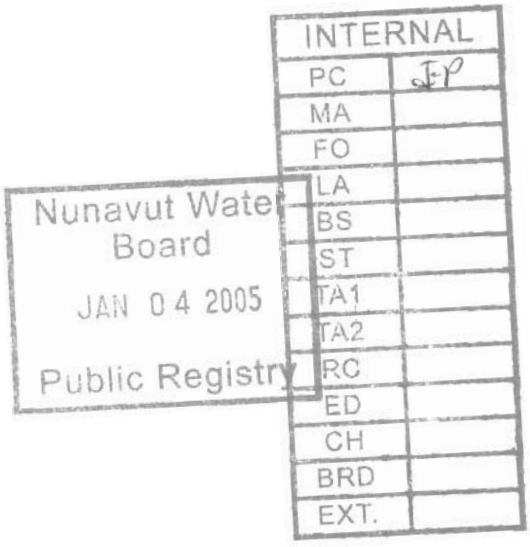
City of Iqaluit

Spill Contingency Plan

Updated: November, 2004



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1.0 INTRODUCTION

The purpose of this spill contingency plan is to outline a formal practical response system which can be implemented immediately in the event of a deleterious material, such as sewage or fuels, being spilled to the natural environment. **The scope of the document includes spills resulting from activities carried out by the City of Iqaluit or from the failure of a system component in the City's infrastructure only.** This plan is intended to promote the safe handling of potentially hazardous materials to minimize health hazards, environmental damage and clean up costs. The plan is written so it can be easily understood and be reasonably comprehensive in providing access to all information required for handling a spill.

Included with this plan is a one page "If You Discover a Spill" response sheet that is intended to be carried in City vehicles and posted in municipal work areas. In an emergency situation, prompt action is important and quick access to a response checklist may reduce the seriousness of a spill.

A sites plan has been included in Appendix A showing the existing layout of all buildings and waste handling/disposal facilities in the City.

2.0 REPORTING PROCEDURES

City of Iqaluit employees have access to mobile radios and key personnel can be reached through dispatch by pager on a 24-hour basis. The dispatch number is monitored 24 hours a day. **All spills that are determined to be the responsibility of the City and only these spills are reported to the dispatch number.**

All spills exceeding reportable quantities are to be reported immediately to the NWT 24-hour Spill Report Line (867)920-8130. Spill Report Line personnel will provide direction and will ensure that an investigation is undertaken by the appropriate government authority. Appendix C contains a listing of material and the quantities that are reportable in the event of a spill:

The following are contact numbers for municipal response personnel:

CITY OF IQALUIT			
CONTACT	**PAGER #**	**WORK #**	**CELL #**
Dispatch	N/A	979-5650	
Chief Administrative Officer (CAO)	N/A	979-5666	N/A
Director of Public Works	N/A	975-8509	975-1877
Operations Superintendent, Public Works	N/A	979-5653	975-1774
Director of Engineering	N/A	975-8501	N/A
Fire Chief	45	979-5657	975-1446
Chief By-Law	N/A	979-5670	975-1930
Uttilidor Foreman	32	979-5648	975-1443
Garage/Roads Foreman	12	979-5638	975-1463
Truck Sewer Water Foreman	N/A	979-5612	975-1473

Equipment may be dispatched for City spill clean-up by the Director of Public Works only. As and when contracts are negotiated on a yearly basis with local contractors to provide equipment and manpower to the City of Iqaluit. See Appendix G for a list of current as and when contracts.

The 24-Hour Spill Line is currently being run by the GNWT-Resources, Wildlife and Economic Development division. Callers to the spill line will be provided with expert advice regarding hazardous materials spills. The personnel at the spill line will also ensure that the government agencies with jurisdiction over the spill are contacted.

EXTERAL ASSISTANCE – GOVERNMENT RESOURCES	
AGENCY	**TELEPHONE #**
24-Hour Spill Line	(867)920-8130

The effectiveness of this spill contingency plan will greatly depend upon the following factors:

- The proper distribution of the plan to those personnel most likely to encounter a spill or release of deleterious substance during the course of their normal work,
- Training of these same personnel as to the objectives and contents of this plan and how they should react upon encountering a spill or system failure that may result in a subsequent release of deleterious substances.
- Training of the response personnel as to what steps they are required to take in the event of the plan being put into action.

2.1 Spill Finder's Response

a. Be alert and consider your personal safety first,

b. Assess the hazard to persons in the vicinity of the spill and where possible take action to control danger to human life. If possible, identify the material or products involved in this particular incident,

c. If the spill crates a fire, explosion or other hazard to human life, remove all potential ignition sources, if possible, evacuate the area, contact the RCMP,

d. If safe and practical try to take appropriate action to stop the release of material,

e. Contact Dispatch and report the spill,

f. Mark the spill scent to warn the public and prevent access.

2.2 Director of Public Works Response

Once notified by the Fire Department or Dispatch, the Director of Public Works shall:

a. Proceed to the spill location.

b. Liaise with the Fire Chief.

The Fire Chief and Director of Public Works are then responsible to ensure the following steps are carried out:

a. Make the necessary arrangements for first aid and removal of injured personnel. Take the necessary action, where possible, to secure the site to protect human safety.

b. If not already done and if it is safe to do so, take the appropriate action to stop the flow or release of material. If at all possible take the necessary action to contain or prevent the spread of the spilled material.

c. Gather information on the status of the situation,

d. Fill out as completely as possible, a spill report form (attached) and then contact the 24 Hour Spill Line at (867) -920-8130,

e. If required, contact the CAO.

The Director of Public Works will be the overall municipal coordinator for any spill response action, and as such he will:

- Work in conjunction with the lead agency to coordinate clean up personnel,
- Be responsible for evaluating the initial situation and assessing the magnitude of the problem,
- Activate the response plan and call out the key personnel in the response team, as deemed appropriate, to meet the situation.
- Assist in developing the overall plan of action for containment and clean up of the specific incident and delegate the responsibility for implementing the plan.
- Ensure that the assigned responsibilities are carried out and that coordination exists between supervisory team members,
- Assess the requirements for men, equipment, materials and tools to contain the spill in light of what resources are immediately available. The urgency will depend on the nature and magnitude of the spill.

Additionally, it will be the Director of Public Works responsibility to ensure that all City spill response personnel receive adequate training in order to fulfill their responsibilities as part of the spill response team.

3.0 SITE INFORMATION AND FAILURE PREVENTION

3.1 Sewage Spills

It is the purpose of this section to outline possible failures of the waste handling/treatment system and the control measures in place to prevent such failures. The location of the lift stations and force main are shown in Figure 1 in Appendix A. Material that is released due to a spill will be collected and disposed of in the sewage lagoon.

3.1.1 Sewage Lift Station

There are two lift stations currently servicing the sewage system in Iqaluit. Lift Station No. 1 is located by the break water and Lift Station No. 2 is located by the sea lift beach. In the event of a pump shut down, both sewage lift stations will eventually overflow into Koojesse Inlet. The pumps are electrically powered, and will not operate if there is a power failure.

In the event of a pump shutdown, there is approximately 20 minutes storage capacity in the wet wells before the sewage will overflow. Each lift station is equipped with fluid high level alarms that trigger auto dialers which contact the 20 Hour Dispatch number. Sewage trucks are dispatched to manually pump out the wet wells. The lift stations are equipped with diesel powered pumps and piping that may be connected for manual operation during power outages.

The lift stations are physically checked on a daily basis.

3.1.2 Sewage Force Main

The sewage force main is routed entirely beneath the ground surface and is not monitored.

3.1.3 Sewage Lagoon

The sewage lagoon is located at the head of Koojesse Inlet on the southwest side of the Municipality. Sewage is conducted to the lagoon by truck and through the force main. The inlet is located on the north side of the lagoon. Outflow from the lagoon is primarily through the west dyke, which was designed to be "leaky". Seepage through the dyke provides some level of solids removal. The effluent discharges directly into Koojesse Inlet.

3.2 Fuel and Gasoline Storage

Diesel fuel and gasoline is stored n aboveground self-contained tanks at the main municipal garage. Diesel is kept in a 20,000L tank and gasoline is kept in a 4,500L tank. Spill clean-up material at the garage consists of "Absorball" pellets which are taken to the landfill and burned after use.

A 2,000L above ground self contained tank is located adjacent to the water treatment plant. It is used to store heating fuel.

The fuel storage tanks are not located near areas that are considered environmentally sensitive.

3.3 Chlorine Gas

Chlorine gas is stored at the water treatment plant. Two class A response suites, 2 Scott pack and personal chlorine detectors are stored at this location. A fixed chlorine detector is also mounted in the storage area.

3.4 Calcium Chloride

Calcium chloride for use on the roads is stored in Tyvex bags at the main garage.

3.5 Glycol

Glycol in 45 gallon drums is stored at the main garage. There are generally no more than 10 drums present at any given time.

3.6 Hydrofluosilicic Acid

Hydrofluosilicic acid for fluoridating the City water supply is stored at the water treatment plant.

3.7 Lime

A maximum of 150 – 25lb bags of lime are stored at the water treatment center for use in controlling the pH of the municipal water supply.

3.8 Sodium Hypochlorite, 12%

Up to 12-20L containers of sodium hypochlorite are stored at the entrance to the water treatment plant.

3.9 Propane

Two 40lb propane cylinders, used to fuel the Zamboni, are stored in the Zamboni room at the arena.

4.0 Sodium Hydroxide Solution

(Caustic Soda 50%) is stored at the water treatment plant.

4.1 Carus UPZ 985

(Zinc Ortho Phosphate) is stored at the water treatment plant.

4.0 SYSTEM COMPONENT FAILURE PREVENTION

4.1 Sewage Lift Station

The lift stations are physically checked on a daily basis. The wet wells are equipped with high fluid level alarms connected to an autodialed which contacts the dispatch number. In the event of pump shutdown, the wet wells have approximately 20 minutes worth of storage capacity before they overflow.

Diesel pumps and piping are located in the stations, and may be installed for emergency operations when the electrical pumps are down. Sewage trucks are on call and may be mobilized by Dispatch in case of pump shutdown.

4.2 Sewage Force Main

The sewage force main is completely buried and is not monitored.

4.3 Sewage Lagoon

The sewage lagoon is routinely checked seven days per week for levels and leaks. If problems are suspected, the frequency of monitoring would increase.

4.4 Chlorine Gas Storage

A fixed chlorine gas detector is installed in the chlorine gas storage room.

5.0 RESPONSE TEAM, ACTION AND EQUIPMENT

Key personnel have been identified for emergency spill response. They are identified below with their key role in the event of a spill:

Director of Public Works	-	Manpower, Loaders and Trucks
Chief Administrative Officer	-	Media
Fire Chief	-	Trucks, Fire Retardant Foam and Emergency Measures Organizations

The Director of Public Works and the Fire Chief work together to coordinate the mobilization of men and equipment as required to contain the spill. The Chief Administrative Officer is in charge of coordinating the information and messages flow to the media. The Fire Chief will provide men and equipment to assist in a spill response action. If the situation is deemed to require it, the Fire Chief will call out the Emergency Measures Organization (EMO).

The following details the response to be taken in case of a spill or leak at the locations outlined in section 3.

5.1 Sewage Spills

Should a sewage spill become apparent, the Director of Public Works would be responsible to:

- Ensure the public safety at all times and if required, notify the Fire Department and CAO,
- Contact the NWT 24-hour Spill Report Line (867)-920-8130,
- Mobilize staff to determine the cause of the problem, and act to stop the release of the sewage,
- Mobilize equipment as required to contain the spill through trenching, berming, etc. to prevent sewage from entering Koojesse Inlet.
- Clean up contaminated areas with suction trucks, loaders, dump trucks and absorbent materials as required.

5.2 Fuel and Gasoline Spills

In the event of a fuel or gasoline spill, the Fire Chief would be contacted by Dispatch and would be responsible to:

- Ensure the public safety at all times and notify the Director of Public Works and the CAO.

The Director of Public Works is then responsible to:

- Contact the NWT 24-hour Spill Report Line (867)-920-8130,
- Mobilize staff to determine the cause of the problem, and to act to stop the release of the product,
- Mobilize equipment as required to contain the spill through trenching, berming, etc.
- Clean up contaminated areas with hand tools, suction trucks, loaders, dump trucks and absorbent materials as required.

5.3 Chlorine Gas Leaks

In the event of a chlorine gas leak, the Fire Chief would be contacted by dispatch and would be responsible to:

- Ensure the public safety at all times and to notify the Director of Public Works and the CAO,

The Director of Public Works is then responsible to:

- Contact eh 24-hour Spill Report Line (867)-920-8130,
- Mobilize staff to determine the cause of the problem and to act to contain the material, if possible to do so in a safe manner, using the available capping tools,
- If the cylinder cannot be capped, arrange for their transport to a safe area and allow the gas to escape,
- Dispose of the faulty cylinders in such a manner as to minimize the risk to human health.

5.4 Hydrofluosilicic Acid

Spills of this material less than 5L will be cleaned up by the Water Treatment Plant Operator using acid neutralizing material. The Water Treatment Plant Operator will notify the Utilidor Foreman of the spill. For spills in excess of 5L, the Water Treatment Plant Operator will evacuate the immediate area and notify Dispatch. Dispatch will contact the Fire Department. The Fire Chief will then be responsible to:

- Ensure the public safety at all times and notify the Director of Public Works and the CAO.

Upon notification by the Fire Chief or Dispatch, the Director of Public Works will be responsible to:

- Contact the 24-hour Spill Report Line, (867)-920-8130,
- Mobilize staff to determine the cause of the problem and act to contain the material if possible to do so in a safe manner,
- Dispose of the neutralized material according to GNWT regulations.

5.5 Sodium Hypochlorite

Spills of this material less than 5L will be cleaned up by the Water Treatment Plant Operator using appropriate neutralizing material. The Water Treatment Plant Operator will notify the Utilidor Foreman of the spill. For spills in excess of 5L, the Water Treatment Plant Operator will evacuate the immediate area and notify Dispatch. Dispatch will contact the Fire Department. The Fire Chief will then be responsible to:

- Ensure the public safety at all times and notify the Director of Public Works and the CAO.

Upon notification by the Fire Chief or the Dispatch, the Director of Public Works will be responsible to:

- Contact the 24-hour Spill Report Line (867)-920-8130,
- Mobilize staff to determine the cause of the problem and act to contain the material if possible to do so n a safe manner.
- Dispose of the neutralized material according to GNWT regulations.

6.0 GENERAL SPILLS

The following sections provide general information on the handling of large volume spills to a variety of receptors. In Iqaluit, sewage and petroleum products are stored in sufficient quantities that a large volume spill could occur.

6.1 Sewage Spills

6.1.1 Containment on Land

Containment of large volume sewage spills on land is generally accomplished using minor earthworks such as earth dams or dykes and trenches.

Dykes and dams may be used to contain and direct spilled materials. The dam or dyke may be lined with a synthetic liner to render it impermeable to the spilled product. The location and size of the barrier should allow for the volume of material to be contained.

When the ground is thawed, trenches may be used to intercept and collect spilled materials. A synthetic liner may be placed on the trench floor and walls to contain the contaminant in the trench. The location and size of the trench should take into account the volume of material to be contained. Trenches placed down slope of the spill may be effective in containing both surface and subsurface movement of spilled material.

6.1.2 Containment on Surface Water

As sewage will readily mix with water it may prove impossible to contain the spill once water is reached. Strong action should be taken to prevent the material from entering a water body and to stop the material discharge at the source. Care should be taken to ensure public health and safety (eg. Protect water intakes, etc) and the long term environmental effects of the spill should be monitored.

If the water is flowing through a drainage ditch or smaller stream, a channel should be constructed to divert the water flow around the spill area. A dam should be constructed to contain the water the sewage has already entered.

6.1.3 Containment on Ice

Containment of spills on ice will be affected by the load bearing strength of the ice. If it is determined that the ice is safe to work on, containment will be achieved using dykes and dams constructed of earth or snow. The dam or dykes should be lined with plastic to make it impermeable to the sewage. Water may be sprayed on snow dams/dykes to form a impermeable ice layer. Absorbent materials may be used in conjunction with barriers to prevent further spread and seepage.

6.1.3 Containment on Snow

Snow will readily absorb liquids, which may facilitate the removal of spilled material to a recovery or disposal site. Saturated contaminated snow may be collected relatively easily and hauled away. Compacted snow can be used to create an effective physical barrier to reduce the spread of spilled materials.

Several types of snow containment structures may be constructed to contain spilled materials. Snow dykes and dams can be erected and then lined with an impermeable liner or sprayed with water to form an impermeable ice layer. Initially the snow around the perimeter of the spill can be compacted, eg. With a snowmobile, to slow the movement of contaminants. The saturated snow can be collected with hand tools or heavy equipment and removed to the sewage lagoon for disposal.

Caution should be exercised as spilled materials can migrate under snow cover for considerable distances and not be visible from above.

6.1.4 Material Removal

Removal of the spilled sewage may be accomplished using several techniques depending on the nature of the spill. Generally, methods used include suction. mechanical removal and the application of absorbent material.

Suction methods may be used initially if there is a significant quantity of free product on the ground. Equipment used to recover material in this fashion may include vacuum trucks, portable pumps or shop vacuums.

Suction screens may be required to prevent hose plugging and possible pump drainage.

Mechanical recovery using hand tools or heavy equipment should be used to collect soils or other loose material contaminated by the sewage. Caution should be exercised when using heavy equipment on a spill site as it is possible to cause a greater environmental impact from the operation of the equipment than from the spill itself.

Recovered liquids and saturated soils will be disposed of in the sewage lagoon.

6.2 Fuel and Gasoline Spills

Extreme caution should be exercised when containing and cleaning up spilled petroleum products due to high fire and explosion hazards associated with these materials.
Depending on the size of the spill and surrounding conditions, personal protective equipment such as rubber gloves (nitrile, neoprene, butyl rubber or PVC), rubber boots (neoprene or butyl rubber), chemical safety goggles and NIOSH/MSHA approved half mask respirators with organic vapor cartridges may be required. In poorly ventilated areas where there is the potential for vapors to concentrate, the use of heavy equipment should be carefully evaluated due to the potential explosion hazard.

6.2.1 Containment on Land

Containment of large volume fuel spills on land is generally accomplished using minor earthworks such as earth dams or dykes and trenches.

Dykes and dams may be used to contain and direct spilled materials. The dam or dyke may be lined with a synthetic liner to render it impermeable to the spilled product. The location and size of the barrier should allow for the volume of the material to be contained.

When the ground is thawed, trenches may be used to intercept and collect spilled materials. A synthetic liner may be placed on the trench floor and walls to contain the contaminant in the trench. This location and size of the trench should take into account the volume of material to be contained. Trenches placed down slope of the spill may be effective in containing both surface and subsurface movement of spilled material.

6.2.2 Containment on Surface Water

As diesel fuels and gasoline are less dense than water, they will float on the surface. Spills of these materials to surface water bodies may be contained using booms and their floating devices.

In standing water, booms should be deployed to contain the floating material close to the shore, thereby facilitating contaminant recovery. If the water is flowing, the booms should be stretched across the width of the water surface and angled against the current to allow for shore side collection.

If the water is flowing through a drainage ditch or smaller stream, an underpass or water bypass dam should be constructed. An earthen dam is constructed to completely stop the flow of water. Piping is then installed to allow water to flow through below the level of the floating fuel. Alternately, a channel may be constructed to divert the water flow around the spill area. A dam should be constructed to contain the water the fuel has already entered.

Weirs constructed of sheet metal, plywood, etc. may be constructed to prevent material flow through culverts or ditches. The sheet is inserted into the stream to below the level of the fuel. The water flows under the weir and spilled material will collect at the surface for removal.

If commercial booms are not readily available, improvising booms can be constructed of virtually any material that will float and form a barrier, eg. logs, inflated fire hoses, etc. These materials may be used alone or, preferably, as supports for absorbent materials.

6.2.3 Containment on or Under Ice

Containment of spills on ice will be affected by the load bearing strength of the ice. If it is determined that the ice is safe to work on, containment will be achieved using dykes and dams constructed of earth or snow. The dam or dyke should be lined with plastic to make it impermeable to the fuel. Water may be sprayed on snow dams/dykes to form an impermeable ice layer. Absorbent materials may be used in conjunction with barriers to prevent further spread and seepage.

If the spill penetrates the ice, containment becomes more difficult. If the water beneath the ice is standing, the ice will be broken to install a containment boom.

If the water is flowing slowly, ice slotting may be used. A trench is cut into the ice downstream of the spill and at an angle to the current to deflect and concentrate the spill. Spilled material that collects in the ice slot may be pumped out, absorbed or burned in place.

Vertical barriers, e.g. plywood sheets, may be inserted into the ice to deflect the movement of spilled material. Trenches should be cut in the ice at an angle to the direction of flow. The vertical barriers are inserted in the slots and allowed to freeze into place. The extent of the under ice spill may be monitored by boring observation holes into the ice with an auger.

6.2.4 Containment on Snow

Snow will readily absorb liquids, which may facilitate the removal of spilled material to a recovery or disposal site. Saturated contaminated snow may be collected relatively easily and hauled away. Compacted snow can be used to create an effective physical barrier to reduce the spread of spilled materials.

Several types of snow containment structures may be constructed to contain spilled material. Snow dykes and dams can be constructed and then lined with an impermeable liner or sprayed with water to form an impermeable ice layer. Initially the snow around the perimeter of the spill can be compacted, eg. with a snowmobile, to slow the movement of contaminants. The saturated snow can be collected with hand tools or heavy equipment and removed to the land fill for disposal or recovery.

