: N/D
Vapour Density: N/D
Ph: 11.6-12.6 Strong alkaline.
Solubility in Water: Negligible (<0.1%)
% Volatile: 0
Evaporation Rate (Butyl Acetate=1): N/D
Odour Threshold: N/D
Coefficient of Water/Oil Distribution: >1
Appearance and Odour: White or white-grey solid. Odourless.
Physical State: Solid.

FIRE AND EXPLOSION INFORMATION

Flash Point/Method: N/AP
Lower Flammable Limit: N/AP
Upper Flammable Limit: N/AP
Autoignition Temperature: N/AP
Extinguishing Media: Use extinguishing media appropriate for surrounding fire.
Special Fire Fighting Procedures: Fire-fighters should wear self-contained breathing apparatus with full facepiece operated in positive pressure mode.
Unusual Fire and Explosion Hazards: N/AP
Hazardous Combustion Products: N/AP
Explosion Data
Sensitivity to Mechanical Impact: N/AP
Sensitivity to Static Discharge: N/AP
Conditions of Flammability: Non-flammable.

HAZARDOUS REACTIVITY

Stability: Stable.
Hazardous Polymerization: Will not occur.
Conditions to Avoid: Air, dusting.
Materials to Avoid: Strong acids, nitromethane, nitroethane, nitropropane, phosphorus, maleic anhydride.
Hazardous Decomposition Products: None identified.
Conditions of Reactivity: N/D

FIRST AID MEASURES

If Inhaled: Move to fresh air. Apply artificial respiration and/or cardiopulmonary resuscitation (CPR) if necessary. Keep warm and at rest. Get medical attention immediately.

In Case of Eye Contact: Immediately flush eyes with a gentle stream of warm water for at least 15 min. lifting upper and lower lids at intervals. Get medical attention immediately.

In Case of Skin Contact: Flush skin with large amounts of water while removing contaminated clothing. Get medical attention.

If Ingested: Do not induce vomiting. If conscious rinse residual calcium hydroxide from mouth with water and give one or two glasses of milk or water. If vomiting occurs have victim lean forward to reduce risk of vomit entering lungs. Get medical attention immediately.

Notes to Physician: Basic (alkaline) chemical. Relatively low water solubility, therefore less corrosive than sodium hydroxide. Unlike calcium oxide (quicklime) does not liberate large amounts of heat on contact with water.

HEALTH HAZARD INFORMATION

Primary Routes of Exposure: Inhalation, skin and eye contact, ingestion.

Signs, Symptoms and Effects of Exposure
Inhalation: Dusts and mists may cause irritation of mouth, nose, throat and possibly lungs.

Eye Contact: Irritation and possible eye damage. Material may be difficult to remove from the eye.

Skin Contact: Irritation and mild burns may occur. Prolonged or repeated contact may cause dermatitis.

Ingestion: May cause burning sensation and limited damage to mouth, throat and esophagus. Stomach cramps may also occur.

Chronic Effects of Exposure: N/D

TOXICITY DATA

LD50 Oral (rat): 7340 mg/kg
LD50 Oral (mouse): 7300 mg/kg
LD50 Dermal (rabbit): N/D
LC50: N/D

Carcinogenicity: Not listed NTP; IARC; OSHA.
Sensitization: N/D
Irritancy: Yes
Reproductive Effects: N/D
Teratogenicity: N/D
Mutagenicity: N/D
Toxicologically Synergistic Products: N/D
Other Data: N/D
Environmental Effects: N/D

PREVENTATIVE MEASURES

Ventilation (Engineering Controls): Use local ventilation for control of high dust situations. Otherwise general ventilation normally adequate.

Personal Protective Equipment
Respiratory: Use respirator approved by NIOSH/MSHA for silica or toxic dust when dust is generated. For very high or unknown concentrations wear full face positive pressure SABA or self-contained breathing apparatus.
Eye: Wear chemical splash goggles (unless full face respirator worn).
Clothing: Coveralls.
Footwear: Avoid getting material inside.
Hands: Wear neoprene, natural rubber or polyethylene gloves. (Do not use PVA gloves).
Other Protective Measures: Barrier creams on exposed skin.

Action to Take for Spills or Leaks: Warn others. Wear appropriate protective clothing and equipment. Stop further spillage, and contain spilled material. Recover spilled material for recycle/reuse, or for disposal to secure landfill.

Waste Disposal Method: Dispose in accordance with all applicable federal, provincial, and local environmental regulations.

Storage and Handling Precautions and Equipment: Keep container tightly closed. Store in a cool, dry area protected from damage and away from acids. Suitable for any general chemical storage area. Avoid skin and eye contact. Avoid inhaling dust.

Special Shipping Information: N/D
Other Precautions: N/D

REGULATORY INFORMATION

TDG Classification
Shipping Name: Non-Regulated
UN: N/R
Class:
PKG:

WHMIS Classification: E

Listed on the Domestic Substances List (DSL): Yes

FOR PRODUCT AND SALES INFORMATION

Contact Your Local Van Waters & Rogers Ltd. Branch Office.

NOTICE

VAN WATERS & ROGERS LTD. EXPRESSLY DISCLAIMS ALL EXPRESSED OR IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE PRODUCT PROVIDED.

REVISION INFORMATION

09/92: Three-year revision. Reconstruction.
10/95: Three-year revision.

Legend: N/AP - Not Applicable. N/D - No Data Available.

END OF MSDS

ACTION PLAN FOR SPILL OF SODA ASH

Initial Spill

Response

- STOP spill at source if possible
- PREVENT soda ash from contacting water
- if soda ash does contact water, CONTAIN solution to as small an area as possible.

Hazards - none

Action for Fire - no special precautions

Recovery

- spills of soda ash on dry surfaces can simply be shovelled into containers
- spills of soda ash on wet surfaces or exposed to rain should be shovelled into water proof containers as soon as possible to minimize the quatity of soda ash being dissolved
- sorbents may be used to contain and recover spilled solutions.

Disposal

- soda ash of acceptable quality recovered from a spill may be used in the mill under the direction of the Mill Superintendent
- solid soda ash and all soda ash solutions should be disposed of in the tailings pond.

Properties

- chemical formula: Na_2CO_3
- greyish-white powder
- soluble in water.

Environmental

Threat - toxic to fish and other aquatic life at concentrations in the order of 100 mg/l and greater.

Containers

- transported and stored in lined paper bags which are palletized and double stretch wrapped.

Supplier - Van Waters and Rogers Ltd.

VAN WATERS & ROGERS LTD. 9800 VAN HORNE WAY RICHMOND, B.C. V6X 1W5

SALES ORDER:

VAN WATERS & ROGERS PRODUCT: 62225

MSDS NUMBER: L1349 VERSION: 1

DATE PRINTED: 26/10/93

ECHO BAY MINES LTD
3300 MANULIFE PLACE
10180 - 101 STREET
EDMONTON, ALTA. T5J 3S4

WHMIS CODES: D,2B

EMERGENCY ASSISTANCE

For Emergency Assistance Involving Chemicals
Call CHEMTREC (800) 424-9300

PRODUCT INFORMATION

Product Name: SODA ASH; VW&R Code: L1349

Common Name/Synonym: Sodium Carbonate
CAS Registry Number: 497-19-8
Chemical Name: Sodium Carbonate
Chemical Family: N/D
Formula: Na_2CO_3
Molecular Weight: 105.99
Product Use: Soda salts; glass; soap, cleaners and water softeners; pulp and paper; photographical agent.

PREPARATION INFORMATION

Date Issued: 06/93
Supercedes: 11/90 (P1120)
Prepared By: MSDS Coordinator. Contact during business hours, Eastern Time (416) 736-9299.

HAZARDOUS INGREDIENTS

Component(s)/CAS No.	% wt.	Exposure Limits, mg/m3 OSHA PEL	ACGIH TLV	ONTARIO TWAEV
Sodium Carbonate (497-19-8)	100	15* 5**	10*	10*

* Nuisance particulates, total dust.
**Nuisance particulates, respirable fraction.

Local regulated limits may vary.

PHYSICAL PROPERTIES

Boiling Point: N/D
Freezing/Melting Point: 854 C
Specific Gravity (Water=1): 2.533 g/cc at 25 C
Vapour Pressure: N/AP
Vapour Density (air=1): N/AP
pH 1% solution: 11.3
Solubility in Water: 17% solution at 20 C
% Volatile: N/AP
Evaporation Rate (Ether=1): N/AP
Odour Threshold: N/AP
Coefficient of Water/Oil Distribution: N/D
Appearance and Odour: Odourless, white powder.
Physical State: Solid.

FIRE AND EXPLOSION INFORMATION

ash Point/Method: N/AP
ower Flammable Limit: N/AP
Upper Flammable Limit: N/AP
Autoignition Temperature: N/AP

Extinguishing Media: Use extinguishing media appropriate for surrounding fire.

Special Fire Fighting Procedures: For fire fighting wear NIOSH-approved, self-contained breathing apparatus.

Unusual Fire and Explosion Hazards: N/D

Hazardous Combustion Products: Heating soda ash liberates CO2.
$Na_2CO_3(solid) = Na_2O(solid) + CO_2(gas)$

Explosion Data
Sensitivity to Mechanical Impact: N/AP
Sensitivity to Static Discharge: N/AP
Conditions of Flammability: N/AP

HAZARDOUS REACTIVITY

Stability: Stable.
Hazardous Polymerization: Will not occur.

Conditions to Avoid: Simultaneous exposure to soda ash and lime dusts (CaO). In the presence of moisture (i.e. perspiration) the two materials combine to form corrosive caustic soda (NaOH) which may cause burns.

Materials to Avoid: Contact with acids will release carbon dioxide gas. an react violently with red hot aluminum metal; fluorine gas; lithium; d 2,4,6-trinitrotoluene.

azardous Decomposition Products: Heating soda ash liberates CO2.
$a_2CO_3(solid) = Na_2O(solid) + CO_2(gas)$

Conditions of Reactivity: N/D

FIRST AID MEASURES

If Inhaled: Promptly remove to fresh air. Restore and/or support breathing. Consult a physician for observation and treatment.

In Case of Eye Contact: Flush eyes promptly with plenty of running water for at least 15 minutes and get medical attention.

In Case of Skin Contact: Remove contaminated clothing. Wash affected area of skin with soap and water. Get medical attention if irritation persists.

If Ingested: If conscious, give 2 to 3 glasses of water to drink to dilute the material. DO NOT INDUCE VOMITING. Contact a physician.

Notes to Physician: N/D

HEALTH HAZARD INFORMATION

Primary Routes of Exposure: Inhalation, skin and eye contact, ingestion.

Signs, Symptoms and Effects of Exposure
Inhalation: Inhalation of product may irritate nose, throat and lungs.
Eye Contact: May irritate or burn eyes.
Skin Contact: May cause skin irritation from prolonged contact, especially in hot weather.
Ingestion: Although low in toxicity, ingestion can be harmful. May cause nausea, vomiting, stomach ache, and diarrhea.

aronic Effects of Exposure: Excessive contact may produce "soda ulcers" on hands and perforation of the nasal septum.

ical Conditions Aggravated by Exposure: N/D
itional Information: N/D

----------TOXICITY DATA----------

LD50 Oral (rat): 2800 mg/kg
LD50 Dermal (rabbit): N/D
LC50 (species): N/D

Carcinogenicity: N/D

Sensitization: Sensitivity reactions may occur from prolonged and repeated exposure.

