

INDUSTRIAL HYGIENE
SURVEY

BY DEPARTMENTS
- ROCKDALE WORKS -

PLAINTIFF'S
EXHIBIT

AL-366

ARD 040439

Asbestos materials, Disposal of:

When items are no longer serviceable, they are immediately deposited in a heavy plastic bag. The bag is inside a container which has a well-fitting lid. The container is marked, and the lid is kept in place at all times. When the plastic liner bag is full, it is tied shut and deposited in a load lugger bucket specially designed for asbestos waste and so identified. When the buckets are full, they are taken to a specially designated area of the Class I Waste Disposal site, emptied, and the waste buried. Yard Service truck drivers transport the waste to the dump.

Potlinings installed before January 1, 1973 were insulated with a Johns Manville material containing asbestos. When these linings are removed, the insulating materials are dumped in Building 27 (during the night shift so that personnel who work in that area are exposed as little as possible to the dust). Dust from this operation must be assumed to contain asbestos fibers. The lining material should be thoroughly wet prior to dumping. As an added precaution, people in the area--West end of Bldg. 127--must wear respirators approved for use in asbestos dust. The material should be hauled to the Class I Waste Disposal Site while still wet in order to minimize exposure to asbestos dust, and the equipment operators must wear approved respirators.

Pots containing asbestos insulation still in service should be identified so that the special precautions pertaining to asbestos will be followed when they are dumped.

SURVEY DEPT.	COMPL.	SENT TO ENGR/SUPV.	APPROVED BY ENGR/S.	RCD RETYPE.
Electrical	✓	W.T. Eckert ✓ 6/1		
Potrooms	✓	H.W. Wickes ✓ 5/25	H.W. 6/9/77	✓ ✓
Anode	✓	W.L. Proctor ✓ 6/9	W.L.P. 6/9/77	✓ ✓
Potlining	✓	J.L. Roddy	J.L.R. 6/14	✓
Control	✓	"	J.L.R. 6/14	✓ ✓
Utility & APLP	✓	"	J.L.R. 6/14	✓ ✓
Env. Contr.	✓	" ✓ 6/8	J.L.R. 6/14	✓ ✓
Shipping	✓	✓ CXV 6/9 Charles Fritz	C.F. 6/23	✓ ✓
Atomizer	✓	C.L. Valentine ✓ 6/9	CXV 6/9	✓ ✓
Ingot	✓	R.J. Leser ✓ CXV 6/9 (add name)	R.J.L. 7/1	✓
Janitors	✓	L.V. Ogea		
Mech. Maint	✓			
Chem Lab	✓	Charles Ross		
Yard Serv.	✓			
Rodding	✓			
Lubricants				

Mn - Ingot
Mg - Ingot

Marinite	Ingot, Atomizer, Mechanical, El
Mercury	Atomizer, Ingot, Yard Service, Mechanical, El
Mortar	Anode, Rodding, Mechanical, Yard Service
Motor Vehicle gas	Plant (Rodding)
Metalizing metal	Mechanical
Naphtha	Electrical, Mechanical, Rodding <i>Atomizer</i>
Nitrogen	Electrical, Mechanical, Rodding, Nitrogen
Oakite	Electrical <i>YS</i>
Oil Absorbent	Potlining, Rodding, Yard Service
Oils	See lubricants
Pipe Joint Compound	Electrical, Mechanical
Oxygen	Potlining, Utility, Atomizer, Ingot
Potassium hydroxide	Electrical
Pot gases	Potrooms
Potroom particulate	Potrooms
Pitch, 50 degree	Potlining
Potlining Mix	Potlining
Penetrating Oil	Utility, Mechanical, Electr.
Pitch	Yard Service, Mechanical
Paints and Enamels	Atomizer, Ingot, Mechanical
Pitch, 110 degree	Anode
Paint Thinners	Mechanical
Paint Removers	Mechanical
Plaster	Mechanical
Potlining Scrap	Yard Service
Premixed grout	Yard Service
Pot Insulation	Potlining
Regenerated alumina, 446	Potrooms
Reclaimed Al Insulation	Potlining
Ring Fce. Exhaust Gases	Anode
Red Mud	Ingot
Refrex-Kleen Flux	Ingot
Red Oil	Env. Control
Raw Sewer Sludge	Yard Service
Sealing Compound	Electrical
Silicone Grease	Electrical
Silver Brazing Alloys	Electrical
Sodium Carbonate	Potrooms, Control, Electrical, Utility
Solder	Electrical, Mechanical
Soldering flux	Electrical, Mechanical
Solvents: various	Potlining, Mechanical, Yard Service, Electrical
Sodium hydroxide	Utility, Ingot, Mechanical
Skim Furnace	Atomizer
Silicon	Ingot
Soaps and Cleaners	Janitors, Mechanical
Steel stubs	Rodding, Mechanical, <i>util</i>
Sand	Mechanical
Sewer gas	Mechanical, Yard Service
Shellac	Mechanical
Sodium chloride	Yard Service
Scrap iron	Yard Service
Scrap drums	Yard Service
Scrap boxes and bags	Yard Service
Steam Boiler Heat. Add.	Mech
Steam Cleaning Fluid	Add Mech.

5	Transformer oil	Electrical
2	Transite Pipe <i>omit</i>	Potlining
2	Titanium	Shipping
3	Titanium/Boron alloy	Ingot
4	Titanium Master alloy	Ingot
	Tris-Nitro	Ingot
1	Tar	Mechanical, Yard service
6	Transite, Plasterboard	Mechanical
	Trichloroethylene <i>Solvent</i>	Mechanical
7	Turpentine	Mechanical
	Used A-446 alumina	Env. Control
6	White Lead	Electrical, Mechanical
	Vira fluxes	Ingot
	Vermiculite	Ingot
7	Whiting	Ingot
	✓ Velvolium Clean, Protect	Janitors
5	Welding rods and wire	Rodding, Mechanical
4	Welding fumes	Mechanical
3	Welding fluxes	Mechanical
1	Water Soluble oil	Yard Service
2	Water softener resin	Yard Service
	Weed-killer	Yard Service
8	Wood and blacktop sealer	Yard Service
	✓ Zinc	Ingot, Shipping

3 sheets on Solvents:
asked
Trichloroethylene
various

ELECTRICAL

- Abrasives
- Acetylene
- Adhesives
- Aerosol
- Alcoa Joint No. 2
- Alcohol (Den.)
- Antifreeze
- Asbestos Gasket Cl.
- Askarels
- Bakelite
- Battery Acid
- Brake fluid
- Caulking Compounds
- Contact Re-Nu
- Copper and Cu Dust
- 1,2 Dichloroethane
- Dye
- Elect. Insul. Mat.
- Epoxy
- Epoxy Cements
- Floor Sweeping Comp.
- Hydrochloric acid
- Insul. Paint & Varn.
- Lead
- Liquid Wrench Penetrating Oil
- Micarta
- Naphtha, VM&P
- Nitrogen
- Oakite
- Pipe Joint Comp.
- Potassium Hydroxide
- Sealing Compound
- Silicone Grease
- Silver Brazing Alloys
- Sodium Carbonate
- Solder
- Soldering flux
- Transformer oil
- Varsol Solvents
- White lead
- Crater Comp #3

CONTROL

- Alumina
- Aluminum Fluoride
- Cryolite
- Fluorspar
- Sodium Carbonate

POTROOMS

- Alumina
- Aluminum Fluoride
- Bath
- Cryolite
- Fluorspar
- Pot Gases
- Potroom Particulate
- Sodium Carbonate
- Regenerated Alumina from A-446

ANODE

- Abrasives
- Aerosol
- Brick
- Butts
- Coke
- Dust from Baked Carbon Scrap
- Dust from Carbon Butts
- Dust from Green Carbon Scrap
- Fumes from Melted 110 Pitch
- Furfural Alcohol
- Mortar
- Natural Gas, Natural
- Oils, Prod. Lubr.
- 110 Pitch
- Refractory Cement, Refr.
- Ring Furnace
- Exhaust Gases

POTLINING

- Acetylene
- Alcoa Joint No. 2
- Alumina
- Alum. Fluoride
- Asbestos
- Asbest. Millboard
- Bath
- Butts
- Castiron
- Coal
- Concrete
- Copper and Cu dust
- Dug Potlining
- Fullers Earth - Oil Abs.
- Methyl Naphthalene
- Molasses
- Oxygen
- 50 Pitch
- Potlining Mix
- Reclaimed Al. Insul.
- Refractory Cement, Refr.
- Solvents (Varsol)
- Transite Pipe
- Pot Insulation

SHIPPING

- Abrasives
- Adhesives
- Aerosol
- Beryllium
- Chromium
- Copper
- Ether
- Inks
- Titanium
- Zinc

UTILITY

- Acetylene
- Adhesives
- Alumina
- Aluminum Fluoride
- Bath
- Calcium Fluoride
- Cryolite
- Fluorspar
- Oxygen
- Lubricants
- Penetrating Oil
- Sodium Carbonate
- Sodium Hydroxide

ATOMIZER

- Abrasives
- Adhesives
- Aerosol
- Aluminum, Molten
- Aluminum Powder
- Beryllium/Copper
- Boron Nitride
- Calcium Carbonate
- Cement, RTV Silicone rubber
- Compressed Air
- Copper, Scrap
- Furnace Gases
- Gas, Natural - anode
- Hydrogen Gas
- Inert Gas
- Inks
- Insulating Materials
- Laundry Additive
- Lubricating oil
- Marinite
- Mercury
- Nitrogen
- Oxygen - Pot
- Paints and Enamels
- Skim, Furnace

INGOT

Abrasives
 Adhesives
 Aerosol
 x Alumina Balls.
 x Alumina, Tabular
 Argon
 Asbestos *Bacteria acid*
 Beryllium
 Boron Alloy
 Castor Oil
 Chlorine
 Chromium
 Copper
 Corrosion Prevent.
 Fumes from Fce Skim
 Fumes from Gas Fired
 Hold. Fces & Brnrs.
 HCl
 Insulating Matrls.
 Kerosene
 Lubricants
 Magnesium
 Manganese Alloy
 Marinite
 Mercury
 Oxygen
 Paints & Enamels
 Red Mud
 Refrex-Kleen Flux
 Silicon
 Sodium Hydroxide
 Titanium/Boron alloy
 Titanium Master alloy
~~Iris Nitro~~
 x Vira fluxes
 x Vermiculite
 x Whiting
 Zinc

ENV. CONTROL

A-398 Bags
 Caulking
 Dust: Pot Dust
 Potlining
 Mill Dust
 Regenerator
 (A446) Dust
 Green Dye
 Lubricants
 Red Oil
 Used A-446 alumina

JANITORS

Bowl cleaner
 Disinfectants
 Insecticides
 Soaps and Cleaners
 Velvolum Cleaner
 & Protector

RODDING

Abrasives
 x Argon
 Asbestos
 Bath
 Carbonizing Comp.
 Copper dust
 Diesel
 x Ferromanganese
 x Ferrophosphorus
 Ferrosilicon
 Fuel gas, bottled
 Furnace gas
 Furnace slag
 Gasoline
 Lubricants
 Mortar
 Motor vehicle gas
 Nitrogen
 x Oil absorbant
 x Steel stubs
 Welding rods
 and wire

MECHANICAL MAINT.

Aerosol
 Alcohol
 Ammonium hydroxide
 x Antifreeze
 x Argon
 Babbitt
~~Bath~~
 x Brass
 Brazing alloys
 x Bronze
 Carbon, C dust
 Carbon dioxide
 Carbon-monoxide
 Cement, refractory
 Chlorine
 Coal
 Copper and Cu dust
 Diesel
 x Electrical Insul.
 Material
 Epoxy
 Ether
 Fiberglass
 Freon
~~Furnace gases~~
 x Glazing compound
 x Graphite
 Hydrochloric acid
 x Inks
 Insulation
 Kerosene
 Lead
 Lime
 Marinite
 Metalizing metal
 Mercury
 x Micarta
 Mortar
 Naphtha
 Natural gas, natural
 x Nitrogen
 Paints & Enamels
 Paint Thinners
 Paint Removers
~~Pitch~~
 Penetrating oil
 x Pipe joint comp.
 Plaster
 Sand
 Sewer gas
 Shellac
 x Soaps and cleansers
 Sodium hydroxide
 Solder
 Soldering flux
 x Steel stubs
 Tar
 x Transite, Plasterbd.
 Solvents
 Liquid wrench

YARD SERVICE

Abrasives
 Adhesives
 Aluminum Fluoride
 Asbestos
 Bath
 Brick
 Butts
 x Calcium Chloride
 Carbon Monoxide
~~Caulking Compounds~~
 Cement
 Cement (Portland)
 Chlorine
 Coke
 Creosote
 Dust from Potrooms
 Epoxy
 Fertilizer
 Floor Patching Resin
 Hardener
 Furnace Slag
 Herbicides
 Insecticides
 Insulation
 Insulating Materials
 Joint Sealer
 Lime
 Mercury
 Mortar
 Oil Absorbant
 Pitch
 Potlining Scrap
 Premixed grout
 Raw Sewer Sludge
 Scrap boxes and bags
 Scrap drums
 Scrap iron
 Sewer gas
 Sodium Chloride
 Solvents
 Tar
 Dug
~~Used~~ Potlining
 Water Soluble oil
 Water softener resin
 Weed killer
 Wood and blacktop sealer
 Floor sweeping compound
 Lubricants