Caution should be exercised as spilled material can migrate under snow cover for considerable distances and cannot be visible from above.

6.2.5 Fire or Explosion

The first step to be taken at a site where there is a fire or explosion risk, or if the material is on fire is to evacuate people from the surrounding area. Dykes or trenches are then constructed down slope of the spilled material to minimize spread of unburned liquids and/or the fire. The fire may then be extinguished using suitable methods and action may be taken to prevent further spillage, contain the material and begin clean-up procedures.

6.2.5 Material Removal

Removal of the spilled fuels may be accomplished using several techniques. Generally, methods used include suction, mechanical removal and the application of absorbent material.

Suction methods may be used initially if there is a significant quantity of free product on the ground or on the surface of a water body. Equipment used to recover material in this fashion may include vacuum trucks, portable pumps or shop vacuums.

Suction screens may be required to prevent hose plugging and possible dump damage.

Mechanical recovery using hand tools or heavy equipment should be used to collect soils or other loose material contaminated by the fuel. Caution should be exercised when using heavy equipment on a spill site as it is possible to cause a greater environmental impact from the operation of the equipment than from the material itself.

Absorbents may be used to soak up petroleum product. They are commonly used for final clean-up, recovery of small amounts of fuel or to remove fuel from places which are inaccessible to other spill clean up methods. Snow and soil can be used as absorbent material for a variety of petroleum products. The saturated absorbent can be collected mechanically and moved to a suitable disposal location.

Recovered liquids will be disposed of in accordance with appropriate GNWT regulations. Saturated soils and absorbents will be transported to the landfill for disposal

6.3 Chlorine Gas Leak

Chlorine is a very toxic gas. Appropriate personal safety equipment must be worn by personnel attempting to contain a leak. Two Class A response suites with Scott packs are located at the Fire Department for use in the event of a leak.

6.3.1 Containment and Disposal

Capping tools are available for sealing leaking cylinders. If a cylinder is capped successfully, it may be returned to the supplier for disposal. If the cylinder cannot be capped, remove the cylinder to a safe location downwind of any populated area and allow the gas to escape.

7.0 SPILL EQUIPMENT INVENTORY

7.1 Spill Equipment Inventory

The following is a listing of equipment owned by the City of Iqaluit that may be used in the event of a spill emergency. The usual location of the equipment is also indicated.

MUNICIPAL SPILL EMERGENCY EQUIPMENT	
EQUIPMENT	**STORAGE LOCATION**
2 Cat 950 Loaders	1 at the Municipal Garage 1 at 1552 Parking Garage
1 Rubber Tired Backhoe	Municipal Garage (outside)
2 Dump Trucks	1 at the Apex Parking Garage 1 at the Municipal Garage
1 Cat 814 Wheel Dozer	1 at the Air Bas Garage
2 Road Graders	1 at 1552 Parking Garage 1 at the Apex Parking Garage
1 Cat M322 Excavator with hammer	1 at the Municipal Garage (outside)
4 Sewage Trucks	4 at the Airbase Parking Garage
5 Water Trucks	1 at the Airbase Parking Garage 4 at the Apex Parking Garage
1 Cat 966 Loader	1 at the Apex Parking Garage

7.2 Resource Contact

The following is a listing of internal and external resources that may be contacted for aid in the event of a spill.

RESOURCES		
CONTACT	**CONTACT #**	**RESOURCE PROVIDED**
Fire Department: Volunteers	979-4422	Manpower, Trucks, Foam
Fire Department: Ambulance	979-4422	Medical, Rescue Equipment
Fire Department: EMO	979-4422	Evacuation, Rescue
24-Hour Spill Report Line	(867)-920-8130	Expert Advice
External Contractors	See Appendix G for As and When Contracts	Manpower, Equipment

8.0 TRAINIG EXERCISES

Training and communication exercises should be carried on an annual basis to determine the actual readiness and ability of the City to handle a spill emergency. The exercises should be served to train key personnel and determine any weaknesses in the plan prior to the occurrence of an emergency situation. A variety of scenarios should be tested, eg. sewage spills from the force main, sewage lagoon dam failures, chlorine gas leaks, fuel spills, etc. to ensure that appropriate action can be taken quickly.

The Fire Department and the Emergency Measures Organization (EMO) currently conduct disaster training exercises in the City of Iqaluit. Neither of these groups target hazardous materials scenarios specifically, but a spill situation is often included as part of the larger exercise.

The Worker's Compensation Board will provide funding for employees to participate in hazardous materials courses if contact with hazardous materials is a component of the employee's job description. Courses available include Materials Safety Data Sheets (MSDS), Workplace Hazardous Materials Systems (WHMIS) and First Aid.

9.0 REFERENCES

Guidelines for Contingency Planning, Northwest Territories Water Board, January, 1987.

Spill Containment and Clean-up Course, Renewable Resources, Pollution Control Division, 1991.

Guidelines for the Preparation of Hazardous Material Spill Contingency Plan, Environmental Protection, Conservation and Protection, Environment of Canada, Western and Northern Region, Northwest Territories District Office, Yellowknife, NT, March 1990.

Contingency Planning and Spill Reporting in the NWT, A Guide to the New Regulations, Resources, Wildlife and Economic Development, Environmental Protection Service, 1993.

Spill Contingency Planning and Reporting Regulations, Environmental Protection Act, Government of the Northwest Territories, 1993.

Emergency Planning for Industry, CAN/CSA-Z731-95, Canadian Standards Association, 1995.

Sewage System Evaluation, Frobisher Bay, Final Report, F.J. Reinders and Associates Limited, October, 1982.

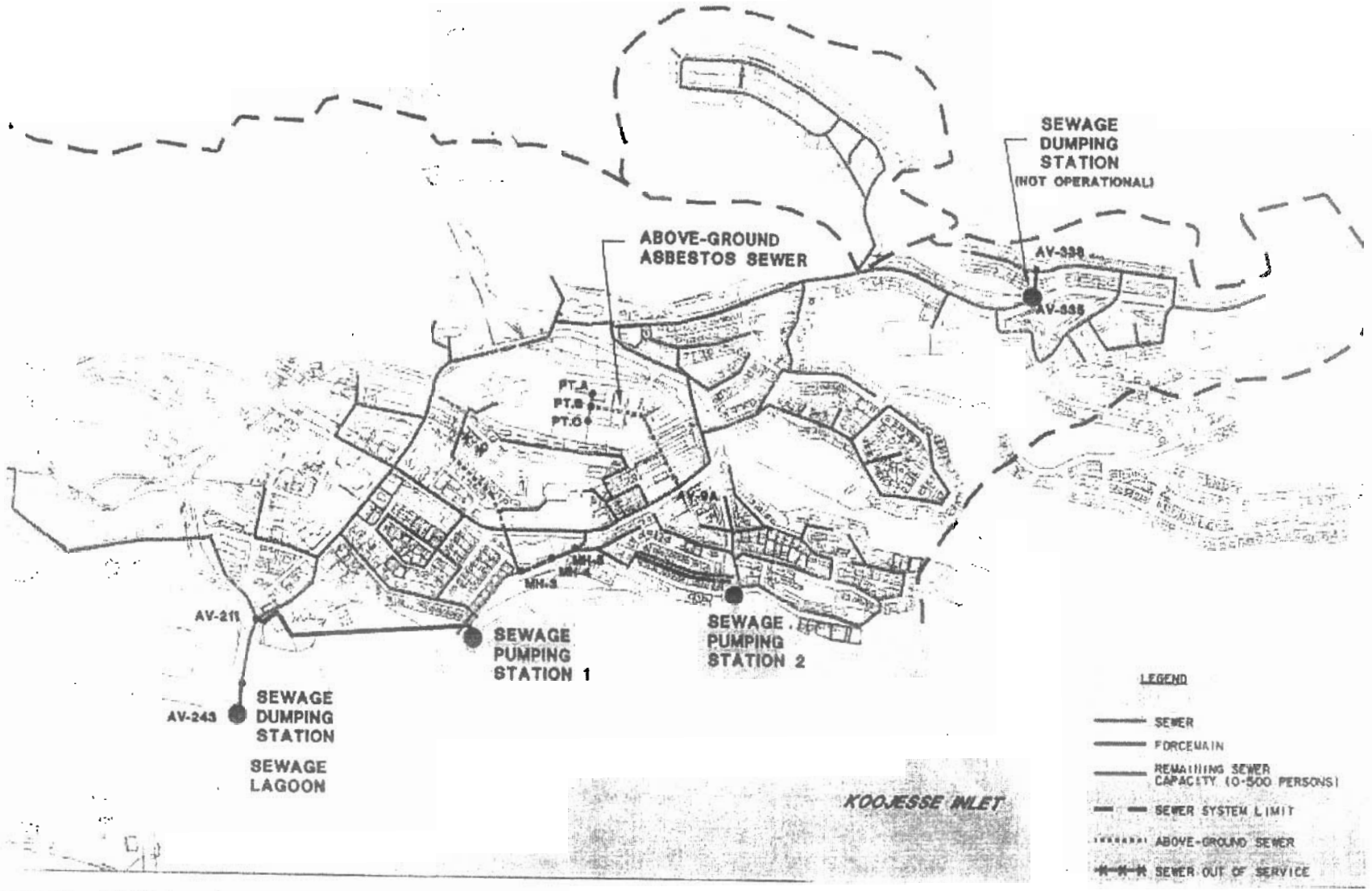
Iqaluit Sewage Lagoon Investigation – Preliminary Report, Ferguson Simek Clark, January, 1998.

Seepage from a Sewage Lagoon, What is a Reasonable Rate? – Draft Discussion Paper, Ferguson Simek Clark, January 1998.

The City of Yellowknife Spill Contingency Plan, October, 1993.

APPENDIX A

City of Iqaluit Site Plan



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DILLON CONSULTING

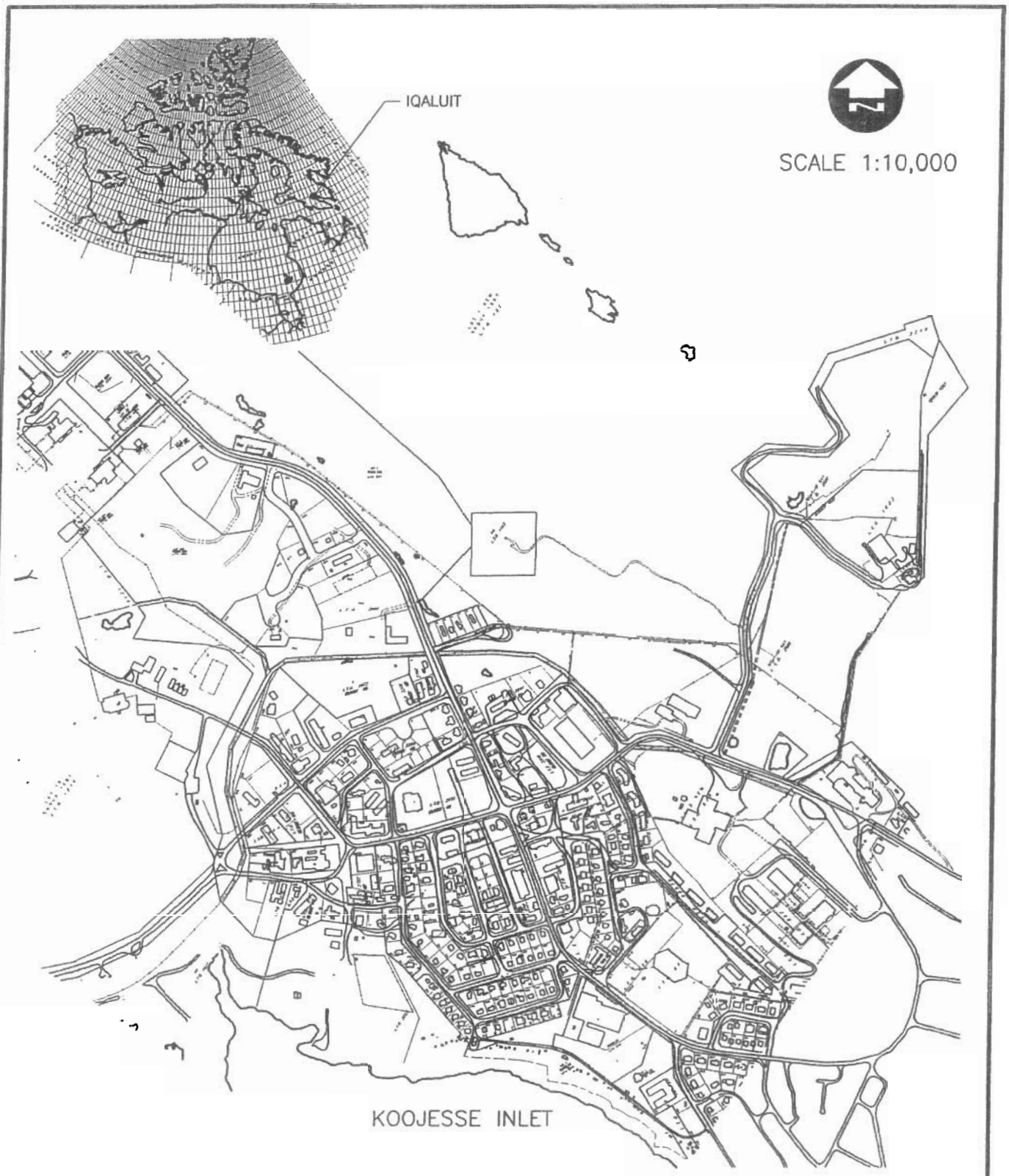
PROJECT: SPILL CONTINGENCY PLAN
DEPARTMENT OF PUBLIC WORKS AND SERVICES

TITLE: LOCATION PLAN OF SEWER FACILITIES

PROJECT NUMBER: 03-1338

DATE: MARCH 2003

FIGURE NUMBER: FIG 2



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PROJECT
SPILL CONTINGENCY PLAN, DEPARTMENT OF PUBLIC WORKS AND SERVICES

TITLE
CITY OF IQALUIT
LOCATION PLAN

PROJECT NUMBER
03-1338

DATE
MARCH 2003

FIGURE NUMBER
FIG 1

APPENDIX B

Sewage Lagoon Preparedness Plan

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1.0 INTRODUCTION

The purpose of this spill preparedness plan is to outline the formal practical response system which will be implemented in the event of a leak or spill occurring at the Iqaluit sewage lagoon. This plan is intended to provide necessary information in a manner that will be easily understood and followed in the event of a spill emergency. The result will be to minimize health hazards, environmental damage and clean up costs if the lagoon dam system fails.

1.1 Background

The Iqaluit sewage lagoon was constructed in 1978 by erecting two dykes stretching from the northwestern shoreline to a nearby island in Koojesse Inlet. The lagoon covered an area of approximately 17,000 m^2 with a retention volume of 32,000 m^3. The western dyke was designed to be permeable and act as a filter while allowing water to pass through. Locally available granular materials were used during the construction process.

The lagoon was reconstructed in 1991, and the retention volume was reduced to a maximum of 25,000 m^3. At the current sewage production rate of 1,800 m^3/day, retention times vary between 6.7 and 13.8 days.

Sewage is transferred to the lagoon through a force main /gravity and by truck.

1.2 Spill Potential

The dykes at the sewage lagoon have failed on two previous occasions, in 1984 and 1991, resulting in uncontrolled releases of sewage to the environment. Seeps, which may indicate problems with the structural integrity of the dykes, have occurred in January of 1992 and December of 1997. It appears that the potential exists for further uncontrolled sewage releases due to dyke failure.

2.0 REPORTING PROCEDURES

The Public Works Department of the City of Iqaluit is responsible for the operation and maintenance of the sewage lagoon. City of Iqaluit employees have access to radios and can be reached by pagers/cell phones 24 hours per day. A dispatch number is monitored on a 24 hour basis.

All spills are to be reported immediately to the 24-hour Spill Report Line (867)-920-8130 to ensure that an investigation may be undertaken by the appropriate government authority.

The following are contact numbers for the City personnel:

CITY OF IQALUIT			
CONTACT	**PAGER #**	**WORK #**	**CELL #**
Dispatch	N/A	979-5650	
Chief Administrative Officer (CAO)	N/A	979-5666	N/A
Director of Public Works	N/A	975-8509	975-1877
Operations Superintendent, Public Works	N/A	979-5653	975-1774
Director of Engineering	N/A	975-8501	N/A
Fire Chief	45	979-5657	975-1446
Chief By-Law	N/A	979-5670	975-1930
Utilidor Foreman	32	979-5648	975-1443
Garage/Roads Foreman	12	979-5638	975-1463
Truck Sewer Water Foreman	N/A	979-5612	975-1473

Equipment may be dispatched by the Director of Public Works only. As and when contracts are negotiated on a yearly basis with local contractors to provide equipment and manpower to the City of Iqaluit. See Appendix G for a list of current as and when contracts. The Director of Public Works has the authority to call in outside contractors.

The 24-hour Spill Report Line is currently being run by the GNWT- Resources, Wildlife and Economic Development division. The personnel at the spill report line will also be able to provide advice regarding spill containment procedures and will see that he government agency having jurisdiction over the spill is contacted. The call to the spill line can be made collect by informing the operator that a spill is being reported.

EXTERAL ASSISTANCE – GOVERNMENT RESOURCES	
AGENCY	**TELEPHONE #**
24-Hour Spill Line	(867)920-8130

2.1 "If You Discover a Spill"

a. Be alert and consider your personal safety first,

b. Assess the hazard to persons in the vicinity of the spill and where possible take action to control danger to human life.

c. If safe and practical try to take appropriate action to stop the release of material,

d. Contact Dispatch and report the spill,

e. If practical, attempt to contain the spread of the spill,

f. If practical, mark the spill scene to warn the public and restrict access.

2.2 Director of Public Work Response

a. Proceed to the spill location,

b. Assess the situation and make arrangements for first aid and removal of injured personnel. Take the necessary action where possible to secure the site to protect human safety,

c. If not already done and if it is safe to do so, take the appropriate action to stop the flow or release of material. If at all possible take the necessary action to contain or prevent the spread of the spilled material.

d. Gather information on the status of the situation,

e. Fill out as completely as possible, a spill report form (attached) and then contact the 24-hour Spill Report Line at (867)-920-8130,

f. Take appropriate action to repair the dyke.

3.0 SITE INFORMATION

The sewage lagoon is located at the northwestern end of Koojesse Inlet. The lagoon was constructed by extending two dykes between the shoreline of the inlet and nearby island. Both dykes were constructed to be permeable, providing filtration of solids while allowing water to pass through. The majority of the discharge occurs, as intended, though the west dyke as it is at a lower elevation than the east dyke. Seeps have appeared on the west dyke on two separate occasions, prompting concern regarding the structural integrity of the dyke. The lagoon has an operation detention volume of between 12,000 m^3 and 25,000 m^3 at operating water levels of 0.7 m to 1.5 m. Sewage enters the lagoon at a rate of approximately 1,800 m^3/day.

In the event of dyke failure, sewage will drain directly into Koojesse Inlet.

4.0 SYSTEM COMPONENT FAILURE PREVENTION

Under normal conditions, the lagoon is monitored seven days per week. The lagoon level is checked and the dykes are inspected for leaks. If problems are suspected with the lagoon, the monitoring frequency will increase.

5.0 SYSTEM MALFUNCTION RESPONSE ACTION

In the event of a dyke breach, essentially raw sewage will be discharged directly into Koojesse Inlet with potentially negative effects on the local fish and shellfish populations. As such, it is important that potential dyke failures be dealt with as quickly as possible. The Director of Public Works should be informed immediately if liquid is detected seeping or flowing through the dyke walls.

Upon notification of seepage through the dyke, the Director of Public Works should:

- Proceed to the site to evaluate the nature of and extent of the problem,
- Contact the 24-hour Spill Report Line, (867)-920-8130,
- Mobilize equipment and manpower as required to contain the sewage and carry our repairs to the dyke.

These actions are more fully outlined in Section 2.2. If it is possible to do so, any sewage released through the dyke breach should be pumped back into the lagoon.

6.0 REPONSE EQUIPMENT

6.1 Spill Equipment Inventory

The following is a listing of equipment owned by the City of Iqaluit that may be used in the event of a spill emergency. The usual location of the equipment is also indicated.

MUNICIPAL SPILL EMERGENCY EQUIPMENT	
EQUIPMENT	**STORAGE LOCATION**
2 Cat 950 Loaders	1 at the Municipal Garage 1 at 1552 Parking Garage
1 Rubber Tired Backhoe	Municipal Garage (outside)
2 Dump Trucks	1 at the Apex Parking Garage 1 at the Municipal Garage
1 Cat 814 Wheel Dozer	1 at the Air Bas Garage
2 Road Graders	1 at 1552 Parking Garage 1 at the Apex Parking Garage
1 Cat M322 Excavator with hammer	1 at the Municipal Garage (outside)
4 Sewage Trucks	4 at the Airbase Parking Garage
5 Water Trucks	1 at the Airbase Parking Garage 4 at the Apex Parking Garage
1 Cat 966 Loader	1 at the Apex Parking Garage

6.2 Resource Contacts

The following is a listing of internal and external resources that may be contacted for aid in the event of a spill.

RESOURCES		
CONTACT	**CONTACT #**	**RESOURCE PROVIDED**
Fire Department: Volunteers	979-4422	Manpower, Trucks, Foam
Fire Department: Ambulance	979-4422	Medical, Rescue Equipment
Fire Department: EMO	979-4422	Evacuation, Rescue
24-Hour Spill Report Line	(867)-920-8130	Expert Advice
External Contractors	See Appendix G for As and When Contracts	Manpower, Equipment

7.0 RESPONSE TEAM

The Department of Public Works is responsible for the operation and maintenance of the Iqaluit sewage lagoon. In the event that one of the dykes at the sewage lagoon fails, the Director of Public Works and the CAO will be considered the key response personnel.