Irritancy: N/D
Reproductive Effects: N/D
Teratogenicity: N/D
Mutagenicity: N/D
Toxicologically Synergistic Products: N/D
Other Data: N/D

Environmental Effects: Degradability - N/AP
Aquatic Toxicity: TLm 48 hr mosquito-fish = 840 mg/l
TLm 96 hr mosquito-fish = 1200 mg/l

----------PREVENTATIVE MEASURES----------

Ventilation (Engineering Controls): Local exhaust - in all areas where dusty or misty conditions prevail. Natural ventilation - adequate for other areas.

Personal Protective Equipment
Respiratory: For dusty or misty conditions, wear NIOSH-approved dust or ist respirator.

e: For dusty or misty conditions, or when handling solutions where ere is reasonable probability of eye contact, wear chemical safety oggles and hard hat. Under these conditions do not wear contact lenses.

Clothing: As a minimum, wear long-sleeve shirt, trousers for routine product use.

Footwear: N/D

Hands: Wear gloves for routine product use. Cotton gloves permitted for dry product, impervious gloves when handling solutions.

Other Protective Measures: Eye wash facility should be provided in storage and general work areas.

Action to Take for Spills or Leaks: Shovel up dry chemical and place into an empty container with cover. Cautiously spray residue with plenty of water. Keep contaminated water from entering sewers and water courses.

Waste Disposal Method: Consistent with the requirements of local waste disposal authorities. If permitted by applicable disposal regulations, bury in a solid waste landfill or dissolve and neutralize as follows: Dissolve in water using caution as solution can get hot. Neutralize with acid and flush to sewer with plenty of water. Good ventilation is required during neutralization due to release of CO_2 gas. Neutralized waste may have to be disposed of by an approved contractor.

Storage and Handling Precautions and Equipment: Store in a cool, dry area away from acids. Prolonged storage may cause product to cake and become wet from atmospheric moisture. Avoid contact with eyes or prolonged skin contact. Avoid breathing dust. Use good personal hygiene nd housekeeping.

pecial Shipping Information: N/D

Other Precautions: When dissolving, add to water cautiously and with

irring; solutions can get hot.

----------REGULATORY INFORMATION----------

DG Classification
Shipping Name: Non-Regulated
UN: N/R
Class:
PKG:

WHMIS Classification: D.2B

Listed on the Domestic Substances List (DSL): Yes

----------FOR PRODUCT AND SALES INFORMATION----------

Contact Your Local Van Waters & Rogers Ltd. Branch Office.

----------NOTICE----------

VAN WATERS & ROGERS LTD. EXPRESSLY DISCLAIMS ALL EXPRESSED OR IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE PRODUCT PROVIDED.

----------REVISION INFORMATION----------

06/93: Reconstruction P1120.

Legend: N/AP - Not Applicable. N/D - No Data Available.

========== END OF MSDS ==========

REFER TO ERP2 - 0081

ACTION PLAN FOR SPILL OF ANFO EXPLOSIVES & ALL CLASS I EXPLOSIVES

Initial Spill

Response

- STOP spill at source if possible
- ELIMINATE all possible sources of ignition
- PREVENT anfo from contacting water
- if anfo does contact water, CONTAIN solution to as small an area as possible. Consider dyking
- ISOLATE area of spill preferably by roping off affected area.

Hazards

- may explode under confinement or high temperatures
- flammable
- low toxicity

Action for Fire

- for fires involving large quantities of anfo, evacuate and do not attempt to fight fire
- for fires involving small quantities of anfo, use large amounts of water to extinguish
- anfo may detonate in fire, under severe impact or confinement

Recovery

- spills of anfo on dry surfaces can simply be shovelled into containers
- spills of anfo on wet surfaces or exposed to rain should be shovelled into waterproof containers as soon as possible to minimize the quantity of ammonium nitrate being dissolved

- anfo or a resulting ammonium nitrate solution, must not be allowed access to any flowing stream
- sorbents, such as peat moss, Conwed, or Graboil, should be used to recover any oil emanating from the anfo spill
- soil heavily contaminated with ammonium nitrate should be excavated if the affected ground water threatens to travel to an adjacent flowing stream.

Disposal

- anfo recovered from a spill may be used in the mine
- ammonium nitrate solutions and soil containing ammonium nitrate should be disposed of in the tailings pond
- sorbents used to recover the oil may be incinerated under controlled conditions or buried at an approved site
- anfo can be disposed of by detonation or incineration under knowledgeable supervision.

Properties

- chemical composition: 94% prilled ammonium nitrate (NH_4NO_3)
  6% No. 2 fuel oil
- trade name: Amex II
- small porous pellets coated with oil, may be dyed with bright colours (yellow)

- ammonium nitrate is very soluble in water; the oil is not soluble and will float
- strong oxidizing agent
- flammable.

Environmental

Threat

- ammonium nitrate is moderately toxic to fish and other aquatic organisms. Toxicity increases with increased pH of the water.

Containers

- anfo will be transported and stored in 25 kg poly bags.

Supplier

- Explosives Limited
  Calgary, Alberta
- C I L

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.

---

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	Powerirac	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:

ntact manufacturer for emergency cleanup and disposal procedures. Keep crowds at a distance. In the event of a majo l, 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.

ORAGE: Follow BATF standards for storage (27 CFR 151 Subpart 3) and OSHA Standards for Storage and Use (29 CFP .)10.109). 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.

Date Issued: 91 07 25
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.

---

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.

Date issued: August 1986
Date revised: 91 08 05
MSDS index no: CXU 0010/90D

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

Detonator assemblies, nonelectric, for blasting 1.1B UN 0360

ICI Canada Inc.
P.O. Box 200, Station "A"
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.)

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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.

Date issued: August 1986
Date revised: 91 08 05
MSDS index no: CXU 0005/900

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

LEAD NITRATE

MANUFACTURE:FLORIDIENNE CHIMIE (BELGIUM)

Moisture-1.2% to 1.4%

Iron-5 PPM maximum

Copper-5PPM maximum

Nitric Acid-0.005% maximum

Insolubles-0.02% maximum

Chloride-0.002 % to 0.004%

Appearance-White crystals

Odour-Odourless

VAN WATERS & ROGERS LTD. 9800 VAN HORNE WAY RICHMOND, B.C. V6X 1W5

SALES ORDER:

VAN WATERS & ROGERS PRODUCT: 35738

MSDS NUMBER: L1261 VERSION: 1

DATE PRINTED: 26/10/93

ECHO BAY MINES LTD
3300 MANULIFE PLACE
10180 - 101 STREET
EDMONTON, ALTA. T5J 3S4

WHMIS CODES: C D.1A D.2A

EMERGENCY ASSISTANCE

For Emergency Assistance Involving Chemicals
Call CHEMTREC (800) 424-9300

PRODUCT INFORMATION

Product Name: **LEAD NITRATE** VW&R Code: L1261

Common Name/Synonym: Lead Nitrate
CAS Registry Number: 10099-74-8
Chemical Name: Lead Nitrate
Chemical Family: N/D
Formula: $Pb(NO_3)_2$
Molecular Weight: N/D
Product Use: N/D

PREPARATION INFORMATION

Date Issued: 10/92
Supercedes: 04/89 (P1959)
Prepared By: MSDS Coordinator. Contact during business hours, Eastern Time (416) 736-9299.

HAZARDOUS INGREDIENTS

Component(s)/CAS No.	% wt.	Exposure Limits, mg/m3 OSHA PEL	ACGIH TLV
Lead Nitrate (10099-74-8)	>99	0.01*	0.15*

*as Pb

Local regulated limits may vary.

PHYSICAL PROPERTIES

Boiling Point: Decomposes at 470 C
Melting Point: N/AP
Freezing Point: N/AP
Specific Gravity (Water=1 at 4 C): 4.53
Vapour Pressure: N/AP
Vapour Density: N/AP
pH: N/D
Solubility in Water: Soluble
Other Solvents: Slightly soluble in alcohol.
% Volatile: N/D
Evaporation Rate (Butyl Acetate=1): N/D
Odour Threshold: N/D
Coefficient of Water/Oil Distribution: N/D
Appearance and Odour: White semi-transparent crystals.
Physical State: Solid, oxidizer.

FIRE AND EXPLOSION INFORMATION

Flash Point/Method: N/AP
Lower Flammable Limit: Promotes combustion
Upper Flammable Limit: Promotes combustion
Autoignition Temperature: Not applicable

Extinguishing Media: Use flooding amounts of water to extinguish the fire.

Special Fire Fighting Procedures: Wear self-contained breathing apparatus.

Unusual Fire and Explosion Hazards: Releases toxic gaseous oxides of Nitrogen. When coming in contact with easily oxidizable materials, it may cause ignition, violent combustion or explosion. Promotes combustion of inflammables.

Hazardous Combustion Products: N/D

Explosion Data
Sensitivity to Mechanical Impact: N/D
Sensitivity to Static Discharge: N/D
Conditions of Flammability: N/D

HAZARDOUS REACTIVITY

Stability: Stable.
Hazardous Polymerization: Will not occur.
Conditions to Avoid: High temperatures.

Materials to Avoid: Reducing agents, combustible materials such as wood, cloth, or organic materials, metals such as iron and copper and their alloys and any other oxidizable materials.

Hazardous Decomposition Products: Will liberate toxic oxides of nitrogen.
Conditions of Reactivity: N/D

FIRST AID MEASURES

If Inhaled: Remove patient to fresh air. If not breathing, give artificial respiration. Obtain medical attention.

In Case of Eye Contact: Flush eyes with running water for at least 20 minutes, holding eyelids open. If irritation persists, obtain medical attention immediately.

In Case of Skin Contact: Flush affected area with running water for at least 20 minutes. If irritation persists, obtain medical attention.

If Ingested: Unless unconscious or convulsing, give large amount of water to induce vomiting. Obtain medical attention immediately.

Notes to Physician: N/D

HEALTH HAZARD INFORMATION

Primary Routes of Exposure: Inhalation, skin and eye contact, ingestion.

Signs, Symptoms and Effects of Exposure
Inhalation: Material contains lead which is a cumulative poison. May cause headaches, dizziness, nervousness, depression, numbness, aching muscles, weakness, laboured breathing, abdominal discomfort, nausea and vomiting.
Eye Contact: Dust is an irritant which may cause redness, possible blurred vision.
Skin Contact: Irritant.
Ingestion: See "Inhalation" for symptoms. Symptoms generally take a longer time to become prevalent when material is ingested rather than inhaled.

Chronic Effects of Exposure: N/D
Medical Conditions Aggravated by Exposure: N/D
Additional Information: N/D

----------TOXICITY DATA----------

)50 Oral (rat): N/D
)50 Dermal (rabbit): N/D
LC50 (species): N/D

Carcinogenicity: Lead compounds are listed by the International Agency for Research on Cancer (IARC) as group 2B - possibly carcinogenic to humans.
Sensitization: N/D
Irritancy: N/D
Reproductive Effects: N/D
Teratogenicity: N/D
Mutagenicity: N/D
Toxicologically Synergistic Products: N/D
Other Data: N/D

Environmental Effects: May be toxic to aquatic life if exposed to materials for a long period of time through small leaks or uncontained spills. Lead may accumulate in the ecosystem and become hazardous to man.