MECH. MAINT. Contd.
 Trichloroethylene
 Turpentine
 Welding fluxes
 Welding fumes
 Welding rods
 White lead
 Liquid wrench
 Hydraulic Fl.
 Steam Boil
 Trt. Add
 Steam Clean
 Fl. Add

see *Procter*
 and

- ✓A-398 bags Env. Contr.
- ✓Abrasives Electrical, Anode, Shipping, Atomizer, Ingot, Yd. Serv. Mech, Rodding
- ✓Acetylene Electrical, Potlining, Utility, Mech
- ✓Adhesives Electrical, Utility, Shipping, Atomizer, Ingot, Yd. Serv. Mech
- ✓Aerosol Electrical, Atomizer, Shipping, Anode, Ingot, Mechanical
- ✓Alcoa Joint #2 Electrical, Potlining,
- ✓Alcohol Electrical, Mechanical
- ✓Antifreeze Electrical, Mechanical
- Asbestos Gsk.Cl. Electrical
- ✓Askarels Electrical
- ✓Alumina Potrooms, Control, Potlining, Utility,
- ✓Aluminum Fluoride Potrooms, Potlining, Utility, Control, Yard Serv.
- ✓Asbestos Potlining, Rodding, Yard Serv. Ingot
- ✓Asbes. Millboard Potlining
- ✓Alum., Molten Atomizer
- ✓Alum Powder Atomizer
- ✓Alumina Balls Ingot
- ✓Alumina, Tabular Ingot
- ✓Ammonium Hydrox. Mechanical,
- ✓Argon Rodding, Mechanical, Ingot
- ✓Bakelite Electrical
- ✓Battery acid Electrical
- ✓Brake fluid Electrical
- ✓Bath Potrooms, Potlining, Utility, Mechanical, Yard Service, Rodding
- ✓Butts Anode, Potlining, Yard Service
- ✓Beryllium Shipping, Ingot
- ✓Beryllium/Copper Atomizer
- ✓Boron nitride Atomizer
- ✓Brick Anode, Yard Service, Mech.
- ✓Boron alloy Ingot
- ✓Bowl cleaner Janitors
- ✓Babbitt Mechanical
- ✓Brass Mechanical
- ✓Bacteriaicide Ingot
- ✓Caulking Comp. Electrical, Env. Control, Yard Service
- ✓Contact Re-Nu Electrical
- ✓Copper and Cu dst Electrical, Potlining, Shipping, Ingot, Mechanical, Rodding
- ✓Cryolite Potrooms, Utility, Control,
- ✓Castiron Potlining Rodding
- ✓Coal Potlining, Mechanical
- ✓Concrete Potlining
- ✓Calcium Fluoride Utility
- ✓Cryolite ~~potlining, rod~~
- ✓Calcium carbonate Atomizer
- ✓Cement, RTV Atomizer
- ✓Cement, Refr. Mechanical, Yard Service, Anode, Potlining
- ✓Cement, Portland Yard Service
- ✓Compressed Air Atomizer, ~~Plant~~ + Plant
- ✓Copper, Scrap → Atomizer ~~see Cu + Cu dust~~ Shipping
- ✓Chromium Shipping, Ingot
- ✓Coke Anode, Yard Service
- ✓Castor Oil Ingot
- ✓Chlorine Ingot, Mechanical, Yard Service
- ✓Corrosion Prevnt. Ingot
- ✓Carbonizing Comp. Rodding
- ✓Carbon, C dust Mechanical CP
- ✓Carbon dioxide Mechanical
- ✓Carbon monoxide Mechanical Plant in yard
- ✓Creosote Yard Service
- ✓Calcium chloride Yard Service
- ✓Crater Comp. Electrical

Asbestos gloves -
depts using

Brazing Alloys } Mech
BRONZE

See 10-10-60
Buck

✓ 1,2 Dichloroethane	Electrical
✓ Dye	Electrical
✓ Dug Potlining	Potlining, Yard Service
✓ Disinfectants	Janitors
✓ Dust-Baked Carbon Scrap	Anode
✓ Dust-Carbon Butts	Anode
✓ Dust-Green Carbon Scrap	Anode
✓ Dust-Pot	Env. Control
✓ Dust-Potlining Mill	Env. Control
✓ Dust-Regenerator 446	Env. Control
✓ Dust from Potrooms	Plant
✓ Diesel	Mechanical, Rodding, CP, Ingot

✓ Electrical Insul. Matl.	Electrical, Mechanical
✓ Epoxy	Electrical, Mechanical, Yard Service - Plant(?)
✓ Epoxy Cements	Electrical
✓ Ether	Shipping, Mechanical

✓ Floor Sweep. Comp.	<u>Plant</u>
✓ Fluorspar	Potrooms, Control, Utility
✓ Fullers Earth	Potlining
✓ Furnace gases	Atomizer, Mechanical, Rodding
✓ Fumes: from melted pitch	Anode
✓ Fumes: from furnace skim	Ingot
✓ Fumes: from hold. fcs.	Ingot
✓ Furfural alcohol	Anode
✓ Fuel gas, bottled	Rodding
✓ Furnace slag	Ingot, Yard Service
✓ Freon	Mechanical
✓ Fiberglass	Mechanical
✓ Fertilizer	Yard Service
✓ Floor Patch. Hardener	Yard Service
✓ Gas, Natural	Atomizer, Anode, Mechanical
✓ Green Dye	Env. Control <i>see Red Oil</i>
✓ Gasoline	Rodding - Plant
✓ Glazing compound	Mechanical
✓ Graphite	Mechanical

1 Ferromanganese - Rodding
 2 Ferrophosphorus - Rodding
 3 Ferrosilicon - Rodding
 8 Fluorescent Tubes - PLT

*G loves, Asbestos -
 Name
 Receipts
 using

Hydrochloric acid	Electrical, Ingot, Mechanical
Hydrogen gas	Atomizer
Herbicides	Yard Service
Hydraulic Fluid	Mech.
Insulating Paint	Electrical
Inks	Atomizer, Shipping, Mechanical Plant
Insulating Materials	Atomizer, Ingot, Yard Service, MM
Insecticides	Janitors, Yard Service
Insulation	Mechanical, Yqrd Service
Joint Sealer	Yard Service
Kerosene <i>see Diesel</i>	Ingot, Mechanical
Lead	Electrical, Mechanical
Liquid Wrench - <i>See Penetrating Oil</i>	Electrical, Mechanical
Lubricants	Plant
Laundry Additive	Atomizer
Lubricating oil	Atomizer (Plant sheet)
Lime	Mechanical, Yard Service

Micarta	Electrical, Mechanical
Methyl naphthalene	Potlining
Molasses	Potlining

*Clyptol
micarta
Duxseal* } 3 sheets under Gen Title "Dux, El"

*Inert gas - Atomizer
 Insulation, block*

INGOT DEPARTMENT - ROCKDALE WORKS

Abrasives

These are used for cleaning Properzi wheel, and eye protection should be used. Masks should be used if extensive carborundum grinding is done because of the possibility of silicosis; however, the amount done is limited and should present no particular problem.

Adhesives

Royal Industrial Cement is used as a gasket adhesive. Adequate ventilation and personal hygiene minimize hazards.

Aerosol

WD 40 is used as a lubricant and Krylon Paint in paint form. They are stored in self-contained cans. The substances are flammable and dangerous if the cans are punctured or stored near heat.

Asbestos

Asbestos is used in spout gaskets at the Properzi. They are pre-formed gaskets, transported in packets. A hazardous situation occurs if fine particles become airborne and are breathed into the lungs. Therefore, extreme care is taken to avoid rubbing and fraying of fibers, and old gaskets should be disposed of in special containers.

Bactericide

Beryllium

Alloys of Be in combination with Al are light and remarkably resistant to stress and strain. Beryllium ingot is stored in small pieces in closed drums. It is a highly toxic bivalent metallic element which constitutes a serious hazard if its fumes are breathed into the lungs. Any skim produced is discarded immediately. Adequate ventilation is essential and toxic fume and dust respirators and safety goggles are worn where dust is present.

Castor Oil

Castor oil is used as a mold lubricant for the DC casting units. There is no particular hazard associated here with the exception of certain allergic reactions of certain persons upon contact with skin. Prolonged contact should be avoided and personal hygiene exercised.

Chlorine

Liquid chlorine is received in one (1) ton cylinders and stored in Building 34-B which is adjacent to the west side of the Ingot Production Department, Building 34. Also in Building 34-B are two liquid chlorine evaporators, pressure reducing valves, and the beginning of the piping system to conduct the chlorine to the holding furnaces in Building 34. At the furnaces, flexible hoses connect the pipe to the graphite fluxing tubes used to introduce the gas into the molten aluminum.

The chlorine system, in an emergency, can be turned off at several of the control panels in Building 34 or at the entrance of Building 34-B. An alarm bell in the system indicates when the evaporator temperature exceeds 180 degrees F. or the chlorine supply cylinders are empty.

Building 34-B has a roof vent fan and an emergency stack vent fan which will remove the heavy chlorine gas from floor level and exhaust it well above ground level. Generally there is no chlorine liberated in the building, ~~except maybe~~ ^{maybe lost} small residual amounts from the pipes when a cylinder is changed or work on the piping is being performed. Absorption ~~thpe~~ ^{type} gas masks are available at the entrance to Building 34-B as well as near the furnaces in Building 34.

In Building 34, ^a little chlorine ^{may escape} escapes at floor level during the fluxing of a furnace. ~~However, some~~ ^{may} ~~will~~ ⁵ escape from the top of furnace along with various reaction products, such as aluminum chloride and hydrogen chloride. ~~This emission rarely bothers anyone at floor level but at times does bother the eramenen.~~ Roof fans help remove any escaped gas from the building, and the furnace stacks exhaust the excess chlorine and the reaction products outside the building.

~~However, some~~ ^{may escape} chlorine ~~will~~ escape at floor level at times when fluxing is done in either an R-249, A-528, R-622, or A-181.... The molten metal is ⁵ fluxed in a box as it comes from the furnace. This unit is covered by an exhaust hood, ~~but occasionally a current of air will blow some chlorine and reaction products out into the area surrounding the fluxing unit.~~ ~~The~~ Amounts of chlorine involved ⁵ are quite small and dissipates quickly. ~~The absorption type gas masks should be worn as necessary.~~

Chromium ✓

Chromium is a hard metal used in alloy to impart stainless properties and smooth surfaces. It is hazardous only if volatilized or vaporized and therefore poses no particular hazard as used.

Copper

Copper is used in Properzi copper molds. Copper dust when present as fine particles may be classed as a source of metal poisoning. However, the fine particles resulting from grinding are minimal and approved dust masks are used.

Corrosion Preventive Additive

Cuprogard is used as a Properzi roll emulsion additive. It is an oxidation retardant for copper and brass piping and valves. Contact with skin is limited and only small quantities are used; therefore, no serious hazard exists.

Fumes from Furnace Skim

Furnace skim consisting mostly of oxides of aluminum, but also containing some metallic aluminum, nitrides and carbides of aluminum, aluminum chloride, magnesium chloride, hydrogen chloride, is raked from the surface of the molten aluminum in the holding furnaces into skim boats. These boats are then transported to the skim room and allowed to cool. When hot, the skim gives off dense, white fumes which are very irritating to the respiratory system. The skim room has an exhaust fan for removal of these fumes. When cool, the skim is transferred from the skim room to rail cars for shipment. The cool skim emits no fumes.

Fumes from Gas Fired Holding Furnaces and Gas Burners

Fumes generated by the stirring, skimming, alloying, and fluxing of metal in the holding furnaces plus the products of combustion of the gas burners heating the furnace are normally retained inside the furnace and exhausted out the stack. The furnaces are normally operated under a slight positive pressure so that the operator may come in contact with these fumes. ~~There is also~~ Some fume emission ^{may occur} around the doors and the top of the furnace during fluxing operations.

~~The Gas burners~~ ^{are} used to heat potroom crucibles and pouring troughs; ~~discharge their products of combustion and any fumes evolved into the atmosphere of Building 34. However, the roof fans generally provide enough draft to remove these exhaust fumes to atmosphere.~~

The fumes which escape from the furnaces and unhooded gas burners generally cause no problem at floor level, but ^{approved respirators should be worn as necessary} at higher elevations, such as that of the crane cabs, they have caused some respiratory irritation and nausea. Adequate ventilation should be maintained by roof ventilator fans. Approved respirators should be used when such fumes prevail.

Hydrochloric Acid

HCl is used in de-ionization of Properzi mill roll lubricant water and cleaning Properzi mold wheel. The corrosive liquid should be handled cautiously, and rubber gloves and eye protection should be used. Adequate ventilation ~~also minimizes irritating fumes.~~ ^{should be provided.}

Insulating Materials

Kaowool is used as insulation of pipes and filter boxes and is composed of abrasive, skin-irritating fibers. Protective gloves, personal hygiene following exposure, and respirators and masks used as necessary minimizes hazards.

Kerosene

Kerosene is used for water-molten aluminum explosion retardation. It is flammable and an irritant if inhaled; ~~however, as used it is not a serious hazard.~~ ^{avoid excessive or prolonged skin exposure.}

Magnesium

Magnesium for certain alloys is received in notched ingot of various sizes. When it is added to molten aluminum, a special tool is used to submerge the magnesium to prevent it from air burning.

The general toxicity of magnesium is considered to be low, but several hazards are encountered. If it is ignited, it burns with such violence that it may explode, and it can cause severe burns to the skin. Metallic magnesium particles imbedded in a wound in the skin can cause gas gangrene and freshly formed magnesium oxide can cause metal fume fever.