As such, it is the responsibility of the Director of Public Works to:

- Ensure public safety at all times, and to contact the CAO if required,
- Contact the 24-hour NWT Spill Report Line (867)-920-8130,
- Mobilize staff to determine the cause of the problem,
- Mobilize equipment as required to contain the sewage and repair the damage to the dykes,
- Clean up material contaminated by the sewage discharge, if possible.

The CAO is generally responsible for contacting the media.

8.0 TRAINING EXERCISES

Training and communication exercises should be carried out on an annual basis to determine the actual readiness and ability of the City to handle a breach of the lagoon containment structure. The exercises should serve to train key personnel and determine any weakness in the plan prior to the occurrence of an emergency situation.

The Fire Department and the Emergency Measures Organization (EMO) currently conduct disaster training exercises in the City of Iqaluit. Neither of these groups target sewage lagoon scenarios specifically, but a hazardous material spill situation is often included as part of the larger exercise.

The Worker's Compensation Board will provide funding for employees to participate in hazardous materials courses if contact with hazardous materials is a component of the employee's job description. Courses available include Materials Safety Data Sheets (MSDS), Workplace Hazardous Materials Information Systems WHMIS) and First Aid.

9.0 REFERENCES

Guidelines for Contingency Planning, Northwest Territories Water Board, January, 1987.

Guidelines for the Preparation of Hazardous Material Spill Contingency Plan, Environmental Protection, Conservation and Protection, Environment of Canada, Western and Northern Region, Northwest Territories District Office, Yellowknife, NT, March 1990.

Contingency Planning and Spill Reporting in the NWT, A Guide to the New Regulations, Resources, Wildlife and Economic Development, Environmental Protection Service, 1993.

Spill Contingency Planning and Reporting Regulations, Environmental Protection Act, Government of the Northwest Territories, 1993.

Emergency Planning for Industry, CAN/CSA-Z731-95, Canadian Standards Association, 1995.

Sewage System Evaluation, Frobisher Bay, Final Report, F.J. Reinders and Associates Limited, October, 1982.

Iqaluit Sewage Lagoon Investigation – Preliminary Report, Ferguson Simek Clark, January, 1998.

Seepage from a Sewage Lagoon, What is a Reasonable Rate? – Draft Discussion Paper, Ferguson Simek Clark, January 1998.

The City of Yellowknife Spill Contingency Plan, October, 1993.

APPENDIX C

Materials and Reportable Quantities List

SCHEDULE B

(Section 9)

ITEM NO.	TDGA CLASS	DESCRIPTION OF CONTAMINANT	AMOUNT SPILLED
1	1	Explosives	Any Amount
2	2.1	Compressed gas (flammable)	Any amount of gas from containers with a capacity greater than 100 lt.
3	2.2	Compressed gas (non-corrosive, non flammable)	Any amount of gas from containers with a capacity greater than 100 lt.
4	2.3	Compressed gas (toxic)	Any amount
5	2.4	Compressed gas (corrosive)	Any Amount
6	3.1, 3.2, 3.3	Flammable Liquid	100 lt.
7	4.1	Flammable solid	25 kg
8	4.2	Spontaneously combustible solids	25 kg
9	4.3	Water reactant solids	25 kg
10	5.1	Oxidizing substances	50 lt. or 50 kg
11	5.2	Organic Peroxides	1 lt. or 1 kg
12	6.1	Poisonous substances	5 lt. or 5 kg
13	6.2	Infectious substances	Any amount
14	7	Radioactive	Any amount
15	8	Corrosive Substances	5 lt. or 5 kg
16	9.1 (in part)	Miscellaneous products or substances, excluding PCB mixtures	50 lt. or 50 kg.
17	9.2	Environmentally hazardous	1 lt. or 1 kg
18	9.3	Dangerous wastes	5 lt. or 5 kg
19	9.1 (in part)	PCB mixtures of 5 or more parts per million	0.5 lt. or 0.5 kg
20	None	Other contaminants	100 lt. or 100 kg

APPENDIX D

Spill Report Forms

Northwest Territories

NWT SPILL REPORT

(Oil, Gas, Hazardous Chemicals or other Materials)

24 – Hour Report Line
Phone: (867) 920-8130
Fax: (867) 873-6924

A Report Date and Time	B Date and Time of spill (if known)	C ☐ Original Report ☐ Update no._____	Spill Number

D Location and map coordinates (if known) and direction (if moving)

E Partly responsible for spill

F Product(s) spilled and estimated quantities (provide metric volumes/weights if possible)

G Cause of spill

H Is spill terminated? ☐ yes ☐ no	I If spill is continuing, give estimated rate	J Is further spillage possible? ☐ yes ☐ no	K Extent of contaminated area (in square meters if possible)

L Factors effecting spill or recovery (weather conditions, terrain, snow cover, etc.)	M Containment (natural depression, dikes, etc.)

N Action, if any, taken or proposed to contain, recover, clean up or dispose of product(s) and contaminated materials

O Do you require assistance? ☐ no ☐ yes, describe:	P Possible hazards to person, property, or environment; eg: fire, drink water, fish or wildlife

Q Comments or recommendations

FOR SPILL LINE USE ONLY

Lead agency

Spill significance

Lead Agency contact and time

.....

.....

.....

Is this file now closed? ☐ yes ☐ no

Reported by	Position. Employer, Location	Telephone

Reported to	Position. Employer, Location	Telephone

Confined Entry Permit

(Post at all entrances to confined space)

Permit #_____

Emergency Phone #'s: Fire Dept Dispatch 979-5650

Location and Description of Confined Space

_____

_____

_____

Details of Work to be performed:

_____

_____

_____

Forman in Charge of Work_____

- is hot permit required (if required fill out hot permit)

Authorized Entrants	All Personel Adequatly Trained	
_____	☐ YES	☐ NO
_____	☐ YES	☐ NO
_____	☐ YES	☐ NO

Atmospheric Monitoring
Instrument Used _____
Calibrated ☐ YES ☐ NO
Suction Test ☐ YES ☐ NO

Personnel Protective Equipment Required

_____

_____

_____

_____

_____

_____

_____

Job Specific Items to be Listed by Utilidor Foreman.

Time Date	Oxygen Must be 19.5%- 23.5%	H2S 10PPM	CO 30PPM	CH4 10%Lev
Prior to Venting				

Name and Signature of Tester _____

Print

_____

Sign

Date _____

Permit Expires at (DATE & TIME):_____

Work Completion

Utilidor Forman _____Date _____

Entrant _____Date _____

Entrant/Standby _____Date _____

Stand-By _____Date _____

APPENDIX E

MSDS Sheets

Esso Imperial Oil MATERIAL SAFETY DATA SHEET

Date Prepared: April 08, 1997
Supersedes: April 13, 1994
MSDS Number: 00826

Cette fiche signalétique est aussi disponible en français

1. PRODUCT INFORMATION

Product Identifier: MIDDLE DISTILLATE
ESSO MARINE GAS OIL (DYED OR CLEAR)
ESSO RAILROAD DIESEL (DYED OR CLEAR)
HEATING OIL (DYED OR CLEAR)
→ DIESEL (DYED OR CLEAR)
DIESEL QUALITY FURNACE FUEL (DYED OR CLEAR)
DIESEL QUALITY HEATING OIL (DYED OR CLEAR)
ESSO DIESEL (DYED OR CLEAR)
ESSO DIESEL QUALITY COMMERCIAL FUEL (DYED OR CLEAR
ESSO DIESEL QUALITY FURNACE FUEL
ESSO DIESEL QUALITY HEATING OIL
ESSO FURNACE FUEL (DYED OR CLEAR)
ESSO HEATING OIL (DYED OR CLEAR)
ESSO MARINE DIESEL FUEL (DYED OR CLEAR)
ESSO RAILROAD DIESEL FUEL #3 (DYED OR CLEAR)
ESSO TOBACCO CURING OIL
FUEL OIL 75
FUEL OIL 76
DIESEL MARINE (DYED OR CLEAR)
DIESEL MARINE GAS OIL (DYED OR CLEAR)
FURNACE (DYED OR CLEAR)
DIESEL MARINE - POUR DEPRESSED (DYED OR CLEAR)
NO.2 FUEL OIL
NAVAL FUEL OIL 3-GP-11M (DYED)
ESSO DIESEL FUEL LS
LOW SULFUR DIESEL (EXPORT (DYED)
DIESEL LOW SULFUR (DYED OR CLEAR)
NO.2 FUEL OIL FOR EXPORT
DIESEL FUEL FOR EXPORT (DYED OR CLEAR)
FURNACE TOBACCO CURING OIL
DIESEL NAVAL 3GP-11 (DYED OR CLEAR)
DIESEL NAVAL 3GP-15 (DYED OR CLEAR)
DIESEL LOW SULFUR RAIL (DYED OR CLEAR)
DIESEL LOW SULFUR DYED EP
DIESEL RAIL (DYED OR CLEAR)
DIESEL RAIL #3 (DYED OR CLEAR)
DIESEL RAIL #3 <HD> (DYED OR CLEAR)
DIESEL LOW SULFUR <032> (DYED OR CLEAR)
FURNACE URBAN (DYED OR CLEAR)
DIESEL (032)
DIESEL (032) DYED

Application and Use:
Multi-purpose fuel

Product Description:

A complex mixture of aliphatic, olefinic, naphthenic and aromatic hydrocarbons.

REGULATORY CLASSIFICATION

WHMIS:

Class D, Division 2, Subdivision B: Toxic Material
Class B, Division 3: Combustible Liquids.

CEPA: CANADIAN ENVIRONMENTAL PROTECTION ACT

All components of this product are either on the Domestic Substances List (DSL) or are exempt.

TDG INFORMATION (RAIL/ROAD):

Shipping Name: FUEL OIL
Class: 3
Packing Group: III
PIN Number: UN1202

Please be aware that other regulations may apply.

TELEPHONE NUMBERS

Emergency 24 hr. (519) 339-2145
Technical Info. (800) 268-3183

MANUFACTURER/SUPPLIER:

IMPERIAL OIL
Products Division
111 St Clair Avenue West
Toronto, Ontario
M5W 1K3
(416) 968-4111

2. REGULATED COMPONENTS

The following components are defined in accordance with sub-paragraph 13(a)(i) to (iv) or paragraph 14(a) of the Hazardous Products Act:

NAME	%	CAS #
Fuel Oil No.2	>99.9 v/v	68476-30-2

3. TYPICAL PHYSICAL & CHEMICAL PROPERTIES

Physical State: Liquid
Specific gravity: not available
Viscosity: 1.30 cSt at 40 deg C
to 11.00 cSt at 40 deg C
Vapour Density: 4
Boiling Point: 150 to 370 deg C
Evaporation rate: < 1 (1= n-butylacetate)
Solubility in water: negligible
Freezing/Pour Point: not available
Odour Threshold: not available
Vapour Pressure: 4 kPa at 38 deg C
Density: 0.85 g/cc at 15 deg C
Appearance/odour: White or pale yellow liquid, petroleum odour

4. HEALTH HAZARD INFORMATION

NATURE OF HAZARD

INHALATION:

Negligible hazard at normal temperatures (up to 38 deg C).
High vapour concentrations are irritating to the eyes, nose, throat and lungs; may cause headaches and dizziness; may be anesthetic and may cause other central nervous system effects.
Avoid breathing vapours or mists.

EYE CONTACT:

Slightly irritating, but will not injure eye tissue.

SKIN CONTACT:

Low toxicity.
Irritating.

INGESTION:

Low toxicity.
Small amounts of this liquid drawn into the lungs from swallowing or vomiting may cause severe health effects (e.g. bronchopneumonia or pulmonary edema).

CHRONIC:

Lifetime skin painting tests indicate that materials of similar composition have produced skin cancer in experimental animals. The relationship of these results to humans has not been fully established.

ACUTE TOXICITY DATA:

Based on animal testing data from similar materials and products, the acute toxicity of this product is expected to be:
Oral : LD50 > 5000 mg/kg (Rat)
Dermal : LD50 > 2000 mg/kg (Rabbit)
Inhalation : LC50 > 2500 mg/m3 (Rat)

OCCUPATIONAL EXPOSURE LIMIT:

Manufacturer recommends:
100 ppm based on composition.

Local regulated limits may vary.

5. FIRST AID MEASURES

INHALATION:

In emergency situations use proper respiratory protection to immediately remove the affected victim from exposure. Administer artificial respiration if breathing has stopped. Keep at rest. Call for prompt medical attention.

EYE CONTACT:

Flush eyes with large amounts of water until irritation subsides. If irritation persists, get medical attention.

Please turn over

SKIN CONTACT:

Immediately flush with large amounts of water. Use soap if available. Remove contaminated clothing, including shoes, after flushing has begun. If irritation persists, seek medical attention.

INGESTION:

DO NOT induce vomiting since it is important that no amount of the material should enter the lungs (aspiration). Keep at rest. Get prompt medical attention.

6. PREVENTIVE AND CORRECTIVE MEASURES

PERSONAL PROTECTION:

The selection of personal protective equipment varies, depending upon conditions of use.
In open systems where contact is likely, wear safety goggles, chemical-resistant overalls, and chemically impervious gloves.
Where only incidental contact is likely, wear safety goggles, long sleeves, and chemical-resistant gloves.
Where concentrations in air may exceed the occupational exposure limits given in Section 4 and where engineering, work practices or other means of exposure reduction are not adequate, approved respirators may be necessary to prevent overexposure by inhalation.

ENGINEERING CONTROLS:

The use of local exhaust ventilation is recommended to control emissions near the source. Laboratory samples should be handled in a fumehood. Provide mechanical ventilation of confined spaces.

HANDLING, STORAGE AND SHIPPING:

Keep containers closed. Handle and open containers with care.
Store in a cool, well ventilated place away from incompatible materials.
In keeping with good personal hygiene practices, wash hands thoroughly after handling the material.
Do not handle or store near an open flame, sources of heat, or sources of ignition.
Material will accumulate static charges which may cause a spark. Static charge build-up could become an ignition source. Use proper relaxation and grounding procedures.
Empty containers may contain product residue. Do not pressurize cut, heat, or weld empty containers. Do not reuse empty containers without commercial cleaning or reconditioning.

LAND SPILL:

Eliminate source of ignition. Keep public away. Prevent additional discharge of material, if possible to do so without hazard.
Prevent spills from entering sewers, watercourses or low areas. Contain spilled liquid with sand or earth Do not use combustible materials such as sawdust
Recover by pumping (use an explosion proof motor or hand pump), or by using a suitable absorbent.
Consult an expert on disposal of recovered material. Ensure disposal in compliance with government requirements and ensure conformity to local disposal regulations. Notify the appropriate authorities immediately.
Take all additional action necessary to prevent and remedy the adverse effects of the spill.

WATER SPILL:

Remove from surface by skimming or with suitable absorbents. If allowed by local authorities and environmental agencies, sinking and/or suitable dispersants may be used in unconfined waters.
Consult an expert on disposal of recovered material. Ensure disposal in compliance with government requirements and ensure conformity to local disposal regulations. Notify the appropriate authorities immediately.
Take all additional action necessary to prevent and remedy the adverse effects of the spill.

7. FIRE AND EXPLOSION HAZARD

Flashpoint and method: >40 deg C PMCT ASTM D93

Autoignition: NA Flammable Limits: LEL: 0.7% UEL: 6.5%

GENERAL HAZARDS:

Combustible Liquid; may form combustible mixtures at or above the flash point.
Toxic gases will form upon combustion.
Static Discharge; material may accumulate static charges which may cause a fire.

FIRE FIGHTING:

Use water spray to cool fire exposed surfaces and to protect personnel.
Shut off fuel to fire.
Use foam, dry chemical or water spray to extinguish fire.
Respiratory and eye protection required for fire fighting personnel.

Avoid spraying water directly into storage containers due to danger of boilover.
A self-contained breathing apparatus (SCBA) should be used for all indoor fires and any significant outdoor fires. For small outdoor fires, which may easily be extinguished with a portable fire extinguisher, use of an SCBA may not be required.

HAZARDOUS COMBUSTION PRODUCTS:

Smoke, carbon monoxide, carbon dioxide and traces of oxides of sulphur

8. REACTIVITY DATA

STABILITY:

This product is stable Hazardous polymerization will not occur

INCOMPATIBLE MATERIALS AND CONDITIONS TO AVOID:

Strong oxidizing agents

HAZARDOUS DECOMPOSITION:

none

9. NOTES

All components of this product are listed on the U.S. TSCA inventory

10. PREPARATION

Date Prepared : April 08, 1997
Prepared by: Lubricants & Specialties
IMPERIAL OIL
Products Division
111 St Clair Avenue West
Toronto, Ontario
M5W 1K3
(800) 268-3183

Esso Imperial Oil — MATERIAL SAFETY DATA SHEET

Date Prepared: June 20, 1997
Supersedes: June 14, 1997
MSDS Number: 08522

Cette fiche signalétique est aussi disponible en français

1. PRODUCT INFORMATION

Product Identifier: UNLEADED GASOLINE
REGULAR UNLEADED
MIDGRADE UNLEADED
ESSO SUPER PREMIUM UNLEADED
PREMIUM UNLEADED
→ ESSO REGULAR UNLEADED
ESSO MIDGRADE UNLEADED
ESSO EXTRA MIDGRADE UNLEADED
ESSO PREMIUM UNLEADED
EXXON MIDGRADE UNLEADED
EXXON PREMIUM UNLEADED
INDOLENE GASOLINE
EXXON REGULAR UNLEADED
PREMIUM GASOLINE
ESSO EXTRA MIDGRADE GASOLINE
MIDGRADE GASOLINE
GASOLINE REGULAR UNLEADED
GASOLINE MIDGRADE UNLEADED MUL89 (DYED OR CLEAR)
GASOLINE REGULAR UNLEADED RUL87 (DYED OR CLEAR)
GASOLINE PREMIUM UNLEADED PUL91 (DYED OR CLEAR)
GASOLINE PREMIUM UNLEADED PUL92 (DYED OR CLEAR)
GASOLINE PREMIUM UNLEADED SUL94
SUPERSUPREME 94 PREMIUM UNLEADED GASOLINE-MTBE
GASOLINE MIDGRADE UNLEADED MUL89 <P91/R87>
GASOLINE MIDGRADE UNLEADED MUL89 DCA <P92/R87>

Application and Use.
Motor gasoline fuel, for use in internal combustion engines only

Product Description.

A mixture of aliphatic and aromatic hydrocarbons and additives.

REGULATORY CLASSIFICATION

WHMIS:

Class D, Division 2, Subdivision A: Very Toxic Material.
Class B, Division 2: Flammable Liquids.

TDG INFORMATION (RAIL/ROAD):

Shipping Name: Gasoline
Class: 3
Packing Group: II
PIN Number: UN1203

Please be aware that other regulations may apply.

TELEPHONE NUMBERS

Emergency 24 hr. (519) 339-2145
Technical Info. (800) 268-3183

MANUFACTURER/SUPPLIER:

IMPERIAL OIL
Products Division
111 St Clair Avenue West
Toronto, Ontario
M5W 1K3
(416) 968-4111

2. REGULATED COMPONENTS

The following components are defined in accordance with sub-paragraph 13(a) (i) to (iv) or paragraph 14(a) of the Hazardous Products Act:

NAME	%	CAS #	
Gasoline	>99 v/v	8006-61-9	LD50 > 18ml/kg,orl,rat LD50 > 5ml/kg,skn,rbt
Methyl T-Butyl Ether	0-11 v/v	1634-04-4	LD50:3.9g/Kg,ing,rat LD50: > 10g/Kg,skn,rbt LC50:142Mg/L,inh,rat

3. TYPICAL PHYSICAL & CHEMICAL PROPERTIES

Physical State: Liquid
Specific gravity: not available
Viscosity: 0.80 cSt at 20 deg C
Vapour Density: 3.2
Boiling Point: 25 to 210 deg C
Evaporation rate: > 10 (1= n-butylacetate)
Solubility in water: negligible
Freezing/Pour Point: -60 deg C less than
Odour Threshold: not available
Vapour Pressure: 76 kPa to 103 kPa at 38 deg C
Density: 0.73 g/cc at 15 deg C
Appearance/odour: Naturally occurring water white or pale yellow; may be dyed a variety of colours for tax or other purposes; petroleum odour.

4. HEALTH HAZARD INFORMATION

NATURE OF HAZARD

INHALATION:

High vapour concentrations are irritating to the eyes, nose, throat and lungs; may cause headache and dizziness; may be anesthetic and may cause other central nervous system effects.
Avoid breathing vapours or mists.

EYE CONTACT:

Slightly irritating, but will not injure eye tissue.

SKIN CONTACT:

Low toxicity.
Frequent or prolonged contact may irritate the skin and cause a skin rash (dermatitis).

INGESTION:

Low toxicity.
Small amounts of this liquid drawn into the lungs from swallowing or vomiting may cause severe health effects (e.g. bronchopneumonia or pulmonary edema).

CHRONIC:

The International Agency for Research on Cancer (IARC) has evaluated gasoline and found it to be a possible human carcinogen.
Contains benzene. Human health studies (epidemiology) indicate that prolonged and/or repeated overexposures to benzene may cause damage to the blood producing system and serious blood disorders, including leukemia.
Animal tests suggest that prolonged and/or repeated overexposures to benzene may damage the embryo/fetus. The relationship of these animal studies to humans has not been fully established.
Contains n-hexane. Prolonged and/or repeated exposures may cause damage to the peripheral nervous system (e.g. fingers, feet, arms etc.).