----------PREVENTATIVE MEASURES----------

Ventilation (Engineering Controls): Local mechanical exhaust ventilation is preferred.

Personal Protective Equipment
Respiratory: NIOSH approved air-purifying respirator for concentrations up to 10 times TLV. Air supplied respirator for higher concentrations.
Eye: Safety glasses with side shields.
Clothing: Face mask, overalls.
Footwear: N/D
Hands: Rubber or cotton gloves.
Other Protective Measures: N/D

Action to Take for Spills or Leaks: In all cases notify applicable government authority if spill is significant. Stop and contain leak or spill. Sweep or shovel material into containers for reuse. Do not allow material to reach waterways.

Neutralizing Chemicals: Add material to great amount of water and add Soda Ash. Neutralize with 6M HCL.

Waste Disposal Method: Consult federal, provincial and local regulations on chemical waste disposal. May be possible to dispose of in a secure, sanitary landfill site.

Storage and Handling Precautions and Equipment: Store in a cool, dry place. Do not store on wooden floors. Store away from all other chemicals and potential sources of contamination. Keep container tightly closed when not in use. Do not use pressure to empty container. Wash thoroughly after handling. Do not get in eyes, on skin, or on clothing.

Do not cut, grind, weld, or drill on or near this container.

Special Shipping Information: N/D

Other Precautions: Containers, even those that have been emptied, will retain product residue. Always obey hazard warnings and handle empty containers as if they were full.

----------REGULATORY INFORMATION----------

TDG Classification
Shipping Name: Lead Nitrate
UN: 1469
Class: 5.1 (6.1) (9.2)
PKG: II

WHMIS Classification: C; D.1A; D.2A

Listed on the Domestic Substances List (DSL): Yes

----------FOR PRODUCT AND SALES INFORMATION----------

Contact Your Local Van Waters & Rogers Ltd. Branch Office.

----------NOTICE----------

VAN WATERS & ROGERS LTD. EXPRESSLY DISCLAIMS ALL EXPRESSED OR IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE PRODUCT PROVIDED.

----------REVISION INFORMATION----------

10/92: 3-year update. Reconstruction.

Legend: N/AP - Not Applicable. N/D - No Data Available.

========== END OF MSDS ==========

FERRIC SULFATE SOLUTION

VAN WATERS & ROGERS LTD. 9800 VAN HORNE WAY RICHMOND, B.C. V6X 1W5

SALES ORDER:

VAN WATERS & ROGERS PRODUCT: 26560

MSDS NUMBER: P1653 VERSION: 3

DATE PRINTED: 26/10/93

ECHO BAY MINES LTD
3300 MANULIFE PLACE
10180 - 101 STREET
EDMONTON, ALTA. T5J 3S4

WHMIS CODES: E

EMERGENCY ASSISTANCE

FOR EMERGENCY ASSISTANCE INVOLVING CHEMICALS CALL CHEMTREC (800) 424-9300.

FOR PRODUCT AND SALES INFORMATION

CONTACT YOUR LOCAL VAN WATERS & ROGERS BRANCH OFFICE

PRODUCT IDENTIFICATION

PRODUCT NAME: FERRIC SULFATE SOLUTION CAS NO.: 10028-22-5
COMMON NAMES/SYNONYMS: IRON SULFATE 50% VW&R CODE: P1653

FORMULA: FE2 O12 S3
HAZARD RATING (MANUFACTURER)
HEALTH: 3
FIRE: 0
REACTIVITY: 0
SPECIAL: NONE

DATE ISSUED: 01/93
SUPERCEDES: 12/89
HAZARD RATING SCALE:
0=MINIMAL 3=SERIOUS
1=SLIGHT 4=SEVERE
2=MODERATE

HAZARDOUS INGREDIENTS

COMPONENT	CAS NO.	%	EXPOSURE LIMITS, MG/M3 OSHA PEL	ACGIH TLV	OTHER LIMIT	HAZARD
FERRIC SULFATE	10028-22-5	48.7	NONE	1 (AS FE)	NONE	CORROSIVE
SULFURIC ACID	7664-93-9	1.3	1	1	NONE	CORROSIVE
WATER	7732-18-5	BAL	NONE	NONE	NONE	NONE

PHYSICAL PROPERTIES

BOILING POINT, DEG F: 212
VAPOR PRESSURE, MM HG/20 DEG C: NOT APPLICABLE
MELTING POINT, DEG F: <0
VAPOR DENSITY (AIR=1): NOT APPLICABLE
SPECIFIC GRAVITY (WATER=1): 1.48
WATER SOLUBILITY, %:55
APPEARANCE AND ODOR:
EVAPORATION RATE (BUTYL ACETATE=1): NOT APPLICABLE

RED CLEAR LIQUID, ODORLESS

FIRST AID MEASURES

IF INHALED: REMOVE TO FRESH AIR. GIVE ARTIFICIAL RESPIRATION IF NOT BREATHING. GET IMMEDIATE MEDICAL ATTENTION.

IN CASE OF EYE CONTACT: IMMEDIATELY FLUSH EYES WITH LOTS OF RUNNING WATER FOR 15 MINUTES, LIFTING THE UPPER AND LOWER EYELIDS OCCASIONALLY. GET IMMEDIATE MEDICAL ATTENTION.

IN CASE OF SKIN CONTACT: IMMEDIATELY FLUSH SKIN WITH LOTS OF RUNNING WATER FOR 15 MINUTES. REMOVE CONTAMINATED CLOTHING AND SHOES; WASH BEFORE REUSE. GET IMMEDIATE MEDICAL ATTENTION.

SWALLOWED: DO NOT INDUCE VOMITING. IF CONSCIOUS, GIVE LOTS OF WATER MILK. GET IMMEDIATE MEDICAL ATTENTION. DO NOT GIVE ANYTHING BY JTH TO AN UNCONSCIOUS OR CONVULSING PERSON.

----------HEALTH HAZARD INFORMATION----------

PRIMARY ROUTES OF EXPOSURE: EYE CONTACT AND SKIN CONTACT.

SIGNS AND SYMPTOMS OF EXPOSURE
INHALATION: VAPORS AND MISTS ARE EXTREMELY CORROSIVE TO THE NOSE, THROAT, AND MUCOUS MEMBRANES.

EYE CONTACT: LIQUID, AND MISTS ARE CORROSIVE TO THE EYES. BRIEF CONTACT OF THE LIQUID OR MISTS WILL SEVERELY DAMAGE THE EYES AND PROLONGED CONTACT MAY CAUSE PERMANENT EYE INJURY.

SKIN CONTACT: NO IRRITATION IS LIKELY AFTER BRIEF CONTACT BUT MAY BE IRRITATING AFTER PROLONGED CONTACT.

SWALLOWED: MISTS AND LIQUID ARE CORROSIVE TO THE MOUTH AND THROAT AND RESPIRATORY TRACT. SWALLOWING THE LIQUID BURNS THE TISSUES, CAUSES SEVERE ABDOMINAL PAIN, NAUSEA, VOMITING, AND COLLAPSE.

CHRONIC EFFECTS OF EXPOSURE: NO SPECIFIC INFORMATION AVAILABLE.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: NONE REPORTED.

----------TOXICITY DATA----------

ORAL: RAT LD50 = 2.5-5.0 G/KG

ERMAL: RABBIT LD50 > 2.0 G/KG

HALATION: NO DATA FOUND

ARCINOGENICITY: THIS MATERIAL IS NOT CONSIDERED TO BE A CARCINOGEN BY THE NATIONAL TOXICOLOGY PROGRAM, THE INTERNATIONAL AGENCY FOR RESEARCH ON CANCER, OR THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION.

OTHER DATA:NONE

----------PERSONAL PROTECTION----------

VENTILATION: LOCAL MECHANICAL EXHAUST VENTILATION CAPABLE OF MAINTAINING EMISSIONS AT THE POINT OF USE BELOW THE PEL.

RESPIRATORY PROTECTION: IF USE CONDITIONS GENERATE MISTS, WEAR A NOISH-APPROVED RESPIRATOR APPROPRIATE FOR THOSE EMISSION LEVELS. APPROPRIATE RESPIRATORS MAY BE A FULL FACEPIECE AIR-PURIFYING CARTRIDGE RESPIRATOR EQUIPPED FOR ACID GASES/MISTS, A SELF-CONTAINED BREATHING APPARATUS IN THE PRESSURE DEMAND MODE, OR A SUPPLIED-AIR RESPIRATOR.

EYE PROTECTION: CHEMICAL GOGGLES AND FULL FACESHIELD UNLESS A FULL FACEPIECE RESPIRATOR IS ALSO WORN. IT IS GENERALLY RECOGNIZED THAT CONTACT LENSES SHOULD NOT BE WORN WHEN WORKING WITH CHEMICALS BECAUSE CONTACT LENSES MAY CONTRIBUTE TO THE SEVERITY OF AN EYE INJURY.

PROTECTIVE CLOTHING: ACID-RESISTANT SLICKER SUIT WITH RUBBER APRON, RUBBER BOOTS WITH PANTS OUTSIDE, AND RUBBER GLOVES WITH GAUNTLETS.

OTHER PROTECTIVE MEASURES: AN EYEWASH AND SAFETY SHOWER SHOULD BE NEARBY AND READY FOR USE.

----------FIRE AND EXPLOSION INFORMATION----------

LASH POINT, DEG F: NONE
METHOD USED: NOT APPLICABLE

FLAMMABLE LIMITS IN AIR, %
LOWER: NOT APPLICABLE
UPPER: NOT APPLICABLE

XTINGUISHING MEDIA: THIS MATERIAL IS NOT COMBUSTIBLE. USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.

ECIAL FIRE FIGHTING PROCEDURES: FIRE FIGHTERS SHOULD WEAR SELF-
TAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING. USE WATER
AY TO COOL NEARBY CONTAINERS AND STRUCTURES EXPOSED TO FIRE.

.USUAL FIRE AND EXPLOSION HAZARDS: NONE REPORTED.

----------HAZARDOUS REACTIVITY----------

STABILITY: STABLE POLYMERIZATION: WILL NOT OCCUR
CONDITIONS TO AVOID: TEMPERATURES ABOVE 1112 DEG F.

MATERIALS TO AVOID: REACTS WITH LIME AND OTHER BASIC MATERIALS TO FORM INSOLUBLE IRON SALTS. SOLUTION IS CORROSIVE TO MILD STEEL, COPPER ALLOYS, GALVANIZED STEEL, PAINTS, ENAMELS AND CONCRETE.

HAZARDOUS DECOMPOSITION PRODUCTS: AT TEMPERATURES ABOVE 1112 DEG F (600 DEG C) MAY LIBERATE IRON OXIDE AND SULFUR TRIOXIDE.

