

Giant Yellowknife Mines Ltd.

Surface Arsenic Loadout Facility

Contingency Plan

1979/80.

March 30/1981
Revision Dates

TRANSPORTATION SPILL

ACTION PLAN

IN THE EVENT OF A SPILL

I CONTAIN

Prevent the arsenic trioxide from contaminating waterways. Small spills must be cleaned up immediately. Large spills covered and contained until proper equipment arrives. Do not flush with water.

II CONTROL

Prevent casual observers from walking through contaminated area or coming in contact with the dust.

III COMMUNICATE

Contact one of the people on the attached sheet in the priority listed (ie., Giant, Emergency Measures, Water Resources), reporting the location and extent of the problem. Start to fill out the emergency spill action plan report sheet.

GIANT YELLOWKNIFE MINES LIMITED

Business
Telephone

Home
Telephone

403/873-6301 Ext 226	Kent Morton, Mill Superintendent	403/873-2015
403/873-6301 Ext 153	L. Connell, Asst. Mill Supt.	403/873-2313
403/873-6301 Ext 129	W.A. Moore, General Manager	403/873-5121
403/873-6301 Ext 229	A.C. Hall, General Mill Foreman	403/873-2571
403/873-6301 Ext 229	D. Dickson, Mill Production Foreman	403/873-5242
403/873-6301	M. Lowden, Occupational Health	403/873-5012

N.W.T. GOVERNMENT - EMERGENCY MEASURES

403/873-7554	Emergency Measures	
403/873-7134	Bernie Scott	403/873-8381
403/873-7654	Dan Billings	403/873-2089

WATER RESOURCES - D.I.A.N.D.

403/873-8242	Pollution Control	
403/873-2231	Lorne Cooper	403/873-8243

ENVIRONMENTAL EMERGENCIES

403/873-3456	Environmental emergencies	
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EMERGENCY SPILL ACTION PLAN

REPORT SHEET

Fill Out This Sheet As Soon As Possible

1. Name of Person reporting spill _____
2. Telephone Number _____
3. Company Name _____
4. Company Address _____
5. Chemical Spilled _____
6. Approximate Quantity _____
7. When spill occurred (date & time) _____

8. When spill reported _____
9. Exact spill location _____

- 9a. Injuries and hazards _____

10. Current situation _____

11. Weather Forecast _____

12. Person Contacted at Giant _____
13. Person Contacted at Emergency Measures _____

14. Person Contacted at Water Resources _____

15. Person Contacted at E.P.S. _____
16. Other Officials informed _____

Handling of Impure As₂O₃

Safety Instructions

These regulations are for your protection and must be strictly adhered to by all personnel working in the spill areas.

1. Food or beverages must not be consumed in the spill area.
2. You are advised not to smoke in this area.
3. Before leaving the spill area remove coveralls and stamp dust off your boots.
4. After leaving the spill area wash your hands and face. A complete shower is preferable.
5. Dust suits, complete with hood and external air supply, must be worn when recovering spilled impure arsenic trioxide.
6. Before removing ~~d~~st suits, stand under the shower until all loose dust is washed away.
7. Keep dust suits and all related apparatus clean and in good repair.
8. Keep cleanup equipment clean of dust build-up by washing down frequently.
9. Try to minimize airborne dust at all times even if it means doing clean-up during the work as well as when the job is finished.
10. Wear coveralls over your clothes at all times and leave the coveralls in the area when you leave. DON'T CARRY DUST FROM PLACE TO PLACE.
11. Great care should be taken not to remove cleanup equipment, tools and other materials from the spill area until all the arsenic trioxide has been cleaned off.

It requires organized work habits and close attention to small detail to minimize arsenic trioxide exposure hazards to the general public and in particular to the cleanup personnel.

Please take every precaution to protect your health and safety.

ARSENIC TRIOXIDE GENERAL INFORMATION

General Description

White powder, odorless.

Solubility in Water

18 grams per liter.

Chemical Reactivity

Contact with acids or acid substances in combination with certain metals, for example, galvanized sheet metal may cause formation of toxic fumes. When heated over 200° C, gas is emitted.

Toxicity

Less than 5 mg per kilogram of body weight.

Protective Equipment

Goggles give complete protection to the eyes, suitable respiratory protection, plastic or rubber gloves, plastic or rubber aprons, boots.

Emergency Action

Spillage - small amounts should be collected in a simple way, that is, by vacuum cleaner. Large quantities must be handled by personnel in protective coveralls with rubber boots, gloves, dust respirator, and close-fitting goggles. The spillage should be contained in dust-proof drums or other suitable packing.

Fire - keep containers cool by spraying with water, gas is emitted over 200° C., don't inhale the gas. Use gas masks working in a gas area.

First Aid

If ingested, cause vomiting by using water, milk of magnesia and take victim to a physician immediately. If inhaled, remove victim from the contaminated area, keep breathing passages open and keep him warm. If powder is on his clothes, change clothing and take a shower using soap and water.

Sanitary Demands

Change work clothing often, wash skin regularly, smoking should not be allowed in places where there is a risk of contact with arsenic trioxide.

GIANT YELLOWKNIFE MINES LIMITED
SURFACE ARSENIC LOAD-OUT FACILITY
CONTINGENCY PLAN

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GIANT YELLOWKNIFE MINES LIMITED
SURFACE ARSENIC LOAD-OUT FACILITY
CONTINGENCY PLAN

1.1 INTRODUCTION

Giant Yellowknife Mines Limited, a major supplier of As_2O_3 to the chemical industry, recognizes the need to provide adequate safeguards for the protection of inhabitants of the N.W.T. and workmen involved with handling of the product. In addition, all potential dangers to the environmental ecosystem related to this reason, Giant has prepared a simple but effective operating procedure for the handling and loading of the product in addition to setting up an emergency response program designed to minimize the effects of any problems encountered with the handling or shipping of the product, anywhere in the N.W.T.

1.2 PURPOSE OF THE CONTINGENCY PLAN

The following contingency plan has been carefully prepared to enable all those concerned with the handling and shipping of the product to understand the operation of the system and to ensure as far as possible, the correct procedure to follow, as rapidly as possible, should unusual or emergency conditions arise.

1.3

Equipment Description

1.3.1

As₂O₃ Loadout Facility

The As₂O₃ surface storage and truck loading facility consists of a pneumatic conveying line, storage silo and a load-out building housing a scale (figure 1.3.1).

The storage silo is a 15,000 cubic foot capacity Peabody pre-engineered, self supporting bolted steel tank, 26' in diameter by 56' high. The interior tank surface is coated with an acid resistant epoxy paint while the exterior steel surface is painted with a baked on acrylic. The joints between the tank sections are rubber gasketed and caulked to ensure an airtight structure. The storage silo and foundation are designed to hold either;

- 780 tons of crystalline As₂O₃ at a bulk density of 105 lbs/cu. ft. or

- 300 tons of baghouse dust at a bulk density of 40 lbs/cu. ft. in a 100 m.p.h. wind, seismic zone 0.

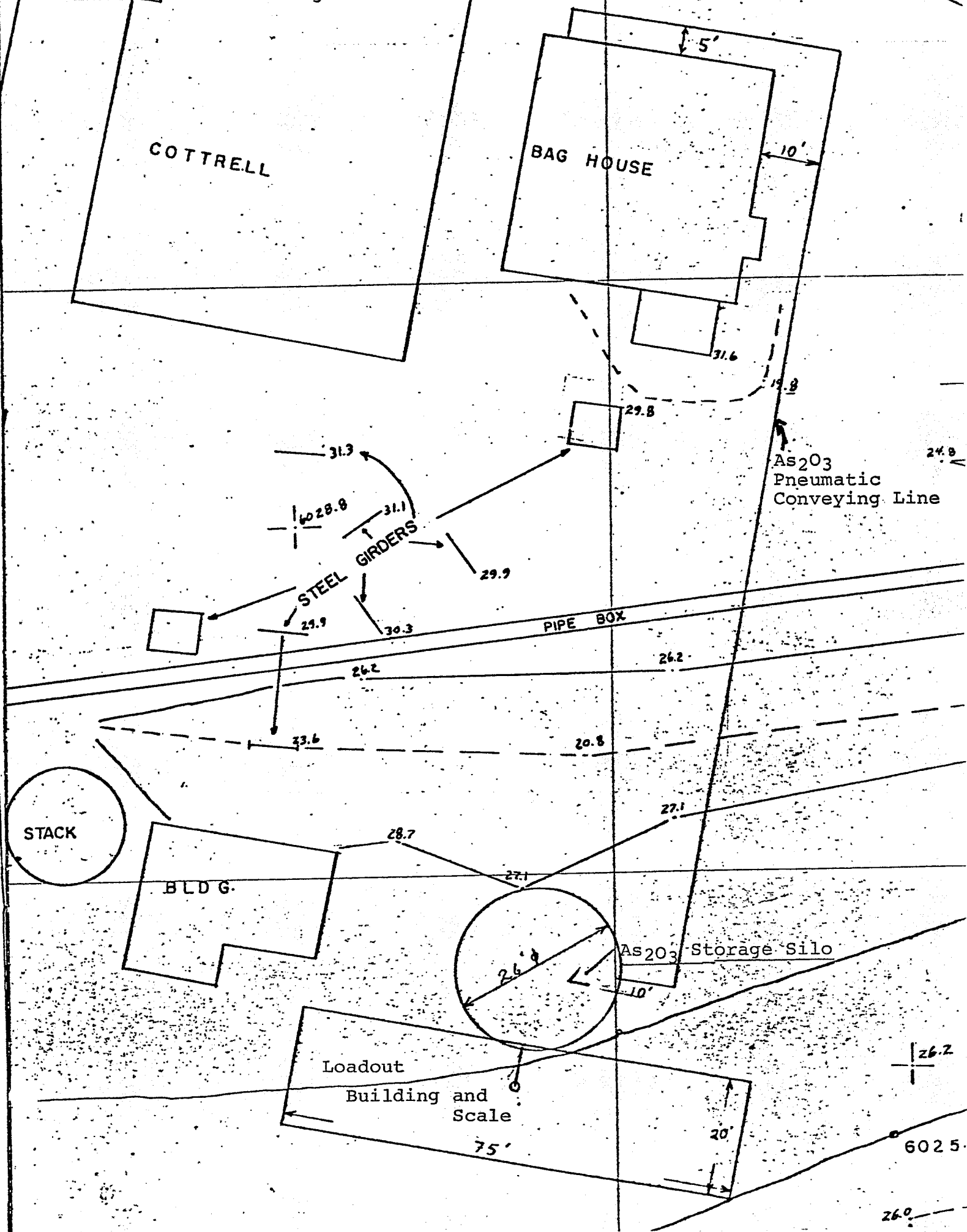
Initially the silo will only be used to store baghouse dust (unrefined As₂O₃).

A 4" diameter pneumatic conveying line and Fuller Kenyon compressed air pump are used to transport unrefined As₂O₃ dust from the mill baghouse hoppers to the storage silo. The silo itself will be maintained under negative pressure as air displaced while the silo is filled will be drawn through a fabric baghouse type filter and returned to the roaster gas handling system.

A manually operated DeZurik knife gate valve is mounted on the bottom of the silo cone. This valve is physically locked in the closed position except for the period of time when a truck is being loaded. This precaution is taken to prevent any material leaving the silo and entering the loading equipment when a truck is not in position.

Figure 1.3.1

As₂O₃ Loadout Facility - Site Plan



A Semco rotary valve (followed by a Ramsey sample cutter and splitter) is mounted directly beneath the knife gate valve. The rotary valve controls the rate of withdrawal of product from the silo thus preventing flooding. (The sample cutter and splitter automatically samples the product being loaded and divides this sample into four equal parts thereby minimizing employee exposure to AS₂O₃).

A Sullivan Scott-Strong screw conveyor mounted beneath the sampler transports the product from the silo to the top of the trucks being loaded. An adjustable tight fitting loading spout mounted on the discharge end of the screw conveyor directs the product into the truck. Dust generated at this drop point is minimized by placing the truck tank and loading spout under negative pressure. Air and dust displaced during the loading cycle are drawn through the fabric baghouse type dust collector located on top of the silo and then returned to the roaster gas handling system (figure 1.3.2).

The silo and truck loading equipment design criteria were to eliminate the need for workmen to come in contact with the product at any time. To this end negative pressures have been induced at all potential dust generation points to prevent fugitive dust emissions.

A fully electronic low profile highway truck scale will be installed alongside the storage silo inside a 75' long x 20' wide self supporting steel framed loadout building. Trucks will be loaded while standing on the scale to avoid any potential overloading. The building will be equipped with overhead vacuum piping to allow immediate cleanup of any possible spillage occurring during the loading cycle.

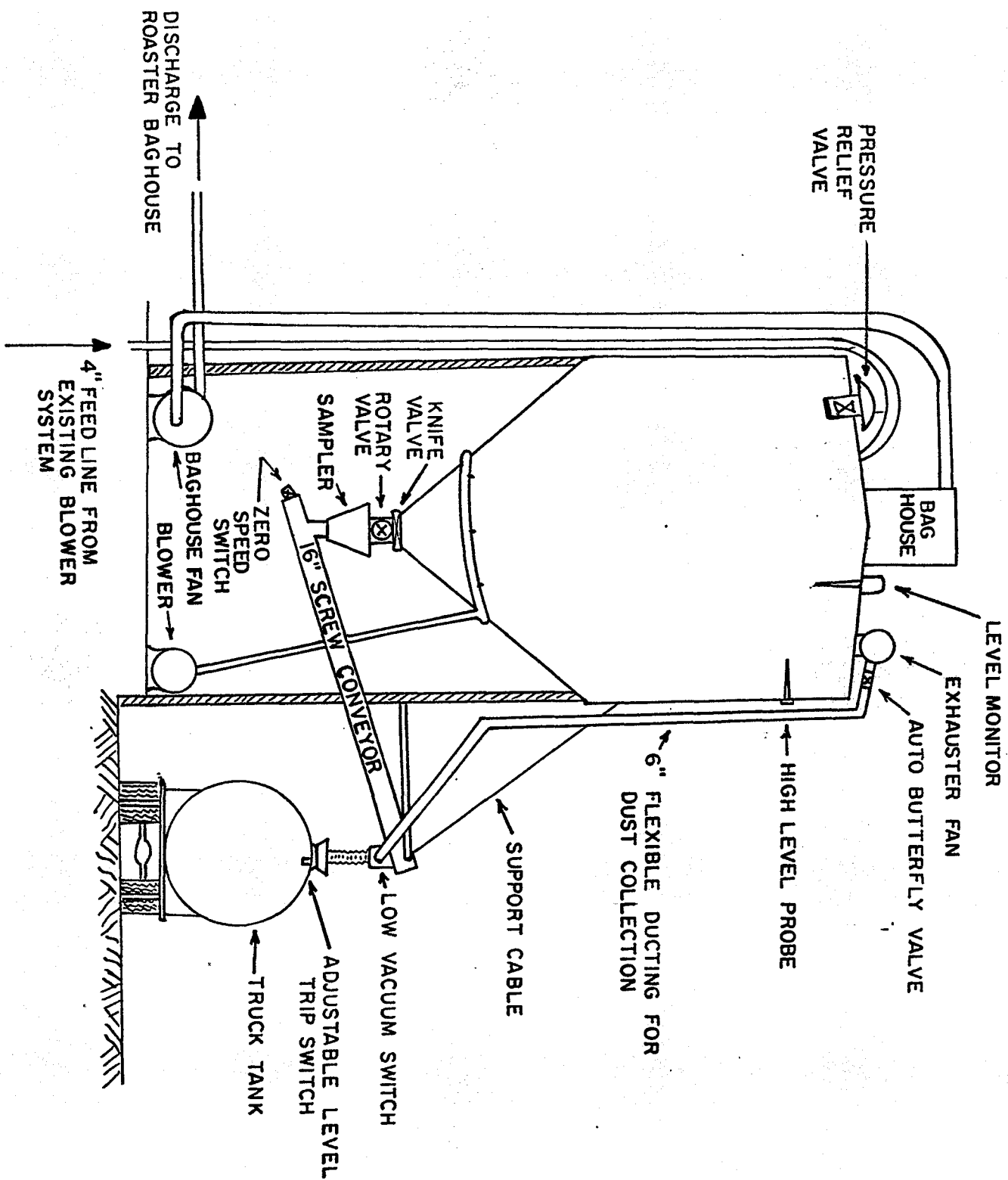


Fig. e 1.3.2

ARSENIC RETURN HOPPER

The storage silo is equipped with a high level alarm probe which shuts down the silo fill equipment when tripped to prevent over filling of the silo. A second level probe allows the load out operator to determine the level of product in the silo by remotely lowering a plump bob. The amount of cable played out is automatically sensed and the level of product in the silo is reported on the control panel.