Manganese

Manganese adds hardness and ductility to alloys and is hazardous only if ingested or inhaled in volatilized form. As used, there is no particular problem.

Marinite

Marinite is used as insulation material. Its dust can irritate the lungs, causing possible asbestosis or lung cancer. Care is taken in handling and scrap and dust are disposed of via special containers. Dust masks are also used if dusting occurs. *See "Asbestos" material sheet.*

Mercury

A small amount of mercury is used in various manometers and would constitute a hazard only when an accident caused spillage or breakage of a manometer tube.

Oxygen

Oxygen is used as a furnace combustion additive and lancing furnace tap holes. It is hazardous because of its violent reaction when used in connection with combustibles and extreme ^{caution} ~~caution~~ is used.

Paints and Enamels

Various kinds of paints and enamels are used for identification purposes. Personal cleanliness will minimize the risk of skin irritation. Work area should be ventilated and cans should be stored below 140 degrees F. In ordinary use, however, ~~these are not serious health hazards.~~ *are very minimal.*

Red Mud

This is a by-product of bauxite processing which is used to coat aluminum molds. Care in handling minimizes dusting. Exact composition is unknown; however, personal hygiene should be exercised after using this material and masks worn if dusting becomes severe.

Refrex - Kleen Flux

This material is a powder used in the holding furnaces to aid in skimming dross. The exact composition is unknown, but it is believed to contain fluoride and thus is a potential hazard. This material is aspirated into the ^{furnace} ~~furnace~~, and dense fumes are created in the furnace during this operation. But, in general most of the fumes are exhausted outside the building through the furnace stack. Careful regulation and maintenance of furnace dampers and drafts should prevent most, if not all, of these fumes from entering the building atmosphere. Reasonable care in handling the flux should be practiced. Prompt removal of skim from furnace area and wearing of approved respirators minimize risks.

Silicon

Silicon is used for alloy purposes. It is a hard, lustrous, crystalline solid of gravel-size particles which, as used here, constitutes no serious health hazard.

Sodium Hydroxide

Sodium hydroxide is used in the process of de-ionizing water. The sodium hydroxide is brought to Building 92B in 400-pound drums and then used in 40-pound quantities. Rubber gloves and ~~face shields~~ are required when mixing the sodium hydroxide with water. A small vent fan draws the fumes out of the building when the solution is mixed.

Titanium-Boron Alloy

Titanium and boron are used in alloying aluminum, ~~to impart lightness and tensile strength.~~ There should be no significant hazard as used here.

Bactericide

Tris-Nitro

Tris-Nitro
This substance is a bactericide used as a Properzi roll emulsion additive.

It is handled in plastic buckets. IN THE QUANTITIES USED, IT IS -
PRESENTS NO PERSONAL HYGIENE PROBLEMS.

Zinc

Zinc itself presents no hazard, but during alloying fumes may be evolved which could cause metal fume fever. The possibility of this happening ^{is} ~~would be~~ slight, ^{with} because typical exposures ~~would be~~ of short duration and ~~the~~ the furnace exhaust system, ^{as equipped with an} ~~were functioning properly, the bulk of the fumes would be exhausted outside the building.~~

POTLINING DEPARTMENT - ROCKDALE WORKS

Acetylene

Steel cylinders of acetylene are ordered from the storeroom as needed. It is used with oxygen mainly for burning. As this gas burns, some carbon monoxide is produced but not in sufficient quantities to be toxic even though the exposure is for relatively long periods. Care is taken not to damage the cylinders or in any way cause a leak of the gas which is an asphyxiant in the unburned state.

Alcoa Joint Compound No. 2

This material is painted on all contacts where aluminum is to be used to make electrical contact to minimize the formation of oxide on the contact surfaces. Although prolonged contact with the skin will cause severe irritation, the exposure time for this department is so short as to minimize the dangers.

Alumina

Alumina is used as insulation for pots, and it is carried from the potrooms in ore buckets. Alumina is quite dusty, but in itself is considered more of a nuisance than a hazard. Respirators are used if dust is heavy and care is taken to minimize the dusting in handling.

Aluminum Fluoride

This material is sometimes used as pot shell insulating material. It is carried by boxes to the potshell, and specified amounts are shoveled into the pots. This material dusts readily and can cause internal poisoning. It is found irritating in both the dust and smoke state to the eyes, nose, and throat. Dust exposure, when shoveling this material, is not severe as a rule. However, dust respirators are provided and should be used if abnormal dusting conditions exist.

Asbestos

This material is found in old pots as insulating material. Possible asbestosis is a hazard if dusting occurs with improper ventilation. Approved respirators should be worn at all times.

Asbestos Millboard

This material is of needle-type, heat-resistant fibers and is used as a

shim under pot shells. Possibility of asbestosis hazard exists when dusting occurs on removal of sheetboard from boxes and when removed from potshell. Approved respirators should be worn at all times.

Bath

The main constituent of bath is cryolite. It also contains varying amounts of alumina, aluminum fluoride, and calcium fluoride. If a pot is to have a lining patched, the pot is cut out and allowed to cool. The bath is broken up with pneumatic hammers, shoveled into buckets, and hauled to the bath crusher. These operations cause varying amounts of fluoride-bearing dust to enter the surrounding atmosphere, which can be irritating to the throat and skin. Care is taken to keep the dust down as much as possible.

If the pot is to be relined, the pot is cut out, allowed to cool somewhat, and then is well soaked with water. The bath is then handled in exactly the same manner as already described but without the dust problem.

Coal

Large amounts of anthracite coal are used as a component of potlining mix. Transferring the coal from the mixers to the mix buckets and subsequently filling the weighing box causes a dust condition which while not injurious is unpleasant.

Concrete (Grout)

Concrete (Grout) is used to level pot stall floors. It comes pre-mixed in concrete trucks to the location as needed and worked by trowel, etc. Continued contact could result in irritated exposed skin membranes. Care in handling fresh concrete and thorough scrubbing of hands should reduce skin irritation. When exposed to dust from broken up material, respirators should be worn.

Copper and Copper Dust

During the cleaning of copper bus, there is a chance of exposure to copper dust and to copper compounds which have formed on the surface of the bus. The copper is sometimes cleaned by grit blasting and by using an abrasive disk. When an abrasive disk is used, it is usually operated in an open and well ventilated area.

Dug Potlining

When a pot is to be relined, it is cut out, cooled, soaked with water, and the bath removed. The cathode or lining is then broken up with the aid of a pot digging machine and pneumatic hammer. The cathode materials, including the carbonaceous material, refractory brick and cement, asbestos, alumina insulation, etc., are then loaded by hand and shoveled into buckets. These are dumped in the west end of Building 127 during the night shifts so that personnel who work in that area are exposed as little as possible to the irritating dust and fumes. The material is then loaded into railroad cars for shipment to a plant for recovery of the fluorides. During the handling of this material, any dust formed may cause irritation of the skin, eyes, and respiratory system because of its alkaline reaction with moisture as well as its fluoride content. The scrap lining material also liberates acetylene and ammonia when it is wet.

Oxygen

Oxygen is used in bottles when using burning bar rig to burn off collector bars and cutting pot pads, bolts, etc. in pot disassembly. As used, it is not hazardous.

50 degree Pitch

This soft pitch is received in tank cars at the Potlining Department. The tank cars are heated with steam until the pitch is liquid, and then it is pumped through steam-heated pipes to a heated storage tank. From storage, the pitch is conveyed through pipes to the weigh scales and mixers. Direct contact with the liquid pitch is rare. The fumes liberated by the liquid pitch may cause skin and eye irritation, but exposure to these fumes is very limited and constitutes only a slight hazard.

Methyl naphthalene

This material is used as a solvent to dilute 50 degree pitch to make room temperature seam mix. Fumes liberated may cause skin and eye irritation, but exposure is limited and constitutes only a slight hazard.

Pot Insulation

Suprex is an asbestos-free material used for insulation in pot cathodes. It comes in 12 X 36 - inch sheets of different thicknesses, usually 1", 2", 3", and 4". It dusts slightly when broken up but is usually used in entire sheets and does not constitute a serious hazard.

Potlining Mix

This material is a mixture of 50 degree pitch, methyl naphthalene, and anthracite coal. It is mixed in a steam heated mixer and then dumped into a container for transportation to the pot being relined. When the mixture first comes from the mixer and until it cools somewhat, it emits pitch fumes which may cause eye and skin irritation. Protection should include the use of goggles for the eyes and skin creams for exposed skin areas, as well as thorough hygiene of exposed areas following exposure to these fumes.

Refractory Cement

This material is used in bonding and air sealing blocks together in the potlining of a cell. Those received in dry forms are potential health hazards because of the danger of silicosis, though remote. Most materials are used wet, thus minimizing the possibilities of hazard. Careful handling of the dry material prevents excessive dusting, and respirators should be worn if dusting does occur.

Solvents

TCE is used to clean oil and grease from metal conductor joints. The materials are carried to the job in cans refilled from larger drums, and rags and brushes, saturated with the solvent, are used to wipe the metal surfaces. Gloves are worn during this operation. Exposure of the skin, especially the hands, to excessive amounts of the solvent, can cause skin irritation, and inhalation of excessive amounts of the solvent could cause a respiratory irritation. Under normal circumstances, exposure to the liquid solvent or its vapors would be of short duration, and rubber gloves are used to further minimize the hazard.

Askarels

This is a trade name for a series of chlorinated aromatic derivatives, such as pentachlorodiphenyl, polychlorinated biphenyls, and trichlorobenzene. They are nonflammable and are used for transformer, reactor, and capacitor insulation where ordinary insulating oil would present a fire hazard. They are enclosed in completely sealed units which are not physically handled, and disposal is by contractor service.

The substances are stored in drums and are pumped into the units if necessary. This is very rare and would occur only if a reactor fails and a new reactor needs filling.

Since the use of these liquids is limited, the hazard is minimal. However, the liquids are highly toxic and special handling precautions are used to prevent all possible exposure.

Battery Acid

This substance is a mixture of sulfuric acid and distilled water which is used as the electrolyte in lead storage batteries. The chemical laboratory makes up a mixture of acid and water which has a specific gravity of 1.400. When a battery needs electrolyte, enough acid and water are added to provide the fully charged battery with an electrolyte of specific gravity 1.260. While the batteries are charging, hydrogen is liberated from the cells. If this gas is released rapidly enough, an acid mist may form in the vicinity of the batteries. To prevent the accumulation of the hydrogen and acid mist, the area used for charging batteries is open and well ventilated.

Brake Fluid

This is a standard hydraulic brake fluid. The Electrical Department's use of this liquid is confined mainly to the braking systems of the overhead cranes.

Solvent: Contact Re-Nu

This product is an aerosol often marketed under the trade name "Freon" and is used as a cleaner and degreaser in the meter shop. The fluorocarbon products marketed under the trademark "Freon" are low in toxicity, nonflammable, nonexplosive, and noncorrosive, but in the presence of open flame or objects operating at high temperature they will decompose to form toxic or irritant products.

The product should be used with adequate ventilation and contact with the skin should be avoided as it may remove the natural skin oils. Since only relatively small amounts of this material are used, and it is generally used in well ventilated areas, it is doubtful that this product presents much of a hazard.

Copper and Copper Dust

This is not a significant hazard unless finely divided as the result of sanding or grinding.

Solvent:

1,2 Dichloroethane

This liquid is received in one quart glass bottles and is primarily used as a degreasing agent. Rags wet with this liquid are used to wipe grease from the interior walls of the mercury arc rectifier tubes. Occasionally small metal parts are allowed to soak in a pan of the solvent and then wiped clean with rags. It is used to clean electrical joints of old Alcoa Joint Compound #. 2 before the joint is made.

Work with this solvent usually takes place in a well-ventilated area, but the fumes or vapors are toxic if inhaled in sufficient quantity. The liquid is dangerous to the eyes and will cause dermatitis if allowed to repeatedly contact the skin. This is a flammable liquid, but it burns with difficulty.

Dye

Spotcheck Developer, Penetrant, and Cleaner are used for coloring and detecting metal cracks. The substances are flammable, but present no significant hazard as used in well-ventilated areas.

Lubricant:

Crater Compound No. 3

This is a heavy black oil of unknown composition or origin which is used to coat large open gears. Since it has a grease-like consistency, it must be heated to a more fluid state before application to the gears. As with other greases, repeated contact with the skin may cause dermatitis.

Epoxy Cements

These are generally used for temporary repairs, but because of their great strength they have also found uses of a permanent nature. Several different cements have been used, but should not be allowed to come in contact with the skin as they may cause dermatitis and in certain individuals an allergic reaction.

Hydrochloric Acid

Small amounts of this acid are used occasionally to clean metal surfaces prior to soldering. It is generally used in a well-ventilated area, and precautions are taken to protect the eyes and skin from this corrosive material.

Insulating Paint and Varnish

Various types or brands of this material have been used, but at the present time a General Electric product called Gyptol is being used. This product is combustible and harmful if taken internally. Prolonged contact with skin could cause dermatitis, and it should be used with adequate ventilation to prevent possible damage to respiratory tract.

Lead

Lead is used most commonly as a joint material, but it is also used in the form of pipes and occasionally as a seal or gasket. It is also present in certain alloys, such as Babbitt and solder. The greatest hazard associated with lead is present when it is used as a joint material. Since it must be melted before use, there is danger of inhaling lead fumes from the molten metal. However, unless the melting of lead is done in a confined area, the concentration of lead in the air is probably below the maximum allowable level.