----------SPILL, LEAK, AND DISPOSAL PROCEDURES----------

ACTION TO TAKE FOR SPILLS OR LEAKS: WEAR ACID-RESISTANT SLICKER SUIT AND COMPLETE PROTECTIVE EQUIPMENT INCLUDING RUBBER GLOVES, RUBBER BOOTS, AND A SELF-CONTAINED BREATHING APPARATUS IN THE PRESSURE DEMAND MODE OR A SUPPLIED-AIR RESPIRATOR. IF THE SPILL OR LEAK IS SMALL, A FULL FACE-PIECE AIR-PURIFYING CARTRIDGE RESPIRATOR EQUIPPED FOR ACID MISTS MAY BE SATISFACTORY. IN ANY EVENT, ALWAYS WEAR EYE PROTECTION. FOR SMALL SPILLS OR DRIPS, MOP OR WIPE UP AND DISPOSE OF IN DOT-APPROVED WASTE CONTAINERS. FOR LARGE SPILLS, CONTAIN BY DIKING WITH SOIL OR OTHER NON-COMBUSTIBLE ABSORBENT MATERIAL AND CAREFULLY NEUTRALIZE WITH SODA ASH OR LIME. IF SODA ASH IS USED, PROVIDE ADEQUATE VENTILATION TO DISSIPATE THE CARBON DIOXIDE GAS. KEEP NON-NEUTRALIZED MATERIAL OUT OF SEWERS, STORM DRAINS, SURFACE WATERS, AND SOIL.
COMPLY WITH ALL APPLICABLE GOVERNMENTAL REGULATIONS ON SPILL REPORTING, ND HANDLING AND DISPOSAL OF WASTE.

SPOSAL METHODS: DISPOSE OF CONTAMINATED PRODUCT AND MATERIALS USED CLEANING UP SPILLS OR LEAKS IN A MANNER APPROVED FOR THIS MATERIAL. NSULT APPROPRIATE FEDERAL, STATE AND LOCAL REGULATORY AGENCIES TO ASCERTAIN PROPER DISPOSAL PROCEDURES.
NOTE: EMPTY CONTAINERS CAN HAVE RESIDUES, GASES AND MISTS AND ARE SUBJECT TO PROPER WASTE DISPOSAL, AS ABOVE.

----------SPECIAL PRECAUTIONS----------

STORAGE AND HANDLING PRECAUTIONS: STORE IN A COOL, DRY, WELL-VENTILATED PLACE AWAY FROM INCOMPATIBLE MATERIALS. KEEP CONTAINER TIGHTLY CLOSED WHEN NOT IN USE. DO NOT USE PRESSURE TO EMPTY CONTAINER. WASH THOROUGHLY AFTER HANDLING. DO NOT GET IN EYES, ON SKIN, OR ON CLOTHING. STORAGE AND EQUIPMENT MATERIALS SHOULD INCLUDE FIBERGLASS REINFORCED PLASTICS, RUBBER, LEAD, TYPE 304 OR BETTER GRADES OF STAINLESS STEEL.

REPAIR AND MAINTENANCE PRECAUTIONS: NONE.

OTHER PRECAUTIONS: CONTAINERS, EVEN THOSE THAT HAVE BEEN EMPTIED, WILL RETAIN PRODUCT RESIDUE AND VAPORS. ALWAYS OBEY HAZARD WARNINGS AND HANDLE EMPTY CONTAINERS AS IF THEY WERE FULL.

----------PREPARATION INFORMATION----------

CONTACT MSDS CO-ORDINATOR, VAN WATERS & ROGERS LTD.
DURING BUSINESS HOURS, EASTERN TIME (416)-736-9299.

----------NOTICE----------

VAN WATERS & ROGERS LTD. EXPRESSLY DISCLAIMS ALL EXPRESSED OR IMPLIED WARRANTIES OF MERCHANTIBILITY AND FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE PRODUCT PROVIDED.

----------REVISION----------

/89: REVISED HAZARD RATING.

01/93: REVIEWED IN ACCORDANCE WITH WHMIS REGULATIONS.

NO CHANGE OF INFORMATION.

========== END OF MSDS ==========

SECTION 7

GUIDELINES FOR MEDIA COMMUNICATIONS

Designated Winter Road Spokesperson: AL PHILPOTT

Alternate Spokesperson:_____

The following are statements of Echo Bay Mines Ltd. Winter Road Operations Policy for crisis communications:

1. Obey the cardinal rule: Tell it all and tell it fast and tell it straight. There is no better or more effective way to stop rumours and calm nerves than to provide accurate information on the crisis as fully and quickly as possible. The flow of information tends to signal that, while things are not in perfect order, there at least are persons somewhere, somehow, reining in the controls. In other words, if "they" can report what is happening, "they" know what is happening and in short order will know how to straighten things out.
2. Cover all bases and all of the important subjects, to the extent possible. Whatever information is available, as long and it does not involve some security or confidential issue, should be made public. If a particular area is not detailed, questions will focus on it and make it far more crucial than it may be.
3. Provide regular updates to the news media. An exceptionally fluid situation required frequent updates. In a crisis situation, there are very few times when there is too much contact with the media and public. Minute by minute accounting builds a trust and confidence. Lapses in the information flow will stimulate speculation and heighten anxiety.

GUIDELINES FOR MEDIA COMMUNICATIONS

Additional Guidelines

Do's:

- Refute rumours with fact and logic.
- Release only verified information.
- Escort the press at the emergency scene.
- Keep a record of all inquiry or news coverage.
- Provide equal opportunity to various news media.

Don't's:

- Joke or ridicule as a means of refutation.
- Speculate on causes of the emergency.
- Interfere with legitimate duties of the press.
- Attempt to cover up.
- Blame anyone for the emergency.

COMMUNICATIONS

Lupin

Lupin can be contacted by:

Telephone	(403) 890-7000/ Weather Station: 890-8764
H.F. Radio	4765.0 or 4441.0 MHz
Radio Telephone	SR1555
Fax	(403) 890-8813

Winter Road

Winter Road Camps & Vehicles:

H.F. Radio	4765.0 or 4441.0 MHz
C.B. Radio	Channel 1

Lockhart Lake Camp	(403) 436 - 9022	
	(403) 436 - 8852	Fax (403) 432 - 0150
Lac De Gras Camp	(403) 432 - 0391	Fax (403) 432-0783

Yellowknife:

Telephone	(403) 920 - 4835
H.F. Radio	4765.0 or 4441.0 MHz
C.B. Radio	Channel 1

Tibbet Lake:

Voice	(403) 432 - 1336	Fax (403) 432 - 1597

SECTION 8

EQUIPMENT AVAILABLE FOR RECOVERY ON THE WINTER ROAD

D8 Cats

D7 Cats

Front End Loaders

Tractor & Trailers for Gravel Haul

Winch Tractors, Lowboys, & Hi-boys

Bed Trucks

Cherry Picker

Tractors with Product Pumps and Tankers

Rig Matts

Vacuum Truck - 80 Barrel

All of the above equipment will be located along the winter road at various locations, ie. Yellowknife, Lockhart Lake, Lac De Gras and Lupin Mine Site. In addition, all trucks hauling fuel are equipped with rolls of polyethylene.

ECHO BAY MINES LTD.

WINTER ROAD PROJECT

NATIONAL SAFETY CODE
PROCEDURAL FORMAT

ECHO BAY MINES LTD.

All commercial vehicles, transport trucks owned by Echo Bay Mines are subject to all applicable vehicle inspections. These units have been historically certified at Western Star North. As we only operate on a three (3) month basis, they are certified once each year. During Winter Road Operations any work done is normally performed at one of the Winter Road Camps.

Rental Units:

Leased units: All lease units must have a valid VIS Certification before coming on line to our operation. Echo Bay Mines personnel also do a walk-around inspection prior to leasing units.

Echo Bay Mines requires all driver's to complete: Pre-trip/daily inspection sheets before operating their unit. This includes each tractor and each trailer unit. This information will be checked off on the vehicle safety inspection and condition report forms (attached). These forms are handed in at the Yellowknife Winter Road Shop. Required repairs are attended to A.S.A.P. If a safety factor is present, the unit will be parked until corrected. All units are to be visually inspected: tires, springs, lights, piping, and valves, and braking system, prior to loading at all times.

All Units are subject to:

Inspections by H.D. Mechanic

A. 3,000 km or 2 round trips: Yellowknife to Lupin Mine

B. 250 hour service, 10 day interval's

C. 500 hour service

See attached forms.

Trailer units undergo a thorough mechanical inspection each year prior to Winter Road Operations to avoid major problems during the season.

These units are subject to vehicle safety inspection and condition reports as well as the "A" Inspections.

(1) all units owned or leased by Echo Bay Mines are assigned unit numbers. Make, model, serial number, year and the tire size information are recorded and will be available at the Winter Road Shop in Yellowknife and filed per unit as per N.S.C. Maintenance Program requirements (Vehicle Maintenance Profile).

(2) A record of services, inspections, repairs and maintenance operations will be kept and made available in the form of a maintenance log book at the Yellowknife Winter Road Shop.

(3) Records for commercial vehicle covered by national Safety Codes will be kept at the Yellowknife Winter Road Shop. These will include inspection reports, and maintenance that is done in other camps as well. Additional information could be obtained from Phil Flaumitsch in Edmonton if required - Winter Road Information.

(4) Services (oil changes, grease jobs) are done on a ten day basis. This is to simplify matters - ten days at 24 hours being 240 hours. This work as well as our A/B/C inspections will be performed by a heavy duty mechanic at the Yellowknife Winter Road Shop or one of the camp sites along our road. All information will be gathered at the Winter Road Shop in Yellowknife and recorded and filed as per (1).

MANPOWER - PROFILES:

- Driver profiles will be put together as per J.J. Keller & Associates information package.

- Driver applications, abstract's, medical information, Driver's License, etc. will be in place at Yellowknife Winter Road Shop. Dangerous goods and/or WHIMS courses are mandatory.

All information pertaining to the Driver will be kept in the Driver Profile. This includes but is not limited to:

- Violation warnings/convictions
- Log book sheets.
- Expense receipts
- All certifiable data as listed above.

MAINTENANCE LOG

MAKE

UNIT– SERIAL NUMBER– MODEL NUMBER– TIRE SIZE–

DATE	DESCRIPTION OF WORK	VEHICLE SAFETY INSPECTION REPORT	INSPECTION A	B	C	WORK ORDER	ODOMETER	SERVICE DUE	P.M. OUT

ACT-134

ECHO BAY MINES LTD.

VEHICLE SAFETY INSPECTION AND CONDITION REPORT

№ 10970 p.15

To be completed at the beginning of each trip and at intervals of NO more than 800 kilometres.

'TE _____ TRACTOR NO. _____

:AGE IN _____ TRAILER NO. _____

MILEAGE OUT _____ TRIP REPORT NO. _____

Driver must ✓ items as inspected. List those defects for correction in the space provided at bottom of form.

1. PRE-TRIP INSPECTION	✓
a. ENGINE OIL, ANTIFREEZE LEVELS	
b. COOLANT LEVEL	
c. BELT TENSION	
d. FUEL	
2. CHECK (After starting the engine):	✓
a. LIGHTS - headlamps, tail lamps, turn signals, stop lamps	
b. BRAKES - Brake adjustment (Maximum slack adjuster travel 1.5 inches.) Compressor build up time from 50 to 90 PSI not to exceed 3 minutes. Air tanks have been drained, tractor protection valve functioning properly, no audible leaks and braking system functioning properly.	
c. HORN - electric and air	
d. WINDSHIELD WIPERS	
e. STEERING - for excessive play	
f. TIRES AND WHEELS SECURE - Wheels are secure. Tire tread depth and condition is acceptable.	
g. WINDSHIELD CONDITION	
h. MIRRORS - adjustment	
i. SAFETY EQUIPMENT	
j. VEHICLE DOCUMENTATION, INSURANCE, AUTHORITIES, ETC.	