1.3.2 Vehicle To Be Loaded

Containers and shipping requirements for arsenic and its compounds are specified by Interstate Commerce Commission regulations. All arsenic compounds are Class B poisons and must carry the poison label. Each container should also carry a printed label identifying the contents. Arsenic trioxide may be shipped in hopper or bottom outlet tanks equipped with waterproof and dust proof covers and fortunately bulk cement trailers are admirably suited to this application. These trailers are normally 3 or 4 compartment type with no internal baffling. They may be constructed of steel or aluminum and have a volume of approximately 1,500 cubic feet. Loading hatches are approximately 14 inches in diameter, rubber gasketed and equipped with eight locking lugs which are tightened and sealed after loading is completed. The bottom hoppers are also equipped with hatches that may be opened to dump into a receiving system located beneath the trailer. This is not normal practice however and it is more usual to unload using the pneumatic conveying system built into the trailer. It is also possible to unload these trailers using a vacuum system through the upper hatches.

The loading spout is designed to form a wedge fit in the trailer hatches and any airborne dust generated within the trailer during the loading cycle is withdrawn through an integral vacuum system which can be located within the spout or on one of the other tank hatches and deposited back in the storage silo.

Trailers will normally be loaded with approximately 22 tons of arsenic trioxide, depending upon gross vehicle weight and load limits. This weight of material will fill the trailer to within two feet of the top during loading but will compact to about half the original volume during transport.

1.4. Description of Typical Loading Cycle

Giant is informed of the impending arrival of a truck 16 to 24 hours ahead by a phone call from the driver. Upon arrival the tractor trailer unit reports to the main gate security office at the Giant minesite. Truck loading is restricted to the hours between 08:00 and 20:00 hours.

Prior to loading, the tractor trailer unit is driven onto the weigh scale, weighed empty and the tare weight recorded (Table 1.4.1). The entire trailer unit is then visually inspected to ensure that there are no leaking gaskets, seals or open valves and that there are no structural deficiencies. If any deficiencies are discovered, they are to be corrected before loading to ensure that the possibility of accidental loss of the product is minimized.

The rear trailer hatch is then unlatched and positioned under the loading spout. The loading spout is lowered into the trailer hatch and checked to ensure a tight fit. The loading cycle is electrically interlocked to prevent initiation of the loading cycle until the spout is fully lowered into the truck hatch. The next trailer hatch is then unlatched and opened to allow the trailer vent line to be attached.

To M. Blanchette

Date

es To

Ref.

From K.S. Morton

Subject ARSENIC SHIPMENT NUMBER:

Truck Identification: _____ (Tractor Plate Number)

_____ (Trailer Plate Number)

		<u>Full</u>	<u>Empty</u>	<u>Net</u>
<u>Truck Weight:</u>	Front	_____	_____	_____
	Rear	_____	_____	_____
	Total:	_____	_____	_____

Assay: _____ % of As₂O₃

_____ Moisture Content

Attached: (please check)

Bill of Lading: _____

Higginbotham Invoice: _____

American Brokers: _____

Copy of Giant's Pro Forma Invoice: _____

TABLE 1.4.1 Operator's Truck Weight Record Sheet

The DeZurich knife gate valve below the silo hopper is then unlocked and manually opened. The main panel power switch is turned on and the selector switches set for truck loading. Normally the system will be ready to start and all that is required to begin the loading cycle is to push the start button (Figure 1.4.2). This will automatically start the appropriate equipment in the correct sequence, typically as follows:

1. Baghouse exhaust fan will start. A differential pressure switch on the baghouse will signal that negative pressure is within the correct operating range.
2. A Keystone valve on the trailer vent line will open as the trailer loading spout exhaust fan starts. A differential pressure switch on the loading spout will sense that adequate negative pressure is being provided.
3. Provided that the loading spout is in its extended position and that the high level tilt switch on the spout indicates a "Go" condition, the screw conveyor will start. The screw conveyor is equipped with a zero speed switch that will shut the system down if the drive belts should slip or if for any other reason the motor should continue to turn while the conveyor itself is stopped.
4. The rotary air-lock valve between the silo hopper and the screw conveyor will begin to turn. Provided that the knife gate valve, located above the rotary valve, is open, the product will be discharged into the screw conveyor and thence into the trailer.
5. The fluidization blower will start, ensuring that material will flow smoothly to the rotary valve. The fluidization blower can be shut down when not required.

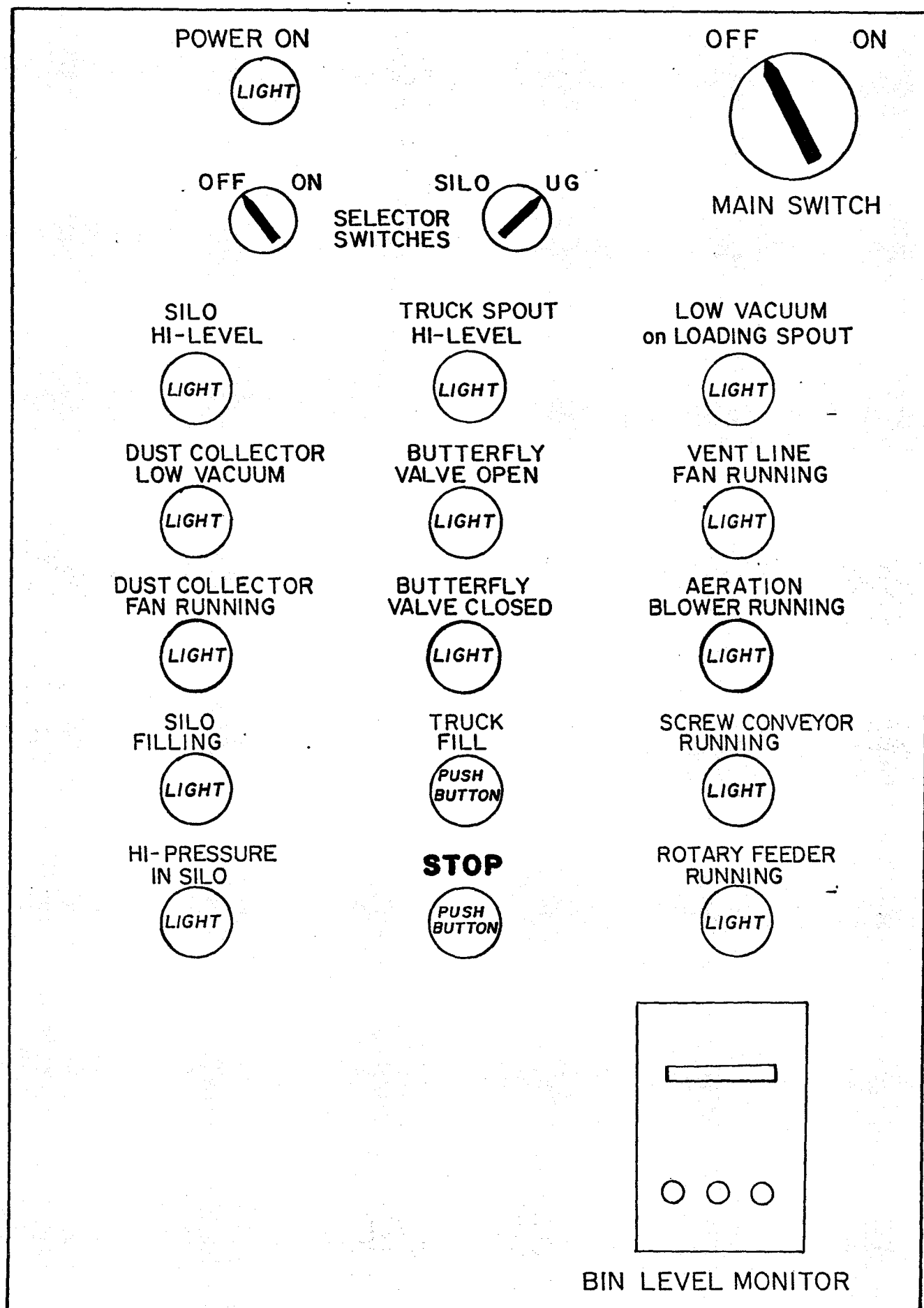


Figure 1.4.2 Loadout Control Panel

Other controls in the system are designed to ensure that the silo fill pneumatic conveying system will not function during truck loading cycles, that the silo cannot be over-filled, that the trailers cannot be over-filled and that the silo baghouse reverse pulse jet cleaning system be functioning properly.

During the loading cycle, an automatic sample splitter will collect four representative samples in plastic bottles. After loading is completed the bottles are removed from the machine and capped, being replaced with fresh bottles.

After the rear hatch is filled to the desired level (determined by viewing through a special window in the loading spout or by timing), the system is shut down, the spout retracted and the trailer relocated for filling of the next hatch.

Once the trailer has been filled to the desired gross vehicle weight, the individual axles of the rig are weighed to ensure compliance with load restrictions. The weights are recorded and the unit is inspected once again. Any visible dust on the surface of the trailer is wiped or vacuumed off, hatches are sealed and paperwork is completed. One sample of the product is tape sealed and placed on board the truck and the rig is sent on its way.

1.5.

Description of Material Being Loaded

The product being shipped by Giant is unrefined arsenic trioxide ranging from 85 to 95% pure. The material is a brownish white, odourless powder with an uncompacted density of 40 lbs/cu. ft. The particle size of the dust is 90% minus 5 microns and is thus free flowing when uncompacted. During transport the product may compact to a bulk density of 80 lbs/cu. ft. and will lose its tendency to flow freely.

This material is a by product of the Giant Yellowknife gold milling operation. The gold bearing mineral arsenopyrite is roasted at high temperature driving off the arsenic as a vapour and at the same time reacting with oxygen to form arsenic trioxide. The roaster gas stream is cleaned of particulate matter and then cooled. At the lower temperature the arsenic trioxide recondenses as a solid and is filtered from the gas stream in a fabric type dust collector. The filtered arsenic trioxide dust is then pneumatically conveyed to the silo for shipment.

Arsenic trioxide has a sublimation point between 400 to 600 °F dependent upon the impurities present. Arsenic trioxide is water soluble with a steep temperature solubility curve;

18 gm/l at 20 °C

70 gm/l at 100 °C

Under certain conditions such as the contact with acids or acid substances in combination with reducing conditions such as contact with galvanized sheet or zinc, arsenic in solution may form arsine (AsH_3), a highly toxic fume.

Toxicity of As_2O_3 is less than 5 mg per kg. of body weight. Arsenic trioxide is considered a carcinogen.

1.6. Classification of Possible System Failures

The loadout system has been designed to minimize and eliminate potential spillage or emission of dust laden air into the atmosphere. Potential failures considered for contingency planning are as follows;

1.6.1 Failure in Pneumatic Transport Line

A break or rupture in the pipeline pneumatically transporting AS_2O_3 dust from the mill to the storage silo could result in the spill of dust onto the ground. A pressure switch located in the pneumatic conveying line at the point of entry to the silo is interlocked with the screw conveyor feeding baghouse dust into the pneumatic conveying pump. This pressure switch will not allow baghouse dust to enter the pneumatic conveying system until blower pressure is sensed at the end of the conveying line. A break or rupture anywhere in the pipeline would result in no pressure being sensed at the end of the line and would result in no additional product being conveyed into the pneumatic transport system. This system of interlocks is intended to minimize any spillage of AS_2O_3 dust should the pneumatic transport line rupture or break.

1.6.2 Pressurization of The Storage Silo

If pressure within the silo were to buildup due to a system failure a balanced pressure relief hatch on top of the silo would spring open. This system prevents further pressure buildup and avoids possible tank failure. To minimize the release of dust laden air should the pressure relief hatch open a fabric filter has been constructed in a special monitor which would allow the pressure to equalize while filtering dust out of the escaping air.

Electrical interlocks have been installed to prevent the operation of the silo fill cycle and truck loading cycle simultaneously. Failure of these interlocks coupled with operator error would result in pressure building up within the silo and the relief hatch opening.

Pressure switches have been interlocked with both the silo fill and truck loading cycles. Failure of these systems would also result in pressure buildup within the silo and opening of the relief hatch.

1.6.3 Overfilling of The Storage Silo

Overfilling of the storage silo with product would result in material backing up in the silo fill line and possibly overflowing the silo through the relief hatch. A high level sensor is located on the upper side of the silo and is electrically interlocked to shut down the silo fill cycle when activated. A second level sensor mounted on top of the silo allows the operator to remotely measure the level of product within the silo.

Failure of both these systems could result in the overfilling of the silo and spillage of product through the relief hatch.

1.6.4 Overfilling of Truck

Overfilling of a truck with product would result in material being spilled. An adjustable high level tilt trip switch is installed within the loading spout which is electrically interlocked with the truck full cycle. This switch will automatically shut down the loading cycle when activated by a high level in the truck thus minimizing the possibility of the operator inadvertently overfilling a truck hatch. Failure of this system could result in product being spilled.

1.6.5

Activation of Loading Cycle When Truck Not in Position

A spill of baghouse dust would occur if the loadout cycle were somehow activated when a truck is not in position under the loading spout. To counter this possibility safety limit switches have been installed on the extendable loading spout. The spout must be in the down position resting in the truck hatch, ie: with no tension on the loading/spout travel cables before the loading system can be activated. A selector switch mounted on the loading spout must also be manually set to the load position before the load cycle can be activated. This ensures that the loadout operator must physically go onto the top of the truck to check the spout location and set the selector switch before the loading cycle can be activated from the control room. Once the Hi truck level trip switch has been activated a short duration relay timer ensures that power to the loading cycle start switch is off so that if the loadout operator were to reposition the loading spout in the next truck hatch without turning off the spout selector switch, the loading cycle would not reactivate until the main start switch on the control panel was pushed.

A 12 inch manually operated knife gate valve has been installed between the bottom of the silo cone and rotary valve. Once a truck has been loaded the loadout operator closes the knife gate valve and padlocks the valve chain drive in the closed position. This practise will further ensure that no product is spilled onto the ground by accidental activation of the loading cycle when a truck is not positioned under the loading spout. This valve also isolates the product in the bin should any of the loadout equipment have to be removed for maintenance purposes.