Lubricant
Penetr. Oil.

Penetrating Oil
Liquid Wrench

This is a liquid penetrant used to free parts frozen by rust, corrosion, scale, paint, varnish, carbon, or gum. It is labeled as being a flammable blend of aromatic solvents. The label further states that prolonged or repeated breathing of the vapor and contact with the skin should be avoided, and that it is harmful if ingested. This material is generally used in well-ventilated areas, but at times it may be used in areas where poor ventilation may cause a hazardous condition.

Solvent:

Naphtha, V.M. & P.

A solvent used in the meter shop for cleaning and degreasing purposes. Since only small quantities are used at any one time, this material probably represents only a slight hazard.

Solvent

Oakite

This is a trade name for several kinds of cleaners used to steam clean machine parts. Both acid and alkaline cleaners are sold as Oakite compounds and all may cause irritation upon contact with skin membranes.

Potassium Hydroxide

This material is used as the electrolyte in the nickel-cadmium batteries used for emergency lighting. It is stored in polyethylene bottles and used as needed. This material is dangerous to the eyes and skin. Inhalation of dusts or mists can cause injury to the respiratory system, and ingestion results in severe injury to the gastrointestinal tract. Chemical safety goggles, a full face shield, rubber gloves, and aprons should be worn when handling this material. Any area of the body which comes in contact with this material should be washed immediately with large amounts of water.

Sealing Compound

These compounds include C-H Chico, Johns Manville Duxseal, and Gould 76003. These materials are used for various sealing purposes; for example, Chico is used to seal explosion-proof circuits from non-explosion-proof areas. ~~Maxix~~ ^{actually by hand} ~~infrequently~~ ^{after} ~~None but the Duxseal is handled physically.~~ ^{contact} ~~however, use is~~ ^{infrequent and contact with the skin is limited as much as possible, thereby minimizing the hazard.} ~~Some individuals sensitive to this material may develop dermatitis.~~ ^{Personal hygiene and cleanliness measures should be exercised/} ~~The affected area should be cleaned thoroughly after contact.~~

Silicone Grease

This grease is a polymer consisting of chains of alternate silicon and oxygen atoms linked to roganic groups and to similar chains. It is used in the meter shop for lubricating meters and clocks which are exposed to fairly high temperatures. It is also used because it does not tend to build up on moving parts like petroleum based greases. Like other lubricants, it may cause dermatitis if repeatedly allowed to come in contact with the skin.

Silver Brazing Alloys

These alloys are occasionally used for such things as rebuilding switch contacts. The danger in these alloys is the cadmium they may contain - 16% to 24%. Since only relatively small amounts of these alloys are used and generally in open, well-ventilated areas, it is doubtful that anyone would be exposed to a concentration in excess of the permitted concentration.

Sodium Carbonate

This is a finely divided powder, alkaline in nature, which is used as electrolyte material. Care in handling minimizes dusting, which can irritate eyes and mucous membranes. Personal contact is kept to a minimum.

Solder

This is an alloy of relatively low melting point which is used for joining other metals. The term applies particularly to tin lead alloys, but other metals, such as silver, copper, zinc, and cadmium, may be included in varying amounts. A piece of solder may contain from one to five cores containing resin which acts as an antioxidant. Since only small amounts are used and generally in open and well-ventilated areas, it is doubtful that solder presents much of a hazard.

Soldering Flux

Small quantities are used in this department as an adhesive. If the flux contains an acid, spattering may cause burns. There is no serious hazard if used properly.

Solvent

Transformer Oil

Large amounts of this oil are used by this department. Pumps are used to add oil to a unit; therefore, skin contact is very limited. No serious health hazard exists as used and handled.

Solvent
Varsol

This substance is a light petroleum distillate used as a solvent for oil and grease. It is usually used in open and well-ventilated areas. The usual practice is to soak the parts to be cleaned in a bucket or can containing the solvent. After a period of soaking the parts are wiped dry with rags or blown dry with the aid of compressed air. Occasionally the Varsol will be aspirated into a stream of compressed air, and the resulting spray used to clean large pieces of equipment. This liquid may cause damage to the eyes, and prolonged contact with the skin may cause dermatitis. Inhalation of large amounts of the solvent vapors may cause adverse reactions, particularly in sensitive individuals. It has a relatively low flash point and thus also presents the problem of being a fire hazard.

White Lead

This material is used for identification purposes and is stored in cans. It is usually in powder form, soluble in acids and insoluble in water. It is poisonous when inhaled into the body, causing a reaction in the upper respiratory tract. Extreme care should be taken in handling to prevent dusting, as well as personal cleanliness after using the lead base paint.

Re: Coral Plaster

This material^{is used} by mechanics & maintenance brickmasons in lining the electric melt furnaces and ladles. Brick has been discontinued for this job - Coral plaster has a longer life thus cutting down maintenance costs and labor by about 1/3.

This material is purchased from Harbison Walker Co. of Houston, Texas. Dave Barber, sales manager D. T. McInerney states that Mr. Barber is going to be contacted re: relation to the complaints that we have had recently. During October we have had at least four First Aid cases of eye and skin irritation from employees working with this material.

A sample of this material has been given to the lab for analysis. It is possible that it may be emitting phosphoric acid fumes, especially when heated, which are only moderately toxic when exposed to for extended periods of time.

This material when used in the maintenance Dept. is not heated.

Brickmasons and helpers are required to wear plastic goggles, which are vented, and appropriate gloves when working with this material.

When this material was first used in an experimental venture, the Process Engineering Dept. lined electric melt furnaces and suffered no ill effects.

Sodium Hydroxide

Sodium hydroxide is used in the process of de-ionizing water. The sodium hydroxide is brought to Building 92B in 400-pound drums and then used in 40-pound quantities. Rubber gloves and ~~face shield~~ are required when mixing the sodium hydroxide with water. A small vent fan draws the fumes out of the building when the solution is mixed.

Titanium-Boron Alloy

Titanium and boron are used in alloying aluminum, ~~to impart lightness and tensile strength.~~ There should be no significant hazard as used here.

Bactericide

Tris-Nitro

Tris-Nitro

This substance is a bactericide used as a Properzi roll emulsion additive. It is handled in plastic buckets. IN THE QUANTITIES USED, TRIS-NITRO PRESENTS NO PERSONAL HYGIENE PROBLEMS.

Zinc

Zinc itself presents no hazard, but during alloying fumes may be evolved which could cause metal fume fever. The possibility of this happening ^{is} would be slight, ~~because~~ ^{with} typical exposures ~~would be~~ of short duration and ~~the~~ the furnace exhaust system, ^{as equipped with an} were functioning properly, the bulk of the fumes would be exhausted outside the building.

POTLINING DEPARTMENT - ROCKDALE WORKS

Acetylene

Steel cylinders of acetylene are ordered from the storeroom as needed. It is used with oxygen mainly for burning. As this gas burns, some carbon monoxide is produced but not in sufficient quantities to be toxic even though the exposure is for relatively long periods. Care is taken not to damage the cylinders or in any way cause a leak of the gas which is an asphyxiant in the unburned state.

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This material is painted on all contacts where aluminum is to be used to make electrical contact to minimize the formation of oxide on the contact surfaces. Although prolonged contact with the skin will cause severe irritation, the exposure time for this department is so short as to minimize the dangers.

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This material is sometimes used as pot shell insulating material. It is carried by boxes to the potshell, and specified amounts are shoveled into the pots. This material dusts readily and can cause internal poisoning. It is found irritating in both the dust and smoke state to the eyes, nose, and throat. Dust exposure, when shoveling this material, is not severe as a rule. However, dust respirators are provided and should be used if abnormal dusting conditions exist.

Asbestos

This material is found in old pots as insulating material. Possible asbestosis is a hazard if dusting occurs with improper ventilation. Approved respirators should be worn at all times.

Asbestos Millboard

This material is of needle-type, heat-resistant fibers and is used as a

shim under pot shells. Possibility of asbestosis hazard exists when dusting occurs on removal of sheetboard from boxes and when removed from potshell. Approved respirators should be worn at all times.

Bath

The main constituent of bath is cryolite. It also contains varying amounts of alumina, aluminum fluoride, and calcium fluoride. If a pot is to have a lining patched, the pot is cut out and allowed to cool. The bath is broken up with pneumatic hammers, shoveled into buckets, and hauled to the bath crusher. These operations cause varying amounts of fluoride-bearing dust to enter the surrounding atmosphere, which can be irritating to the throat and skin. Care is taken to keep the dust down as much as possible.

If the pot is to be relined, the pot is cut out, allowed to cool somewhat, and then is well soaked with water. The bath is then handled in exactly the same manner as already described but without the dust problem.

Coal

Large amounts of anthracite coal are used as a component of potlining mix. Transferring the coal from the mixers to the mix buckets and subsequently filling the weighing box causes a dust condition which while not injurious is unpleasant.

Concrete (Grout)

Concrete (Grout) is used to level pot stall floors. It comes pre-mixed in concrete trucks to the location as needed and worked by trowel, etc. Continued contact could result in irritated exposed skin membranes. Care in handling fresh concrete and thorough scrubbing of hands should reduce skin irritation. When exposed to dust from broken up material, respirators should be worn.

Copper and Copper Dust

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Dug Potlining

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Oxygen

Oxygen is used in bottles when using burning bar rig to burn off collector bars and cutting pot pads, bolts, etc. in pot disassembly. As used, it is not hazardous.

50 degree Pitch

This soft pitch is received in tank cars at the Potlining Department. The tank cars are heated with steam until the pitch is liquid, and then it is pumped through steam-heated pipes to a heated storage tank. From storage, the pitch is conveyed through pipes to the weigh scales and mixers. Direct contact with the liquid pitch is rare. The fumes liberated by the liquid pitch may cause skin and eye irritation, but exposure to these fumes is very limited and constitutes only a slight hazard.

Methyl naphthalene

This material is used as a solvent to dilute 50 degree pitch to make room temperature seam mix. Fumes liberated may cause skin and eye irritation, but exposure is limited and constitutes only a slight hazard.

Pot Insulation

Superex is an asbestos-free material used for insulation in pot cathodes. It comes in 12 X 36 - inch sheets of different thicknesses, usually 1", 2", 3", and 4". It dusts slightly when broken up but is usually used in entire sheets and does not constitute a serious hazard.

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Refractory Cement

This material is used in bonding and air sealing blocks together in the potlining of a cell. Those received in dry forms are potential health hazards because of the danger of silicosis, though remote. Most materials are used wet, thus minimizing the possibilities of hazard. Careful handling of the dry material prevents excessive dusting, and respirators should be worn if dusting does occur.

Solvents

TCE is used to clean oil and grease from metal conductor joints. The materials are carried to the job in cans refilled from larger drums, and rags and brushes, saturated with the solvent, are used to wipe the metal surfaces. Gloves are worn during this operation. Exposure of the skin, especially the hands, to excessive amounts of the solvent, can cause skin irritation, and inhalation of excessive amounts of the solvent could cause a respiratory irritation. Under normal circumstances, exposure to the liquid solvent or its vapors would be of short duration, and rubber gloves are used to further minimize the hazard.

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Battery Acid

This substance is a mixture of sulfuric acid and distilled water which is used as the electrolyte in lead storage batteries. The chemical laboratory makes up a mixture of acid and water which has a specific gravity of 1.400. When a battery needs electrolyte, enough acid and water are added to provide the fully charged battery with an electrolyte of specific gravity 1.260. While the batteries are charging, hydrogen is liberated from the cells. If this gas is released rapidly enough, an acid mist may form in the vicinity of the batteries. To prevent the accumulation of the hydrogen and acid mist, the area used for charging batteries is open and well ventilated.

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Copper and Copper Dust

This is not a significant hazard unless finely divided as the result of sanding or grinding.

Solvent:

1,2 Dichloroethane

This liquid is received in one quart glass bottles and is primarily used as a degreasing agent. Rags wet with this liquid are used to wipe grease from the interior walls of the mercury arc rectifier tubes. Occasionally small metal parts are allowed to soak in a pan of the solvent and then wiped clean with rags. It is used to clean electrical joints of old Alcoa Joint Compound #. 2 before the joint is made.

Work with this solvent usually takes place in a well-ventilated area, but the fumes or vapors are toxic if inhaled in sufficient quantity. The liquid is dangerous to the eyes and will cause dermatitis if allowed to repeatedly contact the skin. This is a flammable liquid, but it burns with difficulty.

Dye

Spotcheck Developer, Penetrant, and Cleaner are used for coloring and detecting metal cracks. The substances are flammable, but present no significant hazard as used in well-ventilated areas.

Lubricants:

Crater Compound No. 3

This is a heavy black oil of unknown composition or origin which is used to coat large open gears. Since it has a grease-like consistency, it must be heated to a more fluid state before application to the gears. As with other greases, repeated contact with the skin may cause dermatitis.

Epoxy Cements

These are generally used for temporary repairs, but because of their great strength they have also found uses of a permanent nature. Several different cements have been used, but should not be allowed to come in contact with the skin as they may cause dermatitis and in certain individuals an allergic reaction.

Hydrochloric Acid

Small amounts of this acid are used occasionally to clean metal surfaces prior to soldering. It is generally used in a well-ventilated area, and precautions are taken to protect the eyes and skin from this corrosive material.

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Solvent:

Naphtha, V.M. & P.