ACUTE TOXICITY DATA:

Based on animal testing data from similar materials and products, the acute toxicity of this product is expected to be:
Oral : LD50 > 18 ml/kg (Rat)
Dermal : LD50 > 5 ml/kg (Rabbit)

OCCUPATIONAL EXPOSURE LIMIT:

Manufacturer recommends:
For Benzene (skin) 1 ppm TWA for 8 hour workday.
For gasoline, 300 mg/m3.
For Methyl-tert-Butyl Ether, a 15 minute short-term exposure limit (STEL) of 50 ppm.

ACGIH recommends:
For Gasoline, ACGIH recommends a TWA of 300 ppm (890 mg/m3) and categorizes it as an animal carcinogen.
For n-Hexane, 50 ppm (180 mg/m3).
For Benzene, ACGIH recommends a TWA of 0.5 ppm (1.6 mg/m3), (skin), and categorizes it as a confirmed human carcinogen
For Methyl-tert-Butyl Ether, ACGIH recommends a TLV of 40 ppm (144 mg/m3 categorizes it as an animal carcinogen.

Local regulated limits may vary.

5. FIRST AID MEASURES

INHALATION:

In emergency situations use proper respiratory protection to immediately remove the affected victim from exposure. Administer artificial respiration if breathing has stopped. Keep at rest. Call for prompt medical attention.

EYE CONTACT:

Flush eyes with large amounts of water until irritation subsides. If irritation persists, get medical attention.

Please turn over

SKIN CONTACT:

Flush with large amounts of water. Use soap if available.
Remove severely contaminated clothing (including shoes) and launder before reuse.
If irritation persists, seek medical attention.

INGESTION:

DO NOT induce vomiting since it is important that no amount of the material should enter the lungs (aspiration). Keep at rest. Get prompt medical attention.

6. PREVENTIVE AND CORRECTIVE MEASURES

PERSONAL PROTECTION:

The selection of personal protective equipment varies, depending upon conditions of use.
In open systems where contact is likely, wear safety goggles, chemical-resistant overalls, and chemically impervious gloves.
Where only incidental contact is likely, wear safety glasses with side shields. No other special precautions are necessary provided skin/eye contact is avoided.
Where concentrations in air may exceed the occupational exposure limits given in Section 4 and where engineering, work practices or other means of exposure reduction are not adequate, approved respirators may be necessary to prevent overexposure by inhalation.

ENGINEERING CONTROLS:

The use of local exhaust ventilation is recommended to control emissions near the source. Laboratory samples should be handled in a fumehood. Provide mechanical ventilation of confined spaces.
Use explosion-proof ventilation equipment.

HANDLING, STORAGE AND SHIPPING:

Keep containers closed. Handle and open containers with care.
In keeping with good personal hygiene practices, wash hands thoroughly after handling the material.
Store and load at normal (up to 38 deg C) temperature and at atmospheric pressure.
Material will accumulate static charges which may cause a spark. Static charge build-up could become an ignition source. Use proper relaxation and grounding procedures.
For personnel entry into confined spaces (i.e. bulk storage tanks) a proper confined space entry procedure must be followed including ventilation and testing of tank atmosphere.
Empty containers may contain product residue. Do not pressurize cut, heat, or weld empty containers. Do not reuse empty containers without commercial cleaning or reconditioning.

LAND SPILL:

Eliminate source of ignition. Keep public away. Prevent additional discharge of material, if possible to do so without hazard.
Vapours or dust may be harmful or fatal. Warn occupants of downwind areas.
Prevent spills from entering sewers, watercourses or low areas. Contain spilled liquid with sand or earth. Do not use combustible materials such as sawdust.
Recover by pumping (use an explosion proof motor or hand pump), or by using a suitable absorbent.
Consult an expert on disposal of recovered material. Ensure disposal in compliance with government requirements and ensure conformity to local disposal regulations. Notify the appropriate authorities immediately.
Take all additional action necessary to prevent and remedy the adverse effects of the spill.

WATER SPILL:

Eliminate all sources of ignition. Vapours or dust may be harmful or fatal. Warn occupants and shipping in downwind areas.
Consult an expert on disposal of recovered material. Ensure disposal in compliance with government requirements and ensure conformity to local disposal regulations. Notify the appropriate authorities immediately.
Take all additional action necessary to prevent and remedy the adverse effects of the spill.

7. FIRE AND EXPLOSION HAZARD

Flashpoint and method: -40 deg C COC D92 less than/moins de

Autoignition: NA Flammable Limits: LEL: 1.4% UEL: 7.6%

GENERAL HAZARDS:

Extremely flammable; material will readily ignite at normal temperatures.
Flammable Liquid; may release vapours that form flammable mixtures at or above the flash point.
Toxic gases will form upon combustion.
Static Discharge; material may accumulate static charges which may cause a fire.

FIRE FIGHTING:

Use water spray to cool fire exposed surfaces and to protect personnel.
Shut off fuel to fire if possible to do so without hazard. If a leak or spill has not ignited use water spray to disperse the vapours.
Either allow fire to burn out under controlled conditions or extinguish with foam or dry chemical. Try to cover liquid spills with foam.
Respiratory and eye protection required for fire fighting personnel.
Avoid spraying water directly into storage containers due to danger of boilover.
A self-contained breathing apparatus (SCBA) should be used for all indoor fires and any significant outdoor fires. For small outdoor fires, which may easily be extinguished with a portable fire extinguisher, use of an SCBA may not be required.

HAZARDOUS COMBUSTION PRODUCTS:

Smoke, carbon monoxide, carbon dioxide under thermal decomposition.

8. REACTIVITY DATA

STABILITY:

This product is stable. Hazardous polymerization will not occur.

INCOMPATIBLE MATERIALS AND CONDITIONS TO AVOID:

Strong oxidizing agents

HAZARDOUS DECOMPOSITION:

none

9. NOTES

10. PREPARATION

Date Prepared : June 20, 1997
Prepared by: Lubricants & Specialties
IMPERIAL OIL
Products Division
111 St Clair Avenue West
Toronto, Ontario
M5W 1K3
(800) 268-3183

CANADA COLORS & CHEMICALS LTD
80 SCARSDALE ROAD
DON MILLS, ONTARIO, CANADA M3B 2R7
(416)-449-7750

PRODUCT : CAUSTIC SODA 50% ACS CODE: 297630

SECTION 01: CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MANUFACTURER.....PURITAN PRODUCTS INC
LE HIGH VALLEY INDUSTRIAL PARK
2290 AVENUE A
BETHLEHEM, PA ; 18017
PREPARED BY.....ENVIRONMENTAL & REGULATORY AFFAIRS DEPARTMENT
PREPARATION DATE.....MAY 15/2002
PRODUCT NAME.....CAUSTIC SODA 50% ACS
PRODUCT CODE.....297630
CHEMICAL FORMULA.....NAOH IN WATER
MOLECULAR WEIGHT.....40.0
CHEMICAL FAMILY.....N.AV.
EMERGENCY PHONE NO.....(416)-444-2112
MATERIAL USE.....REFER TO TECHNICAL LITERATURE

SECTION 02: COMPOSITION/INFORMATION ON INGREDIENTS

HAZARDOUS INGREDIENTS	EXPOSURE LEVELS	LD/50, ROUTE, SPECIES	LC/50, ROUTE, SPECIES
SODIUM HYDROXIDE % :30-60 CAS #:1310-73-2	2 MG/M3 CEV/VP	140-340 MG/KG (ORAL-RAT)	N.AV.

SECTION 03: HAZARDS IDENTIFICATION

ROUTE OF ENTRY:

SKIN CONTACT.....CORROSIVE. CONTACT WITH SKIN CAN CAUSE IRRITATION OR SEVERE BURNS AND SCARRING WITH GREATER EXPOSURES.

SKIN ABSORPTION.....N.AV.

EYE CONTACT.....CORROSIVE. CAUSES IRRITATION OF EYES, AND WITH GREATER EXPOSURES IT CAN CAUSE BURNS THAT MAY RESULT IN PERMANENT IMPAIRMENT OF VISION, EVEN BLINDNESS.

INHALATION.....SEVERE IRRITANT. EFFECTS FROM INHALATION OF MIST VARY FROM MILD IRRITATION TO SERIOUS DAMAGE OF THE UPPER RESPIRATORY TRACT, DEPENDING ON SEVERITY OF EXPOSURE. SYMPTOMS MAY INCLUDE SNEEZING, SORE THROAT OR RUNNY NOSE. SEVERE PNEUMONITIS MAY OCCUR.

INGESTION.....CORROSIVE. SWALLOWING MAY CUASE SEVERE BURNS OF MOUTH, THROAT AND STOMACH. SEVERE SCARRING OF TISSUE AND DEATH MAY RESULT. SYMPTOMS MAY INCLUDE BLEEDING, VOMTING, DIARRHEA, FALL IN BLOOD PRESSURE. DAMAGE MAY APPEAR DAYS AFTER EXPOSURE.

EFFECTS OF ACUTE EXPOSURE.....SEE ABOVE

EFFECTS OF CHRONIC EXPOSURE.....PROLONGED CONTACT WITH DILUTE SOLUTIONS OR DUST HAS A DESTRUCTIVE EFFECT UPON TISSUE.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE....PERSONS WITH PRE-EXISTING SKIN DISORDERS OR EYE PROBLEMS OR IMPAIRED RESPIRATORY FUNCTION MAY BE MORE SUSCEPTIBLE TO THE EFFECTS OF THE SUBSTANCE.

INHALATION, CHRONIC.....SEE ABOVE

SECTION 04: FIRST AID MEASURES

NOTES TO PHYSICIAN:.....PERFORM ENDOSCOPY IN ALL CASES OF SUSPECTED SODIUM HYDROXIDE INGESTION. IN CASES OF SEVERE ESOPHAGEAL CORROSION, THE USE OF THERAPEUTIC DOSES OF STERIODS SHOULD BE CONSIDERED. GENERAL SUPPORTIVE MEASURES WITH CONTINUAL MONITORING OF GAS EXCHANGE, ACID-BASE BALANCE, ELECTROLYTES, AND FLUID INTAKE ARE ALSO REQUIRED.

INSTRUCTIONS:.....INHALATION:.. REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN. CALL A PHYSICIAN. INGESTION:.. DO NOT INDUCE VOMITING. GIVE LARGE QUANTITIES OF WATER OR MILK. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. GET MEDICAL ATTENTION IMMEDIATELY. SKIN CONTACT:.. IMMEDIATELY FLUSH SKIN WITH WATER FOR AT LEAST 15 MINUTES. REMOVE CONTAMINATED CLOTHING AND SHOES. CALL A PHYSICIAN IMMEDIATELY. WASH CLOTHING BEFORE REUSE. EYE CONTACT:.. IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES, LIFTING LOWER AND UPPER EYELIDS OCCASIONALLY. GET MEDICAL ATTENTION AT ONCE.

SECTION 05: FIRE FIGHTING MEASURES

T.D.G. FLAM. CLASS

FLAMMABILITY

IF YES, UNDER WHICH CONDITIONS?.....NOT FLAMMABLE

EXTINGUISHING MEDIA.....SUITABLE FOR SURROUNDING FIRE. ADDING WATER TO CAUSTIC SOLUTION GENERATES LARGE AMOUNTS OF HEAT.

SPECIAL PROCEDURES.....NOT CONSIDERED TO BE A FIRE HAZARD. HOT OR MOLTEN MATERIAL CAN REACT VIOLENTLY WITH WATER. CAN REACT WITH CERTAIN METALS, SUCH AS ALUMINUM, TO GENERATE FLAMMABLE HYDROGEN GAS. WEAR FULL PROTECTIVE CLOTHING AND NIOSH-APPROVED SELF CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN THE PRESSURE DEMAND OR OTHER POSITIVE PRESSURE MODE.

FLASH POINT (C), METHOD.....N.AV.

AUTO IGNITION TEMPERATURE.....N.AV.

UPPER FLAMMABLE LIMIT (% BY VOL.).....N.AV.

LOWER FLAMMABLE LIMIT (% BY VOL.).....N.AV.

EXPLOSION DATA

EXPLOSIVE POWER.....MAY CAUSE FIRE AND EXPLOSIONS WHEN IN CONTACT WITH INCOMPATIBLE MATERIALS.

RATE OF BURNING

PRODUCT : CAUSTIC SODA 50% ACS CODE: 297630

SECTION 05: FIRE FIGHTING MEASURES

SENSITIVITY TO STATIC.....N.AV.
DISCHARGE
SENSITIVITY TO IMPACT.....N.AV.
HAZARDOUS COMBUSTION PRODUCTS....N.AV.

SECTION 06: ACCIDENTAL RELEASE MEASURES

SPILL/LEAK.....VENTILATE AREA OF LEAK OR SPILL. KEEP UNNECESSARY AND UNPROTECTED PEOPLE AWAY FROM AREA OF SPILL. WEAR APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT AS SPECIFIED. CONTAIN AND RECOVER LIQUID WHEN POSSIBLE. DO NOT FLUSH CAUSTIC RESIDUES TO THE SEWER. RESIDUES FROM SPILLS CAN BE DILUTED WITH WATER, NEUTRALIZED WITH DILUTE ACID SUCH AS ACETIC, HYDROCHLORIC OR SULFURIC. ABSORB NEUTRALIZED CAUSTIC RESIDUE ON CLAY, VERMICULITE OR OTHER INERT SUBSTANCE AND PACKAGE IN A SUITABLE CONTAINER FOR DISPOSAL.

SECTION 07: HANDLING AND STORAGE

HANDLING PROCEDURES AND EQUIPMENT.....ALWAYS ADD CAUSTIC SODA TO WATER WITH CONSTANT AGITATION. CONTAINERS OF THIS MATERIAL MAY BE HAZARDOUS WHEN EMPTIED. OBSERVE ALL WARNINGS AND PRECAUTIONS LISTED FOR THE PRODUCT.

STORAGE NEEDS.....KEEP THE CONTAINER TIGHTLY CLOSED WHEN NOT IN USE. PROTECT CONTAINERS FROM PHYSICAL DAMAGE. STORE IN A COOL, DRY AND WELL-VENTILATED AREA AWAY FROM INCOMPATIBLE MATERIALS. STORE AWAY FROM SOURCES OF HEAT AND MOISTURE. STORE ABOVE 16(C) RO PREVENT FREEZING. DO NOT STORE WITH ALUMINUM OR MAGNESIUM. DO NOT MIX WITH ACIDS OR ORGANIC MATERIALS.

SECTION 08: EXPOSURE CONTROLS/PERSONAL PROTECTION

GLOVES/ TYPE.....IMPERVIOUS GLOVES

RESPIRATORY/TYPE.....IF THE EXPOSURE LIMIT IS EXCEEDED, A HALF-FACE DUST/MIST RESPIRATOR MAY BE WORN FOR UP TO TEN TIMES THE EXPOSURE LIIT OF THE MAXIMUM USE CONCENTRATION SPECIFIED BY THE APPROPRIATE REGALATORY AGENCY OR RESPIRATOR SUPPLIER, WHICHEVER IS LOWEST. A FULL-FACE PIECE DUST/MIST RESPIRATOR MAY BE WORN UP TO 50 TIMES THE EXPOSURE LIMIT, OR THE MAXIMUM USE CONCENTRATION SPECIFIED. FOR EMERGENCIES OR INSTANCES WHERE THE EXPOSURE LEVELS ARE NOT KNOWN, USE A FULL-FACEPIEVE POSTIVE-PRESSURE, AIR-SUPPLIED RESPIRATOR. WARNING: AIR-PURIFYING RESPIRATORS DO NOT PROTECT WORKERS IN OXYGEN-DEFICIENT ATMOSPHERES.

EYE/TYPE.....CHEMICAL SAFETY GOGGLES AND/OR FULL FACE SHIELD TO PROTECT EYES AND FACE, IF PRODUCT IS HANLED SUCH THAT IT COULD BE SPLASHED INTO EYES.

FOOTWEAR/TYPE.....BOOTS

CLOTHING/TYPE.....IMPERVIOUS CLOTHING. LAB COAT. APRON SHOULD BE WORN TO PREVENT CONTACT WITH THE LIQUID. COVERALLS

PRODUCT : CAUSTIC SODA 50% ACS CODE: 297630

SECTION 08: EXPOSURE CONTROLS/PERSONAL PROTECTION

OTHER/TYPE.....EYE BATH AND SAFETY SHOWER.

ENGINEERING CONTROLS.....A SYSTEM OF LOCAL AND/OR GENERAL EXHAUST IS RECOMMENDED TO KEEP EMPLOYEE EXPOSURES AS LOW AS POSSIBLE. LOCAL EXHAUST VENTILATION IS GENERALLY PREFERRED BECAUSE IT CAN CONTROL THE EMISIONS OF THE CONTAMINANT AT ITS SOURCE, PREVENTING DISPERSION OF INTO THE GENERAL WORK AREA. PLEASE REFER TO THE ACGIH DOCUMENT, INDUSTRIAL VENTILATION, A MANUAL OF RECOMMENDED PRACTICES, MOST RECENT EDITION, FOR DETAILS.

SECTION 09: PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE.....CLEAR. COLOURLESS. LIQUID

ODOUR.....ODOURLESS

ODOUR THRESHOLD.....N.AV.

VAPOUR PRESSURE (MMHG).....13 @ 60(C) 50% SOLUTION

VAPOUR DENSITY (AIR=1).....1.53 50% SOLUTION

BY VOLUME

BY WEIGHT

EVAPORATION RATE.....N.AV.

BOILING POINT.....140(C) 50% SOLUTION

PH.....14

SPECIFIC GRAVITY (WATER=1).....1.53

SOLUBILITY IN WATER (% W/W).....COMPLETELY MISCIBLE

COEFFICIENT OF WATER/OIL DIST....N.AV.

SECTION 10: STABILITY AND REACTIVITY

CHEMICAL STABILITY:

YES.....STABLE UNDER NORMAL CONDITIONS OF HANDLING AND STORAGE.

NO, WHICH CONDITIONS?

COMPATABILITY WITH OTHER SUBSTANCES:

YES

NO, WHICH ONES?.....HEAT. MOISTURE. INCOMPATIBLE MATERIALS

REACTIVITY CONDITIONS?.....CONTACT WITH ACIDS AND ORGANIC HALOGEN COMPOUNDS, ESPECIALLY TRICHLOROETHYLENE , MAY CAUSE VIOLENT REACTIONS. CONTACT WITH NITROMETHANE AND OTHER SIMILAR NITRO COMPOUNDS CAUSES FORMATION OF SHOCK-SENSITIVE SALTS. CONTACT WITH METALS SUCH AS ALUMINUM, MAGNESIUM, TIN AND ZINC CAUSE FORMATION OF FLAMMABLE HYDROGEN GAS. REACTS READILY WITH VARIOUS SUGARS TO PRODUCE CARBON MONOXIDE. PRECAUTIONS SHOULD BE TAKEN INCLUDING MONITORING THE TANK ATMOSPHERE FOR CARBON MONOXIDE TO ENSURE SAFETY OF PERSONNEL BEFORE VESSEL ENTRY.

HAZARDOUS PRODUCTS OF DECOMPOSITION.....SODIUM OXIDE. DECOMPOSITION BY REACTION WITH CERTAIN METALS RELEASES FLAMMABLE AND EXPLOSIVE HYDROGEN GAS.

PRODUCT : CAUSTIC SODA 50% ACS CODE: 297630

SECTION 11: TOXICOLOGICAL INFORMATION

EXPOSURE LIMIT OF MATERIAL.....OSHA - PEL:. 2 MG/M3. CEILING. ACGIH (TLV):. 2 MG/M3. CEILING
LC 50 OF MATERIAL, SPECIES &.....SEE SECTION 02
ROUTE
LD 50 OF MATERIAL, SPECIES &.....SEE SECTION 02
ROUTE
CARCINOGENICITY OF MATERIAL.....NOT LISTED AS A CARCINOGEN.
REPRODUCTIVE EFFECTS.....N.AV.
IRRITANCY OF MATERIAL.....SKIN, RABBIT: 500MG/24II SEVERE; EYE, RABBIT: 50UG/24H SEVERE.
SENSITIZING CAPABILITY OF.....N.AV.
MATERIAL
SYNERGISTIC MATERIALS.....N.AV.

SECTION 12: ECOLOGICAL CONSIDERATIONS

ENVIRONMENTAL STATEMENT.....NO DATA AVAILABLE

SECTION 13: DISPOSAL CONSIDERATIONS

WASTE DISPOSAL.....DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, PROVINCIAL, AND LOCAL ENVIRONMENTAL REGULATIONS.

SECTION 14: TRANSPORT INFORMATION

TDG CLASSIFICATION.....8
UN NUMBER.....1824
PACKING GROUP.....II
SPECIAL SHIPPING INSTRUCTIONS....N.AP.

SECTION 15: REGULATORY INFORMATION

WHMIS CLASSIFICATION.....E
CPR COMPLIANCE.....THIS PRODUCT HAS BEEN CLASSIFIED IN ACCORDANCE WITH THE HAZARD CRITERIA OF THE CPR AND THE MSDS CONTAINS ALL THE INFORMATION REQUIRED BY THE CPR.