1.6.6

Overfeeding of Loadout Screw Conveyor

The loadout screw conveyor would electrically trip out if it were overloaded for any reason. The baghouse dust contained in the screw conveyor would then have to be removed before the conveyor could be serviced or restarted. A motion switch has been installed on the tail end of the loadout screw conveyor to sense any problems with broken or slipping drive belts, sheared coupling bolts or a broken screw, any of which could result in an overloaded screw conveyor. If the tail end of the screw conveyor were to stop the motion switch would be activated immediately stopping the rotary feeder valve and thus minimizing the amount of product to be removed from the screw conveyor before the required repairs can be made.

1.6.7

Failure of Rotary Feeder or Sampler

The failure of the rotary feeder would stop the flow of product from the silo. The manually operated knife gate valve would then be closed isolating the rotary valve from the product in the silo allowing the required maintenance to be performed. Spillage of baghouse dust would be limited to the amount of material contained in the top half of the rotary valve.

Failure of the sampler would not effect the loading cycle. Any required repairs could be performed once the knife gate valve had been closed and product contained in the sampler had been run through the screw conveyor to the loading truck.

1.6.8 Escape of Dust Laden Air Through Failure of The Truck Vent System

Dust laden air will escape through the truck loading spout should the truck vent system fail or even lose its negative pressure. Such a situation could occur if the vent fan were to fail or if some obstruction blocked the vent line from the truck. A negative pressure switch has been installed at the end of the truck vent line to counter any loss of the vent pressure. If the negative pressure exerted on the loading truck were to fall below the pre set point the pressure switch would be activated shutting down the loading cycle and turning on the low pressure light in the control panel. The loading cycle cannot be reactivated until the required negative pressure in the vent line is restored.

A motorized keystone butterfly valve has been installed on the suction side of the loading truck vent fan. This valve automatically opens when the vent fan is started allowing the truck to be vented through the dust collector located on the top of the silo. This same valve automatically closes once the vent fan is shut down, preventing dust laden air escaping through the truck vent line when the silo is being filled. The position of this valve is indicated on the control panel. The truck loading cycle cannot be activated until this butterfly valve is in the open position. Similarly the silo fill cycle cannot be activated until this butterfly valve is in the closed position.

1.6.9 Massive Tank Rupture

A major spill would occur if the silo were to be ruptured for any reason. The storage part of the silo is located over 14.5 feet above ground level thus safely above the level of impact for any surface vehicle. The storage silo design has been beefed up to hold a product with a bulk density of 105 lbs/cu.ft.. It is presently being used to store a product with a bulk density of 40 lbs/cu.ft. and is thus well below the design storage weight.

2.1 Discovery of a Systems Failure

Failure of any of the described systems, whether resulting in a spill of baghouse dust or not would be discovered by one of two means:

2.1.1 Electrical Alarm System

Failure of any of the silo equipment or monitoring systems will generally shut down the truck loading or silo fill cycles. The loadout operator would be informed of the shutdown and probable area of cause through the indicator lights located on the control panel (Figure 1.4.2). The operator would then have to determine the cause of the shutdown and rectify the problem before the operating cycle could be reactivated.

2.1.2 Visual Discovery of a Systems Failure

The failure of any single system or combination of systems resulting in the spillage or leakage of baghouse dust will likely be discovered through routine visual inspection of the silo and loading equipment. The silo equipment is readily visible to the operator facilitating regular visual inspections.

Failure in Pneumatic Transport Line

Spillage from the pneumatic transport line conveying baghouse dust from the mill to the silo would be due either to;

- A break in the pipeline spilling approximately 80 lbs of baghouse dust per minute assuming the failure of protective systems described in section 1.6.1.

- Leakage from a faulty pipeline coupling or fracture in the pipeline. Spillage rate would be variable depending upon the severity of the problem.

During the silo fill period the pipeline is to be visually inspected on an hourly basis so the worst spill scenario would result in the loss of 2.4 tons of baghouse dust from the pipeline.

Pressurization of the Storage Silo

Over pressurization of the storage silo would result in the silo relief hatch opening and potential release of arsenic dust laden air should all the systems described in section 1.6.2 fail. The plume of dust laden air would be visible to the operator during daylight hours, however it would not be visible at night.

The maximum possible duration of such a failure is estimated to be approximately two hours based on silo fill cycle times.

Overfilling of the Storage Silo

Overfilling of the storage silo could only occur with the failure of the protective systems described in section 1.6.3. Overfilling of the storage silo would likely result in material backing up in the silo fill line and eventually electrically tripping out the Fuller Kenyon pneumatic transport pump. Some material could possibly overflow the silo through the relief hatch however the fabric filter material covering this opening would have to be dislodged. Although the spillage potential is relatively low, the cleanup required to reactivate the system would increase operator exposure to dust.

Assuming all of the backup systems were to fail, the loadout operator would likely first learn of the overfilling of the silo when the Fuller Kenyon pump stopped or when observing product spilling from the top of the silo.

Overfilling of Truck

Failure of the protective systems described in section 1.6.4 could result in the overfilling of a truck hatch. Material would then back up the loading spout, eventually overflowing onto the top of the truck. The loadout operator monitors the hatch loading time on a pocket stopwatch increasing his visual inspection of the loading spout as the level of product in the truck increases. Average loading rates are 280 lbs of baghouse dust per minute with a maximum spill duration estimated at 10 minutes for a worst case spill of 1.4 tons of product.

Activation of Loading Cycle When Truck Not in Position

When a truck is not present the simple action of locking the knife gate valve in the closed position reduces the potential loss of product through failure of the loading cycle interlocks to less than 25 lbs (material not cleaned out of loading system).

If the loading cycle were to be activated while repositioning a truck the spill duration is estimated to be a maximum of 30 seconds for a total spill of 140 lbs of baghouse dust. The loadout operator is in constant sight of the loading spout while repositioning a truck thus ensuring prompt action should the protective systems described in section 1.6.5 fail.

Overfeeding of Loadout Screw Conveyor

Failure of the protective systems on the loadout screw conveyor would not likely result in the spillage of baghouse dust however the cleanup required to reactivate the system would increase operator exposure to arsenic laden dust.

Failure of Rotary Feeder or Sampler

Failure of either the rotary feeder or sampler would not result in the spillage of baghouse dust however the cleanup required to reactivate the system would increase operator exposure to arsenic laden dust.

Failure of Truck Vent Line Valve

Failure of the protective systems described in section 1.6.8 could result in either the release of dust laden air during the truck loading cycle or during the silo fill cycle. If negative pressure is not maintained at the truck vent line during the loading cycle, arsenic dust laden air will escape from the loading spout. The loadout operator visually inspects the hatch for escaping dust after each startup thus minimizing the potential quantity of material escaping from such a failure.

Approximately 300 cfm of dust laden air could escape through the truck vent line if the protective butterfly valve were to fail in the open position and still allow the silo to be filled. Such a failure should be discovered at the time of hourly inspections of the pneumatic transport line.

Massive Failure of the Silo

A massive failure of the silo would result in a serious spill of baghouse dust. The worst case would be loss of the contents of a full silo, approximately 300 tons of baghouse dust.

Routine visual inspections of the silo and auxilliary equipment can be broken into two categories:

Inspections During Silo Fill Cycle

The mill operator initiating the silo fill cycle should physically walk along the length of the pneumatic transport line according to the following schedule;

- Immediately after initiating the fill cycle.
- At hourly intervals during the fill cycle.

The inspection should include;

- Visual check of the entire length of the pneumatic transport line looking for any leakage or spillage of baghouse dust.
- Visual inspection of truck loading spout and vent line looking for escape of dust laden air.
- Visual inspection of the silo looking for escaping dust laden air.

Inspections During Truck Loading Cycle

The loadout operator initiating the truck fill cycle should visually check the silo and loading equipment according to the following schedule;

- Immediately after initiating the fill cycle.
- At fifteen minute intervals during the truck loading cycle.

The inspection should include;

- Visual inspection of truck loading spout and vent line looking for escape of dust laden air.
- Visual inspection of rotary valve, sampler and screw conveyor looking for any escape of dust laden air.
- Visual inspection of silo exterior and interior under the cone again looking for any escape of dust laden air.
- Inspection of control panel to determine status of operating equipment.

2.1.3 Maintenance Check Systems

Regular preventative maintenance checks will be performed on all silo operating equipment. These checks will ensure that each piece of equipment is properly sealed and dust tight. All electrical interlocks and protective systems are to be checked at the same time.

Any fault resulting in leakage or spillage of baghouse dust will receive top priority with the necessary repairs being effected immediately.

2.2 Reporting

Reporting of difficulties arising in the arsenic load-out facility will vary according to the nature of the problems encountered. These will include routine electrical/mechanical problems, potential environmental problems and potential workplace exposure problems.

2.2.1 Notification Procedure

Routine electrical/mechanical problems will be handled in the normal way by appropriate personnel and, provided that mill supervision is made aware, no further notification will be required.

Potential environmental problems must be dealt with as quickly as possible to avoid or minimize environmental impact. Although it is not possible to foresee every possible difficulty, generally, the following notification procedure is to be adhered to.

Upon discovery of the problem, take immediate steps to minimize environmental effects. This may involve shutting down certain equipment, placement of temporary patches, etc.

Notify appropriate mill supervisor if possible, if not possible, notify any mill supervisor. Supervisor is to take whatever steps necessary to prevent or minimize further environmental effects. Depending upon the scope of the problem, the supervisor in charge is to notify the Spill Control Director or the Senior Staff Person on call.

Potential Workplace Exposure Problems will likely be encountered when potential environmental problems occur and will certainly be encountered under a variety of equipment breakdown conditions. Every effort must be made to minimize the possibility of exposure to the product and the supervisor in charge is to direct the workforce with this in mind. The appropriate safety equipment is to be worn and clean-up of the area affected is required as quickly as possible.

2.3 Assessment

Assessment of the problems encountered and the action to be taken is the responsibility of all those involved with the loading facility as detailed above. In the case of a spill of arsenic product that has affected or has the potential of affecting the environment, the Spill Control Director will evaluate the situation and notify the appropriate regulatory agencies.

2.4 Alerting

In the event of a system failure and depending upon the type and extent of the failure, the following individuals or groups will be alerted:

2.4.1 Spill Control Director

Mill Superintendent or Assistant Mill Superintendent:

	<u>Home Phone</u>	<u>Work Phone</u>
K.S. Morton	873-2051	873-6301 Local 226
L.J. Connell	873-2313	873-6301 Local 153

2.4.2 Vacuum Vehicle Director

This position presently remains unfilled. The vehicle will be dispatched by the Spill Control Director and operated by:

R. Lee	873-3130	873-6301 Local 241
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2.4.3 Hazardous Material Handling Squad

L.J. Connell	873-2313	873-6301 Local 153
K. Morton	873-2015	873-6301 Local 226
G. Brehaut	873-5060	873-6301 Local 227
B. Cross	2M2 826	873-6301 Local 227
K. Lehniger	873-4562	873-6301 Local 227

Depending upon the severity of the problem, additional personnel will be drawn from the mill operating crew as required. Personnel having experience in the handling of baghouse dust would logically be called on first for assistance.

2.4.4 Occupational Health Supervisor

Maurice W. Lowden	873-5012	873-6301 Local 134
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2.4.5 Master Mechanic

Howard B. Bye	873-4691	873-6301 Local 214
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2.4.6 Chief Electrician

Borge Bergersen 873-2521 873-6301 Local 215

2.4.7 Construction Foreman

Doug Stoodly 873-4389 873-6301 Local 222

2.4.8 Emergency Measures Liason

Bernie Scott 873-8381 873-7134
Dan Billing 873-2089 873-7654

2.4.9 Water Board Liason

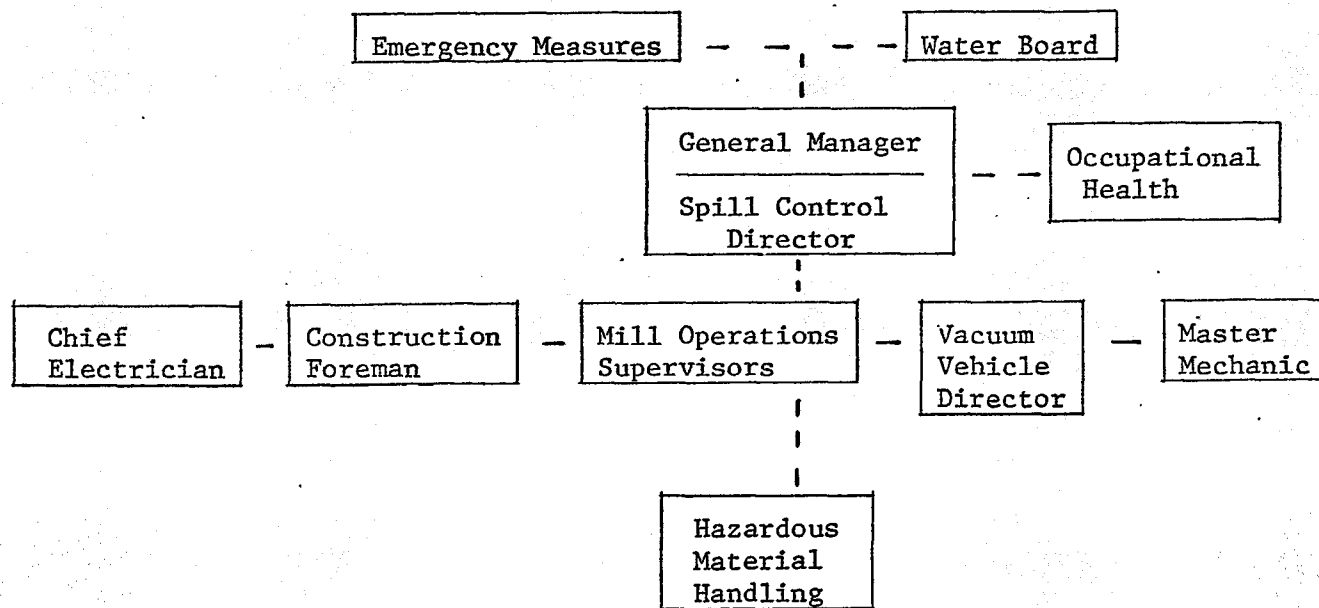
Lorne Cooper 920-2231 920-8243

2.4.10 Mill Operations Supervisors

Albert C. Hall 873-2571 873-6301 Local 229
Dave Dickson 873-5242 873-6301 Local 229

2.4.11

Organizational Chart & Chain of Command For Counter-Measures



3.1

Clean Up Procedure

Clean up of spilled product will occasionally be required and is expected to be limited to spills of a relatively minor nature related to loading difficulties and/or equipment breakdowns. It is possible however that a major spill could occur and it is important that proper clean up procedures be applied in either case.