A solvent used in the meter shop for cleaning and degreasing purposes. Since only small quantities are used at any one time, this material probably represents only a slight hazard.

Solvent

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This is a trade name for several kinds of cleaners used to steam clean machine parts. Both acid and alkaline cleaners are sold as Oakite compounds and all may cause irritation upon contact with skin membranes.

Potassium Hydroxide

This material is used as the electrolyte in the nickel-cadmium batteries used for emergency lighting. It is stored in polyethylene bottles and used as needed. This material is dangerous to the eyes and skin. Inhalation of dusts or mists can cause injury to the respiratory system, and ingestion results in severe injury to the gastrointestinal tract. Chemical safety goggles, a full face shield, rubber gloves, and aprons should be worn when handling this material. Any area of the body which comes in contact with this material should be washed immediately with large amounts of water.

Sealing Compound

These compounds include C-H Chico, Johns Manville Duxseal, and Gould 76003. These materials are used for various sealing purposes; for example, Chico is used to seal explosion-proof circuits from non-explosion-proof areas. ~~XXXXXX~~ actually by hand. ~~XXXXXX~~ after contact. ~~XXXXXXXXXXXX~~ None but the Duxseal is/handled ~~physically~~. ; however, use is infrequent and contact with the skin is limited as much as possible, thereby minimizing the hazard. Personal hygiene and cleanliness measures should be exercised/dermatitis. The affected area should be cleaned thoroughly after contact.

Silicone Grease

This grease is a polymer consisting of chains of alternate silicon and oxygen atoms linked to roganic groups and to similar chains. It is used in the meter shop for lubricating meters and clocks which are exposed to fairly high temperatures. It is also used because it does not tend to build up on moving parts like petroleum based greases. Like other lubricants, it may cause dermatitis if repeatedly allowed to come in contact with the skin.

Silver Brazing Alloys

These alloys are occasionally used for such things as rebuilding switch contacts. The danger in these alloys is the cadmium they may contain - 16% to 24%. Since only relatively small amounts of these alloys are used and generally in open, well-ventilated areas, it is doubtful that anyone would be exposed to a concentration in excess of the permitted concentration.

Sodium Carbonate

This is a finely divided powder, alkaline in nature, which is used as electrolyte material. Care in handling minimizes dusting, which can irritate eyes and mucous membranes. Personal contact is kept to a minimum.

Solder

This is an alloy of relatively low melting point which is used for joining other metals. The term applies particularly to tin lead alloys, but other metals, such as silver, copper, zinc, and cadmium, may be included in varying amounts. A piece of solder may contain from one to five cores containing resin which acts as an antioxidant. Since only small amounts are used and generally in open and well-ventilated areas, it is doubtful that solder presents much of a hazard.

Soldering Flux

Small quantities are used in this department as an adhesive. If the flux contains an acid, spattering may cause burns. There is no serious hazard if used properly.

Solvent

Transformer Oil

Large amounts of this oil are used by this department. Pumps are used to add oil to a unit; therefore, skin contact is very limited. No serious health hazard exists as used and handled.

Solvent
Varsol

This substance is a light petroleum distillate used as a solvent for oil and grease. It is usually used in open and well-ventilated areas. The usual practice is to soak the parts to be cleaned in a bucket or can containing the solvent. After a period of soaking the parts are wiped dry with rags or blown dry with the aid of compressed air. Occasionally the Varsol will be aspirated into a stream of compressed air, and the resulting spray used to clean large pieces of equipment. This liquid may cause damage to the eyes, and prolonged contact with the skin may cause dermatitis. Inhalation of large amounts of the solvent vapors may cause adverse reactions, particularly in sensitive individuals. It has a relatively low flash point and thus also presents the problem of being a fire hazard.

White Lead

This material is used for identification purposes and is stored in cans. It is usually in powder form, soluble in acids and insoluble in water. It is poisonous when inhaled into the body, causing a reaction in the upper respiratory tract. Extreme care should be taken in handling to prevent dusting, as well as personal cleanliness after using the lead base paint.

Re: Coral Plastic

This material^{is used} by mechanical maintenance brickmasons in lining the Lectermelt furnaces and also Brick has been discontinued for this job - Coral plastic is longer life thus cutting down maintenance costs and labor by about 1/3

This material is purchased from Harbison Walker Co. of Houston, Texas. Dave Barber, sales manager D. L. McCreary states that Mr. Barber is going to be contacted relative to the complaints that we have had recently. During October we have had at least seven First Aid cases of eye and skin irritation from employees working with this material.

A sample of this material has been given to the lab for analysis. It is possible that it may be emitting phosphoric acid fumes, especially when heated, which are only moderately toxic when exposed to for extended periods of time.

This material when used in the maintenance Dept. is not heated.

Brickmasons and helpers are required to wear plastic goggles, which are vented, an appropriate gloves when working with this material.

When this material was first used in an experimental venture, the Process Engineering Dept. lined electric melt furnaces and suffered no ill effects.

POTLINING DEPARTMENT - ROCKDALE WORKS

*add
fills
See 16 meet sheet*

Acetylene

Steel cylinders of acetylene are ordered from the storeroom as needed. It is used with oxygen mainly for burning. As this gas burns, some carbon monoxide is produced but not in sufficient quantities to be toxic even though the exposure is for relatively long periods. Care is taken not to damage the cylinders or in any way cause a leak of the gas which is an asphyxiant in the unburned state.

Alcoa Joint Compound No. 2

This material is painted on all contacts where aluminum is to be used to make electrical contact to minimize the formation of oxide on the contact surfaces. Although prolonged contact with the skin will cause severe irritation, the exposure time for this department is so short as to minimize the dangers.

Alumina

Alumina is used as insulation for pots, and it is carried from the potrooms in ore buckets. Alumina is quite dusty, but in itself is considered more of a nuisance than a hazard. Respirators are used if dust is heavy and care is taken to minimize the dusting in handling.

Aluminum Fluoride

This material is sometimes used as pot shell insulating material. It is carried by boxes to the potshell, and specified amounts are shoveled into the pots. This material dusts readily and can cause internal poisoning. It is found irritating in both the dust and smoke state to the eyes, nose, and throat. Dust exposure, when shoveling this material, is not severe as a rule. However, dust respirators are provided and should be used if abnormal dusting conditions exist.

Asbestos

This material is found in old pots as insulating material. ~~Possible~~ *a serious lung disease*
Asbestosis is a hazard if dusting occurs with improper ventilation. Approved
potential
respirators should be worn at all times.

*See
corrected
1/10*

Asbestos Millboard

This material is of needle-type, heat-resistant fibers and is used as a

POTLINING DEPARTMENT - ROCKDALE WORKS

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Asbestosis is a ^{potential} hazard if dusting occurs with improper ventilation. Approved respirators should be worn at all times.

Asbestos Millboard

This material is of needle-type, heat-resistant fibers and is used as a

shim under pot shells. Possibility of asbestosis hazard exists when dusting occurs on removal of sheetboard from boxes and when removed from potshell.

Approved Respirators ^{appt. for use in pot dust} should be worn at all times. ^{See "Asbestos"} ~~See "Asbestos"~~ ~~for handling and~~

Bath

The main constituent of bath is cryolite. It also contains varying amounts of alumina, aluminum fluoride, and calcium fluoride. If a pot is to have a lining patched, the pot is cut out and allowed to cool. The bath is broken up with pneumatic hammers, shoveled into buckets, and hauled to the bath crusher. These operations cause varying amounts of fluoride-bearing dust to enter the surrounding atmosphere, which can be irritating to the throat and skin. Care is taken to keep the dust down as much as possible.

If the pot is to be relined, the pot is cut out, allowed to cool somewhat, and then is well soaked with water. The bath is then handled in exactly the same manner as already described but without the dust problem.

Coal

Large amounts of anthracite coal are used as a component of potlining mix. Transferring the coal from the mixers to the mix buckets and subsequently filling the weighing box causes a dust condition which while not injurious is unpleasant.

Concrete (Grout)

Concrete (Grout) is used to level pot stall floors. It comes pre-mixed in concrete trucks to the location as needed and worked by trowel, etc. Continued contact could result in irritated exposed skin membranes. Care in handling fresh concrete and thorough scrubbing of hands should reduce skin irritation. When exposed to dust from broken up material, respirators should be worn.

Copper and Copper Dust

During the cleaning of copper bus, there is a chance of exposure to copper dust and to copper compounds which have formed on the surface of the bus. The copper is sometimes cleaned by grit blasting and by using an abrasive disk. When an abrasive disk is used, it is usually operated in an open and well ventilated area.

asbestos is bagged & disposed separately.

Dug Potlining

When a pot is to be relined, it is cut out, cooled, soaked with water, and the bath removed. The cathode or lining is then broken up with the aid of a pot digging machine and pneumatic hammer. The cathode materials, including the carbonaceous material, refractory brick and cement, asbestos, alumina insulation, etc., are then loaded by hand and shoveled into buckets. These are dumped in the west end of Building 127 during the night shifts so that personnel who work in that area are exposed as little as possible to the irritating dust and fumes. The material is then loaded into railroad cars for shipment to a plant for recovery of the fluorides. During the handling of this material, any dust formed may cause irritation of the skin, eyes, and respiratory system because of its alkaline reaction with moisture as well as its fluoride content. The scrap lining material also liberates acetylene and ammonia when it is wet.

Oxygen

Oxygen is used in bottles when using burning bar rig to burn off collector bars and cutting pot pads, bolts, etc. in pot disassembly. As used, it is not hazardous.

50 degree Pitch

This soft pitch is received in tank cars at the Potlining Department. The tank cars are heated with steam until the pitch is liquid, and then it is pumped through steam-heated pipes to a heated storage tank. From storage, the pitch is conveyed through pipes to the weigh scales and mixers. Direct contact with the liquid pitch is rare. The fumes liberated by the liquid pitch may cause skin and eye irritation, but exposure to these fumes is very limited and constitutes only a slight hazard.

Solvent: Methyl naphthalene

This material is used as a solvent to dilute 50 degree pitch to make room temperature seam mix. Fumes liberated may cause skin and eye irritation, but exposure is limited and constitutes only a slight hazard.

Pot Insulation

Suprex is an asbestos-free material used for insulation in pot cathodes. It comes in 12 X 36 - inch sheets of different thicknesses, usually 1", 2", 3", and 4". It dusts slightly when broken up but is usually used in entire sheets and does not constitute a serious hazard.

Potlining Mix

This material is a mixture of 50 degree pitch, methyl naphthalene, and anthracite coal. It is mixed in a steam heated mixer and then dumped into a container for transportation to the pot being relined. When the mixture first comes from the mixer and until it cools somewhat, it emits pitch fumes which may cause eye and skin irritation. Protection should include ~~the use of goggles for the eyes and skin creams for exposed skin areas, as well as~~ thorough hygiene of exposed areas following exposure to these fumes.

Refractory Cement

This material is used in bonding and air sealing blocks together in the potlining of a cell. Those received in dry forms are potential health hazards because of the danger of silicosis, though remote. Most materials are used wet, thus minimizing the possibilities of hazard. Careful handling of the dry material prevents excessive dusting, and respirators should be worn if dusting does occur.

Solvents

TCE is used to clean oil and grease from metal conductor joints. The materials are carried to the job in cans refilled from larger drums, and rags and brushes, saturated with the solvent, are used to wipe the metal surfaces. Gloves are worn during this operation. Exposure of the skin, especially the hands, to excessive amounts of the solvent, can cause skin irritation, and inhalation of excessive amounts of the solvent could cause a respiratory irritation. Under normal circumstances, exposure to the liquid solvent or its vapors would be of short duration, and rubber gloves are used to further minimize the hazard.

*also
methyl n.*

UTILITY DEPARTMENT - ROCKDALE WORKS

Acetylene

Steel cylinders of acetylene are ordered from the storeroom as needed. It is used with oxygen mainly for burning. As this gas burns, some carbon monoxide is produced but not in sufficient quantities to be toxic even though the exposure is for relatively long periods. Care is taken not to damage the cylinders or in any way cause a leak of the gas which is an asphyxiant in the unburned state.

Adhesives

These materials are used for bonding purposes in the sludge recovery plant to patch filter cloth. These solvents may be flammable, but as used do not constitute a health hazard.

Alumina

Alumina, the ore of aluminum, is unloaded from railroad cars onto a conveyor and into storage by personnel of the Utility Department. Alumina is quite dusty, but in itself is considered more of a nuisance than a hazard. Respirators are used if dusting is heavy, and care is taken to minimize the dust in handling.

Aluminum Fluoride

Aluminum fluoride, one of the primary components of bath, is unloaded from railroad cars onto a conveyor and into storage by the Utility Department. This material dusts readily and can cause internal poisoning. It is irritating in the dust state to the eyes, nose, and throat. Dust exposure is not severe as a rule; however, respirators are provided and should be used if abnormal dusting conditions exist.

Bath

The main constituent of bath is cryolite. It also contains varying amounts of alumina, aluminum fluoride, and calcium fluoride. If a pot is to have a lining patched, the pot is cut out and allowed to cool. The bath is broken up with pneumatic hammers by the Potlining Department, shoveled into buckets and hauled to the bath crusher by the Utility Department. These operations cause varying amounts of fluoride-bearing dust to enter the surrounding atmosphere,

which can be irritating to the throat and skin. Care is taken to keep the dust down as much as possible.

If the pot is to be relined, the pot is cut out, allowed to cool somewhat, and then is well soaked with water. The bath is then handled in exactly the same manner as already described, but without the dust problem.