SECTION 16: OTHER INFORMATION

N.AP.=NOT APPLICABLE
N.AV.=NOT AVAILABLE

CANADA COLORS & CHEMICALS LTD
80 SCARSDALE ROAD
DON MILLS, ONTARIO, CANADA M3B 2R7
(416)-449-7750

PRODUCT : CARUS UPZ 985 CODE: 294623

SECTION 01: CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MANUFACTURER/SUPPLIER.....CARUS CORPORATION
1500 EIGHTH STREET
LASALLE, IL
USA ; 61301
PREPARED BY.....ENVIRONMENTAL & REGULATORY AFFAIRS DEPARTMENT
PREPARATION DATE.....MAY 22/2003
PRODUCT NAME.....CARUS UPZ 985
PRODUCT CODE.....294623
CHEMICAL FORMULA.....N.AV.
MOLECULAR WEIGHT.....MIXTURE
CHEMICAL FAMILY.....N.AV.
MATERIAL USE.....REFER TO TECHNICAL LITERATURE
EMERGENCY PHONE NO.....(416)-444-2112

SECTION 02: COMPOSITION/INFORMATION ON INGREDIENTS

HAZARDOUS INGREDIENTS/COMPOSITION	EXPOSURE LEVELS	LD/50, ROUTE, SPECIES	LC/50, ROUTE, SPECIES
ZINC PHOSPHATE % :10-30 CAS #:7779-90-0	---	SEE SECTION 11	SEE SECTION 11
PHOSPHORIC ACID % :10-30 CAS #:7664-38-2	1 MG/M3 (OSHA-PEL, ACGIH-TWA 1993-94)	SEE SECTION 11	SEE SECTION 11

SECTION 03: HAZARDS IDENTIFICATION

ROUTE OF ENTRY:
SKIN CONTACT.....MAY CAUSE REDNESS, PAIN, AND SEVERE SKIN IRRITATION.
SKIN ABSORPTION.....N.AV.
EYE CONTACT.....CORROSIVE. MAY CAUSE REDNESS, PAIN, BURNS AND PERMANENT EYE DAMAGE.
INHALATION.....MIST OR VAPOR INHALATION MAY CAUSE IRRITATION TO NOSE, THROAT AND UPPER RESPIRATORY TRACT. SEVERE EXPOSURES CAN LEAD TO CHEMICAL PNEUMONITIS.
INGESTION.....MAY CAUSE IRRITATION OR BURNING TO MOUTH AND THROAT.
EFFECTS OF ACUTE EXPOSURE.....SEE ABOVE
EFFECTS OF CHRONIC EXPOSURE.....NO SPECIFIC INFORMATION.
MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE....MAY AGGRAVATE PRE-EXISTING SKIN, EYE OR RESPIRATORY DISORDERS.
INHALATION, CHRONIC.....N.AV.

PRODUCT : CARUS UPZ 985 CODE: 294623

SECTION 04: FIRST AID MEASURES

INSTRUCTIONS:.....INGESTION:.. BURNING OF MOUTH AREA MAY BE REDUCED OR ELIMINATED THROUGH CONTINUED RINSING WITH WATER. DO NOT INDUCE VOMITING. DRINK LARGE QUANTITIES OF WATER. CONSULT A PHYSICIAN. SKIN: REMOVE CONTAMINATED CLOTHING. FLUSH EXPOSED AREA WITH WATER. RINSE THOROUGHLY. CONTACT A PHYSICIAN. INHALATION: REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. CONTACT PHYSICIAN. EYES:. FLUSH EYES WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. CONSULT PHYSICIAN.

SECTION 05: FIRE FIGHTING MEASURES

FLAMMABILITY.....NON-FLAMMABLE
IF YES, UNDER WHICH CONDITIONS?
EXTINGUISHING MEDIA.....DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR FOAM.
SPECIAL PROCEDURES.....NOT APPLICABLE.
UNUSUAL FIRE AND EXPLOSION HAZARDS.....NONE KNOWN
FLASH POINT (C), METHOD.....N.AV.
AUTO IGNITION TEMPERATURE.....N.AV.
UPPER FLAMMABLE LIMIT (% BY VOL.).....N.AV.
LOWER FLAMMABLE LIMIT (% BY VOL.).....N.AV.
EXPLOSION DATA
EXPLOSIVE POWER.....N.AV.
RATE OF BURNING.....N.AV.
SENSITIVITY TO STATIC DISCHARGE.....N.AV.
SENSITIVITY TO IMPACT.....N.AV.
HAZARDOUS COMBUSTION PRODUCTS....MAY LIBERATE OXIDES OF ZINC, PHOSPHORUS , OR SULFUR IF INVOLVED IN FIRE.

SECTION 06: ACCIDENTAL RELEASE MEASURES

LEAK/SPILL.....CONTAIN AND RECOVER SPILLS. NEUTRALIZE WITH ALKALINE MATERIAL SUCH AS SODA ASH, LIME AND THEN ABSORB WITH AN INERT MATERIAL SUCH AS VERMICULITE OR DRY SAND AND PLACE IT IN A CHEMICAL WASTE CONTAINER FOR PROPER DISPOSAL. DO NOT RETURN SPILLED MATERIAL TO THE ORIGINAL CONTAINER. DO NOT FLUSH TO SEWER. IF RELEASES TO ENVIRONMENT ARE IN REPORTABLE QUANTITIES, REPORT TO THE REQUIRED AGENCIES.

SECTION 07: HANDLING AND STORAGE

HANDLING PROCEDURES AND EQUIPMENT.....WEAR APPROPRIATE PERSONAL PROTECTION EQUIPMENT.

PRODUCT : CARUS UPZ 985 CODE: 294623

SECTION 07: HANDLING AND STORAGE

STORAGE NEEDS.....STORE IN COOL, DRY PLACE. DO NOT STORE IN METAL CONTAINERS. USE HDPE, RUBBER LINED METAL CONTAINERS OR 316 STAINLESS STEEL CONTAINERS DESIGNED FOR PHOSPHORIC ACID.

SECTION 08: EXPOSURE CONTROLS/PERSONAL PROTECTION

GLOVES/ TYPE.....CHEMICAL RESISTANT GLOVES
RESPIRATORY/TYPE.....APPROVED NIOSH/MSHA MIST RESPIRATOR.
EYE/TYPE.....CHEMICAL SAFETY GOGGLES
FOOTWEAR/TYPE.....N.AV.
CLOTHING/TYPE.....IMPERVIOUS APRON.
OTHER/TYPE.....EYEWASH FOUNTAIN. SAFETY SHOWER
ENGINEERING CONTROLS.....WELL VENTILATED AREA.

SECTION 09: PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE.....CLEAR LIQUID
ODOUR.....ODOURLESS
ODOUR THRESHOLD.....N.AV.
VAPOUR PRESSURE (MMHG).....N.AV.
VAPOUR DENSITY (AIR=1).....N.AV.
BY VOLUME
BY WEIGHT
EVAPORATION RATE.....N.AV.
BOILING POINT.....N.AV.
PH.....<2
SPECIFIC GRAVITY (WATER=1).....1.32
SOLUBILITY IN WATER (% W/W).....SOLUBLE IN ALL PROPORTIONS.
COEFFICIENT OF WATER/OIL DIST....N.AV.

SECTION 10: STABILITY AND REACTIVITY

CHEMICAL STABILITY:
YES.....STABLE
NO, WHICH CONDITIONS?.....N.AV.
COMPATABILITY WITH OTHER
SUBSTANCES:
YES
NO, WHICH ONES?.....ALUMINUM. ZINC. MILD STEEL. STRONG CAUSTIC SOLUTIONS.
REACTIVITY CONDITIONS?.....AVOID CONTACT WITH METAL. MAY FORM FLAMMABLE HYDROGEN GAS.
HAZARDOUS PRODUCTS OF.....MAY LIBERATE ZINC, SULFUR OR PHOSPHORUS OXIDES IF INVOLVED IN FIRE.

SECTION 11: TOXICOLOGICAL INFORMATION

EXPOSURE LIMIT OF MATERIAL.....SEE SECTION 02
LC 50 OF MATERIAL, SPECIES &.....N.AV.
ROUTE

PRODUCT : CARUS UPZ 985 CODE: 294623

SECTION 11: TOXICOLOGICAL INFORMATION

LD 50 OF MATERIAL, SPECIES &.....N.AV.
ROUTE
CARCINOGENICITY OF MATERIAL.....NOT LISTED BY NTP, IARC OR OSHA.
REPRODUCTIVE EFFECTS.....N.AV.
IRRITANCY OF MATERIAL.....SEE SECTION 03
SENSITIZING CAPABILITY OF.....N.AV.
MATERIAL
SYNERGISTIC MATERIALS.....N.AV.

SECTION 12: ECOLOGICAL CONSIDERATIONS

NO INFORMATION AVAILABLE.

SECTION 13: DISPOSAL CONSIDERATIONS

WASTE DISPOSAL.....DISPOSE OF IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, PROVINCIAL, AND LOCAL ENVIRONMENTAL REGULATIONS.

SECTION 14: TRANSPORT INFORMATION

UN NUMBER.....3264
TDG CLASSIFICATION.....8
PACKING GROUP.....III
SPECIAL SHIPPING INSTRUCTIONS....N.AV.

SECTION 15: REGULATORY INFORMATION

WHMIS CLASSIFICATION.....E
CPR COMPLIANCE.....THIS PRODUCT HAS BEEN CLASSIFIED IN ACCORDANCE WITH THE HAZARD CRITERIA OF THE CPR AND THE MSDS CONTAINS ALL THE INFORMATION REQUIRED BY THE CPR.

SECTION 16: OTHER INFORMATION

IARC.....INTERNATIONAL AGENCY FOR RESEARCH ON CANCER
N.AP.=NOT APPLICABLE
N.AV.=NOT AVAILABLE
NTP.....NATIONAL TOXICOLOGY PROGRAM
OSHA OSHA.....OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION

CANADA COLORS & CHEMICALS LTD
80 SCARSDALE ROAD
DON MILLS, ONTARIO, CANADA M3B 2R7
(416)-449-7750

PRODUCT : HYDRATED LIME CODE: 494812

SECTION 01: CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MANUFACTURER.....GRAYMONT
25,RUE DE LAUZON
BOUCHERVILLE, QUE
J4B 1E7
PREPARED BY.....ENVIRONMENTAL & REGULATORY AFFAIRS DEPARTMENT
PREPARATION DATE.....NOV 05/2002
PRODUCT NAME.....HYDRATED LIME
PRODUCT CODE.....494812
CHEMICAL FORMULA.....CA(OH)2
MOLECULAR WEIGHT.....74.08
CHEMICAL FAMILY.....N.AV.
MATERIAL USE.....VARIOUS. WATER TREATMENT. PULP AND PAPER
EMERGENCY PHONE NO.....(416)-444-2112

SECTION 02: COMPOSITION/INFORMATION ON INGREDIENTS

HAZARDOUS INGREDIENTS	EXPOSURE LEVELS	LD/50, ROUTE, SPECIES	LC/50, ROUTE, SPECIES
CALCIUM HYDROXIDE % :>92 CAS #:1305-62-0	5 MG/M3 TWA (ACGIH 1993-94)	7340 MG/KG (ORL-RAT)	N.AP.
CRYSTALLINE SILICA % :>0.1 CAS #:14808-60-7	1 MG/M3 ACGIH	N.AV.	N.AV.

SECTION 03: HAZARDS IDENTIFICATION

ROUTE OF ENTRY:
SKIN CONTACT.....MUCOUSE AND SKIN CORROSION, REMOVES NATURAL SKIN OILS.
SKIN ABSORPTION.....N.AV.
EYE CONTACT.....SEVERE EYE IRRITATION, INTENSE WATERING OF THE EYES, POSSIBLE LESIONS, POSSIBLE BLINDNESS WHEN EXPOSED FOR PROLONGED PERIOD.
INHALATION.....IF INHALED IN FORM OF DUST, IRRITATION OF BREATHING PASSAGES, COUGH.
INGESTION.....IF INGESTED, PAIN, VOMITING BLOOD, DIARRHEA, COLLAPSE, DROP IN BLOOD PRESSURE (INDICATES PERFORATION OF ESOPHAGUS OR STOMACH).
EFFECTS OF ACUTE EXPOSURE.....SEE ABOVE
EFFECTS OF CHRONIC EXPOSURE.....CONTACT DERMATITIS.
MEDICAL CONDITIONS AGGRAVATED....N.AV.
BY OVEREXPOSURE

CANADA COLORS & CHEMICALS LTD
80 SCARSDALE ROAD
DON MILLS, ONTARIO, CANADA M3B 2R7
(416)-449-7750

PRODUCT : HYDRATED LIME CODE: 494812

SECTION 01: CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MANUFACTURER.....GRAYMONT
25,RUE DE LAUZON
BOUCHERVILLE, QUE
J4B 1E7
PREPARED BY.....ENVIRONMENTAL & REGULATORY AFFAIRS DEPARTMENT
PREPARATION DATE.....NOV 05/2002
PRODUCT NAME.....HYDRATED LIME
PRODUCT CODE.....494812
CHEMICAL FORMULA.....CA(OH)2
MOLECULAR WEIGHT.....74.08
CHEMICAL FAMILY.....N.AV.
MATERIAL USE.....VARIOUS. WATER TREATMENT. PULP AND PAPER
EMERGENCY PHONE NO.....(416)-444-2112

SECTION 02: COMPOSITION/INFORMATION ON INGREDIENTS

HAZARDOUS INGREDIENTS	EXPOSURE LEVELS	LD/50, ROUTE, SPECIES	LC/50, ROUTE, SPECIES
CALCIUM HYDROXIDE % :>92 CAS #:1305-62-0	5 MG/M3 TWA (ACGIH 1993-94)	7340 MG/KG (ORL-RAT)	N.AP.
CRYSTALLINE SILICA % :>0.1 CAS #:14808-60-7	1 MG/M3 ACGIH	N.AV.	N.AV.

SECTION 03: HAZARDS IDENTIFICATION

ROUTE OF ENTRY:
SKIN CONTACT.....MUCOUSE AND SKIN CORROSION, REMOVES NATURAL SKIN OILS.
SKIN ABSORPTION.....N.AV.
EYE CONTACT.....SEVERE EYE IRRITATION, INTENSE WATERING OF THE EYES, POSSIBLE LESIONS, POSSIBLE BLINDNESS WHEN EXPOSED FOR PROLONGED PERIOD.
INHALATION.....IF INHALED IN FORM OF DUST, IRRITATION OF BREATHING PASSAGES, COUGH.
INGESTION.....IF INGESTED, PAIN, VOMITING BLOOD, DIARRHEA, COLLAPSE, DROP IN BLOOD PRESSURE (INDICATES PERFORATION OF ESOPHAGUS OR STOMACH).
EFFECTS OF ACUTE EXPOSURE.....SEE ABOVE
EFFECTS OF CHRONIC EXPOSURE.....CONTACT DERMATITIS.
MEDICAL CONDITIONS AGGRAVATED....N.AV.
BY OVEREXPOSURE

PRODUCT : HYDRATED LIME CODE: 494812

SECTION 04: FIRST AID MEASURES

GENERAL.....CONSULT A PHYSICIAN FOR ALL EXPOSURES EXCEPT MINOR INSTANCES OF INHALATION.

INSTRUCTIONS:.....SKIN:.. CARFULLY AND GENTLY BRUSH THE CONTAMINATED BODY SURFACES IN ORDER TO REMOVE ALL TRACES OF LIME. USE A BRUSH, CLOTH OR GLOVES. REMOVE ALL LIME-CONTAMINATED CLOTHING. RINSE CONTAMINATED AREA WITH LUKEWARM WATER FOR 15 TO 20 MINUTES. CONSULT A PHYSICIAN IF EXPOSED AREA IS LARGE OR IF IRRITATION PERSISTS. EYES:. IMMEDIATELY RINSE CONTAMINATED EYE(S) WITH GENTLY RUNNING LUKEWARM WATER FOR 15 TO 20 MINUTES. IN ALL CASES, IMMEDIATELY CONTACT A PHYSICIAN. INHALATION:.. MOVE SOURCE OF DUST OR MOVE VICTIM TO FRESH AIR. OBTAIN MEDICAL ATTENTION IMMEDIATELY. IF VICTIM DOES NOT BREATHE, GIVE ARTIFICAL RESPIRATION. INGESTION:.. IF VICTIM IS CONSCIOUS, GIVE 300ML (10OZ) OF WATER, FOLLOWED BY DILUTE VINEGAR (1 PART VINEGAR, 2 PARTS WATER) OR FRUIT JUICE TO NEUTRALIZE THE ALKALI. DO NOT INDUCE VOMITING. CONTACT A PHYSICIAN IMMEDIATELY.

SECTION 05: FIRE FIGHTING MEASURES

FLAMMABILITY.....NOT FLAMMABLE
IF YES, UNDER WHICH CONDITIONS?
EXTINGUISHING MEDIA.....USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.
SPECIAL PROCEDURES.....N.AP.
FLASH POINT (C), METHOD.....N.AP.
AUTO IGNITION TEMPERATURE.....N.AP.
UPPER FLAMMABLE LIMIT (% BY VOL.).....N.AP.
LOWER FLAMMABLE LIMIT (% BY VOL.).....N.AP.
EXPLOSION DATA
- EXPLOSIVE POWER.....N.AV.
- RATE OF BURNING.....N.AV.

SENSITIVITY TO STATIC DISCHARGE.....N.AP.
- SENSITIVITY TO IMPACT.....N.AP.

UNUSUAL FIRE AND EXPLOSION HAZARDS.....NONE
HAZARDOUS COMBUSTION PRODUCTS.....N.AP.

SECTION 06: ACCIDENTAL RELEASE MEASURES

LEAK/SPILL.....LIMIT ACCESS TO TRAINED PERSONNEL. USE INDUSTRIAL VACCUMS FOR LARGE SPILLS. VENTILATE AREA.

PRODUCT : HYDRATED LIME CODE: 494812

SECTION 07: HANDLING AND STORAGE

HANDLING PROCEDURES AND EQUIPMENT.....AVOID SKIN AND EYE CONTACT. MINIMIZE DUST GENERATION. WEAR PROTECTIVE GOGGLES AND IN CASES OF INSUFFICIENT VENTILATION, USE ANTI-DUST MASK. AN EYE WASH STATION AND SAFETY SHOWER SHOULD BE READILY AVAILABLE WHERE THIS MATERIAL OR ITS WATER DISPERSIONS ARE USED.

STORAGE NEEDS.....KEEP TIGHTLY CLOSED CONTAINERS IN A COOL, DRY AND WELL-VENTILATED AREA, AWAY FROM ACIDS. KEEP OUT OF REACH OF CHILDREN.

SECTION 08: EXPOSURE CONTROLS/PERSONAL PROTECTION

GLOVES/ TYPE.....GAUNTLETS CUFF STYLE.

RESPIRATORY/TYPE.....NIOSH APPROVED FILTERING ANTI-DUST MASK.

EYE/TYPE.....TIGHT FITTING GOGGLES

FOOTWEAR/TYPE.....RESISTANT TO CAUSTICS.

CLOTHING/TYPE.....FULLY COVERING SKIN.

OTHER/TYPE.....WEAR CLEAN, DRY GLOVES, FULL LENGTH PANTS OVER BOOTS, LONG SLEEVED SHIRTS BUTTONED AT THE NECK, HEAD PROTECTION AND APPROVED EYE PROTECTION SELECTED FOR THE WORKING CONDITIONS. EVALUATE DEGREE OF EXPOSURE AND USE PPE IF NECESSARY. AFTER HANDLING LIME, EMPLOYEES MUST SHOWER. IF EXPOSED DAILY, USE OIL VASELINE, SILICONE BASED CREME ETC. TO PROTECT EXPOSED SKIN PARTICULARLY NECK, FACE AND WRISTS.

ENGINEERING CONTROLS.....ENCLOSE DUST SOURCES; USE EXHAUST VENTILATION (DUST COLLECTOR) AT HANDLING POINTS, KEEP LEVELS BELOW MAX. CONCENTRATION PERMITTED.

SECTION 09: PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE.....SOLID. FINE WHITE POWDER

ODOUR.....NO ODOUR

ODOUR THRESHOLD.....N.AP.

VAPOUR PRESSURE (MMHG).....N.AP.

VAPOUR DENSITY (AIR=1).....N.AP.

EVAPORATION RATE.....N.AP.

BOILING POINT.....N.AP.

PH.....SATURATED SOLUTION. Ca(OH)2. @ 25(C). 12.45

DENSITY.....320-690 KG/M3

SPECIFIC GRAVITY (WATER=1).....2.3-2.4

SOLUBILITY IN WATER (% W/W).....0.165G/100G @20C

COEFFICIENT OF WATER/OIL DIST....N.AP.

SECTION 10: STABILITY AND REACTIVITY

CHEMICAL STABILITY:

YES

NO, WHICH CONDITIONS?.....ABSORBS CARBON DIOXIDE IN THE AIR TO FORM CALCIUM CARBONATE.

COMPATABILITY WITH OTHER SUBSTANCES:

PRODUCT : HYDRATED LIME CODE: 494812

SECTION 10: STABILITY AND REACTIVITY

YES
NO, WHICH ONES?.....BORON TRIFLUORIDE. CHLORINE TRIFLOURIDE. ETHANOL. FLUORINE. HYDROGEN FLUORIDE. PHOSPHOROUS PENTOXIDE. ACIDS. VIOLENT REACTION WITH GENERATING HEAT AND POSSIBLE EXPLOSION IN CONFINED AREA.

REACTIVITY CONDITIONS?.....REACTS VIOLENTLY WITH STRONG ACIDS. REACTS CHEMICALLY WITH ACIDS AND MANY OTHER COMPOUNDS AND CHEMICAL ELEMENTS TO FORM CALCIUM BASED COMPOUNDS. EXPLOSIVE WHEN MIXED WITH NITRO ORGANIC COMPOUNDS.