3.1.1

Vacuum Vehicle Removal

To facilitate clean up of large, hard to handle spills, a truck mounted vacuum cleaner will be kept on site and in a state of readiness at all times. This machine is intended for cleanup of highway spills or more local spills that may be distributed over a relatively wide area or in an area difficult to clean up using other means. The storage box on the vehicle will contain up to 16 cu. yds of dust, liquid, slurry, rock or any combination of these. At present the vehicle is designed to unload by dumping the box or by pneumatically conveying the material into another storage chamber using a special unloading facility at the minesite. Future plans include modification of the vehicle to allow it to unload into a storage chamber using it's own air system to convey material picked up. Other plans include equipping a trailer, to be pulled by the vacuum truck, with life support systems, air compressor, water tank, storage lockers, emergency shower and spare vacuum hose racks. These modifications are designed to make the vehicle much more versatile and more easily able to cope with major spills.

a. Myers Sherman "Vactor" Vacuum Truck

The spill clean up procedures are built around a Meyers Sherman "Vactor" industrial vacuum unit mounted in a Kenworth highway truck, purchased by Giant as a unit dedicated to the clean up of wastes and mining products harmful to the local environment. The Vactor unit consists of a 4500 c.f.m. Rootes blower set up to draw under vacuum pressure. Material to be picked up is drawn through an 8 inch line into a 16 cubic yard truck box. Heavy or coarse particulate matter and liquids are collected in this box. Lighter dust particles pass through the box into a cyclone and on to a fabric baghouse type dust collector. Material collected in the cyclone and baghouse is augered back to the truck box. The truck capacity is 16 cubic yards or 17,280 lbs of baghouse dust.

The material collected in the box is generally removed by a simple dump action. The Giant Vactor unit has been modified, however, to allow baghouse dust to be unloaded from the truck box into a receiving hopper mounted over a pneumatic conveying line. The dust is pneumatically unloaded using the Rootes blower mounted on the truck. This modified unloading system is a completely closed circuit, allowing recovered baghouse dust to be pneumatically conveyed back into the storage silo or into underground storage vaults at the minesite.

The Vactor unit allows the cleanup of spilled baghouse dust, contaminated ground material including rocks, soil and organic ground cover and contaminated pools of groundwater or other liquids either singly or in combination.

3.1

Clean Up Procedures

Clean up procedures will vary depending upon the severity of the spill or equipment failure being dealt with. For the sake of contingency planning clean up procedures have been established for each of the following spill severity categories;

- a) Visible airborne dust emissions generally categorized as being less than two pounds per minute.
- b) Spillage from conveying equipment generally categorized by the ability to terminate the spill by shutting down the equipment. These spills could vary from two pounds to 300 pounds per hour in severity.
- c) Spillage from storage silo or transport truck generally requiring repairs to be effected to terminate the spill. Spills in this category could vary from two pounds per minute to major loss of product.
- d) Spillage of arsenic bearing materials due to a massive failure such as a rupture, generally requiring the removal of all product from the storage vessel.

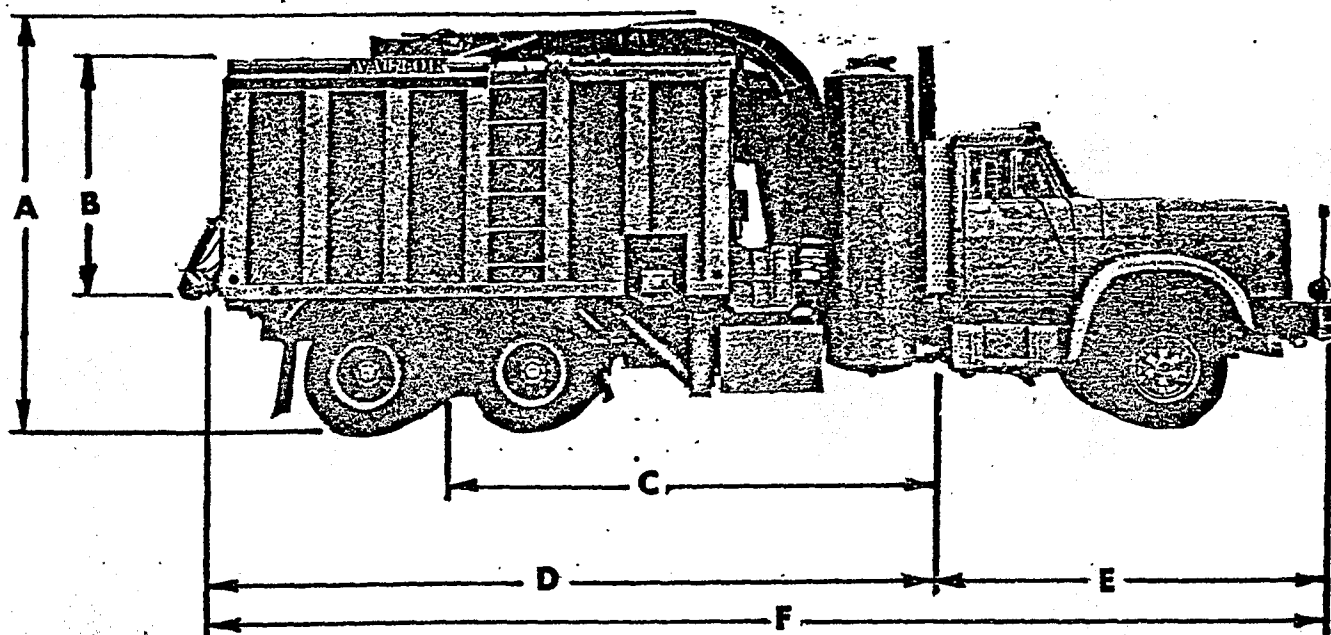
Prior to detailing the clean up procedures for each of the above categories, the various pieces of equipment available for cleanup and the kinds of protective equipment for cleanup personnel are listed with a short description.

3.1.1

Clean-Up Equipment

Clean up equipment at Giant Yellowknife Mines varies from general construction equipment to specialized pieces of equipment purchased solely for dealing with potential spillage of arsenic bearing materials.

Weights & Dimensions



	* A	B	C	D	* E	* F
ENGLISH	140"	94"	170"	247"	134"	33 Ft.
METRIC	355.6 Cm.	238.8 Cm.	431.8 Cm.	627.4 Cm.	340.4 Cm.	10.05 Meters

Overall Empty Weight * 38,710 lbs. - 17,559 Kg.

Front Axle Empty Weight * 14,450 lbs. - 6,555 Kg.

Rear Axle Empty Weight * 24,260 lbs. - 11,004 Kg.

Module, Empty Weight 20,000 lbs. - 9,072 Kg.

* Approximate, depending upon Chassis selected.

Future modifications planned for this vehicle include;

- Construction of flat bed mounted storage boxes to increase the total vacuum truck storage capacity. These additional storage boxes will enable the vacuum truck to completely recover the contents of a spilled tanker truck on the N.W.T. highway system before having to return to the minesite to unload.

- The outfitting of an existing pup trailer with a Catalyst of Canada life support system (protective dust suit system), air compressor, portable water tank, equipment storage lockers, emergency shower, workbench, tool lockers and racks for spare vacuum truck hose. This pup trailer is pulled behind the vacuum truck using a fifth wheel converter and will provide the much needed support for the clean up crew especially in coping with major spills.

b. Construction Equipment

Giant has the following construction equipment available on the minesite for use where required in any spill situation;

- D6 Caterpillar bulldozer
- D8 Caterpillar bulldozer with ripper attachment.
- 980 Rubber tired front end loader.
- 4 cubic yard Michigan front end loader.
- Steel track backhoe unit.
- 2 ten ton gravel trucks.
- 2 35 ton off highway Pit trucks.
- 1 Equipment float and tractor.

This equipment would be used depending upon spill conditions to;

- Construct earthworks to contain a spill or divert groundwater away from a spill area.
- Excavate diversion ditches around a spill area to keep groundwater away.
- Construct pads or clear brush away from the spill site to provide access for cleanup equipment.

- Remove contaminated soils or snow cover.
- Move contaminated soils or snow cover into a centralized containment area for cleanup.

Additional equipment such as cranes, trucks or earth moving equipment is available on a rental basis from local contractors such as

- Curry-Whissel Construction
- Robinson Trucking Ltd.

if required.

C. Small Hand Tools

Small hand tools such as shovels, spades, wheelbarrows etc. will likely form the first line of defence in containing larger spills while heavy equipment is mobilized. Generally speaking a good stock of these tools is always available on the Giant minesite.

3.1.2 Protective Equipment for Cleanup Personnel

A wide variety of protective equipment is available to minimize the exposure of clean up personnel to arsenic bearing dusts stirred up during the clean up activity. The major types of protective equipment available at Giant are as follows;

a. Protective Coveralls made of cotton, normex or synthetic water tight materials. The cotton coveralls are adequate when dealing with smaller spills or for short exposure periods. Coveralls made of synthetic water tight materials are recommended for use in dealing with larger spills where exposure periods to arsenic bearing materials is likely to be of a longer duration.

b. Paper Particulate Masks

Paper particulate masks are not adequate as a first level of protection from fine baghouse dust. These masks are useful as secondary forms of protection when used in conjunction with other forms of respiratory protection.

c. Racal Airstream Filtering Helmets.

The Racal airstream helmet is basically a hardhat with a face visor, air circulation fan and filtering system. Dust laden air is drawn into the rear of the helmet by a small axial fan. Large dust particles are removed by a coarse prefilter which also serves to protect the fan. After leaving the fan the air is passed through a filter bag located in the crown of the helmet. This filter bag is designed to remove more than 95% of the dust particles 0.5 microns or larger in size. The filtered air is then passed downward over the user's face along the inside of the visor. A positive pressure is maintained in the region of the user's nose and mouth which continues even when the helmet is being used by a manual worker with a heavy requirement for air. The air is exhausted at the bottom of the visor. The low air flow resistance in the system makes possible the use of a small fan powered by a portable rechargeable battery pack. The low voltage light weight battery is connected to the fan motor via a flexible cable. The battery pack may be clipped to a belt or carried in a pocket.

The Racal airstream helmet is intended for use in low risk exposure situations or for short exposure durations. They are not adequate protection for tasks requiring ongoing exposure to arsenic dust or in areas where dust is being stirred up. Baghouse dust has an extremely low particle size so more dust particles would tend to pass through the filter bag than for other dust types.

They are useful in protecting an employee for short periods such as shutting down a piece of leaking equipment or for cleaning up spills where dust is not being stirred up or becoming airborne through other means such as cleaning up small spills using vacuum equipment (assuming no wind).



AIRSTREAM TYPE AH1

Beats dust all around the farm—
and protects head, eyes and face!
Airstream provides protection in
three areas...

Face and Eye Protection

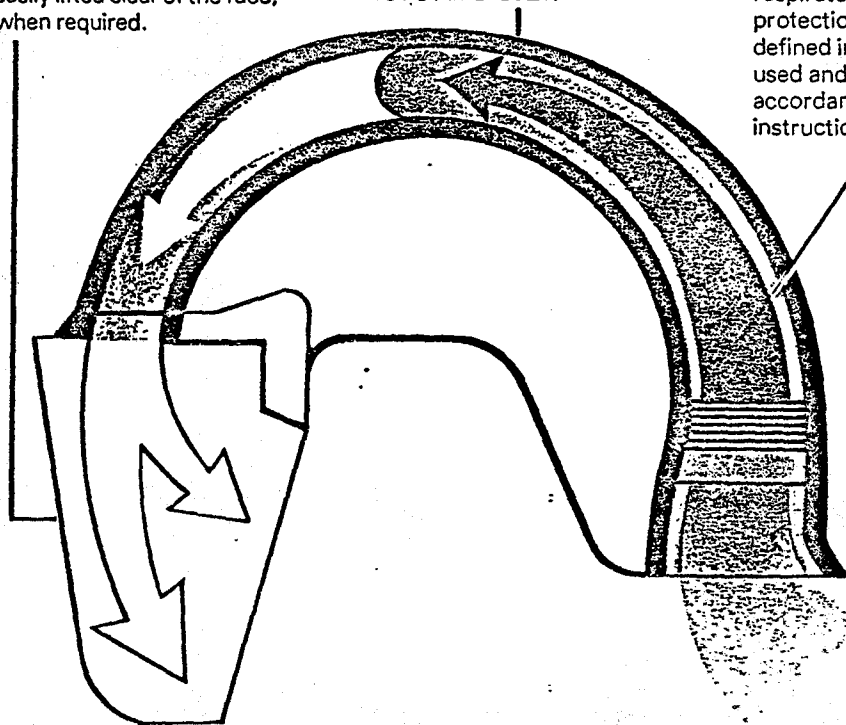
to BS 2092 Grade 1 (M).
The (M) means that the
visor meets the molten
metal splash requirements
of BS 2092. The replaceable
visor screen is mounted in a
clear surround and the
whole assembly is hinged at
the temples so that it is
easily lifted clear of the face,
when required.

Head Protection

is assured by the rugged
construction of the hard
ABS helmet fitted with a
compact and comfortable
head harness—fully
adjustable to fit 5 to 99
percentile of head sizes.
The helmet meets the
impact and penetration
requirements of BS5240:
1975 AMD 2021.

Lung Protection

against nuisance dust is
provided by the unique
Airstream air circulation
and filtering system in which
up to 95% of particles down
to 0.5 micron in size are
removed and a constant
stream of purified air is
passed over the entire facial
area. This is equivalent to a
respirator having a nominal
protection factor of 10 as
defined in BS 4275 when
used and maintained in
accordance with the
instruction book.



d. Catalyst "Life Support" Dust Tight Protective Helmets.

The Catalyst "Life Support" system consists of a full surround fibreglass helmet incorporating two independent air supplies, a full conference-type communications system, lifeline and parachute harness. The primary air supply is set to maintain 2" water differential pressure inside the helmet face seal. The secondary air supply is set to maintain 1" water differential pressure and will thus automatically engage in the event of a primary failure. Air lines, communication line and life line all run inside a PVC jacketed "umbilical line". This ensures protection from kinking air lines, chemical attack or damage to air lines from sharp cornered obstacles. Each helmeted worker has his own umbilical line.

Air is supplied from an external compressor and is regulated through a console. The console indicates and allows control of air pressure supplied to the helmeted worker. Both warning lights and sonic alerts register any malfunction on the primary air supply due to a leak or no flow situation. When the secondary air supply is activated a light warning notifies the console operator.

The Catalyst "Life Support" system is felt to be the best of its kind anywhere and provides complete respiratory protection to a clean up employee exposed to arsenic laden atmospheres. This system is recommended for use in all cleanup situations where other respiratory protection may not be adequate. It is important to remember that when using the Catalyst equipment the compressor intake should not be located in an area where arsenic laden air can be drawn through the system.

e. Skin Protection

Various forms of skin protection are available ranging from water tight coveralls thru, gloves, disposable paper coveralls and hoods to various barrier creams.

3.1.3 Cleanup Procedures

Upon notification the spill control director will assess the spill severity and potential environmental impact and will mobilize the necessary equipment, personnel and services required to deal effectively with the situation. The spill control director will direct the cleanup activity expediting the necessary equipment and services required to;

- Cleanup the spill
- Prevent further environmental damage.
- Monitor the immediate environmental impact and potential for public harm and act as liason with emergency measures in mitigating these impacts.

Clean ups of spilled product will occasionally be required and is expected to be limited to spills of a relatively minor nature related to loading difficulties and/or equipment breakdowns. It is possible however that a major spill could occur and it is important that proper cleanup procedures be applied in either case.

A. Visible Airborne Dust Emissions

When a visible airborne dust emission is observed the piece of equipment causing the release of arsenic dust should be shut down. The cause of the emission should then be determined and steps taken to either repair or replace the piece of equipment to prevent further release.

Upon discovering a visible dust leak the first reaction should be to take action to terminate the arsenic dust spill. The person discovering the spill should then quickly assess the nature of the spill, take any action he is capable of to prevent spread of the effected area and then contact the spill director and brief him on the situation. If the spill is small in nature the person discovering the spill should take action to cleanup the effected area before calling the spill director. This quick action would ensure minimum spread of the spilled product and thus minimize environmental impact. If the person discovering the spill is unable to clean up the area effected he may take other action such as covering the effected area with plastic or a tarp to minimize spread prior to calling the spill control director.