Calcium Fluoride (Sludge)

Sludge is pumped from settling basins to filtering-drying plant and loaded via elevator into bulk rail cars. The material is dusty and emits some fumes during processing and drying. These conditions may cause skin and respiratory irritation as well as excessive absorption of fluorides into the body. Adequate ventilation should minimize the hazard of the dusting. As necessary, a 3M8705 respiratory dust mask and adequate gas mask should be used. Personal hygiene should be exercised as well as avoidance of dust on food and drinking liquids.

Cryolite

Cryolite, the main constituent of bath, is unloaded from railroad cars onto a conveyor and into storage by the Utility Department. Handling, hazards, and method of control are the same as for aluminum fluoride.

Fluorspar

Fluorspar, a constituent of bath, is unloaded from railroad car in crates, boxes, and sacks by the Utility Department. Handling, hazards, and method of control are the same as for aluminum fluoride.

Oxygen

Oxygen is used in bottles as a fuel for cutting metal pads. As used, it is not hazardous.

Lubricants

Various lubricants are used as vehicle lubrication, hydraulic fluid, machine lubrication, etc. There is a possibility of dermatitis; however, personal hygiene and adequate ventilation minimizes hazards.

Penetrating Oil

This material is used to loosen rusted parts. The possibility of dermatitis is present, but as used there should be no serious danger.

Sodium Carbonate

Sodium Carbonate (soda ash) is added to pots to maintain proper bath ratio. It is unloaded from railroad cars in 100-pound bags and in bulk by the Utility Department. It is transported by conveyor belt to storage until needed in the potrooms, when it is distributed to pots via dump buckets. This compound is alkaline and is irritating to mucous membranes as well as being an internal poison. Dusting is not severe as a rule; however, hygiene measures prevent personal contact and dust respirators are provided if dusty conditions exist.

Sodium Hydroxide

This material is received and used from drums to clean pipefittings used on pot (molten metal) siphons. It is mixed with water to required strength. Sodium hydroxide will cause burns to skin membranes and conjunctivitis of the eyes. Careful handling of the material, as well as protection in the form of gloves is provided to minimize the hazard.

ANODE DEPARTMENT - ROCKDALE WORKS

Abrasives

These are used for grinding, cleaning, and polishing purposes. The various forms are generally of the inert or nonsiliceous type. Thus the dust produced by the abrasive is not as dangerous as that produced by the material which is being ground, sanded, or buffed. Operations using abrasives are usually conducted where exhaust systems are present or in open, well-ventilated areas. However, when working on materials which produce a dangerous dust, such as copper, respirators are used.

Aerosol

Various aerosols are used as lubricants and paint forms. They are stored in self-contained cans and carried to work site. The substances are flammable and dangerous if the cans are punctured or stored near heat.

Brick

Fire brick is used in the construction and maintenance of the baking furnaces. Cutting is done with a power saw which has a dust disposal system so that there is very little danger of anyone inhaling brick dust.

Butts

Butts or "burn offs" are solid chunks of anode that have been removed from operating pots. These are delivered from the Potrooms to the Carbon Plant. Most of the butts are in pieces at least 8" X 8" although there is some dust present. The butts are dumped or shoveled directly into a floor hopper feeding a conveyor. During the dumping and rehandling there is dusting. Butts contain fluorides, and when the dust is inhaled, there can be some irritation of the nose and throat. Two men handle these butts, and they normally step out of the way as the truck dumps the butts. Hence, their exposure is limited.

During crushing and grinding dust is collected at its source.

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Coke

Coke is one of the principal materials used in making carbon electrodes, and as such is handled throughout the entire Carbon Plant. Therefore, any of the people employed may, at one time or another, be exposed to coke dust in the atmosphere. Different kinds of coke are used, but all are quite similar as far as health hazards are concerned. Coke dust-laden air when inhaled may contribute

to respiratory trouble.

In the Carbon Plant, coke is received in covered hopper or open-top cars. Most of the handling of coke from car to storage and throughout the remainder of the Carbon Plant is done in closed conveyors to which suitable dust collecting systems are attached. However, some dusty conditions exist occasionally on the furnaces where dust collection is next to impossible. The exposure is rather limited by the recent use of fluid coke. Respirators are available and recommended when conditions are very dusty.

Dust from Baked Carbon Scrap

Baked scrap consists of baked anodes which were scrapped before reaching the potrooms. This material is crushed in the same hammermill as the butts and causes just about as much dust. This dust usually contains fluorides, since most anodes contain a certain percentage of butts.

Dust from Carbon Butts

Carbon butts (reclaimed anodes) are loaded into boxes by potroom crews. Bath materials adhere to these butts, and the amount depends upon the quality of the cleaning job in the potrooms. The butts are dumped into a hopper which feeds a conveyor which transports them to the hammermill where they are crushed before going to storage tanks. A dust collector carries off fine particles generated by crushing.

Dust from Green Carbon Scrap

Green carbon scrap consists of anodes which are scrapped after leaving the press and before reaching the baking furnaces. This material is crushed in the same hammermill as the butts and baked scrap, but it produces less dust. This dust also contains fluorides from its butt content and can cause skin and eye irritation due to the pitch it contains.

Fumes from Melted 110 Degree Pitch

Carbon mixing operations require that coke aggregate and 110 degree pitch be heated in a steam-heated mixer to about 30 - 40 degrees above the softening point of the pitch. At this temperature the more volatile constituents of the pitch are vaporized and enter the atmosphere from openings in the mixers and from the conveyor belt which transports the mix to the press room. A fume-removal system removes most of the fumes from the mixer area.

Furfural Alcohol

This substance is used as a vehicle and binder in carbon cements and is stored in metal drums and cans. Volatile fumes can cause irritation to eyes, nose, skin, and mucous membranes. It should be handled with extreme care, used in well-ventilated areas, and skin contact should be avoided. Eye protection should also be used.

Mortar

Several different bonding mortars are used in repairing, building, maintaining and operating carbon baking furnaces. In handling dry mortar materials, the health hazard danger is from the inhalation of dust. One man does the mixing of mortar and his contact with the dust is limited. A number of the materials are received ready mixed in wet form and consequently are not subject to dusting.

Natural Gas

Natural gas is used as fuel for the baking furnaces. The gas is supplied to the burners at less than 20 psi by pipes and hoses. Due to frequent repositioning of the burner units, there are some natural failures of hoses, pipes and fittings. However, the gas contains an additive which makes odor detection of a leak possible. In addition, the area into which gas could leak is quite large and well ventilated so that only a serious rupture or breakage of lines could cause a hazardous condition. The greatest hazard of natural gas in this operation is of a fire or explosive nature.

When using the standby system supply (a mixture of propane and air), care must be exercised to prevent this mixture from settling into the pits. If the waste gas fans should cut off, the supply of natural gas would be cut off immediately by an automatic latch valve.

Oils, Production Lubrication

This oil is usually ML 680 or any other clean, lightweight oil and is used to spray the mosepiece of the carbon anode press. During this operation small droplets of oil are introduced into the atmosphere of the press room. However, this constitutes only a very minor hazard since the amount is small and the press room is well ventilated.

110 Degree Pitch

110 degree pitch is received in railway hopper bottom cars. It is unloaded into a track hopper at Bldg. 52A and transported by conveyor into Bldg. 52 for

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storage. The pitch is received in flake form and contains a certain amount of residual moisture which greatly reduces the amount of dust created during unloading. Occasionally the pitch sticks in a car and, if the use of a car shake-out does not dislodge it, a worker must enter the car and force the pitch through the hoppers. This action presents the greatest possible exposure to pitch dust.

Exposure of the skin to pitch dust may result in a serious pitch burn. The dust causes the skin to become sensitive to light and wind and, if rubbed by clothing, may be accompanied by blistering and peeling of the skin. Pitch burns generally cause more discomfort during the hot weather months. The dust also causes eye irritation. Protective creams and ointments for skin protection are only partially effective.

Refractory Cement

Cements, such as Harwaco Bond, Super 3000, and Penseal are used for minor patching of refractory walls. It is usually received already mixed with water and could cause skin irritation when handled in this form. As used, however, hazards should be slight.

Ring Furnace Exhaust Gases

These gases are formed during the combustion in the ring furnace flues. The major constituents of this gas are nitrogen, carbon dioxide, and oxygen. However, it contains a small amount of carbon monoxide, some sulfur compounds, and tar and pitch vapors which have diffused through the flue walls from the baking pits. These gases are normally contained in the flues and ducts leading to the exhaust stack, but during firing changes, breakdowns, or maintenance some of these gases may escape into the furnace area. This constitutes only a very slight hazard, because the buildings are large and well ventilated.

The exhaust gases are cleaned by processing through an Alcoa 446 unit. A small part of the hydrocarbons are exhausted through a short stack.

CONTROL DEPARTMENT - ROCKDALE WORKS

Alumina

Alumina, the ore of aluminum, is unloaded from railroad cars onto a conveyor and into storage by personnel of the Utility Department, as supervised by the Control Department. Alumina is quite dusty, but in itself is considered more of a nuisance than a hazard. Respirators are used if dusting is heavy, and care is taken to minimize the dust in handling.

Aluminum Fluoride

The Control Department supervises the unloading and transportation of aluminum fluoride, one of the primary components of bath. The Utility Department unloads the material from railroad cars onto a conveyor into storage until distributed to the potrooms via dump buckets. This material dusts readily and can cause internal poisoning. It is irritating in the dust state to the eyes, nose, and throat. Dust exposure is not severe as a rule; however, respirators are provided and should be used if abnormal dusting conditions exist.

Cryolite

This material is the main constituent of bath. Handling, hazards, and method of control are the same as for aluminum fluoride.

Fluorspar

Fluorspar is a constituent of bath. Handling, hazards, and method of control are the same as for aluminum fluoride.

Sodium Carbonate

Sodium carbonate (soda ash) is added to pots to maintain proper bath ratio. It is unloaded from railroad cars in 100-pound bags and in bulk by the Utility Department. It is transported by conveyor belt to storage until needed in the potrooms, when it is distributed to pots via dump buckets. The Control Department supervises the unloading and transportation of sodium carbonate (performed by the Utility Department).

This compound is alkaline and is irritating to mucous membranes as well as being an internal poison. Dusting is not severe as a rule; however, hygiene measures prevent personal contact and dust respirators are provided if dusty conditions exist.

POTROOMS - ROCKDALE WORKS

Alumina

Alumina (aluminum oxide) is the raw material from which metallic aluminum is produced. It is a white, granular solid which is received in closed hopper bottom railway cars. It is unloaded onto belt conveyors which carry it to large storage tanks. A portable hopper is filled from the storage tanks and used to fill the individual pot hoppers. Each time a pot is worked alumina is added to the molten bath. Most of the alumina is added by the automatic feeder.

Alumina is quite dusty when it is handled. This dust may have an added hazard in that it may contain fluorides recycled by the A-398 process. Dust type respirators are used to minimize the hazard of inhalation of the dust.

Aluminum Fluoride

Aluminum fluoride is delivered to the potrooms in portable hoppers and added to pot ore bins utilizing a gravimetric feeder. In the electrolytic process, HF and NaAlF_4 are volatilized. Thus, aluminum fluoride has to be replenished by regularly scheduled additions. As one of the primary components of cryolite or bath, aluminum fluoride is used to maintain the ratio of sodium fluoride to aluminum fluoride to a target less than 1.50. It is worked into the pot through the automatic feeder.

Aluminum fluoride dusts readily and can cause internal poisoning. Also, it is found irritating, in both the smoke and dust states, to the eyes, nose and throat. However, exposure in the potrooms is limited. The use of respirators is recommended in abnormal exposure. Shielding of pots would adequately take care of smoke removal.

Bath

Bath is the electrolyte material used in the electrolytic reduction process. The term bath is used to identify cryolite after the cryolite has been melted up in the reduction process. Bath is used and handled in both the liquid and solid state. An approximate bath composition is: 8% CaF_2 , 5% Al_2O_3 , 9-10% excess AlF_3 , and the balance cryolite (Na_3AlF_6).

Bath is handled in liquid form (melting point about 930-970 degrees C) by siphoning from the pot into a crucible. This bath may either be allowed to solidify or transferred to another pot in the liquid state. In the liquid state

it is hazardous because of the burns it may cause if allowed to come into contact with the skin and the volatile fluorides which it emits. Prolonged or continuous exposure to this smoke could be serious in that the smoke would be irritating to the mucous membranes.

Solid bath is handled by practically all transportation and handling methods and in varying degrees of exposure. When bath is handled, practically all other electrolyte materials will be present in one form or another. In the solid state the greatest hazard is the inhalation of the fluoride bearing dust created during handling or crushing operation. However, in its many forms and methods of use in the potrooms, it cannot be considered a serious health hazard.

Cryolite

Cryolite is drawn to the potrooms from storage tanks in buggies and generally dumped on the floor in front of the pot or pots in which it is to be used. From the floor the cryolite is shoveled onto the pot or pots as needed.

Cryolite is the main constituent of bath and acts as a solvent for alumina in the electrolytic reduction process in which aluminum oxide is reduced to metallic aluminum.

Cryolite is not used in any regular or scheduled manner in the potrooms. Exposure is therefore limited. Pot tenders shovel the various kinds of cryolite onto the pots at infrequent intervals as needed. Cryolite dusts readily and can cause internal poisoning, but normal exposure in the potrooms is so limited that there are no hazards involved. Gases as the result of melting cryolite irritate the respiratory tract to a limited extent. The use of respirators is recommended in heavy exposure to cryolite dust and adequate ventilation is necessary to avoid gas concentrations.