HAZARDOUS PRODUCTS OF DECOMPOSITION.....THERMAL DECOMPOSITION AT 540 C WILL PRODUCE CALCIUM OXIDE AND WATER.

HAZARDOUS POLYMERIZATION.....WILL NOT OCCUR

SECTION 11: TOXICOLOGICAL INFORMATION

EXPOSURE LIMIT OF MATERIAL

LC 50 OF MATERIAL, SPECIES & ROUTE.....N.AV.

LD 50 OF MATERIAL, SPECIES & ROUTE.....7340 MG/KG. (ORAL-RAT)

CARCINOGENICITY OF MATERIAL.....CALCIUM HYDROXIDE IS NOT LISTED ON THE MSHA, OSHA OR IARC LISTS OF CARCINOGENS . HOWEVER, HYDRATED LIME COULD CONTAIN CRYSTALLINE SILICA, WHICH INHALED IN THE FORM OF QUARTZ OR CRYSTOBALITE FROM OCCUPATIONAL SOURCES, IS CLASSIFIED BY IARC AS (GROUP 1) CARCINOGENIC TO HUMANS.

REPRODUCTIVE EFFECTS.....N.AV.

IRRITANCY OF MATERIAL.....SEVERE TO MOIST TISSUES. EYE-RABBIT- 10MG/24HR- SEVERE.

SENSITIZING CAPABILITY OF MATERIAL.....N.AV.

SYNERGISTIC MATERIALS.....N.AV.

SECTION 12: ECOLOGICAL CONSIDERATIONS

NO DATA AVAILABLE.

SECTION 13: DISPOSAL CONSIDERATIONS

WASTE DISPOSAL.....IN ACCORDANCE WITH MUNICIPAL, PROVINCIAL AND FEDERAL REGULATIONS.

SECTION 14: TRANSPORT INFORMATION

UN NUMBER.....N.AP.

TDG CLASSIFICATION.....NOT REGULATED

PACKING GROUP.....N.AP.

SPECIAL SHIPPING INSTRUCTIONS....N.AP.

PRODUCT : HYDRATED LIME CODE: 494812

SECTION 15: REGULATORY INFORMATION

WHMIS CLASSIFICATION.....E. D2A
CPR COMPLIANCE.....THIS PRODUCT HAS BEEN CLASSIFIED IN ACCORDANCE WITH THE HAZARD CRITERIA OF THE CPR AND THE MSDS CONTAINS ALL THE INFORMATION REQUIRED BY THE CPR.

SECTION 16: OTHER INFORMATION

N.AV.=NOT AVAILABLE
N.AP.=NOT APPLICABLE

CANADA COLORS & CHEMICALS LTD
80 SCARSDALE ROAD
DON MILLS, ONTARIO, CANADA M3B 2R7
(416)-449-7750

PRODUCT : HYDROFLUOSILICIC ACID 25% CODE: 496000

SECTION 01: CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MANUFACTURER/SUPPLIER.....SULCO CHEMICALS LTD.
60 FIRST STREET EAST
ELMIRA, ONTARIO
N3B 2Z5
PREPARED BY.....ENVIRONMENTAL & REGULATORY AFFAIRS DEPARTMENT
PREPARATION DATE.....OCT 06/2003
PRODUCT NAME.....HYDROFLUOSILICIC ACID 25%
PRODUCT CODE.....496000
CHEMICAL FAMILY.....INORGANIC ACID
MATERIAL USE.....N.AV.
EMERGENCY PHONE NO.....(519)-669-5166

SECTION 02: COMPOSITION/INFORMATION ON INGREDIENTS

HAZARDOUS INGREDIENTS/COMPOSITION	EXPOSURE LEVELS	LD/50, ROUTE, SPECIES	LC/50, ROUTE, SPECIES
SILICATE (2-) HEXAFLUORO-, DIHYDROGEN % :23 CAS #:16961-83-4	SEE/VOIR SECTION 11	SEE SECTION 11	SEE SECTION 11

SECTION 03: HAZARDS IDENTIFICATION

ROUTE OF ENTRY:
SKIN CONTACT.....SEE BELOW
SKIN ABSORPTION.....N.AV.
EYE CONTACT.....SEE BELOW
INHALATION.....SEE BELOW
INGESTION.....SEE BELOW
EFFECTS OF ACUTE EXPOSURE.....MAY CAUSE IRRITATION OR BURNS IN ALL PARTS OF THE BODY, INCLUDING THE SKIN, EYES, THROAT, LUNGS, MOUTH, AND INTESTINAL TRACT. EXPOSURES HIGHER THAN THE RECOMMENDED LIMITS OVER LONG PERIODS OF TIME MAY CAUSE CHRONIC IRRITATION OF THE NOSE, THROAT AND BRONCHIAL PASSAGES. MAY CAUSE BONE CHANGESE (FLUOROSIS) OR CALCIUM METABOLISM DISORDERS.
EFFECTS OF CHRONIC EXPOSURE.....SEE ABOVE

SECTION 04: FIRST AID MEASURES

PRODUCT : HYDROFLUOSILICIC ACID 25% CODE: 496000

SECTION 16: OTHER INFORMATION

N.AP.=NOT APPLICABLE

PRODUCT : HYDROFLUOSILICIC ACID 25% CODE: 496000

SECTION 10: STABILITY AND REACTIVITY

NO, WHICH ONES?.....STRONG ALKALIES. METALS. GLASS. STONEWARE. STRONG CONCENTRATED ACIDS SUCH AS SULFURIC AND PERCHLORIC ACIDS.
REACTIVITY CONDITIONS?.....SEE ABOVE
HAZARDOUS PRODUCTS OF DECOMPOSITION.....AT TEMPERATURES ABOVE 108.3/ 227 F, MAY PRODUCE TOXIC, IRRITATING AND CORROSIVE GASES INCLUDING SIF6 AND HF.

SECTION 11: TOXICOLOGICAL INFORMATION

EXPOSURE LIMIT OF MATERIAL.....TWA = 2.5 MG/M3 (AS F). OSHA PEL: TWA = 2.5 MG/M3 (AS F)
ADDITIONAL INFORMATION.....MAXIMUM USE LEVEL FOR POTABLE WATER TREATMENT IS 6.0 MG/L
ACUTE TOXICITY:.....LDLO (SKIN-FROG) = 140 MG/KG
CARCINOGENICITY OF MATERIAL.....NOT LISTED BY IARC, NTP
REPRODUCTIVE EFFECTS.....N.AV.
IRRITANCY OF MATERIAL.....SEE SECTION 03
SENSITIZING CAPABILITY OF MATERIAL.....N.AV.
SYNERGISTIC MATERIALS.....N.AV.

SECTION 12: ECOLOGICAL CONSIDERATIONS

NO INFORMATION AVAILABLE.

SECTION 13: DISPOSAL CONSIDERATIONS

WASTE DISPOSAL.....DISPOSE OF IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, PROVINCIAL, AND LOCAL ENVIRONMENTAL REGULATIONS.

SECTION 14: TRANSPORT INFORMATION

UN NUMBER.....1778
TDG CLASSIFICATION.....8
PACKING GROUP.....II
SPECIAL SHIPPING INSTRUCTIONS....N.AP.

SECTION 15: REGULATORY INFORMATION

WHMIS CLASSIFICATION.....E
CPR COMPLIANCE.....THIS PRODUCT HAS BEEN CLASSIFIED IN ACCORDANCE WITH THE HAZARD CRITERIA OF THE CPR AND THE MSDS CONTAINS ALL THE INFORMATION REQUIRED BY THE CPR.

SECTION 16: OTHER INFORMATION

IARC.....INTERNATIONAL AGENCY FOR RESEARCH ON CANCER
NTP.....NATIONAL TOXICOLOGY PROGRAM
N.AV.=NOT AVAILABLE

PRODUCT : HYDROFLUOSILICIC ACID 25% CODE: 496000

SECTION 07: HANDLING AND STORAGE

HANDLING PROCEDURES AND EQUIPMENT.....MAINTAIN ADEQUATE VENTILATION. TRAIN WORKERS IN SAFE HANDLING. WASH THOROUGHLY AFTER WORKING WITH HYDROFLUOSILICIC ACID, ESPECIALLY AROUND THE FINGERNAILS. CHEMICAL SAFETY GOGGLES SHOULD BE WORN WHENEVER WORKING NEAR STORAGE TANKS OR VESSELS.

STORAGE NEEDS.....STORE IN PLASTIC CONTAINERS AWAY FROM HEAT. DO NOT USE METAL, GLASS, OR STONEWARE. SECONDARY CONTAINMENT SHOULD BE PROVIDED TO MINIMIZE ENVIRONMENTAL CONTAMINATION IN THE EVENT OF A LEAK, SPILL, OR OTHER RELEASE.

SECTION 08: EXPOSURE CONTROLS/PERSONAL PROTECTION

GLOVES/ TYPE.....RUBBER OR NEOPRENE

RESPIRATORY/TYPE.....FOR CONCENTRATIONS UP TO 20 PPM OF VAPOR (AS F), A CHEMICAL CARTRIDGE RESPIRATOR PROVIDING PROTECTION AGAINST FLUORIDE GASES MAY BE USED. ABOVE 20 PPM, A SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE SHOULD BE USED, OPERATED IN A POSITIVE PRESSURE DEMAND MODE.

EYE/TYPE.....CHEMICAL SAFETY GOGGLES AND FACE SHIELD.

FOOTWEAR/TYPE.....SEE BELOW

CLOTHING/TYPE.....ACID SUITS, INCLUDING BOOTS

OTHER/TYPE.....EYE-WASH; SAFETY SHOWER. PROTECTIVE EQUIPMENT SHOULD BE CLEANED THOROUGHLY AFTER EACH USE. DO NOT TOUCH EQUIPMENT AFTER USE UNTIL IT HAS BEEN NEUTRALIZED.

ENGINEERING CONTROLS.....LOCAL EXHAUST RECOMMENDED TO REDUCE EXPOSURE TO VAPORS TO LESS THAN 3 PPM AS FLUORIDE.

SECTION 09: PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE.....COLOURLESS. LIQUID

ODOUR.....SOUR PENETRATING ODOR.

ODOUR THRESHOLD.....N.AV.

VAPOUR PRESSURE (MMHG).....24 @ 25 (C)

VAPOUR DENSITY (AIR=1).....N.AP.

EVAPORATION RATE.....(BUTYL ACETATE=1). 1.0

BOILING POINT.....108.3 C/227 F (DECOMPOSES)

PH.....N.AV.

SPECIFIC GRAVITY (WATER=1).....1.23 @ 15.6 C

SOLUBILITY IN WATER (% W/W).....COMPLETELY SOLUBLE.

COEFFICIENT OF WATER/OIL DIST....N.AV.

SECTION 10: STABILITY AND REACTIVITY

CHEMICAL STABILITY:

YES.....STABLE

NO, WHICH CONDITIONS?.....HEATING INCREASES VAPOR PRESSURE.

COMPATABILITY WITH OTHER SUBSTANCES:

YES

PRODUCT : HYDROFLUOSILICIC ACID 25% CODE: 496000

SECTION 04: FIRST AID MEASURES

INSTRUCTIONS:.....EYE CONTACT:.. FLUSH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER FOR AT LEAST 15 MINUTES, HOLDING LIDS APART TO ENSURE COMPLETE IRRIGATION OF THE EYE. GET IMMEDIATE MEDICAL ATTENTION. SKIN CONTACT:.. IMMEDIATELY WASH TWICE WITH SOAP AND WATER. REMOVE AND MACHINE WASH CONTAMINATED CLOTHING. GET MEDICAL ATTENTION IF PAIN PERSISTS AFTER AFFECTED AREA IS WASHED. INHALATION: REMOVE TO FRESH AIR. GET MEDICAL ATTENTION IF DISCOMFORT PERSISTS. INGESTION: DO NOT INDUCE VOMITING. IF CONSCIOUS, GIVE LARGE AMOUNTS OF WATER OR MILK WITH MILK OF MAGNESIA. GET IMMEDIATE MEDICAL ATTENTION.

SECTION 05: FIRE FIGHTING MEASURES

FLAMMABILITY.....NOT FLAMMABLE
IF YES, UNDER WHICH CONDITIONS?
EXTINGUISHING MEDIA.....WATER, DRY CHEMICALS, AND CO2 CAN BE USED ON FIRES IN WHICH IT IS INVOLVED.
SPECIAL PROCEDURES.....WEAR NIOSH/MSHA APPROVED POSITIVE PRESSURE SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING. COOL CONTAINERS WITH WATER USING FOG NOZZLE.
UNUSUAL FIRE AND EXPLOSION HAZARDS.....REACTS WITH MANY METALS TO PRODUCE FLAMMABLE AND EXPLOSIVE HYDROGEN. DECOMPOSITION OCCURS ABOVE 108 C/227 F TO PRODUCE TOXIC, IRRITATING AND CORROSIVE GASES INCLUDING SIF6 AND HF.
FLASH POINT (C), METHOD.....N.AP.
AUTO IGNITION TEMPERATURE.....N.AV.
UPPER FLAMMABLE LIMIT (% BY VOL.).....N.AP.
LOWER FLAMMABLE LIMIT (% BY VOL.).....N.AP.
EXPLOSION DATA
EXPLOSIVE POWER.....N.AV.
RATE OF BURNING.....N.AV.
SENSITIVITY TO STATIC DISCHARGE.....N.AV.
SENSITIVITY TO IMPACT.....N.AV.
HAZARDOUS COMBUSTION PRODUCTS....AT TEMPERATURES ABOVE 108 C/227 F, MAY PRODUCE TOXIC, IRRITATING AND CORROSIVE GASES INCLUDING SIF6 AND HF.

SECTION 06: ACCIDENTAL RELEASE MEASURES

LEAK/SPILL.....RESTRICT ACCESS TO AREA UNTIL COMPLETION OF CLEANUP. USE ACID SUITS AND ACID-RESISTANT FOOTWEAR. DIKE TO CONTAIN MATERIAL. COLLECT AS MUCH OF THE SPILLED MATERIAL AS POSSIBLE IN ACID RESISTANT CONTAINERS FOR POSSIBLE REUSE. ABSORB THE REMAINING MATERIAL WITH SAND, VERMICULITE OR OTHER ABSORBENT MATERIAL, OR NEUTRALIZE WITH SODA ASH, SODIUM BICARBONATE, LIMESTONE OR LIME, UNTIL ACIDITY IS NEUTRALIZED.

Brenntag Canada Inc.

BRENNTAG

MATERIAL SAFETY DATA SHEET

CHLORINE, LIQUEFIED GAS

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Brenntag Canada Inc.
43 Jutland Road.
Toronto, Ontario
M8Z 2G6
(416) 259-8231

WHMIS Number: 00010002
Index: GCD0016/04A
Effective Date: 2002 February 05
Date of Revision: 2004 March 08
Website: http://www.brenntag.ca

EMERGENCY TELEPHONE NUMBERS

Toronto, ON (416) 226-6117	Montreal, QC (514) 861-1211	Winnipeg, MB (204) 943-8827
Edmonton, AB (780) 424-1754	Calgary, AB (403) 263-8660	Vancouver, BC (604) 685-5036

PRODUCT IDENTIFICATION

Product Name: Chlorine, Liquefied Gas.
Chemical Name: Chlorine.
Synonyms: Not available.
Chemical Family: Halogen.
Molecular Formula: Cl2.
Product Use: Bacteriacide in water treatment. Chemical intermediate.
CAS #: 7782-50-5.
WHMIS Classification / Symbol: A: Compressed Gas, C: Oxidizer, D-1A: Very Toxic (acute effects), D-2A: Very Toxic (Chronic Effects), E: Corrosive.

READ THE ENTIRE MSDS FOR THE COMPLETE HAZARD EVALUATION OF THIS PRODUCT. Consult Product Technical Literature.

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: Corrosive! May be fatal if inhaled. Causes severe skin and eye burns. Gas is extremely irritating to eyes and respiratory tract. Strong, offensive odor. Strong oxidizer. Contact with other combustible material can cause fire. Liquefied compressed gas. Contents under pressure. Ruptured containers may rocket.

POTENTIAL HEALTH EFFECTS

. Inhalation: Corrosive! Product may cause severe irritation of the nose, throat and respiratory tract. Repeated and/or prolonged exposures may cause productive cough, running nose, bronchopneumonia, pulmonary oedema (fluid build-up in lungs), and reduction of pulmonary function. Toxic effects may be delayed. See "Other Health Effects" Section.

. Skin Contact: Corrosive! Chlorine vapours may cause burning and prickling sensations, reddening and blisters. Direct contact with liquid causes severe local irritation, blistering and burns. Avoid handling when the skin is moist, wet or abraided. Burns (chemical) can occur if not promptly removed. See "Other Health Effects" Section.

INTERNATIONAL: The following component or components of this product appear on the European Inventory of Existing Commercial Chemical Substances: Chlorine.

16. OTHER INFORMATION

ADDITIONAL INFORMATION AND SOURCES USED

1. RTECS-Registry of Toxic Effects of Chemical Substances, Canadian Centre for Occupational Health and Safety RTECS database.
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 Sheet(s).
4. "CHEMINFO", through "CCINFOdisc", Canadian Centre for Occupational Health and Safety, Hamilton, Ontario, Canada.
5. Guide to Occupational Exposure Values, 2002, American Conference of Governmental Industrial Hygienists, Cincinnati, 2002.
6. The British Columbia Drug and Poison Information Centre, Poison Managements Manual, Canadian Pharmaceutical Association, Ottawa, 1981.

To obtain revised copies of this or other Material Safety Data Sheets, contact your nearest Brenntag Canada Regional office.

British Columbia: 20333-102B Avenue, Langley, BC, V1M 3H1
Phone: (604) 513-9009 Facsimile: (604) 513-9010

Alberta: 6628 - 45 th. Street, Leduc, AB, T9E 7C9
Phone: (780) 986-4544 Facsimile: (780) 986-1070

Manitoba: 681 Plinguet Street, Winnipeg, MB, R2J 2X2
Phone: (204) 233-3416 Facsimile: (204) 233-7005

Ontario: 43 Jutland Road, Toronto, ON, M8Z 2G6
Phone: (416) 259-8231 Facsimile: (416) 259-6175

Quebec: 2900 Jean Baptiste Des., Lachine, PQ, H8T 1C8
Phone: (514) 636-9230 Facsimile: (514) 636-0877

Atlantic: A-105 Akerley Boulevard, Dartmouth, NS, B3B 1R7
Phone: (902) 468-9690 Facsimile: (902) 468-3085

Prepared By: Regulatory Affairs Group, Brenntag Canada Inc., (416) 259-8231.

irrigation water supplies, lakes, streams, ponds or rivers.

13. DISPOSAL CONSIDERATIONS

Deactivating Chemicals: Chlorine gas will disperse to the atmosphere leaving no residue. Gaseous material can be absorbed in alkaline solutions of Caustic Soda, Soda Ash or Hydrated Lime. When absorbing Chlorine in alkaline solutions, the reaction is exothermic. Ensure the absorption is controlled as to heat and reaction. (3)

Since hypochlorites are formed, solutions must be treated with reducing agents such as sodium sulphite before disposal. Do not immerse container in caustic solution. Liquid and/or solid residues from neutralization must be disposed of in a permitted waste management facility. (3)

Hypochlorites: Carefully neutralize by adding hydrogen peroxide: one US pint of 35 % hydrogen peroxide solution per pound of hypochlorite to be neutralized. Dilute the neutralized residue with water. (3)

Waste Disposal Methods: This information applies to the material as manufactured. Reevaluation of the product may be required by the user at the time of disposal since the product uses, transformations, mixtures and processes may influence waste classification. Dispose of waste material at an approved (hazardous) waste treatment/disposal facility in accordance with applicable local, provincial and federal regulations. Do not dispose of waste with normal garbage, or to sewer systems.

Safe Handling of Residues: See "Waste Disposal Methods".

Disposal of Packaging: Empty containers retain product residue (liquid and/or vapour) and can be dangerous. See above, "Deactivating Chemicals". Do not expose such containers to heat, flame, sparks, static electricity, or other sources of ignition; they may explode and cause injury or death. Return empty containers.

14. TRANSPORTATION INFORMATION

CANADIAN TDG ACT SHIPPING DESCRIPTION:
Chlorine, Class 2.3(8), UN1017.
Label(s)/Placard(s): Poison Gas, Corrosive.
ERAP Index: 500 Kg or L. Exemptions: Not available. Marine: P (Marine Pollutant).

US DOT CLASSIFICATION (49CFR 172.101, 172.102):
Chlorine, Class 2.3, UN1017.
Label(s)/Placard(s): Poison Gas, Corrosive.
Reportable Quantity (CERCLA-RQ): 10 lb / 4.54 Kg. Exemptions: Not applicable.
Special Documentation Addition: (i) Toxic Inhalation Hazard. (ii) Hazard Zone B.
Marine: P (Marine Pollutant).

IMO: Marine Pollutant: Chlorine.

15. REGULATORY INFORMATION

CANADA
CEPA - NSNR: This material is included on the DSL under the CEPA.
CEPA - NPRI: This material is on the NPRI list of substances.
Controlled Products Regulations Classification (WHMIS): A: Compressed Gas, C: Oxidizer, D-1A: Very Toxic (acute effects), D-2A: Very Toxic (Chronic Effects), E: Corrosive.

USA
Environmental Protection Act: This material is included on the TSCA Inventory.
OSHA Hazard Communication (29CFR 1910.1200) Classification: Compressed Gas, Oxidizer, Highly Toxic, Chronic Effects, Corrosive.