Upon arrival the spill control director will quickly assess the severity of the spill and mobilize the necessary personnel and equipment. Small airborne dust leaks will result in little product being spilled over a large area. Clean up of these minor spills will normally be effected using hand tools or small power tools such as shovels, drums and a small shop vac style vacuum cleaner. In this first spill category the only dust recovered will be visible concentrations around the leak point. Baghouse dust lost at such a slow rate over the larger area would not likely be visible and thus not likely recovered.

B. Spillage From Conveying Equipment

The person discovering a spill of baghouse dust from a piece of conveying equipment should take immediate action to terminate the spill by shutting down the silo fill cycle or truck fill cycle. This same person should quickly assess the nature of the spill and effected area and take any possible action to prevent the spread of the spilled baghouse dust; say by shutting the doors on the storage silo or scale building or by covering the effected area with a tarp or plastic sheet. The person discovering the spill should then call the spill control director and brief him on the situation.

The spill control director will assess the severity of the spill and mobilize the necessary personnel and equipment to clean up the effected area. Clean up will generally be accomplished by using the Vactor truck to remove spilled baghouse dust and any contaminated ground material or water where feasible. If the spill is likely to spread to say a local watershed the spill control director will mobilize the necessary equipment to contain the spilled product and divert water from the contaminated area. Initial containment will likely employ hand tools such as shovels to cover the interim period before heavy equipment can be mobilized.

C. Spillage from Storage Silo or Transport Truck

The person discovering a spill of baghouse dust from the storage silo or transport truck should quickly assess the situation and take any possible steps to terminate the spill by placing a temporary plug or patch in the leak point, using any material at hand. This same person should take whatever steps he can to contain the spilled material or divert groundwater away from the effected area and then call the spill control director and brief him on the situation.

Upon arrival the spill control director will assess the severity of the spill and mobilize the necessary personnel and equipment to clean up the effected area. In the case of a spill on the N.W.T. highway system the emergency clean up crew will be mobilized along with the Vactor vacuum truck prior to the spill control director leaving for the spill site.

Upon arrival the emergency clean up crew will quickly assess the situation and terminate the leak or leaks by placing of temporary patches or plugs. The crew will then arrange to contain the spilled material by the construction of containment dykes and/or diversion ditches to direct groundwater away from the site. If required the crew will call the minesite and arrange for heavy equipment to be dispatched to assist in containing the spilled material.

After putting on the appropriate protective equipment the clean up crew will proceed to recover the spilled material and any contaminated ground cover using the Vactor vacuum unit.

The spill control director will arrange for the necessary equipment to right a rolled truck and to make more permanent repairs to prevent further loss of material while the damaged truck is returned to Yellowknife. If the damage is not too severe the truck may be repaired on site and then continue on its way rather than be returned to Yellowknife.

D. Major Rupture of Transport Truck or Silo

The person discovering a major spill such as a truck rupture should quickly assess the situation and call the Spill Control Director. The spill control director will mobilize the emergency clean up crew and Vactor vacuum truck and then contact the R.C.M.P. and emergency measures department of the N.W.T. government. The R.C.M.P. will be requested to isolate the area to prevent potential harm to the public.

Upon arrival the spill control director and emergency clean up crew will quickly assess the situation and take steps to contain the spilled material by the construction of containment dykes and/or diversion ditches. The spill control director will mobilize additional heavy equipment as required.

If the rupture is serious enough to require total removal of the truck contents a set of steel containers will be set on a flat deck truck and moved to the spill site from the Giant minesite. The Vactor vacuum truck will be used to recover the spilled material and contaminated ground cover which will be placed in the steel containers for removal to the Giant minesite.

After cleaning out all the contained and spilled baghouse dust the damaged truck will be removed to the nearest repair site.

A spill of baghouse dust into a body of water would result in more severe ecological damage than a spill on land due to the soluble nature of the contained arsenic. It is speculated that only a small percentage of any spillage into a water body would be recoverable. This percentage would decrease as the currents in the water body increased.

Massive failure of the silo would result in the silo contents being removed using the Vactor vacuum truck and pneumatically conveyed to underground storage vaults on the Giant minesite.

4.1 Corrective Measures To Prevent Further Spills

The Giant arsenic trioxide loadout facility has been engineered to counter any potential spill of baghouse dust. Nevertheless even the best engineered system can fail or overlook some unknown problem area. Following any such systems failure an investigation of the probable causes will be conducted and steps taken to eliminate or minimize the potential for further recurrence.

4.1.1 Electrical

Electrical systems failures will generally cause the shut down of either the silo fill cycle or the truck fill cycle. Failure of any electrical system will be analyzed by the Giant electrical department and corrective measures taken to prevent recurrence.

4.1.2 Mechanical

Mechanical systems failures will be analyzed by the Giant engineering and mechanical staff and corrective measures taken to prevent recurrence. Some mechanical failures may result in the re-engineering and subsequent replacement of faulty components.

4.1.3 Other (Engineering, Design)

Engineering or design faults resulting in a spillage of baghouse dust will be analyzed by Giant engineering personnel and their consultants and subsequent measures taken to correct the fault to prevent recurrence.

5.1 Disposal

Baghouse dust recovered from a spill will generally be contained or returned to the minesite in three types of containers:

- a) Steel drums or plastic bags.
- b) The 16 cubic yard storage box on the Myers Sherman vacuum truck.
- c) Steel container boxes.

Disposal of this recovered material will be through one of the following two methods:

5.1.1 Return Material to Underground Storage and/or Silo

The majority of the recovered baghouse dust will be returned to the storage silo on the Giant minesite or to the underground storage vaults under the Giant minesite. A permanent cyclone-baghouse dust collection unit is mounted over the pneumatic conveying pipeline leading to the storage silo and underground storage vaults. This unit is designed to facilitate the pneumatic unloading of the 16 cubic yard storage box on the Myers Sherman vacuum truck. The baghouse dust is drawn through a 1" slot in the tail end of the box to the permanent cyclone-baghouse unit. The conveying air is returned to the baghouse unit on the Myers Sherman truck and exhausted back into the box to pickup additional dust. Rotary air lock valves beneath the cyclone and baghouse unit feed the baghouse dust into the pneumatic conveying line loading to either the storage silo or the underground storage vaults. Rocks, gravel and shrubs greater than 1 inch will remain in the box and have to be disposed of in another way.

Baghouse dust contained in steel drums or steel container boxes will have to be pneumatically transferred to the Myers Sherman vacuum truck before they can be returned to the storage silo or underground vaults located on the Giant minesite.

5.1.2 Return Material to Tailings Pond

Arsenic containing material that cannot be returned to the storage silo or underground vaults such as contaminated gravels, brush and slurried material will be deposited into the tailings pond on the Giant minesite and slurried. The arsenic dissolved in the pond will then be treated and stabilized as ferric arsenate in the tailings effluent treatment plant located at the outflow of the first tailings pond.

6.1

Post Operational Analysis

Following each spill cleanup operation a post operational analysis will be conducted. Basically the spill control director will meet with the clean up squad and other effected Giant departments to evaluate the clean up operation and list deficiencies in cleanup equipment and procedures.

These deficiencies will then be addressed and the following steps taken:

- Revise the contingency plan to reflect the new procedures required to rectify the deficiencies.
- Order any additional clean up equipment required to correct deficiencies or to replace equipment and material consumed in the cleanup.

7.1

Final Reporting

Reporting of any spillage of baghouse dust will be in two phases;

- Initial reporting at the time of the spill broadly describing the location, nature and severity of the spill.
- Final reporting following the post operational analysis describing the nature of the spill, location, cleanup action taken, probable cause, environmental and health impacts and steps required to prevent recurrence.

EMERGENCY SPILL ACTION PLAN
REPORT SHEET

Fill Out This Sheet As Soon As Possible

1. Name of Person reporting spill _____
2. Telephone Number _____
3. Company Name _____
4. Company Address _____
5. Chemical Spilled _____
6. Approximate Quantity _____
7. When spill occurred (date & time) _____

8. When spill reported _____
9. Exact spill location _____

- 9a. Injuries and hazards _____

10. Current situation _____

11. Weather Forecast _____

12. Person Contacted at Giant _____
13. Person Contacted at Emergency Measures _____

14. Person Contacted at Water Resources _____

15. Person Contacted at E.P.S. _____
16. Other Officials informed _____

7.1.1 To Management

Initial spill reporting will be on the attached report sheet which will be completed when the spill is first reported.

A final report will be filed with management following the post operational analysis detailing the spill, cleanup activity, probable cause and recommending steps required to prevent recurrence and more efficient cleanup.

Daily verbal progress reports will be filed with management during the cleanup period.

7.1.2 To Environmental Authorities

Initial spill reporting will be as described in section 7.1.1 .

A final report will be filed with the environmental authorities following the post operational analysis detailing the nature and location of the spill, steps taken to contain the spill, cleanup action taken, environmental impact monitoring and steps taken to minimize the environmental impact.

Weekly progress reports will be filed during the cleanup period.

7.1.3 To Emergency Measures Director

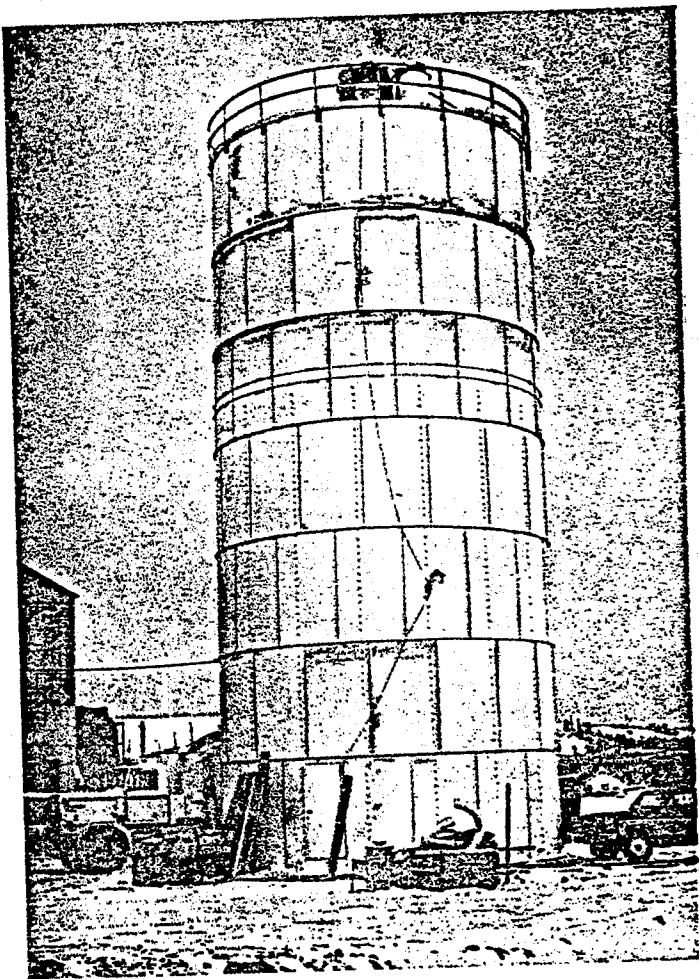
Initial spill reporting will be as described in section 7.1.1 .

A final report will be filed with the emergency measures director following the post operational analysis detailing the nature and location of the spill, steps taken to contain the spill, cleanup action taken, environmental impact monitoring, steps taken to minimize the environmental and public safety and health impacts. The report will discuss the probable cause of the spill and actions taken to prevent recurrence.

Daily verbal progress reports complimented by weekly written summaries will be filed with the emergency measures director during the cleanup period.

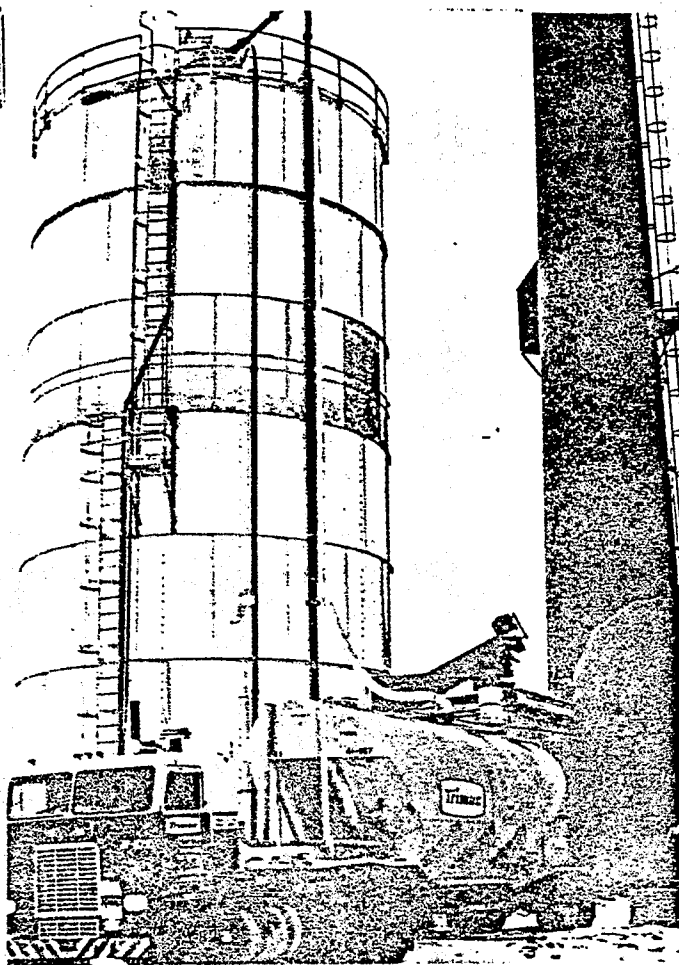
The contingency plan will be reviewed following the post operational analysis and revised if necessary.

An annual review of the contingency plan will also be undertaken.