Fluorspar

Fluorspar (calcium fluoride) is a naturally occurring material which is added occasionally to the electrolytic cells to impart or maintain certain desired properties in the molten bath. It is delivered to the potrooms in buggies and is generally dumped on the floor in front of the pot or pots in which it is to be used. It is added to the cells by shovel as needed. It does not dust readily, and any dust produced is more of a nuisance than a hazard. The dust could, however, be toxic if ingested.

Pot Gases

These gases are emitted by the electrolytic cells during the reduction of aluminum oxide to metallic aluminum. They are visible as a white smoke or fume and are composed of carbon dioxide, carbon monoxide, various gaseous fluorides, and varying amounts of finely divided solids. The major portion of this gas is drawn through an electrostatic precipitator and scrubber system before entering the atmosphere. Dry scrubbing (A-398) is used in lines 5, 7, and 8 in lieu of precipitators and wet scrubbers. However, each time a cover is removed to do some work on the cell, some of this gas escapes into the surrounding area. This gas usually rises rapidly to the roof ventilators and exposures to it are of short duration.

Potroom Particulate

This finely divided solid is removed from the pot gases by a combination of multiclones and electrostatic precipitators. It is transferred from the collecting hoppers to a storage tank in the ore unloading area by means of either trailer mounted buckets or conveyor system. From storage it is blended with alumina by adding it to the belt conveyor carrying the alumina to storage tanks. This blended alumina is used only in lines not using A-398 system. Composition is roughly 2/3 alumina, 1/4 bath compound, 9 per cent carbon dust. Exposures are usually of a short duration, since this gas usually rises rather rapidly to the roof ventilators. However, prolonged inhalation of large amounts of this gas may cause nausea, a choking sensation, and irritations to the eyes, skin, and respiratory passages.

Sodium Carbonate

This material is used to raise the ratio of sodium fluoride to aluminum fluoride in the molten bath of the electrolytic cells or in combination with aluminum fluoride to synthesize electrolyte. Dust from this material, due to its alkaline nature, is very irritating to the eyes, respiratory passages, and skin. However, under normal conditions workers are seldom exposed to dust from this material unless a bag is dropped or in some way broken. At the present time bulk sodium carbonate is being regularly used. It is dispensed in the same manner as AlF_3 .

Regenerated Alumina from A-446

Gray dusty granular material, produced at the carbon baking facilities

and blended with alumina similarly to potroom particulate. Partially coked alumina, basically is just a nuisance dust. Eye protection should be worn, as well as a respirator when dusting is severe.

SHIPPING DEPARTMENT - ROCKDALE WORKS

Abrasives

Sand is used as a non-slip agent for trackmobile wheels. The only hazard involved would be the inhalation of the loose sand which could be injurious to operators. As used, however, the risk is slight.

Beryllium

Beryllium is used as an alloying constituent of aluminum. Dust from the metal or its compounds when breathed into the lungs creates conditions similar to chemical pneumonitis.

Where materials containing beryllium or its salts are processed in such a way that beryllium may be present as dust in the atmosphere, adequate ventilation is essential. Toxic fume and dust respirators should be worn where dust is prevalent.

Ether

This material is used in vehicle operation for quick start on vehicles. It is a light volatile flammable liquid and should be used with adequate ventilation and away from the presence of heat.

Inks

Marsh stencil ink is used for recording and identification purposes. Petroleum naphtha is a constituent, and it should be used with adequate ventilation and prolonged breathing of fumes avoided.

ELECTRICAL DEPARTMENT - ROCKDALE WORKS

Abrasives

Abrasives, used in various forms, are generally of the inert or non-siliceous type. Thus the dust produced by the abrasive is not as dangerous as that produced by the material which is being ground, sanded, or buffed. Operations using abrasives are usually conducted where exhaust systems are present or in open, well-ventilated areas. However, when working on materials which produce a dangerous dust, such as copper, respirators are used.

Acetylene

Steel cylinders of acetylene are ordered from the storeroom as needed. It is used with oxygen mainly for burning. As this gas burns, some carbon monoxide is produced but not in sufficient quantities to be toxic even though the exposure is for relatively long periods. Care is taken not to damage the cylinders or in any way cause a leak of the gas which is an asphyxiant in the unburned state.

Adhesives

These are received from the storeroom and stored in small amounts in office cabinets. They are used for various bonding purposes. Properties vary, but the solvents are hazardous only in that they may be flammable liquids.

Aerosol

WD-40 is used as a lubricant, and Krylon paint is used in paint form. They are stored in self-contained cans. The substances are flammable and dangerous if the cans are punctured or stored near heat.

Alcohol, Denatured

Denatured alcohol is stored in metal cans and as needed used as a cleaning agent and for crane cylinder repairs. The odor varies depending upon additive material and is poisonous when taken internally.

Asbestos Gasket Cloth

This material is stored in crates, pre-cut, and used in transformer gaskets. It is not hazardous unless the dust particles become airborne (as a result of grinding, etc.). ~~See "Asbestos" for method of control~~

Askarels

This is a trade name for a series of chlorinated aromatic derivatives, such as pentachlorodiphenyl, polychlorinated biphenyls, and trichlorobenzene. They are nonflammable and are used for transformer, reactor, and capacitor insulation where ordinary insulating oil would present a fire hazard. They are enclosed in completely sealed units which are not physically handled, and disposal is by contractor service.

The substances are stored in drums and are pumped into the units if necessary. This is very rare and would occur only if a reactor fails and a new reactor needs filling.

Since the use of these liquids is limited, the hazard is minimal. However, the liquids are highly toxic and special handling precautions are used to prevent all possible exposure.

Battery Acid

This substance is a mixture of sulfuric acid and distilled water which is used as the electrolyte in lead storage batteries. The chemical laboratory makes up a mixture of acid and water which has a specific gravity of 1.400. When a battery needs electrolyte, enough acid and water are added to provide the fully charged battery with an electrolyte of specific gravity 1.260. While the batteries are charging, hydrogen is liberated from the cells. If this gas is released rapidly enough, an acid mist may form in the vicinity of the batteries. To prevent the accumulation of the hydrogen and acid mist, the area used for charging batteries is open and well ventilated.

Brake Fluid

This is a standard hydraulic brake fluid. The Electrical Department's use of this liquid is confined mainly to the braking systems of the overhead cranes.

Excerpt
Contact Re-Nu

This product is an aerosol often marketed under the trade name "Freon" and is used as a cleaner and degreaser in the meter shop. The fluorocarbon products marketed under the trademark "Freon" are low in toxicity, nonflammable, nonexplosive, and noncorrosive, but in the presence of open flame or objects operating at high temperature they will decompose to form toxic or irritant products.

The product should be used with adequate ventilation and contact with the skin should be avoided as it may remove the natural skin oils. Since only relatively small amounts of this material are used, and it is generally used in well ventilated areas, it is doubtful that this product presents much of a hazard.

Copper and Copper Dust

This is not a significant hazard unless finely divided as the result of sanding or grinding.

1,2 Dichloroethane

This liquid is received in one quart glass bottles and is primarily used as a degreasing agent. Rags wet with this liquid are used to wipe grease from the interior walls of the mercury arc rectifier tubes. Occasionally small metal parts are allowed to soak in a pan of the solvent and then wiped clean with rags. It is used to clean electrical joints of old Alcoa Joint Compound # 2 before the joint is made.

Work with this solvent usually takes place in a well-ventilated area, but the fumes or vapors are toxic if inhaled in sufficient quantity. The liquid is dangerous to the eyes and will cause dermatitis if allowed to repeatedly contact the skin. This is a flammable liquid, but it burns with difficulty.

Dye

Spotcheck Developer, Penetrant, and Cleaner are used for coloring and detecting metal cracks. The substances are flammable, but present no significant hazard as used in well-ventilated areas.

Crater Compound No. 3

This is a heavy black oil of unknown composition or origin which is used to coat large open gears. Since it has a grease-like consistency, it must be heated to a more fluid state before application to the gears. As with other greases, repeated contact with the skin may cause dermatitis.

Epoxy Cements

ARD 040486

These are generally used for temporary repairs, but because of their great strength they have also found uses of a permanent nature. Several different cements have been used, but should not be allowed to come in contact with the skin as they may cause dermatitis and in certain individuals an allergic reaction.

Hydrochloric Acid

Small amounts of this acid are used occasionally to clean metal surfaces prior to soldering. It is generally used in a well-ventilated area, and precautions are taken to protect the eyes and skin from this corrosive material.

Insulating Paint and Varnish *Electrical (Resinite) ad*

Various types or brands of this material have been used, but at the present time a General Electric product called Gyptol is being used. This product is combustible and harmful if taken internally. Prolonged contact with skin could cause dermatitis, and it should be used with adequate ventilation to prevent possible damage to respiratory tract.

Lead

Lead is used most commonly as a joint material, but it is also used in the form of pipes and occasionally as a seal or gasket. It is also present in certain alloys, such as Babbitt and solder. The greatest hazard associated with lead is present when it is used as a joint material. Since it must be melted before use, there is danger of inhaling lead fumes from the molten metal. However, unless the melting of lead is done in a confined area, the concentration of lead in the air is probably below the maximum allowable level.

Liquid Wrench — *Use title Penetrating Oil*

This is a liquid penetrant used to free parts frozen by rust, corrosion, scale, paint, varnish, carbon, or gum. It is labeled as being a flammable blend of aromatic solvents. The label further states that prolonged or repeated breathing of the vapor and contact with the skin should be avoided, and that it is harmful if ingested. This material is generally used in well-ventilated areas, but at times it may be used in areas where poor ventilation may cause a hazardous condition.

Naphtha, V.M. & P.

A solvent used in the meter shop for cleaning and degreasing purposes. Since only small quantities are used at any one time, this material probably represents only a slight hazard.

Potassium Hydroxide

Sealing Compound

Silicone Grease

Silver Brazing Alloys

ARD 040488

Sodium Carbonate

This is a finely divided powder, alkaline in nature, which is used as electrolyte material. Care in handling minimizes dusting, which can irritate eyes and mucous membranes. Personal contact is kept to a minimum.

Solder

This is an alloy of relatively low melting point which is used for joining other metals. The term applies particularly to tin lead alloys, but other metals, such as silver, copper, zinc, and cadmium, may be included in varying amounts. A piece of solder may contain from one to five cores containing resin which acts as an antioxidant. Since only small amounts are used and generally in open and well-ventilated areas, it is doubtful that solder presents much of a hazard.

Soldering Flux

Small quantities are used in this department as an adhesive. If the flux contains an acid, spattering may cause burns. There is no serious hazard if used properly.

Transformer Oil

Large amounts of this oil are used by this department. Pumps are used to add oil to a unit; therefore, skin contact is very limited. No serious health hazard exists as used and handled.

Varsol

akite
Varsol

This substance is a light petroleum distillate used as a solvent for oil and grease. It is usually used in open and well-ventilated areas. The usual practice is to soak the parts to be cleaned in a bucket or can containing the solvent. After a period of soaking the parts are wiped dry with rags or blown dry with the aid of compressed air. Occasionally the Varsol will be aspirated into a stream of compressed air, and the resulting spray used to clean large pieces of equipment. This liquid may cause damage to the eyes, and prolonged contact with the skin may cause dermatitis. Inhalation of large amounts of the solvent vapors may cause adverse reactions, particularly in sensitive individuals. It has a relatively low flash point and thus also presents the problem of being a fire hazard.

White Lead

This material is used for identification purposes and is stored in cans. It is usually in powder form, soluble in acids and insoluble in water. It is poisonous when inhaled into the body, causing a reaction in the upper respiratory tract. Extreme care should be taken in handling to prevent dusting, as well as personal cleanliness after using the lead base paint.

ATOMIZER - ROCKDALE WORKS

Abrasives

These are used for sharpening tools, and eye protection should be used. Masks should also be used if extensive carborundum grinding is done because of the possibility of silicosis; however, the amount done is limited and should present no particular problem.

Adhesives

These materials, such as Swifts' Glue, are used for weak bonding of palletized bags. Adequate ventilation and personal hygiene minimize hazards.

Aerosol

WD 40 is used as a lubricant and enamel paint is used in paint form. They are stored in self-contained cans. The substances are flammable and dangerous if the cans are punctured or stored near heat.

Aluminum, Molten

Molten aluminum is used in the Atomizer for aluminum powder and aluminum granules. The extreme heat of the molten metal is very injurious upon contact with tissue, thus necessitating careful handling. Contact with wet, cold tools could result in explosions; therefore, only dry, hot tools should be allowed to come in contact with the metal.

Aluminum Powder

Various grade numbers of aluminum powder are produced in the Atomizer for customer sales. It is flammable with dust clouds of a highly explosive nature, producing rapid evolution of intense heat. The powder is handled with extreme care and stored and handled under inert atmosphere. Dust clouds and ignition sources should be avoided, and heat protective clothing should be worn.

Beryllium/Copper Alloy

Hand tools made of this alloy are used in the Atomizer because of its low sparking characteristics from impact or abrasion. It is hazardous only if very fine BE-Cu particles become airborne and are inhaled. As used, however, the hazards are slight.

Calcium Carbonate

This substance is used for metal trough surface protection. Excessive dust in the air could cause lung irritation; however, as used the possibilities of hazard are slight.