HMIS: 3 Health, 0 Fire, 0 Reactivity. (3)
NFPA: 4 Health, 0 Fire, 0 Reactivity. (3)

Toxicological Data:

Chlorine	LC50 (Inhal'n, Rat, 4h)	= 147 ppm (1)
	LC50 (Inhal'n, Mouse, 4h)	= 69 ppm (1)

Carcinogenicity Data: The ingredient(s) of this product is (are) not classed as carcinogenic by ACGIH, IARC, OSHA or NTP. See "Other Studies Relevant to Material".
Reproductive Data: No adverse reproductive effects are anticipated.
Mutagenicity Data: No adverse mutagenic effects are anticipated.
Teratogenicity Data: No adverse teratogenic effects are anticipated.
Respiratory / Skin Sensitization Data: None known.

Synergistic Materials: Mortality in Chlorine-Nickel test groups for rainbow trout was found to be higher than that of either nickel or chlorine alone. The relevance to humans is not known. Incidences of respiratory sensitization in platinum refinery workers increased following a spill of chlorine. (3)

Other Studies Relevant to Material: Effects in rats during acute inhalation exposure to Chlorine were primarily attributed to its severe irritant effects. Repeated inhalation of Chlorine (1, 3 or 9 ppm for 6 weeks) by rats resulted in respiratory irritation, reduced body weight gain, organ weight changes, increased white blood cells, some animal deaths and changes in liver, kidney, spleen, thymus and gastric mucosa. Longer term (1 year) inhalation of Chlorine (0.1, 0.5 or 2.3 ppm) by monkeys resulted in eye and upper respiratory tract irritation. Effects observed in rabbits following repeated inhalation (up to 9 months) were weight loss, nasal irritation, sneezing and laboured respiration. Life-time inhalation of Chlorine (up to 2.5 ppm) produced nasal cell injury in rats and mice. No effects were observed in guinea pigs after repeated inhalation (87 days) or in mice after drinking chlorinated water (33 or 55 days).

Repeated exposure of rats to 30 ppm Chlorine in their drinking water resulted in reduced spleen weights and immunological effects. Long term (2 years) administration of Chlorine in drinking water (70, 140 or 275 ppm) resulted in an increase in leukemia in female rats at 140 ppm only. No adverse effects on fertility, life span, growth pattern, hematology or histology were seen in rats given chlorinated water (100 mg Chlorine / Litre daily) throughout the entire lifespan for 7 consecutive generations. No birth defects were observed in mice after drinking chlorinated drinking water during pregnancy. Chlorine produced no genetic changes in standard tests using animals. A positive response was observed in a test using human cells, while mixed responses have been reported in a variet of tests using bacterial cells or animal cells. (3)

12. ECOLOGICAL INFORMATION

Ecotoxicity: Highly toxic to aquatic life.

Fish toxicity:	critical concentration =	0.3 mg/L
Aesthetic:	critical concentration =	0.5 mg/L
Plant:	critical concentration =	100 mg/L

72-HR LC50 = 0.5 mg/L, Daphnia Magna
96-HR LC50 = 0.02 mg/L, Daphnia Magna
96-HR LC50 = 0.08 to 0.18 mg/L, Brook Trout
96-HR LC50 = 0.07 mg/L, Channel Catfish Fingerlings
96-HR LC50 = 0.44 to 2.32 mg/L, Bluegill Sunfish
96-HR LC50 = 1.6 mg/L, Redsid Shiner
96-HR LC50 = 0.70 mg/L, Blackside Dance

Exposure of Sand-dollar sperm to 0.002 mg/L for 5 minutes resulted in a 50 percent reduction in egg fertilization. Depressed shoot and total plant dry weight and shoot length were reported when the aquatic plant myriophyllum spicatum was continuously exposed to chlorine (as low as 0.05 mg total residual chlorine/L) for 96 hours. Chlorine is considered to be phytotoxic and has bactericidal, algicidal and fungicidal properties. Chlorine does not appear to retard seed germination. (3) This product does not bioaccumulate in aquatic or terrestrial food chains. (3)

Environmental Fate: In an uncontrolled spill scenario where the concentration of Chlorine is well above those used for drinking water, it can be dangerous if allowed to contaminate

Chlorine	1 ppm	0.5 ppm	1 ppm	----	0.5 ppm (Ceiling)

9. PHYSICAL AND CHEMICAL PROPERTIES (Not intended as Specifications)

Physical State: Liquefied Gas.
Appearance and Odour: Greenish yellow liquified gas with a sharp, pungent, irritating odour.
Odour Threshold (ppm): 0.06 ppm (Detection); 0.2 ppm (Perception).
Boiling Range (Deg Celsius): -35 to -34.
Melting/Freezing Point (Deg Celsius): -101.
Vapour Pressure (mm Hg at 20 Deg. Celsius): 4,788 to 5,120 (Approximately 82.5 to 85 psig).
Vapour Density (Air = 1.0): 2.5.
Relative Density (g/cc): 1.467.
Bulk Density: 88.76 lb/ft3 at 15.6 Degrees Celsius.
Viscosity: 0.3538 at 15.6 Degrees Celsius.
Evaporation Rate (Butyl Acetate = 1.0): Not available.
Water Solubility: 0.71 % at 1 ATM, 21 Degrees Celsius. Slightly soluble in water. Chlorine reacts with water or humidity to produce Hydrochloric Acid and Hypochlorous Acid. These two acids cause metal corrosion. (3,4)
Solubility: Soluble in alkaline solutions, carbon tetrachloride, hydrochloric acid and sodium chloride solutions.
% Volatile by Volume: 100.
pH: 1.5 to 2.0 (0.8 % Aqueous Solution). Strongly Acidic.
Coefficient of Water/Oil Distribution: Not applicable.
Volatile Organic Compounds (VOC): 0 %.

10. STABILITY AND REACTIVITY

CHEMICAL STABILITY

Under Normal Conditions: Stable.
Under Fire Conditions: Although non-combustible in air, chlorine supports the combustion of other materials.
Hazardous Polymerization: Will not occur.

Conditions to Avoid: High temperatures, sparks, open flames and all other sources of ignition. Avoid contact with water. Chlorine reacts with water or humidity to produce Hydrochloric Acid and Hypochlorous Acid. These two acids cause metal corrosion. (3,4)

Materials to Avoid: This product is a strong oxidizer. Strong oxidizers can cause ignition of combustible or oxidizable materials. May decompose violently on contact with metals, or their salts, dusts or other contaminants. Reacts with water or humidity to produce Hydrochloric Acid and Hypochlorous Acid. These two acids cause metal corrosion. (3,4)

Chlorine reacts with combustible, organic or nitrogen compounds (hydrocarbons, cleaning solvents, paints or thinners, oil, grease gasoline, petroleum products, turpentine, alcohols, carbon disulphide, hydrogen acetylene, hydrogen, ether and ammonia). (3,4)
Strong oxidizers. Lewis or mineral acids.

At ordinary temperatures: Dry Chlorine (gas or liquid) is not corrosive to most common metals, including steel, stainless steel, silver, iron, cast iron, nickel and its alloys, copper, brass, bronze, lead platinum and tantalum. Dry Chlorine (gas or liquid) reacts with aluminum, zinc, arsenic, gold, mercury, class 300 stainless steel, titanium, selenium, tellurium and tin. (3,4)

At high temperatures: Dry Chlorine is corrosive to most metals. The reaction rate of dry Chlorine increases rapidly above a temperature which is characteristic for the metal. (3,4)

Decomposition or Combustion Products: Thermal decomposition products are toxic and may include oxides of Chlorine and irritating gases. Chlorine reacts with water or humidity to produce Hydrochloric Acid and Hypochlorous Acid. These two acids cause metal corrosion. (3,4)

11. TOXICOLOGICAL INFORMATION

and tonne containers are equipped with fusible plugs. The fusible plugs are designed to melt at temperatures above 70 Deg. Celsius to reduce the internal pressure of the cylinder by releasing Chlorine gas.

Special Materials to be Used for Packaging or Containers: Chlorine is stable in steel containers at room temperatures when stored dry. Intense local heat above 215 C on steel walls can cause steel to ignite chlorine. (3) Equipment for storage, handling or transportation should NOT be made of: stainless steel. Confirm suitability of any material before using.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

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

Engineering Controls: Local exhaust ventilation required. Ventilation should be corrosion proof. Make up air should be supplied to balance air that is removed by local or general exhaust ventilation. Ventilate low lying areas such as sumps or pits where dense vapours may collect.

For personnel entry into confined spaces (i.e. bulk storage tanks) a proper procedure must be followed. It must include consideration of, among other things, ventilation, testing of tank atmosphere, provision and maintenance of SCBA, and emergency rescue. Use the "buddy" system. The second person should be in view and trained and equipped to execute a rescue. (4)

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Eye Protection: Use full face-shield and gas-tight goggles when there is potential for contact. Contact lenses should not be worn when working with this material.

Skin Protection: Gloves and protective clothing made from neoprene should be impervious under conditions of use. Prior to use, user should confirm impermeability. Skin protection should be insulated against cold temperatures. Do not use gloves or protective clothing made from leather and rubber or plastic. Discard contaminated gloves.

Respiratory Protection: DO NOT USE chemical cartridge respirators with oxidizable sorbents (charcoal). Chlorine: Up to 5 ppm, wear a chemical cartridge respirator with Chlorine or acid gas cartridges; up to 10 ppm self-contained breathing apparatus (SCBA). (3,4) Use an air-supplied respirator if concentrations are high or unknown.

If while wearing a respiratory protection, you can smell, taste or otherwise detect anything unusual, or in the case of a full facepiece respirator you experience eye irritation, leave the area immediately. Check to make sure the respirator to face seal is still good. If it is, replace the filter, cartridge or canister. If the seal is no longer good, you may need a new respirator. (4)

Immediately Dangerous to Life and Health (IDLH) value: 10 ppm. (4) The purpose of establishing an IDLH value is to ensure that the worker can escape from a given contaminated environment in the event of failure of the most protective respiratory equipment. In the event of failure of respiratory protective equipment, every effort should be made to exit immediately. (4)

Other Personal Protective Equipment: Wear an impermeable apron and boots. Locate safety shower and eyewash station close to chemical handling area. Take all precautions to avoid personal contact. Use of a Chlorine gas monitor with local and remote alarms and monitoring is strongly recommended.

EXPOSURE GUIDELINES

ACGIH TLV		OSHA PEL		NIOSH REL	
(STEL)		(TWA)	(STEL)	(TWA)	(STEL)

fire zone whenever possible. Ventilate low lying areas such as sumps or pits where dense vapours may collect.

Fire Fighting Protective Equipment: Use self-contained breathing apparatus and special protective clothing.

6. ACCIDENTAL RELEASE MEASURES

Information in this section is for responding to spills, leaks or releases in order to prevent or minimize the adverse effects on persons, property and the environment. There may be specific reporting requirements associated with spills, leaks or releases, which change from region to region.

Containment and Clean-Up Procedures: In all cases of leak or spill contact vendor at Emergency Number shown on the front page of this MSDS. See Section 13, "Deactivating Chemicals".

Wear respirator, protective clothing and gloves. Ruptured containers may rocket. Ventilate enclosed spaces. Where possible, elevate the leak to the highest position of the cylinder, such that gas and not liquid escapes. Apply emergency device. Eliminate all sources of ignition. Move unprotected personnel upwind of leaking container. Call emergency response naming the chemical and the type of container that is leaking. Consider the use of fog-nozzles to control vapours. Do not immerse in water. Notify applicable government authority if release is reportable or could adversely affect the environment. Vapour knock down water is corrosive and toxic, thus it should be diked for containment. Ensure compatible materials are used. For a leaking container: dispose of contents to a safe out-of-doors area or a hood with forced ventilation. Attach appropriate control valve provided with a trap or check valve and a long piece of flexible hose connected to the valve outlet. Discharge the gas at a moderate rate into an adequate amount of approximately 15% aqueous Sodium Hydroxide or other alkali or reducing solution in suitable container. When all the gas is discharged, close the cylinder valve and tag the cylinder as defective. (3)

7. HANDLING AND STORAGE

HANDLING

Handling Practices: Use normal "good" industrial hygiene and housekeeping practices. Vapours are heavier than air. Use self-contained breathing apparatus. Secure containers at all times. Fix leaks promptly. Immerse contaminated clothing in water immediately and KEEP WET until discarded or laundered. Avoid moisture contamination. Chlorine reacts with water or humidity to produce Hydrochloric Acid and Hypochlorous Acid. These two acids cause metal corrosion. (3,4)

Do not store or transport with food or feed. Keep away from combustibles and incompatible materials.

Ventilation Requirements: See Section 8, "Engineering Controls".

Other Precautions: Use only with adequate ventilation and avoid breathing vapours. Avoid contact with eyes, skin or clothing. Wash thoroughly with soap and water after handling. Wash contaminated clothing thoroughly before re-use.

STORAGE

Storage Temperature (Deg Celsius): Ideal storage temperature is 10-27 Deg. Celsius. Do not expose sealed containers to temperatures above 51 Degrees Celsius. (3)

Ventilation Requirements: Do not use in poorly ventilated or confined areas without proper respiratory protection. Ventilation should be corrosion proof.

Storage Requirements: Store in a cool, well-ventilated area. Keep away from heat, sparks and flames. Keep containers closed. Do not expose sealed containers to temperatures above 51 Degrees Celsius. Use of a Chlorine gas monitor with local and remote alarms and monitoring is strongly recommended. Secure containers at all times. Fix leaks promptly. Regularly inspect process equipment, piping and detection equipment. Chlorine cylinders

alert and not convulsing, rinse mouth out and give 1/2 to 1 glass of water to dilute material. IMMEDIATELY contact local Poison Control Centre. Vomiting should only be induced under the direction of a physician or a poison control centre. If spontaneous vomiting occurs, have victim lean forward with head down to avoid breathing in of vomitus, rinse mouth and administer more water. IMMEDIATELY transport victim to an emergency facility.

Note to Physicians: Treatment for corrosive chemical contact with skin:

1. Immerse the exposed part immediately in ice water to relieve pain and to prevent swelling and blistering. Place cold packs, ice or wet cloths on the burned area if immersion is not possible.
2. Remove anything that is constrictive, such as rings, bracelets or footwear, before swelling begins.
3. Cover the exposed part with a clean, preferably sterile, lint-free dressing.
4. For severe exposure, immediately seek medical attention and monitor breathing and treat for shock.

When treating frost bite, flush affected areas with water no warmer than 44 Deg. Celsius. Do not use heated water or dry heat and frozen parts should not be rubbed before or after thawing.

Medical conditions that may be aggravated by exposure to this product include neurological, cardiovascular and skin disorders, diseases of the skin, eyes or respiratory tract.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

Flammability Class (WHMIS): Not regulated.
Flash Point (TCC, Deg. Celsius): Not Flammable.
Autoignition Temperature (Deg. Celsius): Not applicable.
Flammability Limits in Air (%): LEL: Not applicable. UEL: Not applicable.

Hazardous Combustion Products: Thermal decomposition products are toxic and may include oxides of Chlorine and irritating gases. Chlorine reacts with water or humidity to produce Hydrochloric Acid and Hypochlorous Acid. These two acids cause metal corrosion. (3,4)

Unusual Fire or Explosion Hazards: Although non-combustible in air, chlorine supports the combustion of other materials. Flammable gases and vapours will form explosive mixtures with chlorine. Chlorine cylinders and tonne containers are equipped with fusible plugs. The fusible plugs are designed to melt at temperatures above 70 Deg. Celsius to reduce the internal pressure of the cylinder by releasing Chlorine gas. Expansion of liquid and change of state from liquid to vapour will allow mixture to encompass a large area. If tank is involved in a fire situation, a BLEVE (Boiling Liquid Expanding Vapour Explosion) may result. Ruptured containers may rocket. Where possible, elevate the leak to the highest position such that gas and not liquid escapes.

This product is a strong oxidizer. Strong oxidizers can cause ignition of combustible or oxidizable materials. May decompose violently on contact with metals, or their salts, dusts or other contaminants.

Sensitivity to Mechanical Impact: Not expected to be sensitive to mechanical impact.
Rate of Burning: Not available.
Explosive Power: Not available.
Sensitivity to Static Discharge: Not expected to be sensitive to static discharge.

EXTINGUISHING MEDIA

Fire Extinguishing Media: Use media appropriate for surrounding fire and/or materials.

FIRE FIGHTING INSTRUCTIONS

Instructions to the Fire Fighters: Fire-exposed containers should be kept cool by spraying with water to reduce pressure. Isolate materials that are not involved in the fire and protect personnel. Cool containers with flooding quantities of water until well after the fire is out. Chlorine reacts with water or humidity to produce Hydrochloric Acid and Hypochlorous Acid. These two acids cause metal corrosion. (3,4) Remove containers from

. Skin Absorption: May be absorbed through intact skin. Skin absorption is a secondary concern to the continual destruction of tissue while the product is in contact with the skin.

. Eye Contact: Extremely corrosive! This product causes corneal scarring and clouding. Glaucoma, cataracts and permanent blindness may occur. See "Other Health Effects" Section.

. Ingestion: Corrosive! Product is a gas. Ingestion is not a likely route of exposure. See "Other Health Effects" Section.

Other Health Effects: Corrosive effects on the skin and eyes may be delayed, and damage may occur without the sensation or onset of pain. Strict adherence to first aid measures following any exposure is essential.

May cause frostbite, olfactory fatigue, tooth erosion, shock, central nervous system (CNS) depression and asphyxia and cyanosis. Olfactory fatigue is a term used to describe a condition characterized by the temporary loss of odour perception. 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. Cyanosis is 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. Asphyxia is characterized by increased breathing volume, accelerated pulse rate, muscular incoordination, faulty judgement, emotional instability, fatigue, nausea, vomiting, bewilderment, gasping respiration and unconsciousness.

Chlorine: Inhalation exposure can result in primary irritation of the respiratory tract, gradual loss of pulmonary function and asthma-like attacks in suseptible individuals. Acute exposure is characterized by the irritation of the respiratory tract causing runny nose, sore throat, coughing, chest discomfort, shortness of breath and reduced lung function. Overexposure may lead to bronchitis, bronchial spasm and pulmonary oedema. Chronic exposure may lead to asthmatic attack in certain individuals, with the following symptoms: chest tightness, wheezing, cough and shortness of breath. (3)

3. COMPOSITION, INFORMATION ON INGREDIENTS (Not Intended As Specifications)

Hazardous Ingredients	CAS No.	ACGIH TLV	%
Chlorine	007782-50-5	0.5 ppm *A4	95 - 100

A4 = Not classifiable as a human carcinogen. (ACGIH-A4)

4. FIRST AID MEASURES

FIRST AID PROCEDURES

. Inhalation: Move victim to fresh air. Give artificial respiration ONLY if breathing has stopped. Give cardiopulmonary resuscitation (CPR) if there is no breathing AND no pulse. Oxygen administration may be beneficial in this situation but should only be administered by personnel trained in its use. Obtain medical attention IMMEDIATELY.

. Skin Contact: Flush skin with running water for a minimum of 20 minutes. Start flushing while removing contaminated clothing. If irritation persists, repeat flushing. Obtain medical attention IMMEDIATELY. Flush skin with running water for a minimum of 20 minutes. Start flushing while removing contaminated clothing. If irritation persists, repeat flushing. Obtain medical attention IMMEDIATELY. See "Note to Physicians" below.

Treat frostbite by immediately immersing affected areas in warm water until the skin has warmed up and turned pink. Obtain medical attention IMMEDIATELY.

. Eye Contact: Immediately flush eyes with running water for a minimum of 20 minutes. Hold eyelids open during flushing. If irritation persists, repeat flushing. Obtain medical attention IMMEDIATELY. Do not transport victim until the recommended flushing period is completed unless flushing can be continued during transport.

. Ingestion: Do not attempt to give anything by mouth to an unconscious person. If victim is

CANADA COLORS & CHEMICALS LTD
80 SCARSDALE ROAD
DON MILLS, ONTARIO, CANADA M3B 2R7
(416)-449-7750

PRODUCT : SODIUM HYPOCHLORITE 12% CODE: 832827

SECTION 01: CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MANUFACTURER/SUPPLIER.....DUTCH CHEMICAL
44 CLAYSON ROAD
WESTON, ONT
M9M 2G7
PREPARED BY.....ENVIRONMENTAL & REGULATORY AFFAIRS DEPARTMENT
PREPARATION DATE.....SEP 24/2003
PRODUCT NAME:.....SODIUM HYPOCHLORITE 12%
PRODUCT CODE:.....832827
CHEMICAL FORMULA.....NaOCl
MOLECULAR WEIGHT.....N.AV.
CHEMICAL FAMILY.....CHLORITE
MATERIAL USE.....WATER PURIFICATION, BLEACHING AGENT AND DESINFECTANT.
EMERGENCY PHONE NO.....(416)-444-2112

SECTION 02: COMPOSITION/INFORMATION ON INGREDIENTS

HAZARDOUS INGREDIENTS/COMPOSITION	EXPOSURE LEVELS	LD/50, ROUTE, SPECIES	LC/50, ROUTE, SPECIES
SODIUM HYPOCHLORITE % :12-20 CAS #:7681-52-9	SEE/VOIR SECTION 11	SEE SECTION 11	SEE SECTION 11

SECTION 03: HAZARDS IDENTIFICATION

ROUTE OF ENTRY:
SKIN CONTACT.....CORROSIVE. CAN CAUSE SEVERE LOCAL IRRITATION, BURNS AND BLISTERS. PROLONGED OR REPEATED CONTACT WITH DILUTED SOLUTIONS MAY BLEACH SKIN OR CAUSE DERMATITIS.
SKIN ABSORPTION.....N.AV.
EYE CONTACT.....VERY CORROSIVE!. CAN CAUSE IRRITATION AND SEVERE DAMAGES RESULTING IN BLINDNESS.
INHALATION.....CORROSIVE. MAY CAUSE IRRITATION OF THE NOSE AND UPPER RESPIRATORY TRACT, HEADACHE AND COUGHING.
INGESTION.....CORROSIVE. BURNING IN MOUTH AND THROAT. SEVERE PAIN, VOMITING, DIARRHEA.
EFFECTS OF ACUTE EXPOSURE.....SEE ABOVE
EFFECTS OF CHRONIC EXPOSURE.....N.AV.