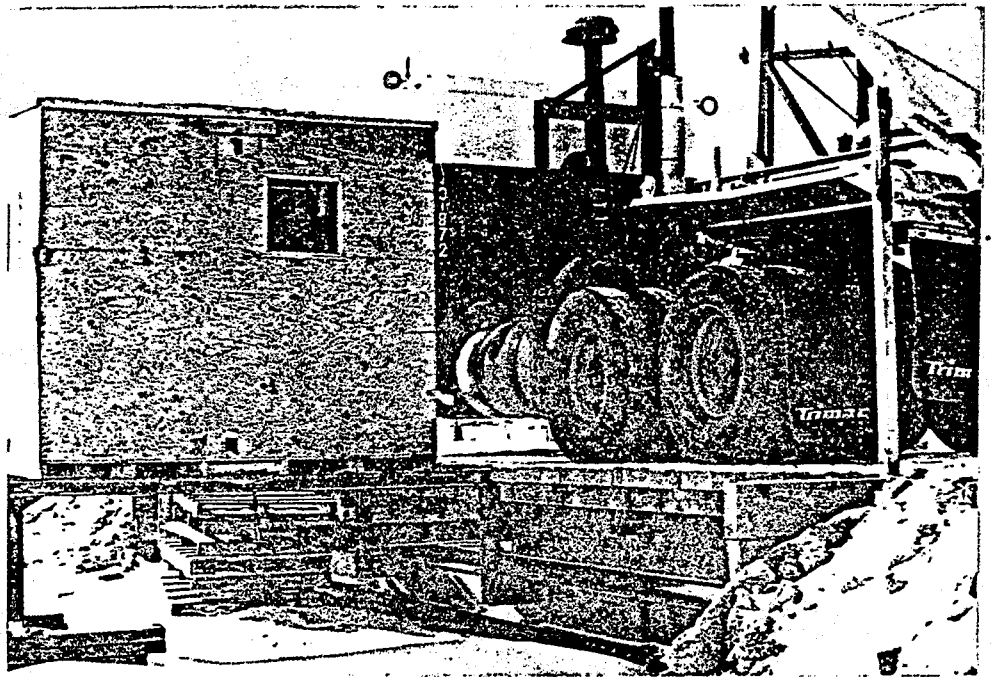


Arsenic Trioxide Storage Silo
at Giant

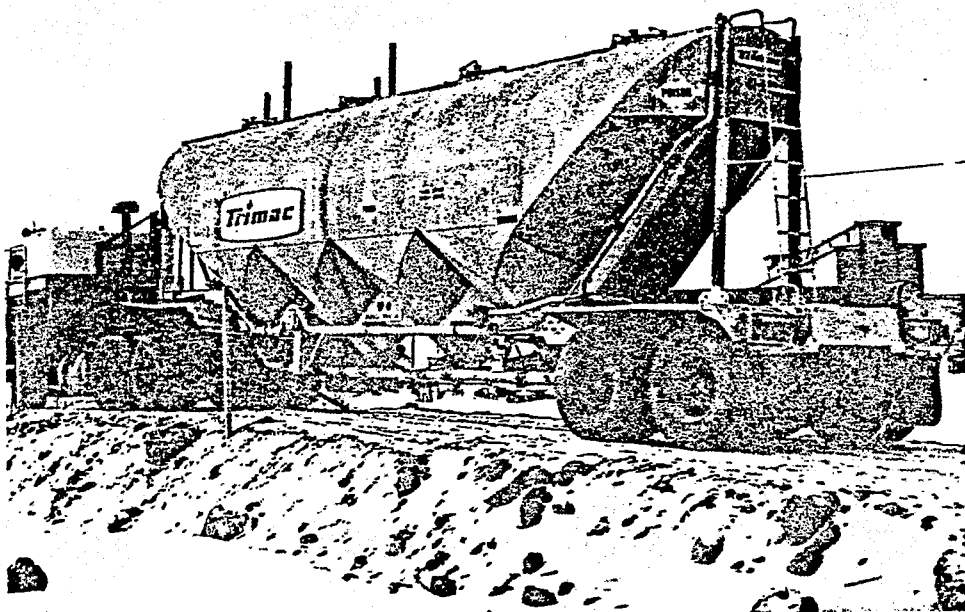
Truck in Position During Loading
Cycle



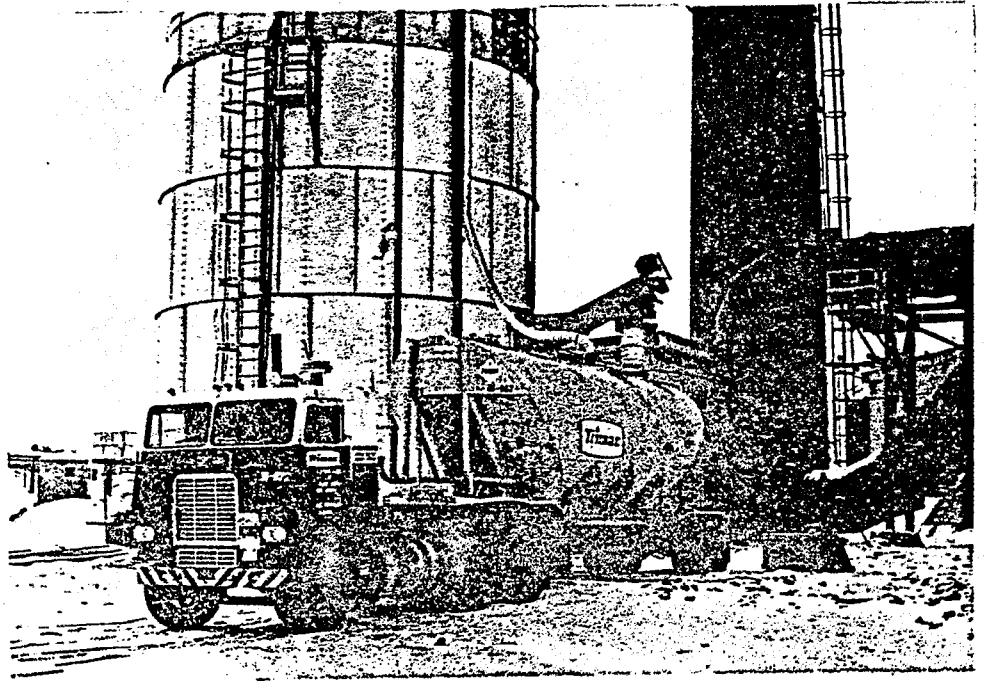
Arsenic Trioxide Bulk Hauler



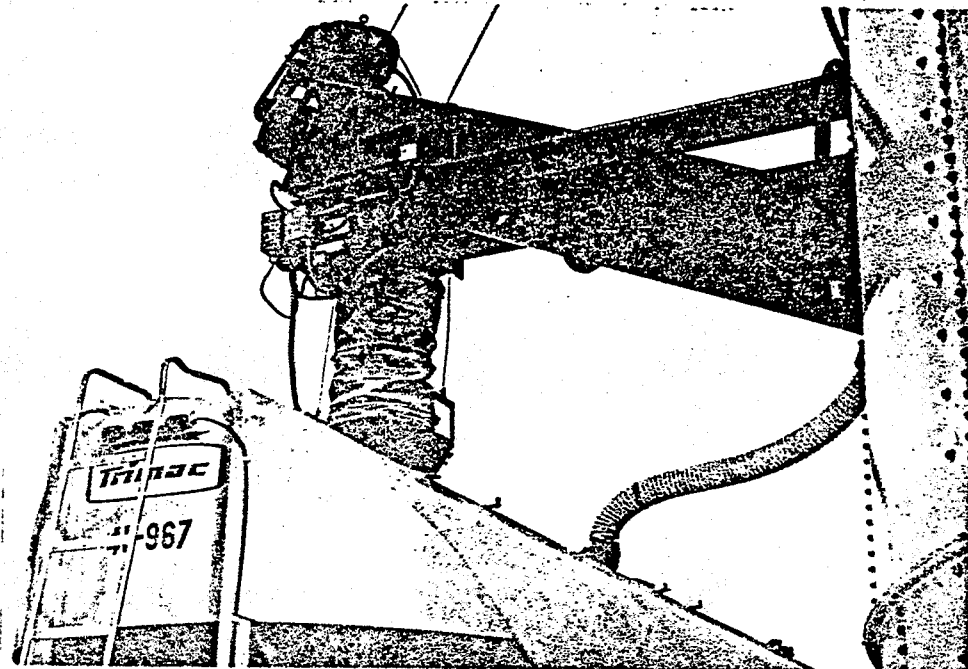
Truck Weigh Scale



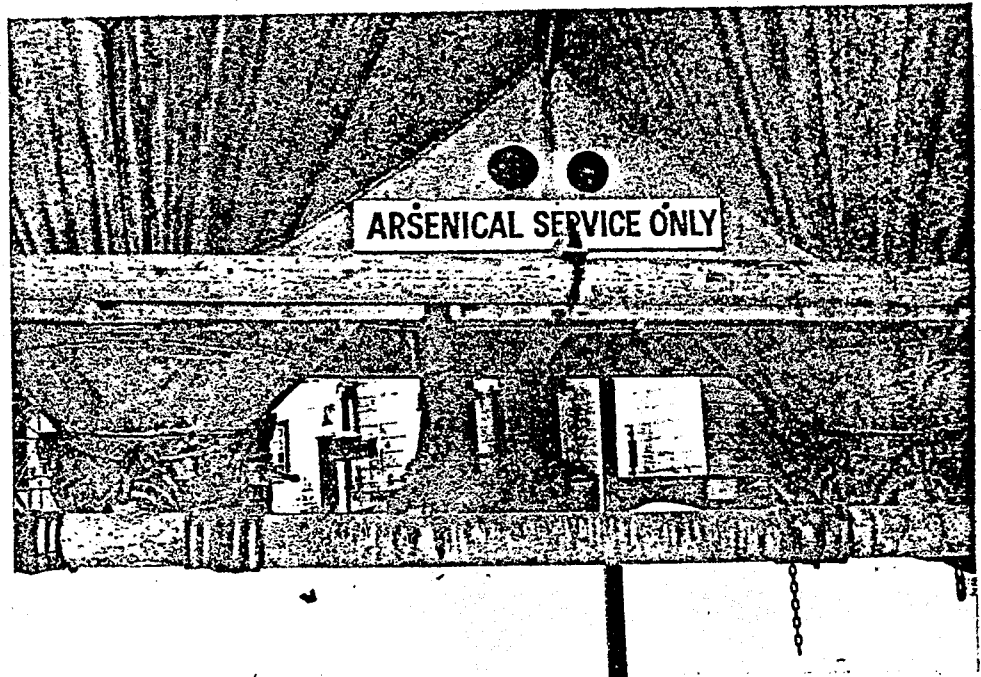
Truck in Position During Loading Cycle



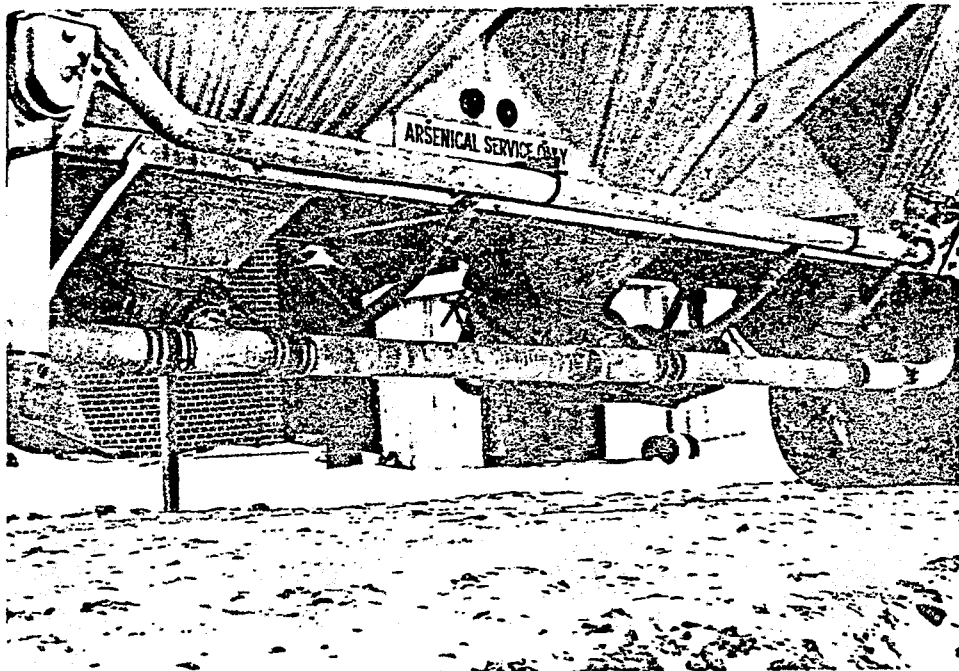
Loading Spout and Truck Vent Line in Load Position