3. ENROUTE INSPECTION: ROAD CHECK	✓
To be completed after the first 50 kilometres and at intervals of 160 kilometres thereafter.	
a. TIRES	
b. WHEELS AND LUGS	
c. OIL LEAKS	
d. FUEL LEAKS	
e. CARGO - SECURE	
4. END OF TRIP INSPECTION	✓
a. FUEL UNIT	
b. DRAIN AIR TANKS	
c. LIGHTS AND LICENSE	
d. PARK UNIT IN A SAFE AREA	
OIL ADDED _____	
COOLANT ADDED _____	

☐ UNIT IS ROADWORTHY

☐ UNIT REQUIRES CORRECTION

Completed form is to be submitted to the Maintenance Department in Edmonton.

REMARKS AND REPAIRS REQUIRED: (Identify unit number for each remark or repair)

_____

_____

_____

_____

_____

_____

_____

: ABOVE UNIT IS ROADWORTHY: DRIVER'S SIGNATURE _____

E

"A" INSPECTION
TRACTORS AND TRAILERS

A

ECHO BAY MINES LTD.

DATE_____

:e completed at either the beginning or the end of each trip or every 3000 kms.

nd: Use (X) for serviceable and (R) for repair action.

WORK ORDER NO._____

TRACTOR		
UNIT NO	ODOMETER	
INSPECTION CHECKPOINTS		COND.
LUBRICATE	STEERING	
	KING PINS	
	DRIVE LINE	
CHECK U JOINT WEAR		
CHECK OILS AND TOP UP	MAIN TRANSMISSION	
	AUXILIARY TRANSMISSION	
	FORWARD DIFFERENTIAL	
	REAR DIFFERENTIAL	
REPLACE FAULTY LIGHT BULBS		
RECORD OIL PRESSURE		
DRAIN AIR TANKS COMPLETELY		
CHECK AIR SYSTEM PRESSURE		
CK WIPER BLADE CONDITION		
REPLACE FUEL FILTERS		
INSPECT TIRES FOR WEAR		
INSPECT SPRINGS AND SUSPENSION		
CONFIRM OPERATOR'S REPORT		
SERVICEMAN'S COMMENTS:		

TRAILER		
UNIT NO	ODOMETER	
INSPECTION CHECKPOINTS		CONI
BRAKE ADJUSTMENT		
OIL LEVEL IN WHEEL BEARINGS		
LIGHTS		
SPRINGS		
KING PIN		
TIRE CHECK		
MUD FLAPS		
LANDING GEAR		
GLAD HANDS		
SERVICEMAN'S COMMENTS:		

NOTES: REPAIRS are to be done as a RESULT of this service inspection, NOT as a part of it.
SERVICE parts required such as bulbs or fuel filters are to be written on the UNIT'S WORK ORDER.

I detect no defects or deficiencies in this motor vehicle as would be likely to affect the safety of its operation or result in its mechanical breakdown.

MECHANIC'S SIGNATURE _____

"B" INSPECTION

ECHO BAY MINES LTD.

ɔe completed every 250 hrs. or 15,000 kilometres (whichever occurs first).

ɟend: Use (X) for serviceable and (R) for repair action.

UNIT NO	ODOMETER	WORK ORDER NO.	DATE

INSPECTION CHECKPOINTS		COND.	RECOMMENDED ACTION
CONFIRM OPERATOR'S REPORT			
COMPLETE "A" INSPECTION			
CHANGE ENGINE OIL AND FILTERS			
INSPECT CHARGING SYSTEM			
INSPECT STARTING SYSTEM			
AIR INLET PIPING AND RESTRICTIONS			
CHECK AIR COMPRESSOR FILTER			
INSPECT TIRES FOR MATCHING			
INSPECT BRAKE LINING WEAR			
CHECK BRAKE ADJUSTMENT			
INSPECT ALL COMPONENTS FOR FUEL, OIL, COOLANT			
LEAKS	ENGINE		
	RADIATOR AND HOSES		
	TRANSMISSIONS		
	DIFFERENTIAL(S)		
	FUEL SYSTEM		
	WATER PUMP		
CHECK TURBO OPERATION			
INSPECT MANIFOLDS AND EXHAUST			
CHECK EXHAUST SMOKE			
DIAGNOSE ALL OPERATOR COMPLAINTS OF LOW POWER, POOR ACCELERATION, ETC.			

INSPECTOR'S COMMENTS

NOTES: REPAIRS are to be done as a RESULT of this inspection, NOT as a part of it.
SERVICE parts required such as oil filters are to be written on the UNIT'S WORK ORDER.

I detect no defects or deficiencies in this motor vehicle as would be likely to affect the safety of its operation or result in its mechanical breakdown.

MECHANIC'S SIGNATURE

C

E

ECHO BAY MINES LTD.

"C" INSPECTION HEAVY TRUCK

completed every 500 hrs. or 30,000 kilometres (whichever occurs first).

Use (X) for serviceable, (R) for repair action, and (–) for not equipped.

UNIT NO.	ODOMETER	WORK ORDER NO	DATE

1. CHECK VEHICLE HISTORY OF PREVIOUS WORK PERFORMED.

INSPECTION CHECKPOINTS	COND.
COMPLETE "B" INSPECTION	
DRAIN CRANKCASE AND REFILL WITH _____	
GREASE CHASSIS	
APPLY NEXT SERVICE STICKER	

2. THE FOLLOWING ITEMS ARE TO BE CHECKED.

INSPECTION CHECKPOINTS	COND.	INSPECTION CHECKPOINTS	COND.
AIR CLEANER ELEMENT		SHOCKS, SUSPENSION, SPRINGS	
POWER STEERING FLUID LEVEL		DRIVELINE AND U JOINTS	
POWER STEERING HOSE (CONDITION)		DIFFERENTIAL LUBRICANT LEVEL	
RADIATOR COOLANT LEVEL		TRANSMISSION LUBRICANT LEVEL (ALLISON HOT)	
COOLANT STRENGTH MINIMUM Summer –34°F (–30°C) Winter –40°F (–40°C)		TRANSMISSION AND DIFFERENTIAL BREATHER	
		TIRES (CONDITION AND INFLATION)	
RADIATOR AND HEATER HOSE (CONDITION)		WINDSHIELD WIPER (OPERATION AND CONDITION)	
BUG SCREEN AND SHUTTER (OPERATION)		GLASS AND MIRROR (CONDITION)	
BATTERY ELECTROLYTE LEVEL		ALL LIGHTS (OPERATION AND CONDITION)	
BATTERY TERMINALS AND MOUNTS		REFLECTOR (CONDITION)	
FAN BELT (CONDITION AND TENSION)		MUD FLAP (CONDITION)	
BRAKE (ADJUSTMENT)		CHECK LUBRICANT LEVELS	
DRAIN AIR TANKS		GREASE ALL MISC. ATTACHED EQUIPMENT	
EMERGENCY BRAKE (OPERATION)		START ENGINE, RUN, SHUT OFF & CHECK FOR OIL LEAKS	
CLUTCH PEDAL (ADJUSTMENT)		RECHECK OIL LEVEL	

INSPECTOR'S COMMENTS:

_____

_____

_____

NOTES: REPAIRS are to be done as a RESULT of this inspection, not as a part of it.
SERVICE parts required such as oil filters are to be written on the UNIT'S WORK ORDER.

, detect no defects or deficiencies in this motor vehicle as would be likely to affect the safety of its operation or result in its mechanical breakdown.

MECHANIC'S SIGNATURE _____

PENALTIES FOR INFRACTIONS OF RULES OF THE ROAD

a. Exceeding of speed limits:

i. First offence - three (3) day suspension without pay;

ii. Second offence - seven (7) day suspension without pay;

iii. Third offence - the driver will be banned form driving on the Winter Ice Road for the remainder of the haul season

iv. Accident resulting from speeding the driver will be banned from driving on the Winter Ice Road for the remainder of the haul season.

b. Alcohol and Drugs:

i. Immediate dismissal and the driver will be permanently banned from driving on the Winter Ice Road and will not be permitted to continue or complete the trip.

c. Vehicle separation infractions:

i. First offence - written warning

ii. Second offence - three (3) day suspension without pay;

iii. Third offence - seven (7) day suspension without pay;

iv. Fourth offence - the driver will be banned from driving on the road for the remainder of the haul season.

d. Interference with road maintenance activities:

i. First offence - written offence;

ii. Second offence - the driver will be banned from driving on the Winter Ice Road for the remainder of the haul season.

e. Ignoring a road closure posting:

i. First offence - seven (7) day suspension without pay;

ii. Second offence - the driver will be banned from driving on the Winter Ice Road for the remainder of the haul season.

f. Non-reporting of fuel or chemical spills:

i. First offence - will be subject to immediate dismissal.

f.1. Fuel or chemical spills caused by driver neglect:

i. Driver will be subject to immediate dismissal.

g. Failure to observe required rest period:

i. First offence - warning;

ii. Second offence - three (3) day suspension without pay;

iii. Third offence - seven (7) day suspension without pay;

iv. Fourth offence - the driver will be banned from driving on the Winter Ice Road for the remainder of the haul season.

h. Refusal to stop when requested to do so:

Immediate dismissal.

i. N.S.C. Regulation: Pre-trip/daily vehicle inspection and proper log book recording will be completed in accordance with applicable regulation. Failure to do so will result in:

i. First offence - written warning

ii. Second offence - three (3) day suspension without pay;

iii. Third offence - immediate dismissal.

DRIVER INSTRUCTIONS

1. You will report directly to the Lockhart Dispatcher.
2. You are to report all servicing and repairs required on your vehicle.
3. you are not to overnight in Yellowknife unless broken down, or in excess of hours of service.
4. Your loads will be set by the Dispatcher located at Lockhart Lake Camp.
   You must have a "fill slip" to load at the Petro Canada Plant. This slip will be provided by the Dispatcher. You must receive instructions from the Petro Canada Loader, the first time you load.
5. Your speed limit will be set and posted by the Road Superintendent and enforced through the Road Patrol.
6. You may have emergency repairs carried out at:
   a. Lupin Mine Site or Road Camps
   b. All major repair work will be carried out in the Yellowknife Shop.
7. You are to run with at least one other truck at all times. It may be a haul contractor's truck, a lease truck, or the other Echo Bay Mines Ltd. units.
8. You are responsible for ensuring you have adequate winter clothing to temperatures of -50 degrees F, a good sleeping bag and emergency rations (rations may obtained from either Camp.
9. You are to ensure that you have sufficient fuel in you running tanks at all times (it gets cold when a truck stops if sitting in a storm.)
   In addition, the following fuel management is to be carried out:
   a. Fuel tanks are to be full when leaving Yellowknife Northbound and all unit's are to be topped up at Lockhart lake Camp on Northbound leg.
   b. All units have access to fuel and Lac De Gras and Lupin if necessary, due to weather or unforeseen circumstances.