SECTION 04: FIRST AID MEASURES

PRODUCT : SODIUM HYPOCHLORITE 12% CODE: 832827

SECTION 04: FIRST AID MEASURES

INSTRUCTIONS:.....INHALATION: MOVE VICTIM TO FRESH AIR. GIVE ARTIFICIAL RESPIRATION ONLY IF BREATHING HAS STOPPED. OBTAIN MEDICAL ATTENTION IMMEDIATELY. SKIN CONTACT: REMOVE CONTAMINATED CLOTHING. FLUSH AFFECTED AREA WITH WATER FOR AT LEAST 20 MINUTES. OBTAIN MEDICAL ATTENTION. EYE CONTACT:.. FLUSH EYES IMMEDIATELY WITH RUNNING WATER FOR AT LEAST 30 MINUTES HOLDING EYELIDS OPEN. OBTAIN MEDICAL ATTENTION IMMEDIATELY. INGESTION:.. 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. OBTAIN IMMEDIATE MEDICAL ATTENTION.

SECTION 05: FIRE FIGHTING MEASURES

FLAMMABILITY.....NOT FLAMMABLE
IF YES, UNDER WHICH CONDITIONS?
EXTINGUISHING MEDIA.....USE APPROPRIATE MEDIA TO EXTINGUISH SURROUNDING FIRE.
SPECIAL PROCEDURES.....FULL PROTECTIVE EQUIPMENT, INCLUDING A SELF-CONTAINED BREATHING APPARATUS, SHOULD BE WORN. REMOVE STORAGE VESSELS FROM FIRE ZONE IF POSSIBLE. USE ATER SPRAY TO COOL CONTAINERS TO AVOID PRESSURE BUILD-UP.
FLASH POINT (C), METHOD.....NON-FLAMMABLE
AUTO IGNITION TEMPERATURE.....N.AP.
UPPER FLAMMABLE LIMIT (% BY VOL.).....N.AP.
LOWER FLAMMABLE LIMIT (% BY VOL.).....N.AP.
EXPLOSION DATA
- EXPLOSIVE POWER.....NO DATA
- RATE OF BURNING.....NO DATA

SENSITIVITY TO STATIC DISCHARGE.....NO DATA
- SENSITIVITY TO IMPACT.....NO DATA

UNUSUAL FIRE AND EXPLOSION HAZARDS.....N.AV.
HAZARDOUS COMBUSTION PRODUCTS....N.AV.

SECTION 06: ACCIDENTAL RELEASE MEASURES

LEAK/SPILL.....STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR LEAK:. VENTILATE THE AREA. STOP AND CONTAIN LEAK OR SPILL. ABSORB USING AN INERT MATERIAL (SAND, ASHES, ETC.), COLLECT AND DISPOSE. FOR RECOVERY, PUMP INTO POLYETHYLENE CONTAINERS.

SECTION 07: HANDLING AND STORAGE

HANDLING PROCEDURES AND EQUIPMENT.....SEE SECTION 8 FOR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT. PROTECT CONTAINERS AGAINST PHYSICAL DAMAGE.

PRODUCT : SODIUM HYPOCHLORITE 12% CODE: 832827

SECTION 07: HANDLING AND STORAGE

STORAGE NEEDS.....STORAGE TEMPERATURE:. BELOW 29 C AND ABOVE FREEZING POINT. STORE IN A COOL (BELOW 29 C) DRY, WELL-VENTILATED AREA AWAY FROM INCOMPATIBLES AND DIRECT SUNLIGHT. LONG-TERM STORAGE IS IMPOSSIBLE WITHOUT DECOMPOSITION. USE POLYETHYLENE CONTAINERS.

SECTION 08: EXPOSURE CONTROLS/PERSONAL PROTECTION

GLOVES/ TYPE.....USE RUBBER GLOVES
RESPIRATORY/TYPE.....NIOSH/MSHA APPROVED AIR-PURIFYING RESPIRATOR EQUIPPED WITH CHLORINE CARTRIDGES WHEN NECESSARY.
EYE/TYPE.....USE CHEMICAL SAFETY GOGGLES WHEN THERE IS A POTENTIAL FOR EYE CONTACT.
FOOTWEAR/TYPE.....RUBBER BOOTS IF NECESSARY ALSO.
CLOTHING/TYPE.....RUBBER APRON
OTHER/TYPE.....SAFETY SHOWERS AND EYEWASH FOUNTAINS SHOULD BE INSTALLED IN STORAGE AND HANDLING AREAS.
ENGINEERING CONTROLS.....LOCAL EXHAUST VENTILATION.

SECTION 09: PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE.....CLEAR, GREENISH-YELLOW AQUEOUS SOLUTION
ODOUR.....STRONG CHLORINE ODOUR
ODOUR THRESHOLD.....NO DATA
VAPOUR PRESSURE (MMHG).....17.5 MMHG AT 20 C
VAPOUR DENSITY (AIR=1).....NO DATA
EVAPORATION RATE.....NO DATA
BOILING POINT.....SLOWLY DECOMPOSES AT 40 C TO NACL AND NACLO3
PH.....11.5 - 13.0
SPECIFIC GRAVITY (WATER=1).....APPROXIMATELY. 1.165 G/ML FOR A 12%; 1.26 G/ML FOR A 20%
SOLUBILITY IN WATER (% W/W).....MISCIBLE IN ALL PROPORTION IN WATER.
COEFFICIENT OF WATER/OIL DIST....NO DATA

SECTION 10: STABILITY AND REACTIVITY

CHEMICAL STABILITY:
YES
NO, WHICH CONDITIONS?.....UNDER FIRE CONDITIONS. UNSTABLE ABOVE 40 C, WHEN EXPOSED TO SUNLIGHT OR IN CONTACT WITH METALS.

COMPATABILITY WITH OTHER SUBSTANCES:
YES
NO, WHICH ONES?.....ACIDS. AMMONIA. OXIDIZABLE MATERIALS. UREA. NICKEL. COPPER. TIN. MANGANESE. IRON. MOST METALS

REACTIVITY CONDITIONS?.....TEMPERATURES ABOVE 40 C
HAZARDOUS PRODUCTS OF DECOMPOSITION.....CHLORINE GAS WHEN IN CONTACT WITH ACID; OXYGEN WHEN IN CONTACT WITH METALS. CHLORINE
HAZARDOUS POLYMERIZATION.....WILL NOT OCCUR

PRODUCT : SODIUM HYPOCHLORITE 12% CODE: 832827

SECTION 11: TOXICOLOGICAL INFORMATION

EXPOSURE LIMIT OF MATERIAL.....ACGIH - TLV:. 0.5 PPM,. (AS CHLORINE)
LC 50 OF MATERIAL, SPECIES &.....LC50 (INHALATION, RAT): >10,500 MG/M3/H
ROUTE
LD 50 OF MATERIAL, SPECIES &.....LD50 (ORAL, RAT): 8910 MG/KG
ROUTE
CARCINOGENICITY OF MATERIAL.....THE INGREDIENTS OF THIS PRODUCT ARE NOT LISTED AS CARCINOGENS.
REPRODUCTIVE EFFECTS.....NO INFORMATION IS AVAILABLE.
TERATOGENICITY.....NO INFORMATION IS AVAILABLE.
IRRITANCY OF MATERIAL.....SEE SECTION 03
SENSITIZING CAPABILITY OF.....N.AV.
MATERIAL
SYNERGISTIC MATERIALS.....NONE KNOWN

SECTION 12: ECOLOGICAL CONSIDERATIONS

NO INFORMATION AVAILABLE.

SECTION 13: DISPOSAL CONSIDERATIONS

WASTE DISPOSAL.....DISPOSE OF IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, PROVINCIAL, AND LOCAL ENVIRONMENTAL REGULATIONS.

SECTION 14: TRANSPORT INFORMATION

UN NUMBER.....1791
TDG CLASSIFICATION.....8
PACKING GROUP.....III
SPECIAL SHIPPING INSTRUCTIONS....N.AP.

SECTION 15: REGULATORY INFORMATION

WHMIS CLASSIFICATION.....D2B. E
CPR COMPLIANCE.....THIS PRODUCT HAS BEEN CLASSIFIED IN ACCORDANCE WITH THE HAZARD CRITERIA OF THE CPR AND THE MSDS CONTAINS ALL THE INFORMATION REQUIRED BY THE CPR.

SECTION 16: OTHER INFORMATION

ACGIH.....AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS
N.AV.=NOT AVAILABLE
N.AP.=NOT APPLICABLE

TRAVIS CHEMICALS
a division of Stanchem Inc.

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: Dowfrost 76-100%
PRODUCT USE: Engine Coolant, Heat Transfer Fluid
EFFECTIVE DATE: July 2, 1998

WHMIS CLASSIFICATION:

Not Controlled

TDG CLASSIFICATION:

NON-REGULATED

1. PRODUCT INFORMATION

Supplier: Travis Chemicals a division of Stanchem Inc.
Address: 777-8th Avenue
Calgary, Alberta T2P 3R5

Manufacturer Travis Chemicals

Emergency Telephone No: (403) 263-8660 (24 hrs)
CANUTEC Telephone No: (613) 996-6666

WHMIS Group Number: 00062749
HCI Index Number: HCI1611/97C

2. HAZADOUS INGREDIENTS

*Ingredient**	*Weight%*	*CAS#*	*LD50 (Units) Species/Route*	*LC50 (Units) Species/Route*	*Exposure Limits TWA-8hr ppm*
Propylene Glycol	95-100	57-55-6	21-33.7 g/kg oral rat	NAV	NAV
Di-potassium Phosphate	1-5	7758-11-4	NAV	NAV	NAV

All components of this product are either listed on or exempt from the Canadian Domestic Substances List (DSL)
Components not controlled under Controlled Products Regulation are not listed.

3. PHYSICAL DATA

Physical State:	Liquid	***Odour Threshold:***	NAP
Odour and Appearance:	Odourless; yellow colour	***Evaporation Rate:***	NAV
Specific Gravity:	1.05-1.06	***Vapour Density:***	2.6
Vapour Pressure (mmHg)	0.22 @20 C	***Freezing Point C***	NAV
Boiling Point C	>100	***pH***	10-11
Coefficient Water/Oil	NAV		

4. FIRE AND EXPLOSION HAZARD

Flash Point(C) >100 *Method:* Est *Upper Flammability Limit:* NAP
Lower Flammability Limit: NAP
Autoignition temperature: NAP
Means of Extinction: CO_2 ___ *Dry Chemical* ___ *Foam* __ *Water Fog* ___ *Other* As appropriate for surrounding fire
Conditions of Flammability: Product is not considered flammable but will ignite with excess heat.
Hazardous Combustion Ingredients: Carbon monoxide, carbon dioxide.
Explosion Data: *Mechanical Impact:* Not expected.
Static Discharge: Not expected.
Fire Fighting Procedures: Firefighters must wear appropriate self-contained breathing apparatus and clothing. Note: Hazardous Combustion Products.

5 REACTIVITY DATA

Stability of Product: X Stable __Unstable __Conditions of Instability
Incompatible Materials Oxidizing materials.
Conditions of Reactivity: Product is generally stable.
Hazardous Decomposition Ingredients: Carbon monoxide, carbon dioxide, water.

6. TOXICOLOGICAL DATA

Routes of Entry *X Skin Contact* *X Skin Absorption* *X Eye Contact* *X Inhalation* *X Ingestion*

Class D, Division 2A- Very Toxic Materials

Chronic Toxic Effects:	Not reported
Teratogenicity and Embryotoxicity:	Not reported
Carcinogenicity:	Not reported
Reproductive Toxicity:	Not reported
Respiratory Tract Sensitization:	Not reported
Mutagenicity:	Not reported
Class D, Division 2B-Toxic Materials	
Chronic Toxic Effects:	Not reported
Skin and Eye Irritation:	Not reported
Skin Sensitization:	Not reported
Mutagenicity:	Not reported
Toxicologically synergistic products:	Not reported
Other reported Toxic Effects	At room temperatures vapours are minimal. Mists may cause upper respiratory tract. Repeated excessive ingestion may cause CNS effects. Eye contact can cause temporary irritation. Corneal injury is unlikely. Prolonged skin contact can cause flaking and softening of the skin.

7. FIRST AID MEASURES

Skin contact: Wash affected area with soap and water for at least 15 minutes. Remove and clean contaminated clothing. Seek medical attention if irritation develops or persists.

Eye contact: Flush with water immediately for at least 15 minutes by holding eye open while flushing. Seek immediate medical attention.

Inhalation: Remove victim from area to fresh air. Apply artificial respiration if breathing has stopped If difficulty breathing, administer oxygen. Seek immediate medical attention.

Ingestion: Never give anything by mouth to an unconscious person. Do not induce vomiting. Give water. Seek immediate medical aid.

Advice to Physician: Treatment based on judgement in response to reactions of the patient.

8. PREVENTATIVE MEASURES

Personal Protective Equipment: (All equipment should be NIOSH approved)

Respiratory: Exposure within those recommended by respiratory manufacturer requires:

X Air Purifying	___Acid Gas Cartridge	___Organic Vapour Cartridge
___Dust Mask	___Ammonia Cartridge	

Exposures that are Immediately Dangerous to Life or Health (IDLH) require an atmosphere-supplying type, positive pressure mode, Self Contained Breathing Apparatus (SCBA).

Eye Protection: Chemical goggles must be worn at all times when handling product. If there is a possibility of splashing, wear protective face shield. If vapours irritate eyes, wear full face respirator.

Clothing: Chemical resistant protective clothing must be worn at all times when handling product. Wash thoroughly or dispose of any contaminated clothing.

Engineering Controls: Local exhaust ventilation is recommended for all controlled products. The use of mechanical ventilation is recommended whenever this product is used in a confined space or when air circulation is inadequate. If product is flammable/combustible, all equipment should be explosion proof.

Leak and Spill Procedures: Remove all sources of ignition. Contain spill. Absorb material on appropriate non-flammable absorbent and shovel into compatible salvage containers. Avoid all bodily contact. Appropriate breathing apparatus must be worn if ventilation is inadequate. Do not allow product to enter sewers or stormwater inlets.

Waste Disposal: It is the responsibility of the user of this product to determine at the time of disposal whether this product meets criteria for hazardous waste. This is because product uses, processes, mixtures, etc., may render a non-hazardous material hazardous, or a hazardous material non-hazardous.

PREVENTATIVE MEASURE, CONTINUED

Container Disposal: Empty container retains product residue. Containers must be rinsed before disposal or re-use. Observe all hazard precautions. Keep away from heat, sparks and flames. Do not weld or use a cutting torch on or near container. Do no distribute, make available, furnish or reuse empty container except for storage and shipment of original product. Remove all hazardous product residue and puncture or otherwise destroy empty container before disposal.

Special Shipping Information: Note: Storage and Handling Precautions. Refer to Fire and Explosion Hazard for data on flammability/combustibility of product. Do ***not*** ship with foodstuffs, feed or clothing.

Storage and Handling Procedures: Avoid inhalation of vapours/mists. Do not get on skin, in eyes or on clothing. Keep container closed when not in use. Wear suitable protection for eyes and skin when handling. Use with adequate ventilation. Avoid contact with incompatible materials. Store in cool, dry, well ventilated area away from sources of heat, ignition, sparks. Use proper grounding techniques if product is classified as flammable or combustible. Eye wash and safety showers should be easily accessible and in proper operating order.

9. PREPARATION INFORMATION

Prepared By:	Safety Department	***Title:***	Product Stewardship Co-ordinator
Date:	July 2, 1998	***Phone Number***:	(403)232-0474

NK	=	Not known
ND	=	Not decided
NAV	=	Not available
>	=	Greater than
<	=	Less than
SCBA	=	Self Contained Breathing Apparatus

APPENDIX F

If You Discover a Spill Response Action

TOWN OF IQALUIT
"IF YOU FIND A SPILL"

FIRST PERSON RESPONSE:

a) Be alert and consider your personal safety first.

b) Assess the hazard to persons near the spill, and where possible, take action to control danger to human life.

c) If the spill creates a fire, explosion or other hazard to human life, remove all potential ignition sources if possible, evacuate the area, and contact the RCMP.

d) If safe and practical, take appropriate action to stop the spill.

e) Contact Dispatch and report the spill.
DISPATCH - 979-5670

f) Mark the scene to warn the public and restrict access.

MUNICIPALITY OF IQALUIT
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APPENDIX G

As and When Contracts List

AWARD OF "AS AND WHEN" TENDERS – June 1, 2004 to May 30, 2005

Awarded To	For Which Service	Hourly Rate(s)	Contact Info
4577 Nunavut Ltd O/A Baffin Building Systems	**Infrastructure and Utilador Repairs**	$5,000 winter start-up on 224 and 235 per occasion $45.00 per hour Labor $55.00 per hour H/E Operator $50.00 per hour Truck Driver $60.00 per hour Fusion Tech. $55.00 per hour Plumber	Robert Hann 975-1484 John Bishop 975-1484
Second Bidder on Service		**None**	
4577 Nunavut Ltd O/A Baffin Building Systems	**Supply Granular Material (Delivered)**	$34.00 per yard ¾" minus crush gravel $30.00 per yard 2" minus crush gravel $16.00 per yard sand (un-screened) $60.00 per yard ¾" clear crush stone $32.00 per yard 1" crush gravel $27.00 per yard screened sand	John Bishop 975-1484 Robert Hann 975-1213 Chris Groves 979-4874
Second Bidder		**None**	

Awarded To	For Which Service	Hourly Rate(s)	Contact Info
No Bids	**Vehicle Rental**		
4577 Nunavut Ltd O/A Baffin Building Systems	**Heavy Equipment Rental**		As Above
	Excavators	$240.00 per hour CAT 234 (track)	
		$200.00 per hour CAT 224 (wheel)	
		$350.00 per hour CAT 224 (with hoe ram)	
	Dump Truck	$100.00 per hour Ford Tandem Dump	
		$110.00 per hour Tandem Ampirol	
		$105.00 per hour	
	Loaders	John Deere 624E $105.00 per hour	
		Michigan L90 $105.00 per hour	
		CAT 950G	
	Fusion Machine	$200.00 per day McElroy #28	
		Combination	
	Gas Pump	$100.00 per day 1036 Junior	
	Granular Processing Plant	$2000.00 per day CR061 Pitmaster	
	Asphalt Plant	$5000.00 per day Cederapids H230 Batch Plant	
	Generator	No Bid	
	Compactor	$110.00 per hour Bomag	
	Bull-Dozer	$100.00 per hour CAT D4D	
	Grader	$95.00 per hour Champion	
Second Bidder		**None**	

Awarded To	For Which Service	Hourly Rate(s)	Contact Info
Wynberg Automotive	**Heavy Truck Repairs**	$62.00 per hour $70.00 per hour (Shop o/t rate) $70.00 per hour (Field o/t rate)	Reg Wynes 979-0748 Troy Comeau 979-6472
Second Bidder			
Nunavut Performance		As above	Rob Bertrand 979-6626 Cathy Shwartz 979-8858
Wynberg Automotive	**Small Vehicle and Equipment Repairs**	$62.00 per hour $70.00 per hour (shop o/t rate) $70.00 per hour (field o/t rate)	Reg Wynes 979-6476 Troy Comeau 979-6472
Second Bidder			
Nunavut Performance		As Above	Rob Bertrand 979-6626 Cathy Shwartz 979-8858
No Bids	**Communication and Office Equipment Repair**		
Arctic Circle Construction and Development	**Carpentry and Painting**	$40.00 per hour	Michael Rizzi 979-4130 Dan Choquet 979-7767
Second Bidder			
4577 Nunavut Ltd. O/A Baffin Building Systems	Note:	As Above $65.00 per hour (locksmith)	Chris Groves 979-9649 Robert Hann 979-6949

Awarded To	For Which Service	Hourly Rate(s)	Contact Info
4577 Nunavut Ltd O/A Baffin Building Systems	**Plumbing Services**	$55.00 per hour $65.00 per hour (shop o/t rate) $65.00 per hour (field o/t rate)	Chris Groves 979-6949 Robert Hann 979-6949
Second Bidder	None		
4577 Nunavut Ltd O/A Baffin Building Systems	**Electrical Services and Repairs**	$55.00 per hour $65.00 per hour (shop o/t rate) $65.00 per hour (field o/t rate)	Chris Groves 979-6949 Robert Hann 979-6949
Second Bidder	None		
4577 Nunavut Ltd. O/A Baffin Building Systems	**Heating and Air Conditioning**	$55.00 per hour $110.00 for call-out	Chris Groves 979-6949 Robert Hann 979-6949
Second Bidder	None		
4577 Nunavut Ltd. O/A Baffin Building Systems	**Welding and Fabrication and Repairs**	$120.00 per hour (shop and field)	Chris Groves 979-6949 Robert Hann 979-6949
Second Bidder	None		