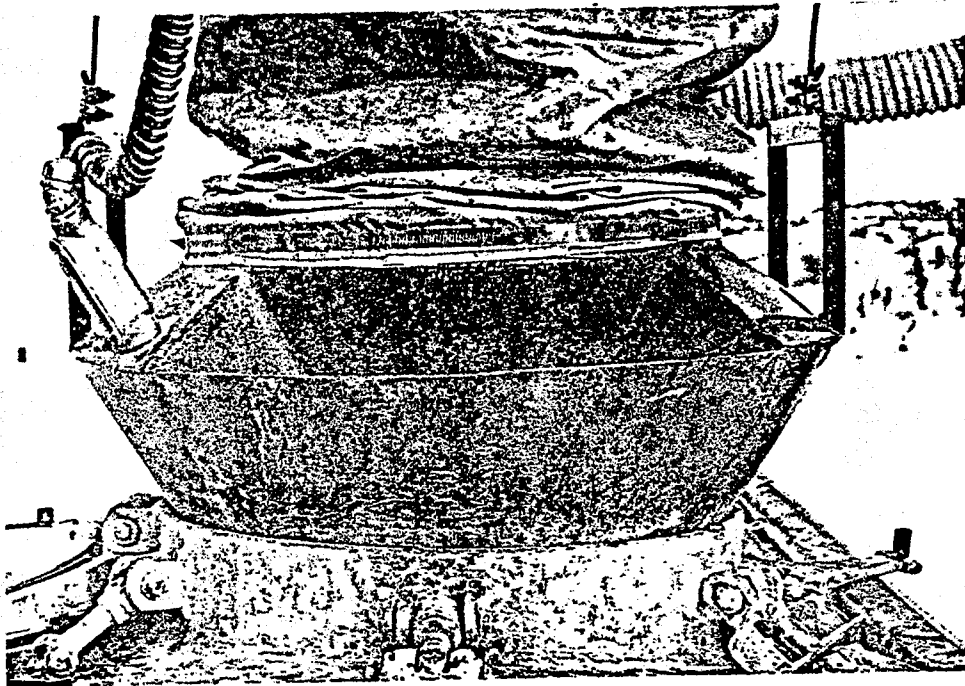
Restricted Service Labelling



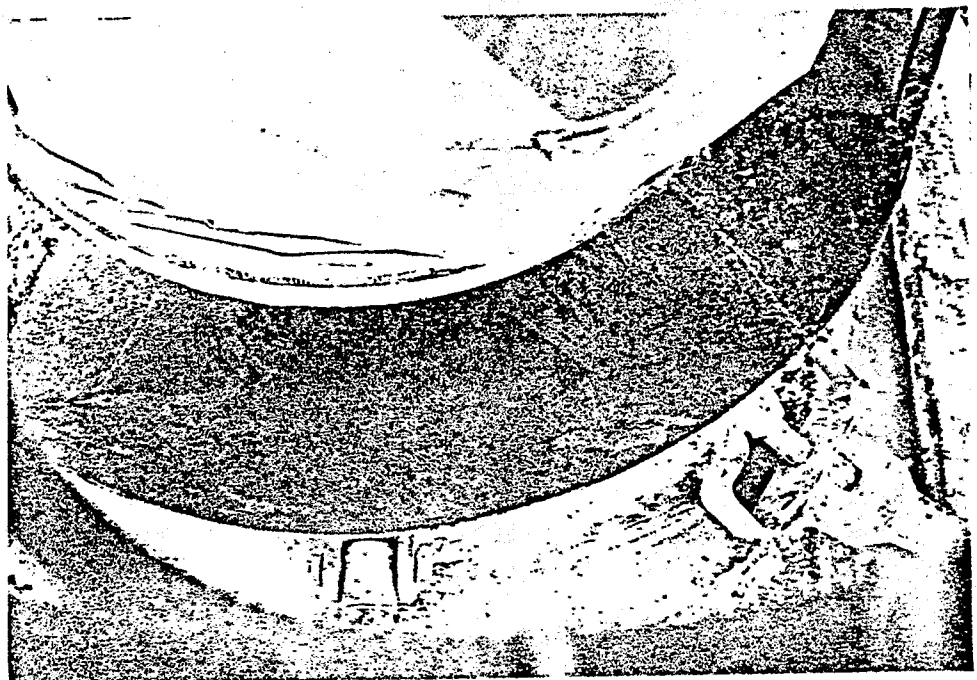
Vacuum Unloading System

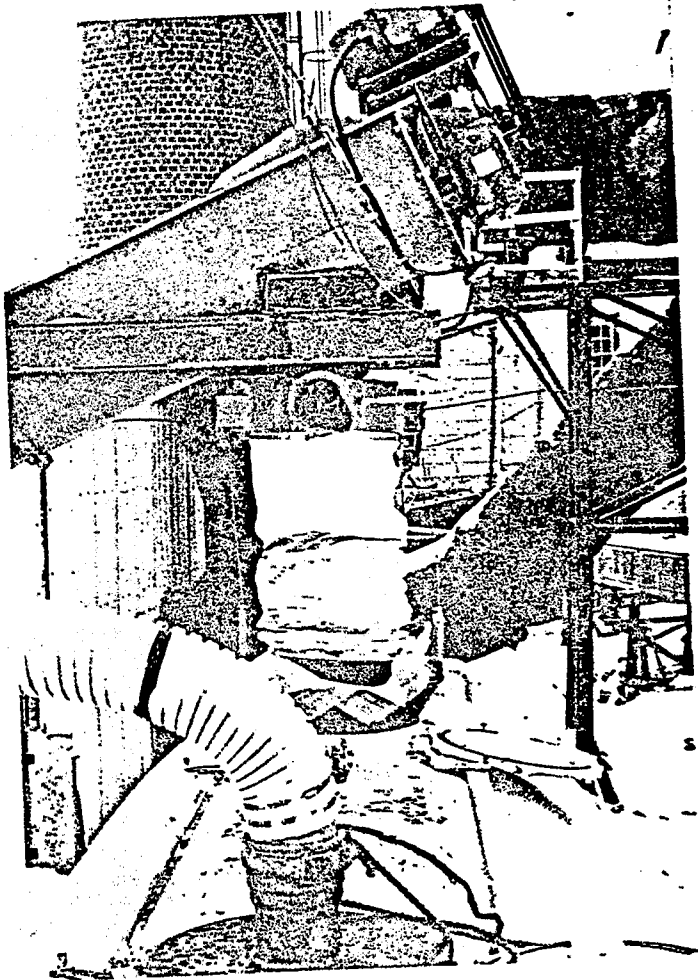


Loading Spout Engaged in Truck Hatch



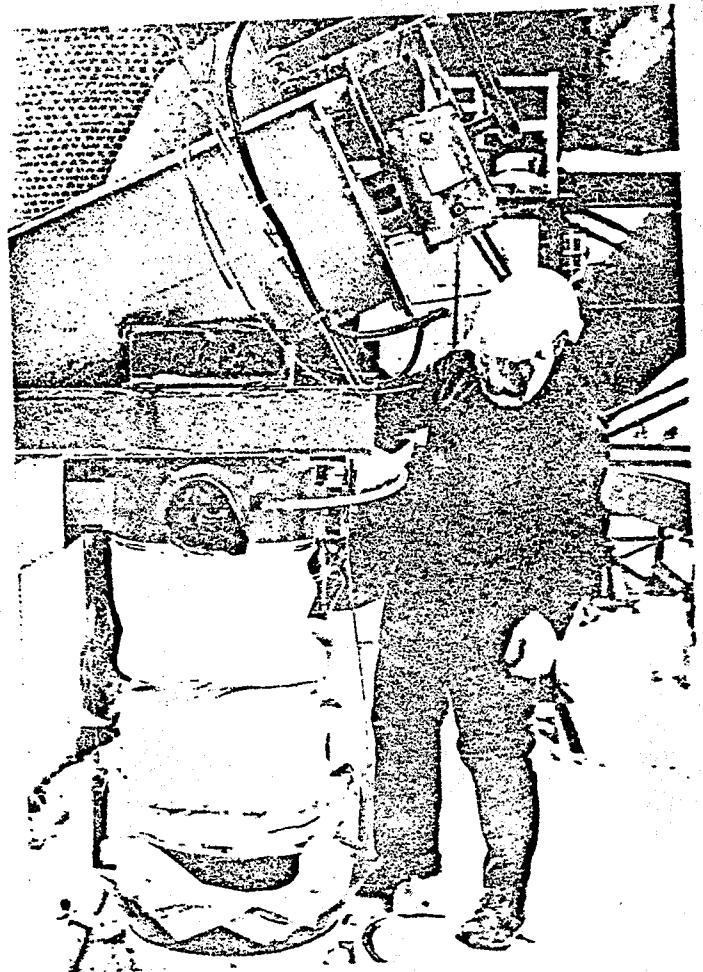
Dust Free Loading Spout in Operation

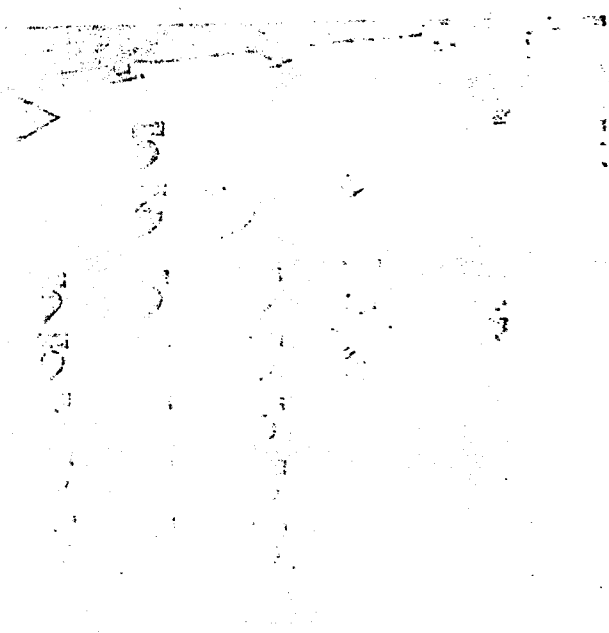




Loading Spout and Truck Vent
Line in Position

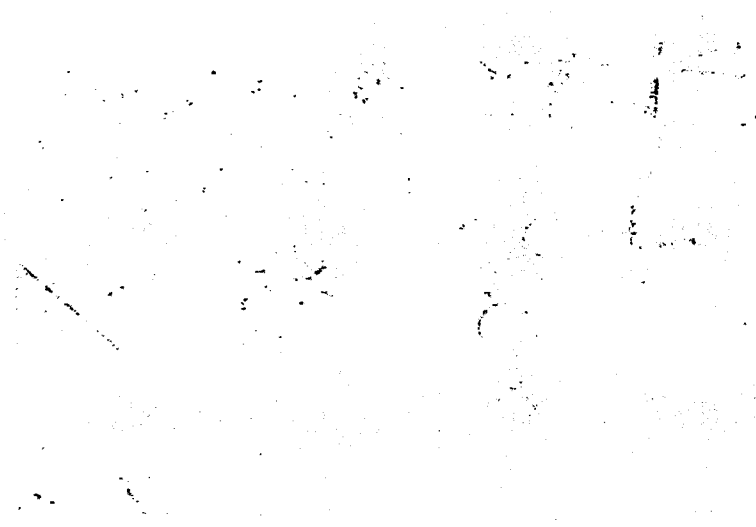
Operator Positioning Truck
Loading Spout



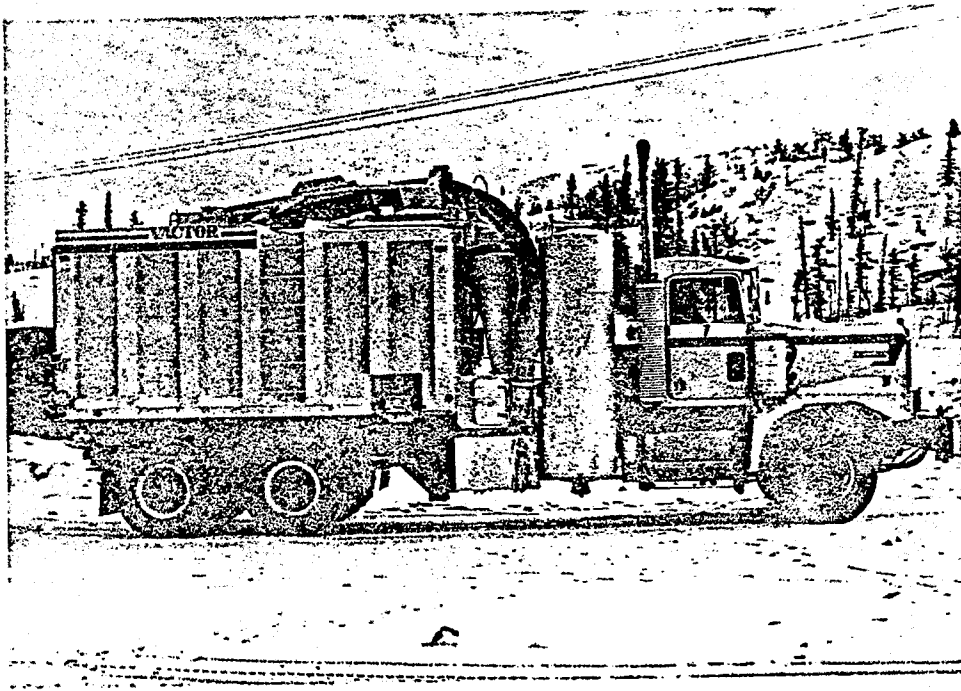


Arsenic Trioxide Loading Control
Panel

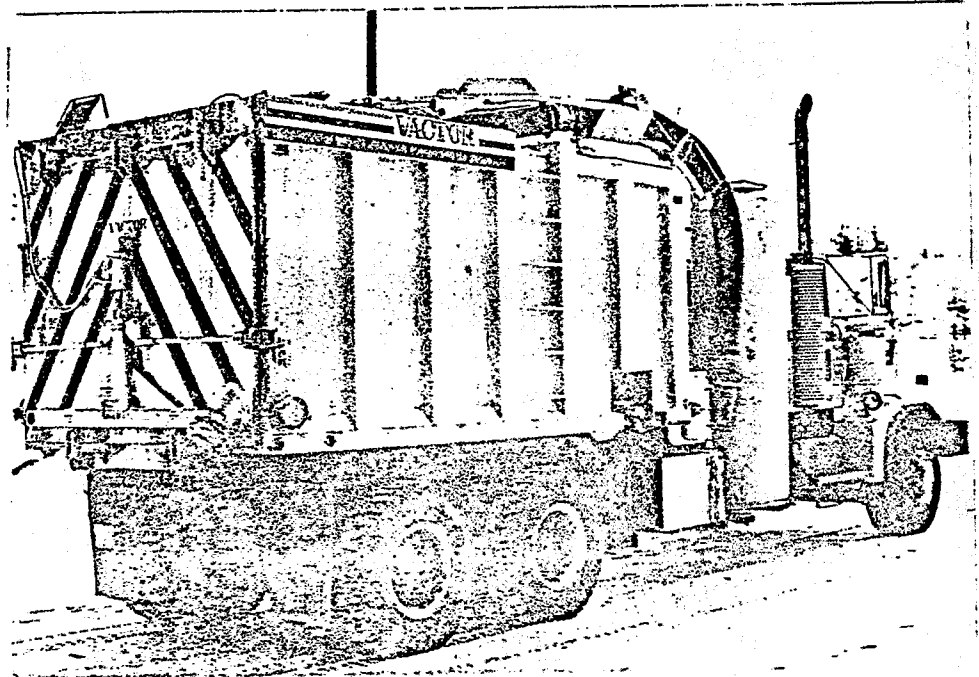
Stack Loading viewed from top of site



Vacuum Recovery Truck



Vacuum Recovery Truck



TRANSPORTATION SPILL

ACTION PLAN

IN THE EVENT OF A SPILL

I CONTAIN

Prevent the arsenic trioxide from contaminating waterways. Small spills must be cleaned up immediately. Large spills covered and contained until proper equipment arrives. Do not flush with water.

II CONTROL

Prevent casual observers from walking through contaminated area or coming in contact with the dust.

III COMMUNICATE

Contact one of the people on the attached sheet in the priority listed (i.e., Trimac, Koppers, Giant), reporting the location and extent of the problem. Start to fill out the emergency spill action plan report sheet.

TRIMAC

<u>Business Telephone</u>	<u>Name</u>	<u>Home Telephone</u>
403/264-0101 403/265-4027	Walter Wemets, Regional Manager	403/282-8604
403/264-0101	Jim Coyston, Branch Manager	403/279-5267
403/264-0101	Bob Hissett, Disp.	403/280-0254
403/264-9900	Gerry Tumbach, Safety Director	403/271-7431

KOPPERS COMPANY, INC.

404/363-6300	K.E. Cogan, Manager, Operations	404/393-8594
412/227-2000	Koppers Company Transportation, Emergency Center	412/227-2000
404/363-6300	W.F. Brantley, Plant Manager	404-435-0166
404/363-6300	C.D. Smith, Plant Engineer	404/498-0188
412/227-2460	R.D. Arsenault, Director, Technical & Planning Department	412/935-5249
404/363-6300	F.E. Boge, Manager, Engineering	404/987-2492
412/227-2450	J.F. Bridges, Technical Service Rep.	412/625-3216
404/363-6300	F.L. Broxton, Senior Project Engineer	404/487-6139
412/227-2452	P.A. Goydan, Marketing Manager	412/795-2415
404/363-6300	Harris Hollis, Dispatcher	404/284-4452
412/227-2726	Wayne Simkins, Product Services & Marketing Representative	412/899-2940

GIANT YELLOWKNIFE MINES LIMITED

403/873-6301	Kent Morton, Mill Superintendent	403/873-2015
403/873-6301	Larry Connell, Asst. Mill Superintendent	403/873-2313
403/873-6301	W.A. Moore, General Manager	403/873-5121

EMERGENCY SPILL ACTION PLAN

REPORT SHEET

Fill Out This Sheet As Soon As Possible

1. Name of Person reporting spill _____
2. Telephone Number _____
3. Company Name _____
4. Company Address _____
5. Chemical Spilled _____
6. Approximate Quantity _____
7. When spill occurred (date & time) _____
8. When spill reported _____
9. Exact spill location _____

- 9a. Injuries and hazards _____

10. Current situation _____

11. Weather Forecast _____

12. Person Contacted at Trimac _____
13. Person Contacted at Koppers _____
14. Person Contacted at Giant _____
15. Person Contacted at E.P.A. _____
16. Other Officials informed _____

ARSENIC TRIOXIDE GENERAL INFORMATION

General Description

White powder, odorless.

Solubility in Water

18 grams per liter.

Chemical Reactivity

Contact with acids or acid substances in combination with certain metals, for example, galvanized sheet metal may cause formation of toxic fumes.

When heated over 200° C, gas is emitted.

Toxicity

Less than 5 mg per kilogram of body weight.

Protective Equipment

Goggles give complete protection to the eyes, suitable respiratory protection, plastic or rubber gloves, plastic or rubber aprons, boots.

Emergency Action

Spillage - small amounts should be collected in a simple way, that is, by vacuum cleaner. Large quantities must be handled by personnel in protective coveralls with rubber boots, gloves, dust respirator, and close-fitting goggles.

The spillage should be contained in dust-proof drums or other suitable packing.

Fire - keep containers cool by spraying with water, gas is emitted over 200° C., don't inhale the gas. Use gas masks working in a gas area.

First Aid

If ingested, cause vomiting by using water, milk or milk of magnesia and take victim to a physician immediately. If inhaled, remove victim from the contaminated area, keep breathing passages open and keep him warm. If powder is on his clothes, change clothing and take a shower using soap and water.