10. Prior to loading units must be visually inspected according to N.S.C. regulations and recorded per the "Driver Visual Inspection Form" . (This includes: springs, tires, lights, brakes, oil/fuel leaks, etc...).
11. You are to comply with the rules and regulations of the National Safety Code (N.S.C.).

RULES OF THE ROAD FOR HAUL VEHICLES

i. All vehicles are subject to search by Echo Bay at any time while on the Winter Ice Road, and at either of the road camps.

ii. All speed limits will be set and monitored by Echo Bay and will be passed to haul contractor's representatives on the Winter Ice Road, or posted, or both.

iii. All alcohol and drugs are prohibited on the Winter Ice Road, at the road camps and at Lupin.

iv. Vehicle separation is critical to the safety and success of the haul operation and vehicles are not permitted to run alone. A minimum of two (2) units must be together at all times. A minimum separation of one-half (1/2) kilometre between vehicles is mandatory.

v. Road maintenance takes precedence over all other activities and interference with road maintenance is therefore prohibited.

vi. Road closure will be set up by Echo Bay, as required at its sole discretion, with such closures being posted at each road camp, Lupin and at Yellowknife Shop.

vii. Fuel and chemical spills must be immediately reported to Echo Bay Dispatch at Lockhart Lake Camp, who in turn will notify the Environmental Protection Agency through the "Spill Line" (Phone 403-920-8130, Fax 403-873-6924).

viii. Drivers are required to rest a minimum of eight (8) hours in any twenty-four (24) hour period, and in accordance with N.S.C. Regulations.

ix. All drivers must stop when requested to do so by Echo Bay or haul contractor's personnel.

ECHO BAY MINES LTD.
WINTER ROAD - B TRAIN
SAFETY PROGRAM

All Echo Bay Mines Ltd. Winter Road/B Train Personnel will be issued a copy of rules and regulations pertaining to the safe conduct and operations of the Winter Road. A signed acknowledgement of review/familiarity will be submitted to the employer by the employee. (Copy of rules and regulations enclosed).

Two emergency response units will be maintained and located along the Winter Road route. One unit to be located at Lockhart Lake Camp Facility and one unit to be located at the Lac De Gras Camp Facility.

Eleven Winter Road personnel will be trained (by Echo Bay Mines - Lupin Safety Department) to perform emergency response and recovery duties. Trained individuals will be located at all pertinent facilities (Yellowknife, Lockhart Lake, Lac De Gras, Lupin and Edmonton).

The registered Echo Bay Mines "Oil and Toxic Spill Contingency Plan" will be in place and carried out in accordance to the plan (Copy Attached).

Echo Bay Winter Road:

Al Philpott- Director of Transportation

- Phone: (Bus) (403) 890-4652
  (Res) (403) 986-0363

Andy Hamel - Traffic Superintendent

Phone: (403) 429-5838 Edmonton Office
(403) 986-0122 Home

Winter Road Facilities:

Lac De Gras:

Phone: (403) 432 - 0391

Fax: (403) 432 - 0783

Lockhart Lake:

Phone: (403) 436 - 8852

Phone: (403) 436 - 9022

Fax: (403) 432 - 0150

Lupin Mine Site:

Phone: (403) 890-7000 Main Switchboard

Phone: (403) 890-8764 Weather Station (24 Hour)

Yellowknife Shop:

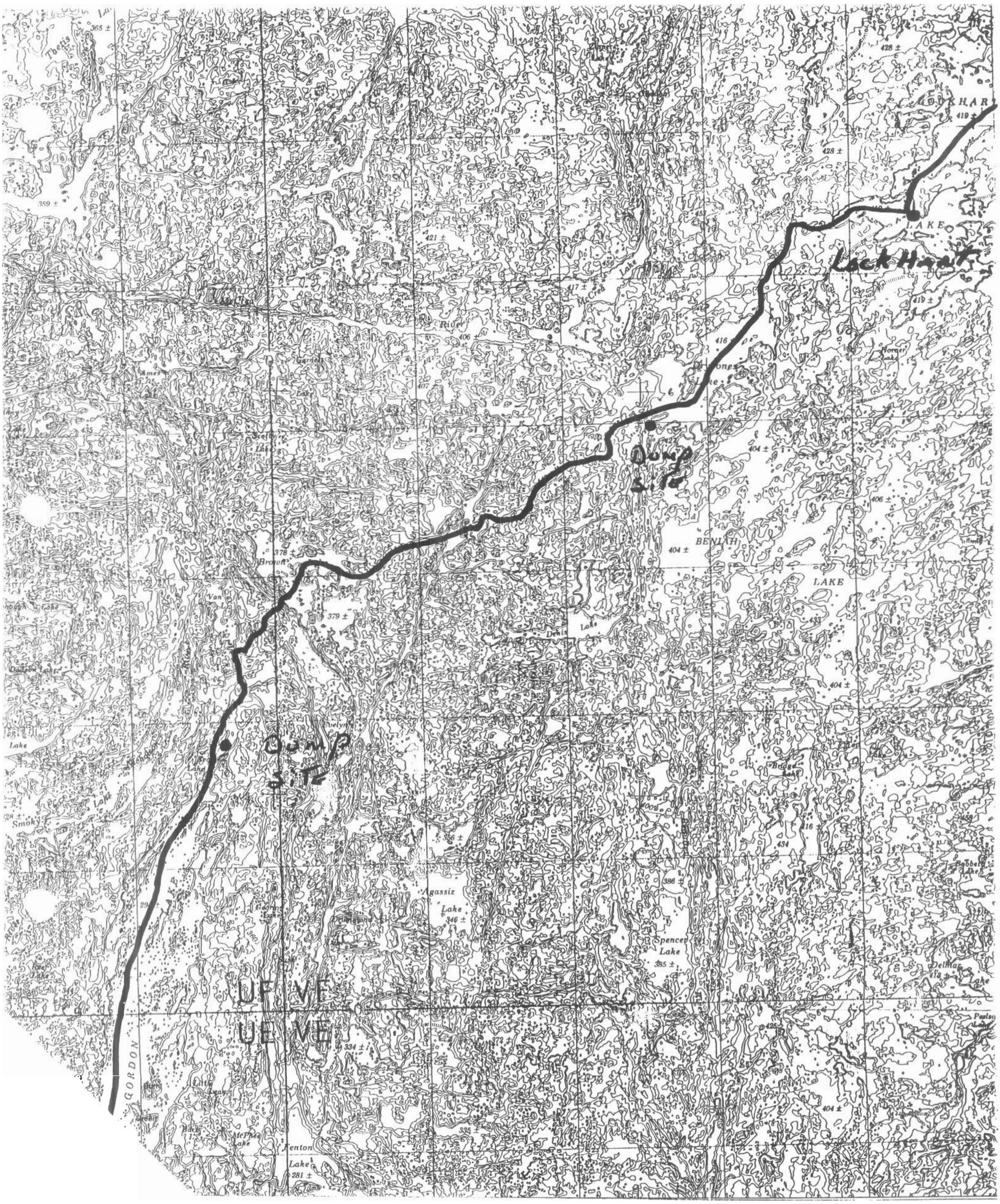
Phone: (403) 920-4835

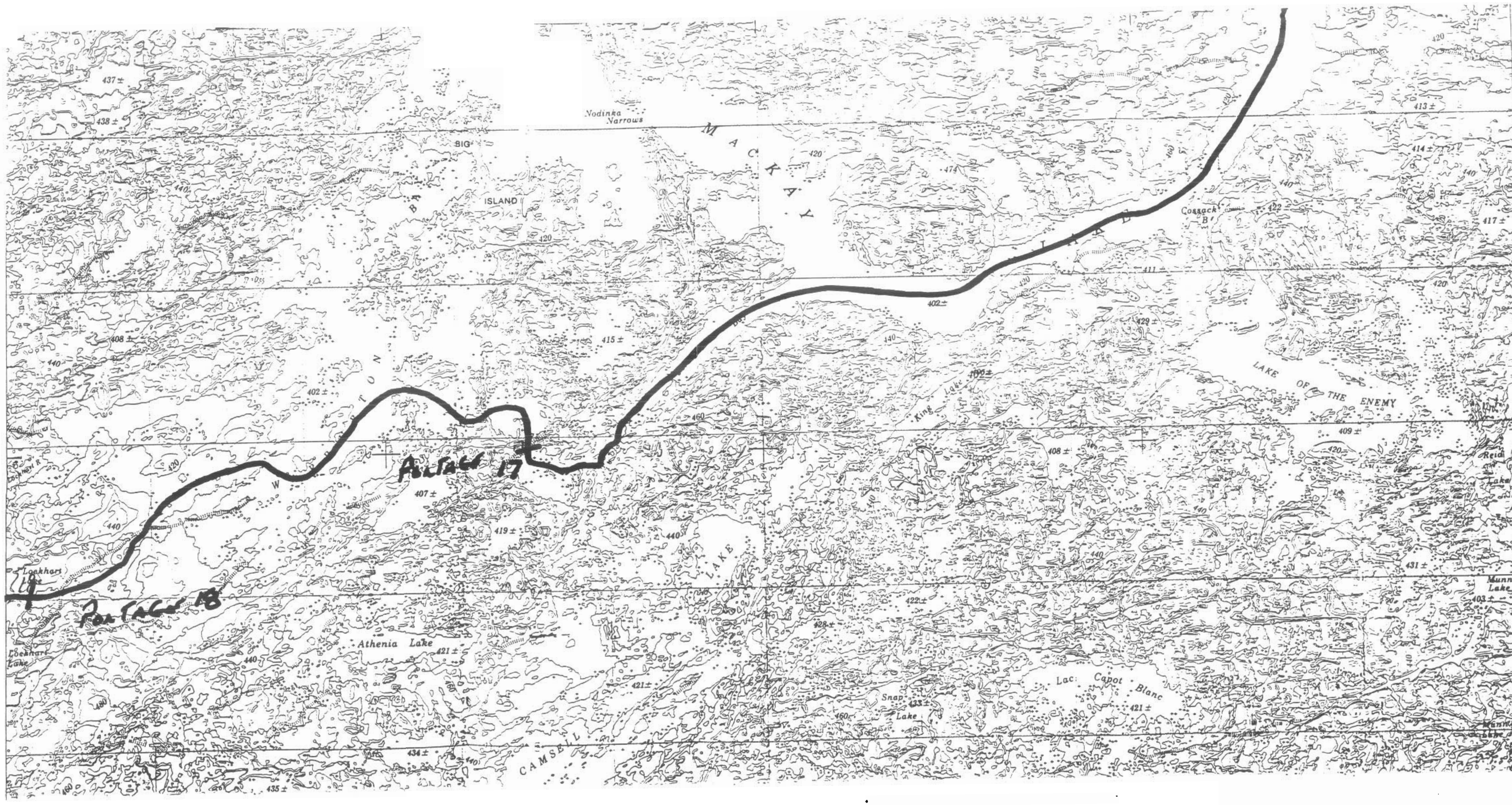
Fax: (403) 920-4409

Tibbet Lake:

Phone: (403) 432 - 1336

Fax: (403) 432 - 1597

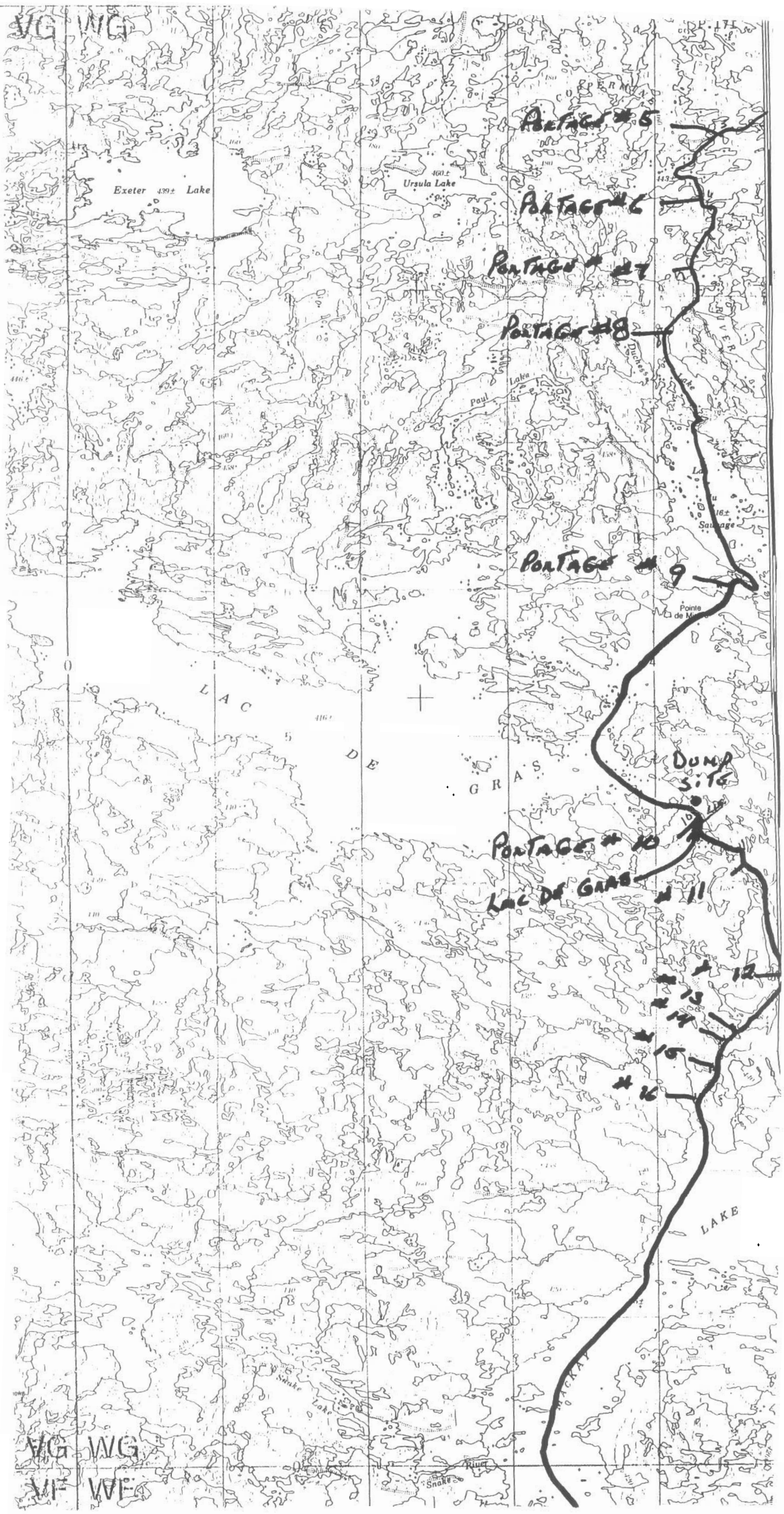

Lock Haven
Dump Site
Dump Site
DRIVE
DRIVE
GORDON
LAKE
BENLIATH
Agassiz Lake
Spencer Lake
Fenton Lake
McCrea Lake
Brown
Smoky
Delmar



Nodinka Narrows
MACKAY
BIG ISLAND
Cossack B.
LAKE OF THE ENEMY
King Lake
Reid Lake
Munn Lake
Lockhart Lake
Athenia Lake
LAKE
Snap Lake
Lac Capot Blanc
CAMSELL
PORTAGE 17
PORTAGE 18

WG WG

WG WG



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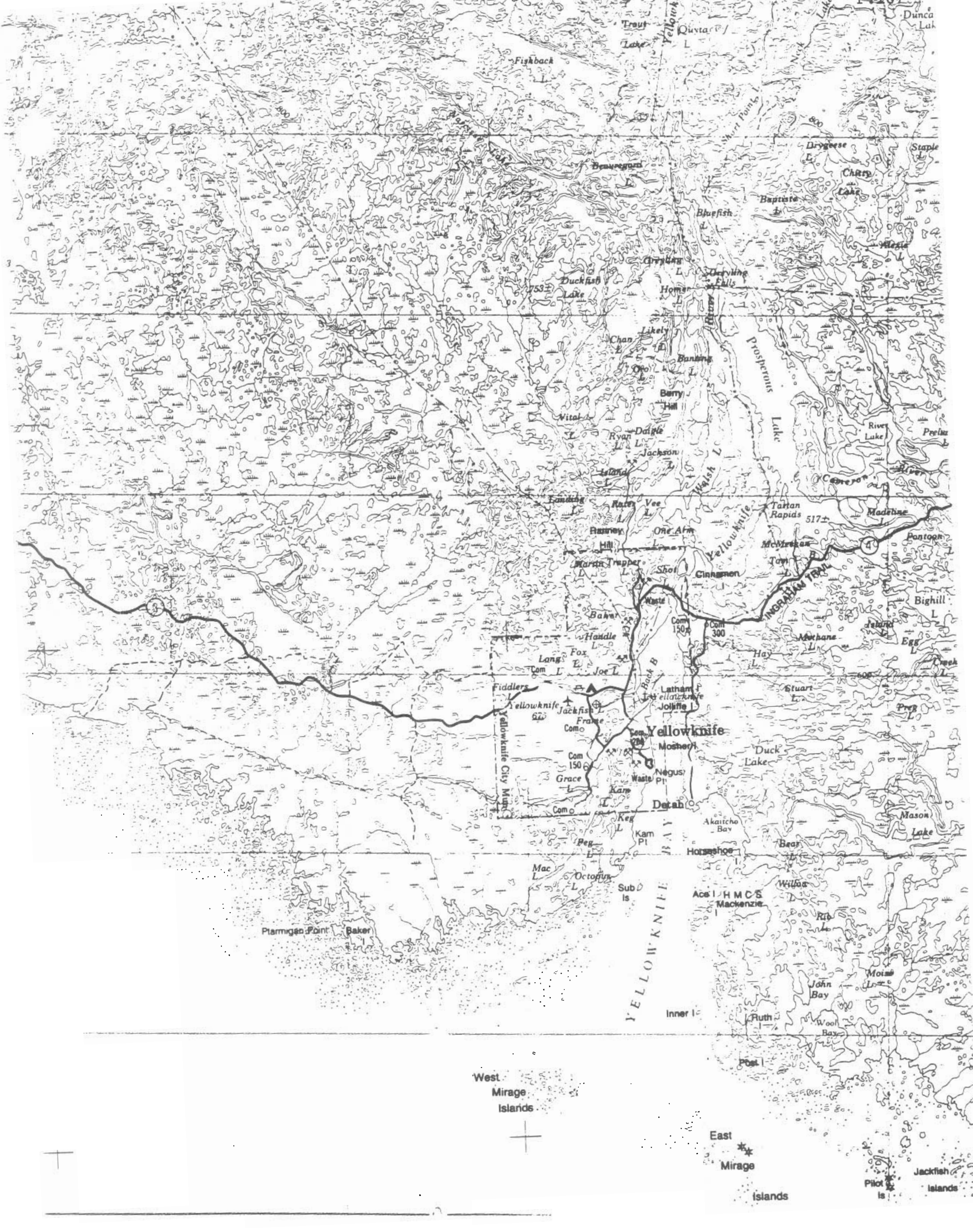
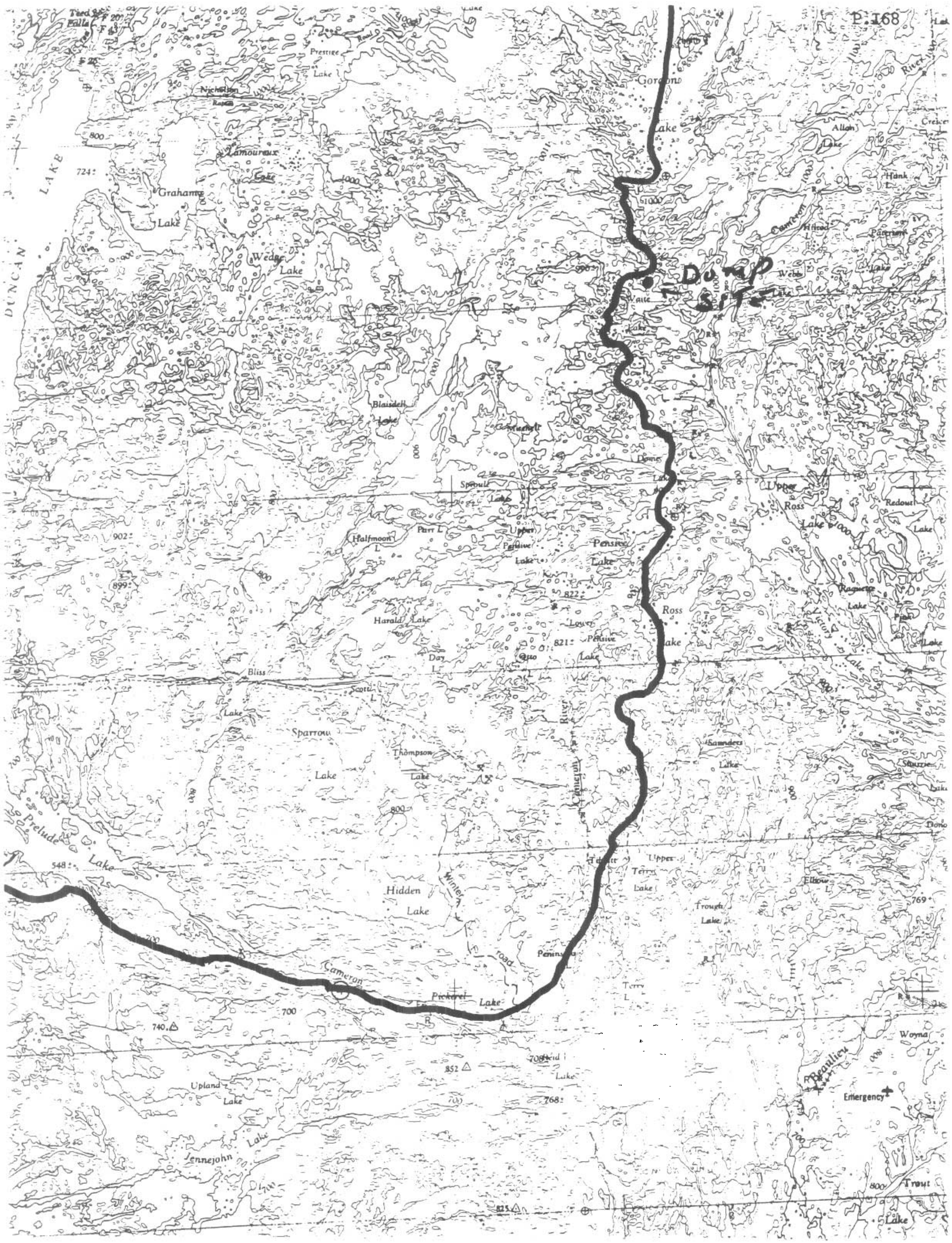
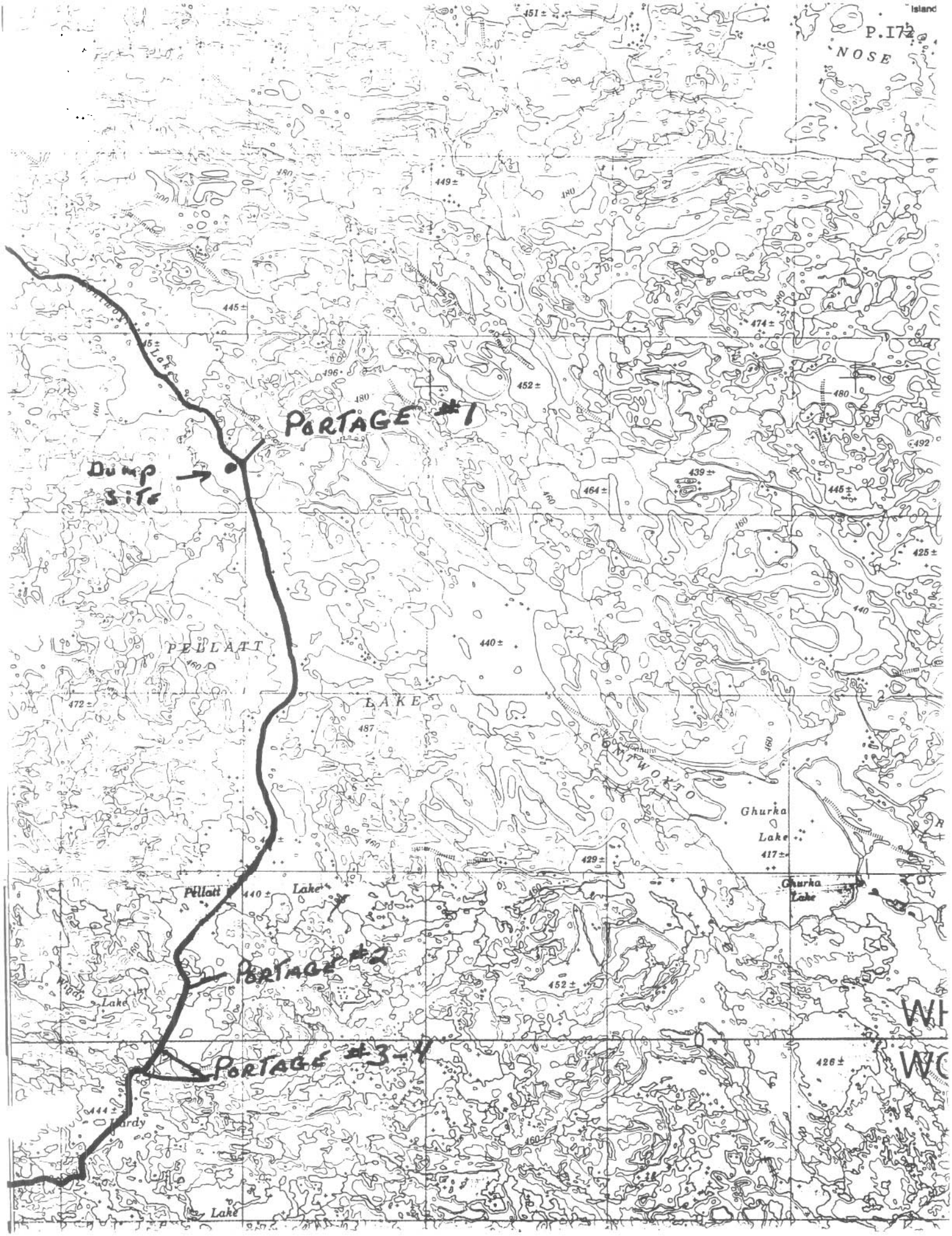
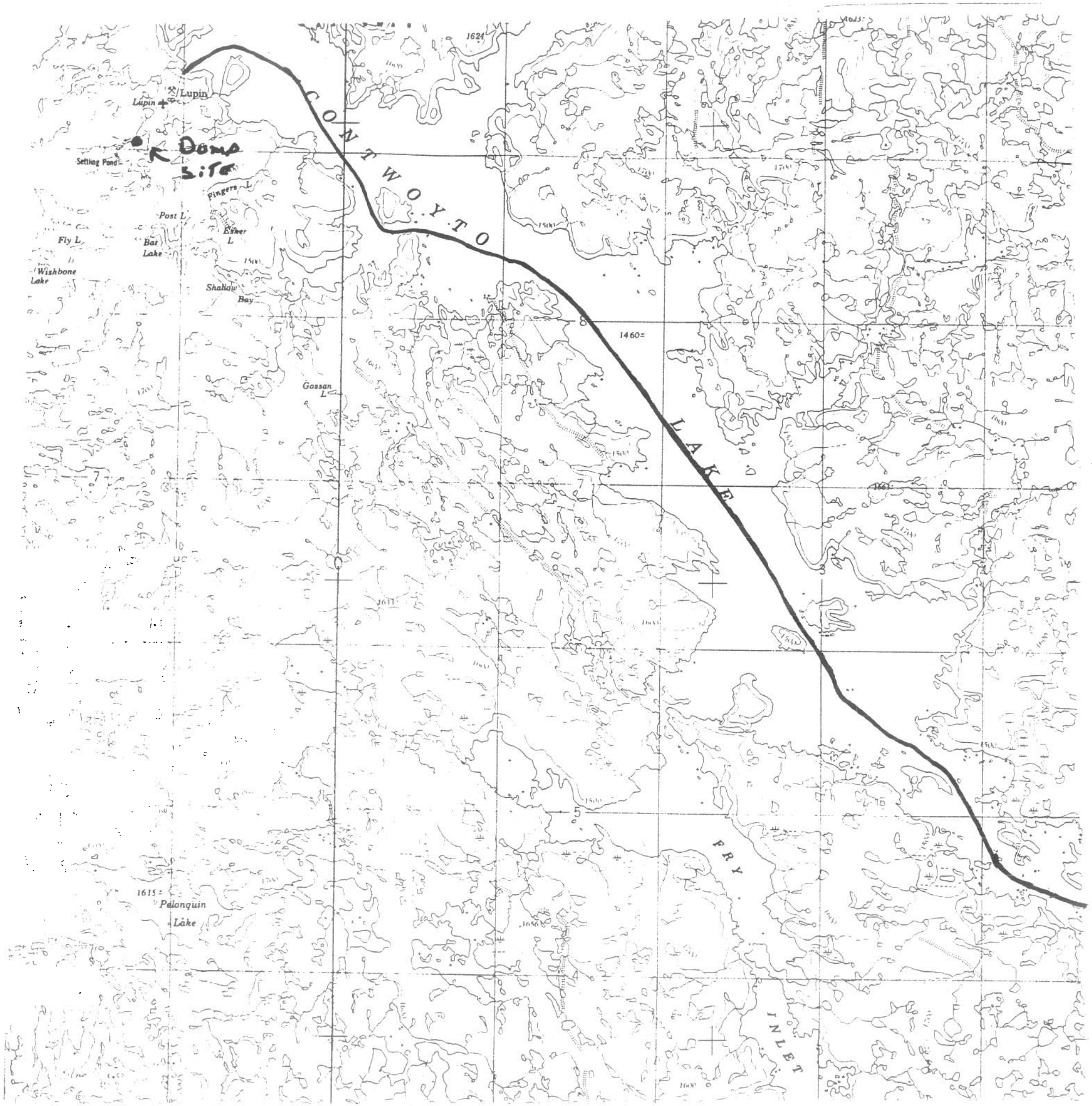

Trout Lake
Yellowknife
Quyta L
Fishback L
Drygeese L
Staple
Beauregard
Chitty Lake
Baptiste L
Bluefish L
Grayling L
Grayling Falls
Duckfish Lake
753±
Homer L
Chan L
Likely L
Banting L
Oro L
Berry Hill
Prosperous Lake
River Lake
Vital L
Ryan L
Daigle L
Jackson L
Island L
Walsh L
Cameron River
Landing L
Rater L
Vee L
Tartan Rapids
517±
Madeline L
Ranney Hill
One Arm L
McMeekan
Pontoon
Martin L
Trapper L
Shot L
Cinnamon
Tani
INGRAHAM TRAIL
Waste
Bighill L
Baker
Handle L
Com 150
Com 300
Methane L
Island L
Egg L
Lang L
Fox L
Joe L
Hay L
Creek L
Fiddlers L
Yellowknife
Jackfish L
Back B
Latham I
Yellowknife
Jolliffe I
Stuart L
Prog L
Frame
Com
Com 200
Yellowknife
Mosher I
Duck Lake
Com 150
Grace L
Yellowknife City Mun
Kam L
Waste
Negus Pt
Com
Detah
Keg L
Kam Pt
Akaitcho Bay
Mason Lake
Peg L
Horseshoe
Bear L
Mac L
Octopus L
Sub Is
YELLOWKNIFE BAY
Ace I
H M C S Mackenzie I
Wilfox L
Rip L
Ptarmigan Point
Baker
Moise L
John Bay
Inner I
Ruth I
Wool Bay
Post I
West Mirage Islands
East Mirage Islands
Jackfish Islands
Pilot Is


P.168
Dump Site
Gordon Lake
Allan Lake
Cameron
Waite Lake
Webb Lake
Duncan Lake
Lamoureux Lake
Graham Lake
Wedge Lake
Prestige Lake
Nicholson Rapids
Blaisdell Lake
Sproule Lake
Halfmoon L
Parr L
Upper Pensive Lake
Pensive Lake
Upper Ross Lake
Redout
Harald Lake
Day L
Lower Pensive Lake
Ross Lake
Bliss Lake
Scott L
Sparrow Lake
Thompson Lake
Cameron River
Saunders Lake
Prelude Lake
Hidden Lake
Winter road
Upper Terry Lake
Trough Lake
Elbow L
Cameron
Pickerel Lake
Terry L
Upland Lake
Jennejohn Lake
Beaulieu
Emergency
Trout
Lake


PORTAGE #1
Dump Site
PORTAGE #2
PORTAGE #3+4
PELLATT LAKE
Pellatt Lake
Ghurka Lake
Hardy Lake
NOSE
Island


Lupin
Lupin
Setting Pond
DOMA
SITE
Fingers L
Post L
Fly L
Bat
Lake
Esker
L
Wishbone
Lake
Shallow
Bay
Gossan
L
CONTWOYTO
LAKE
1460±
FRY
INLET
1615±
Pelonquin
Lake