Sanitary Demands

Change work clothing often, wash skin regularly, smoking should not be allowed in places where there is a risk of contact with arsenic trioxide.

PRODUCT

Trade name White Arsenic	Chemical or technical name Arsenic Trioxide
-----------------------------	--

COMPANY

Information issued by BOLIDEN METALL AB, Sæller, Production group 3 / Alf-Björkengren	Date of issue 1978-04-06
Supplier	
Manufacturer BOLIDEN METALL AB, Skelleftehamn, Sweden, Telephone 046-0910-31500	

CLASSIFICATION (according to Swedish legislation)

Product hazardous to health Poison <input checked="" type="checkbox"/> Dangerous substance <input type="checkbox"/> No <input type="checkbox"/>	Subject to registration Reg.nr (Class ①)	No <input type="checkbox"/>
Classified or considered by Products Control Board/Division Reference schedule <input checked="" type="checkbox"/> Response <input type="checkbox"/> Verdict <input type="checkbox"/> No. in register	Subject to licence Yes <input type="checkbox"/> No <input type="checkbox"/>	No <input type="checkbox"/>
Inflammable product Class 1 <input type="checkbox"/> 2a <input type="checkbox"/> 2b <input type="checkbox"/> 3 <input type="checkbox"/> Inflammable gas <input type="checkbox"/> No <input type="checkbox"/>	Explosive product Transportation class: A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> E <input type="checkbox"/>	No <input type="checkbox"/>
Transportation class according to IMDG (IMCO) 6029 Class 6.1 UN No. 1561	RID (OCTI) C1 6.1, 52	ADR (ECE) C1 6.1, 52
	RAR (IATA)	

CONTENTS ②

Arsenic trioxide > 99 %

CHEMICAL/PHYSICAL PROPERTIES

General description (form, viscosity, colour, smell etc) White powder, odourless			
Solubility in water at 20°C: 18,1 g/1000 g H ₂ O at°C:		Solubility in organic solvents (state solvent): Alcohol	
Vapour pressure at 20°C: 8,5 · 10 ⁻¹⁰ mmHg/Pa; at°C: mmHg/Pa		Vapour density (air = 1) ③: -	Evaporation (ether = 1) ③: -
Odour threshold: - ppm	Acidity/Alkalinity: - meq/g	pH in concentrate: - in dilution as used: -	
Inflammability limits in air: % by vol; g/m ³	Ignition temperature ④: - °C	Flashpoint ⑤: - °C (Method):	
Density See remarks at 20°C: 3 865 kg/m ³	Solidifies at ⑤: - °C	Boiling point: Sublimated + 193 °C	Storage stability: Unlimited
Chemical reactivity ⑥: Contact with acids or acid substances in combination with certain metals, for example galvanized sheet or light metal, may cause formation of toxic fumes. Gas is emitted over 200°C when heated.			

REMARKS ⑦

Weight by unit of volume: 2 000 kg/m³

INFORMATION ON HEALTH HAZARDS ⑧

Toxicity: $< 5 \text{ mg/kg body-weight}$.

Threshold Limit Value: $0.5 \text{ mg/m}^3 \text{ As}$ (Health and Safety Executive (UK) Guidance Note EH 15/76)

Poisonous if swallowed or by dust inhalation. Dust may cause irritations on skin and mucous membranes. The substance may cause efflorescence in longer contact especially with wet skin.

INFORMATION ON ENVIRONMENTAL HAZARDS ⑨

Arsenic trioxide may, in a marine environment, be restored into less poisonous organic arsenical compounds. Arsenic may cause cancer.

PROTECTIVE EQUIPMENT; VENTILATION ETC ⑩

Goggles giving complete protection to eyes.

Suitable respiratory protective device.

Plastic or rubber gloves, plastic or rubber apron. Boots.

See complementary information.

EMERGENCY ACTION (spillage, fire, first aid in case of skin or eye contact, ingestion or inhalation) ⑪

Spillage: Small amounts should be collected in a simple way, e.g. by vacuum cleaner. Large quantities must be handled (shoveled, brushed) by personnel in washable overalls, with rubber boots and gloves, dust respirator and close-fitting goggles. The spillage should be enclosed in a strong, dust-proof packing. **Fire:** Keep containers cool by spraying with water. Gas is emitted over 200°C . Don't inhale gas. Use gas-mask working in gas area. **First aid:** If ingested: Cause vomiting by using water, milk or milk of magnesia and take victim to a physician immediately. If inhaled:

Remove victim from contaminated area, keep breathing passages open and keep him warm. If powder on clothes: Change clothes and take a shower with soap.

COMPLEMENTARY INFORMATION ⑦

Sanitary demands

Change working clothes often. Wash the skin regularly. Use talc if needed. Rinse out mouth before smoking or having food. Smoking should not be allowed in places where there is a risk of contact with arsenic trioxide.

Notes

① For pesticides only.

② Primarily components which are of importance for the protection of health and the environment. Quantities should be declared as complete as circumstances allow. In some cases group notations may be acceptable.

③ May be specified as < 1 , $= 1$ or > 1 .

④ Specify if less than 150°C , otherwise specify as $> 150^\circ\text{C}$.

⑤ Specify if less than 100°C , otherwise specify as $> 100^\circ\text{C}$.

⑥ Report if combined with special risk e.g. strongly oxidizing (risk of

⑧ Type and magnitude of risk should be stated as well as acute toxicity, threshold limit value etc. If known also state symptoms of poisoning and the risk of sensitization (allergies). Acute as well as chronic poisoning should be considered. References may be added.

⑨ E.g. degradability, chemical and biological oxygen demand (COD, BOD), toxicity for wildlife and plants, bio-accumulation risks etc. References may be added.

⑩ Information on suitable precautionary measures and handling in-

EMERGENCY ACTION

Each trailer will carry an emergency kit containing 4 sets of goggles, 4 disposal uniforms, 4 disposal boots, 4 respirators with cartridges, 8 sets of additional cartridges, 4 long gauntlet rubber gloves, large plastic garbage bags with ties, 2 small shovels, 1 spill plan.✓

If a spillage occurs, primary effort must be containment. When local authorities are contacted, it may be necessary to arrange for a backhoe to get to the accident area so that dirt can be mounded around the spill and covered with a plastic tarp until clean-up procedures can be initiated.

Personnel will wear respirators, tight fitting goggles, gloves, disposable uniform and boots.

Each spill will have to be evaluated on an individual basis, however, most dry-bulk accidents do not involve catastrophic rupture of the tank. Small amounts of spillage should be collected in a simple way, that is, by vacuum cleaner or carefully shoveling into approved open top drums or plastic bags. This material may be placed back into the trailer for processing.

A catastrophic spill may also require the use of a large vacuum truck to transfer the trioxide into a sift proof trailer with final clean-up conducted either by shoveling dirt into approved containers or possibly through the use of front end loaders into sift proof dump trucks for transportation to an approved disposal site.

Do not use water to flush the site. This action may result in contamination of waterways or municipal sewer systems.

TRANSPORTATION DANGEROUS GOODS CONTACTSCANADA:

Mr. T. D. Ellison,
Director,
Transport Dangerous Goods Branch,
Transport Canada,
Place de Ville,
Ottawa, Ontario.
K1A 0N5

(613) 992-4624

ALBERTA:

Mr. E. Nagy,
Manager,
Transport Field Operations,
Alberta Transportation,
4920 - 51 Street,
Red Deer, Alberta.
T4N 5Y5

(403) 342-6074

Mr. R. Pritchard,
Waste Management Branch,
Alberta Environment,
Oxbridge Place,
9820 - 106 Street,
Edmonton, Alberta.
T5K 1J6

(403) 427-2739

Mr. Ernie Tyler,
Coordinator, Alberta Disaster Services,
12348 - 149 Street,
Edmonton, Alberta.
T5V 1B4

(403) 427-2772

SASKATCHEWAN:

Mr. Wm. McLaren,
Saskatchewan Highway Traffic Board,
1874 Scarth Street,
Regina, Saskatchewan.
S4P 2G6

(306) 565-4037

MANITOBA:

Mr. G. F. Sewell,
Assistant Maintenance Engineer,
Manitoba Department Highways and Transportation,
1075 Portage Avenue,
Winnipeg, Manitoba.
R3G 0S1

(204) 786-8704

ONTARIO:

Mr. A. Sharp,
Dangerous Goods Transportation Office,
Program Development Branch,
Transportation Regulations Division,
Ministry of Transportation & Communications,
Downsview, Ontario.
M3M 1J8

(416) 248-3548

NORTHWEST TERRITORIES:

Mr. D. Billing, (or Mr. B. Scott)
Environmental Services Division,
Department of Renewable Resources,
Government of the N.W.T.,
Yellowknife, N.W.T.
X1A 2L9

(403) 873-7654

EPA REGIONAL OIL & HAZARDOUS MATERIALS
EMERGENCY SPILL RESPONSE TELEPHONE NUMBERS

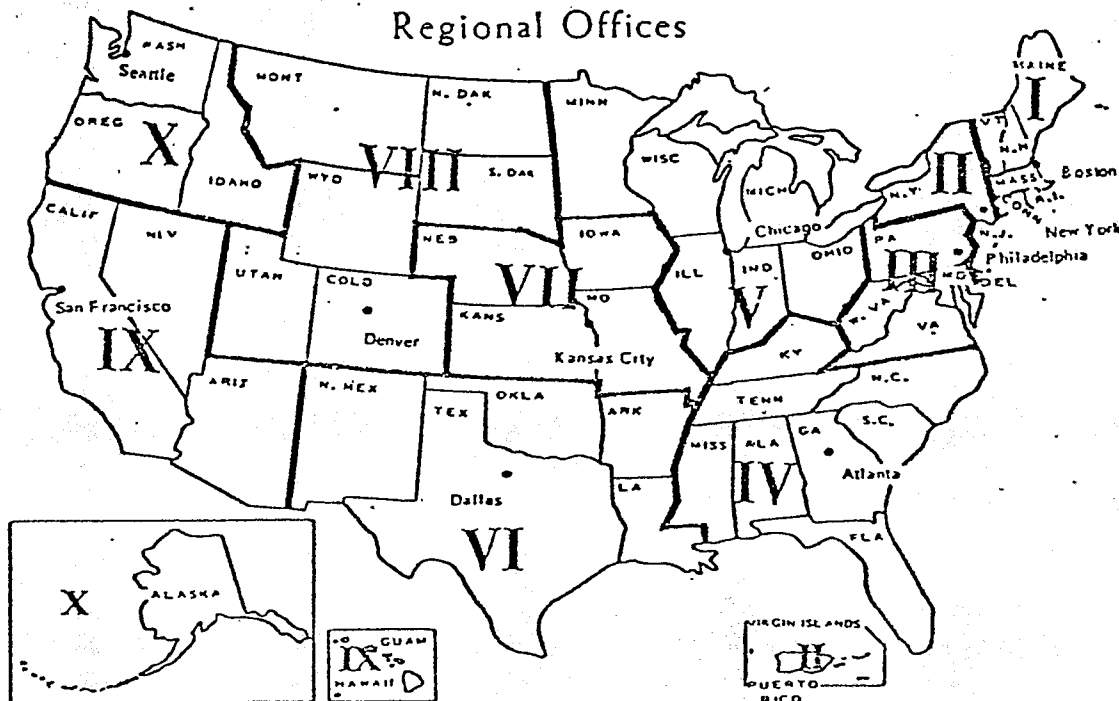
REGIONS

TELEPHONE NO.

I	617-223-7265
II	201-548-8730
III	215-597-9898
IV	404-526-5062
V	312-353-6188
VI	214-749-3840
VII	816-374-3778
VIII	303-837-3880
IX	415-556-6254
X	206-442-1200

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY

Regional Offices



KOPPERS

Interoffice Correspondence

To F. W. Flury From Traffic & Transportati
Department
Location K-850 Location K-850
Subject Emergency Response Assistance: Date January 5, 1981
Arsenic Trioxide

The following companies have capabilities to provide emergency response in the event of an accidental spill of Arsenic Trioxide. Specific arrangements have not been made on behalf of Koppers to employ their services.

Rogers Petro-Chem Waste Management

RR1 Grove City, MN 56243

Contact: Mr. DeWaynn Rogers (612) 857-2527

Vacuum vehicles are available with emergency response capabilities. Northern sections of area served by subsidiary Bay West. Standard service available within 12 hours driving time of Grove City.

Area: North Dakota, Minnesota, Wisconsin, Illinois, Indiana.

Interstate Pollution Control, Inc.

1525 9th St., Rockford, IL 61108

Contact: Mr. Bill Skoglund (815) 229-1155

Vacuum equipment available for emergency response.

Area: Illinois, Wisconsin

Technosolve, Inc.

RR1 Box 197A, Zionsville, IN 46077

Contact: Mr. Michael Finton (317) 372-3295
24 hour emergency number (317) 255-3577

Emergency response available for Arsenic compounds.

KOPPERS

Interoffice Correspondence

To F. W. Flury

From _____

Location _____

Location _____

Subject _____

Date January 5, 1981

2.

Area: Illinois, Indiana, Kentucky.

Environmental Emergency Services Co.

Ft. of N. Portsmouth, P.O. Box 3320, Portland, Oregon 97208

Contact: Mr. Keith Roberts (503) 285-9111 Ext. 345
emergency hotline (800) 547-0792

Provides emergency response services across USA.
Has 23 systems of personnel and equipment, can
operate on a contingency basis. Ability to handle
any dry or liquid spill. Used by the Burlington
Northern RR.

Area: Continental USA.

offices: Fargo, ND; LaCross, WI; St. Louis, MO;
and Monroe, LA.

Kansas Industrial Environmental Services

P.O. Box 745, Wichita, KS.

Contact: Mr. Cliff McDaniel (316) 744-1286
emergency number (316) 261-9230.

All vacuum equipment operates out of Kansas. Past
experience with Arsenic Trioxide. Primary function
is disposal but will respond to spills.

Area: Arkansas, Illinois, Kansas, Missouri.

Earth Industrial Waste Management, Inc.

1570 Commerce St., Memphis, TN

KOPPERS

Interoffice Correspondence

To F. W. Flury

From _____

Location _____

Location _____

Subject _____

Date January 5, 1981

3.

Contact: Mr. Carter Gray (901) 521-0096 (also 24 hr.)

No vacuum equipment available but can handle spill.
Has experience with Arsenic Trioxide and can provide
response service within 3 hours driving time of
Memphis.

Area: Tennessee and surrounding states

Catalyst Services Canada, Ltd.

P.O. Box 1050 Cochrani
Alberta TOL OWO

Contact: Mr. Edwards (403) 932-2777 24 hr. availability

Has equipment available in Calgary, and can respond to
spill anywhere given enough response time. Suggests a
meeting to discuss requirements for equipment and
placement. Has vacuum vehicles operating from Calgary
and truck mounted response equipment.

Area: All of Canada and also specific routes in US - limitation:
driving time.

Assuming that Koppers could handle Georgia; only two states do not
provide a base for emergency response: Kentucky and Alabama. However,
Kentucky is covered by Technosolve, Inc. of Indiana. In speaking with
the various firms, Environmental Emergency Services, Rogers Petro-
Chem Waste Mgmt., Kansas Industrial Environmental Services, and Earth
Industrial Waste Mgmt., Inc. appear to be most able to provide the
services we would require. All companies requested further info
prior to any service agreement.

J. S. Sebbens

JSS:kas