Cement, Rubber

Dow-Corning RTV Silicone Rubber Cement is used as a miscellaneous sealant and is handled in cartridges. Exposure is limited and constitutes only a slight hazard.

Compressed Air

Compressed air is used in pneumatic tools, piped from compressors to point of use. The major hazard is from penetration of skin by air bubbles, resulting in circulatory system damage. Molten metal and compressed air at nozzles could cause burns. High pressure air contact with body tissue should be avoided.

Copper, Scrap

Scrap copper is used in aluminum-copper alloy powder. As used, the hazards are slight. It becomes a problem only if vaporized, resulting in copper intoxication.

Furnace Gases

These are formed as a by-product in combustion of natural gas. Adequate ventilation and regulation of dampers and drafts minimize risks.

Gas, Natural

Natural gas is used as a furnace combustion fuel. It is flammable and an asphyxiant in confined spaces. Adequate ventilation is provided.

Hydrogen Gas

Hydrogen gas is a reaction product from storage battery chargers. It can also be a by-product of aluminum powder wet by water. It is explosive but not toxic unless it is found in large enough quantities to exclude oxygen. Under usual circumstances, however, there is slight hazard.

Paints and Enamels

Various kinds of paints and enamels are used in the Atomizer as protective coatings and container identification. Personal cleanliness will minimize the risk of skin irritation and possible subsequent dermatitis. Work area should be ventilated and cans should be stored below 140 degrees F. In ordinary use, however, these are not serious health hazards.

Inert Gas

A mixture of CO₂ and nitrogen is used as a fire suppressing atmosphere in powder conveyors, screens, tanks, and containers. It can induce asphyxia by excluding oxygen. There should be adequate ventilation and/or fresh air supply when working inside ducts and tanks.

Inks

Marsh K-1 is used for product identification on bags, drums, etc. Petroleum naphtha is a constituent and should be used with adequate ventilation.

Insulating Materials

Johns Manville Hi Temp Block Insulation and Kaowool are used as heat insulation on furnace metal troughs. Frayed fibers can cause skin irritation; however, personal hygiene, protective clothing and gloves, plus care in handling minimizes risks.

Lubricating Oil

Anderol 500 is used as air compressor lubrication, and as used should pose no significant hazard other than skin irritation after prolonged contact.

Marinite

Marinite is used in prefabricated metal trough dams. Sawing or machining material can produce dust which can irritate lungs; therefore, wearing dust masks plus dust collecting equipment and vacuum sweepers minimize the hazard. Disposal of dust and scrap via special container is to approved scrap area.

Mercury

Mercury is used in instrumentation, and because of the vapors normally given off, a serious hazard exists whenever it is used or handled. All mercury should be kept in closed containers to prevent the escape of vapors, and exhaust systems should be used where necessary. Spilled mercury should be picked up at once and disposed of to an approved scrap area. Gloves must be worn when handling.

Oxygen

Steel cylinders of oxygen are used as fuel for cutting aluminum metal spills and lancing furnace tap holes. As used, it is not toxic.

INGOT DEPARTMENT - ROCKDALE WORKS

Abrasives

These are used for cleaning Properzi wheel, and eye protection should be used. Masks should be used if extensive carborundum grinding is done because of the possibility of silicosis; however, the amount done is limited and should present no particular problem.

Adhesives

Royal Industrial Cement is used as a gasket adhesive. Adequate ventilation and personal hygiene minimize hazards.

Aerosol

WD 40 is used as a lubricant and Krylon Paint in paint form. They are stored in self-contained cans. The substances are flammable and dangerous if the cans are punctured or stored near heat.

Asbestos Gaskets

Asbestos is used in spout gaskets at the Properzi. They are pre-formed gaskets, transported in packets. A hazardous situation occurs if fine particles become airborne and are breathed into the lungs. Therefore, extreme care is taken to avoid rubbing and fraying of fibers, and old gaskets should be disposed of in special containers.

Bactericide

Beryllium

Alloys of Be in combination with Al are light and remarkably resistant to stress and strain. Beryllium ingot is stored in small pieces in closed drums. It is a highly toxic bivalent metallic element which constitutes a serious hazard if its fumes are breathed into the lungs. Any skim produced is discarded immediately. Adequate ventilation is essential and toxic fume and dust respirators and safety goggles are worn where dust is present.

Castor Oil

Castor oil is used as a mold lubricant for the DC casting units. There is no particular hazard associated here with the exception of certain allergic reactions of certain persons upon contact with skin. Prolonged contact should be avoided and personal hygiene exercised.

Chlorine

Liquid chlorine is received in one (1) ton cylinders and stored in Building 34-B which is adjacent to the west side of the Ingot Production Department, Building 34. Also in Building 34-B are two liquid chlorine evaporators, pressure reducing valves, and the beginning of the piping system to conduct the chlorine to the holding furnaces in Building 34. At the furnaces, flexible hoses connect the pipe to the graphite fluxing tubes used to introduce the gas into the molten aluminum.

The chlorine system, in an emergency, can be turned off at several of the control panels in Building 34 or at the entrance of Building 34-B. An alarm bell in the system indicates when the evaporator temperature exceeds 180 degrees F. or the chlorine supply cylinders are empty.

Building 34-B has a roof vent fan and an emergency stack vent fan which will remove the heavy chlorine gas from floor level and exhaust it well above ground level. Generally there is no chlorine liberated in the building except maybe a small residual amount from the pipes when a cylinder is changed or work on the piping is being performed. Absorption type gas masks are available at the entrance to Building 34-B as well as near the furnaces in Building 34.

In Building 34 little chlorine escapes at floor level during the fluxing of a furnace. However, some will escape from the top of furnace along with various reaction products, such as aluminum chloride and hydrogen chloride. This emission rarely bothers anyone at floor level but at times does bother the crane men. Roof fans help remove any escaped gas from the building, and the furnace stacks exhaust the excess chlorine and the reaction products outside the building.

However, some chlorine will escape at floor level at times when fluxing is done in either an R-249, A-528, R-622, or A-181. The molten metal is fluxed in a box as it comes from the furnace. This unit is covered by an exhaust hood, but occasionally a current of air will blow some chlorine and reaction products out into the area surrounding the fluxing unit. The amount of chlorine is quite small and dissipates quickly.

Chromium

Chromium is a hard metal used in alloy to impart stainless properties and smooth surfaces. It is hazardous only if volatilized or vaporized and therefore poses no particular hazard as used.

Copper

Copper is used in Properzi copper molds. Copper dust when present as fine particles may be classed as a source of metal poisoning. However, the fine particles resulting from grinding are minimal and approved dust masks are used.

Corrosion Preventive

Cuprogard is used as a Properzi roll emulsion additive. It is an oxidation retardant for copper and brass piping and valves. Contact with skin is limited and only small quantities are used; therefore, no serious hazard exists.

Fumes from Furnace Skim

Furnace skim consisting mostly of oxides of aluminum, but also containing some metallic aluminum, nitrides and carbides of aluminum, aluminum chloride, magnesium chloride, hydrogen chloride, is raked from the surface of the molten aluminum in the holding furnaces into skim boats. These boats are then transported to the skim room and allowed to cool. When hot, the skim gives off dense, white fumes which are very irritating to the respiratory system. The skim room has an exhaust fan for removal of these fumes. When cool, the skim is transferred from the skim room to rail cars for shipment. The cool skim emits no fumes.

Fumes from Gas Fired Holding Furnaces and Gas Burners

Fumes generated by the stirring, skimming, alloying, and fluxing of metal in the holding furnaces plus the products of combustion of the gas burners heating the furnace are normally retained inside the furnace and exhausted out the stack. The furnaces are normally operated under a slight positive pressure so that the operator may come in contact with these fumes. There is also some fume emission around the doors and the top of the furnace during fluxing operations.

The gas burners used to heat potroom crucibles and pouring troughs discharge their products of combustion and any fumes evolved into the atmosphere of Building 34. However, the roof fans generally provide enough draft to remove these.

The fumes which escape from the furnaces and unhooded gas burners generally cause no problem at floor level, but at higher elevations, such as that of the crane cabs, they have caused some respiratory irritation and nausea. Approved respirators should be used when such fumes prevail.

Hydrochloric Acid

HCl is used in de-ionization of Properzi mill roll lubricant water and cleaning Properzi mold wheel. The corrosive liquid should be handled cautiously, and rubber gloves and eye protection should be used. Adequate ventilation also minimizes irritating fumes.

Insulating Materials

Kaowool is used as insulation of pipes and filter boxes and is composed of abrasive, skin-irritating fibers. Protective gloves, personal hygiene following exposure, and respirators and masks used as necessary minimizes hazards.

Kerosene

Kerosene is used for water-molten aluminum explosion retardation. It is flammable and an irritant if inhaled; however, as used it is not a serious hazard.

Magnesium

Magnesium for certain alloys is received in notched ingot of various sizes. When it is added to molten aluminum, a special tool is used to submerge the magnesium to prevent it from air burning.

The general toxicity of magnesium is considered to be low, but several hazards are encountered. If it is ignited, it burns with such violence that it may explode, and it can cause severe burns to the skin. Metallic magnesium particles imbedded in a wound in the skin can cause gas gangrene and freshly formed magnesium oxide can cause metal fume fever.

Manganese

Manganese adds hardness and ductility to alloys and is hazardous only if ingested or inhaled in volatilized form. As used, there is no particular problem.

Marinite

Marinite is used as insulation material. Its dust can irritate the lungs, causing possible asbestosis or lung cancer. Care is taken in handling and scrap and dust are disposed of via special containers. Dust masks are also used if dusting occurs.

Mercury

A small amount of mercury is used in various manometers and would constitute a hazard only when an accident caused spillage or breakage of a manometer tube.

Oxygen

Oxygen is used as a furnace combustion additive and lancing furnace tap holes. It is hazardous because of its violent reaction when used in connection with combustibles, and extreme caution is used.

Paints and Enamels

Various kinds of paints and enamels are used for identification purposes. Personal cleanliness will minimize the risk of skin irritation. Work area should be ventilated and cans should be stored below 140 degrees F. In ordinary use, however, these are not serious health hazards.

Red Mud

This is a by-product of bauxite processing which is used to coat aluminum molds. Care in handling minimizes dusting. Exact composition is unknown; however, personal hygiene should be exercised after using this material and masks worn if dusting becomes severe.

Refrex - Kleen Flux

This material is a powder used in the holding furnaces to aid in skimming dross. The exact composition is unknown, but it is believed to contain fluoride and thus is a potential hazard. This material is aspirated into the furnace, and dense fumes are created in the furnace during this operation. But, in general most of the fumes are exhausted outside the building through the furnace stack. Careful regulation and maintenance of furnace dampers and drafts should prevent most, if not all, of these fumes from entering the building atmosphere. Reasonable care in handling the flux should be practiced. Prompt removal of skim from furnace area and wearing of approved respirators minimize risks.

Silicon

Silicon is used for alloy purposes. It is a hard, lustrous, crystalline solid of gravel-size particles which, as used here, constitutes no serious health hazard.

Sodium Hydroxide

Sodium hydroxide is used in the process of de-ionizing water. The sodium hydroxide is brought to Building 92B in 400-pound drums and then used in 40-pound quantities. Rubber gloves and face shields are required when mixing the sodium hydroxide with water. A small vent fan draws the fumes out of the building when the solution is mixed.

Titanium-Boron Alloy

Titanium and boron are used in alloying aluminum to impart lightness and tensile strength.

Tris-Nitro

This substance is a bactericide used to reduce bacterial growth in water-oil hot lubricating emulsion. It is handled in 55-gallon plastic-lined drums. It contains tris (hydroxymethyl) nitromethane (50%) and water and is harmful if swallowed. Caution should be exercised in handling to avoid excessive skin contact.

See Bactericide.

Zinc

Zinc itself presents no hazard, but during alloying fumes may be evolved which could cause metal fume fever. The possibility of this happening would be slight, because typical exposures would be of short duration and if the furnace exhaust system were functioning properly, the bulk of the fumes would be exhausted outside the building.

ENVIRONMENTAL CONTROL - ROCKDALE WORKS

A-398 Bags

Pot dust collector bags are changed periodically by Environmental Control Bag Changer crews and used bags are removed to Class A dump area. Dust from the used bags can create a problem if excessive amounts are inhaled. Care in handling plus wearing approved dust masks and/or respirators minimize hazard.

Caulking

Dow-Corning RTV silicone is used from caulking cartridges to seal miscellaneous dust collector connections, doors, etc. It is usually used in a well-ventilated area, so danger from fumes is minimal.

Dust: Pot Dust

Dust from pots is drawn via duct and fume collection system into A-398 dust collector units. Collected dust is fed into a storage tank, blended with fresh alumina, and transported by dump boxes into pot alumina feeders. Approved dust masks and/or respirators should be worn. Care in handling should minimize formations of dust clouds.

Dust: Potlining Mill Dust

Anthracite coal is ground, sized, and mixed with binder as pot cathode relining material. Two dust collectors provide anthracite dust control on grinding, elevating, storing, and mixing facilities. The Bag Changer crew disposes of collected dust and occasionally changes the dust collector bags. Hydrocarbon solvent vapors could cause skin and membrane irritation, and personal hygiene and dust masks are recommended. However, closed container transportation does minimize hazard.

Dust: A-446 Regenerator Dust

A vent system on the A-446 regenerator units collects dust and pipes the collected dust back to the regenerator units. The bags are changed periodically by the Bag Changers crew. Hazards and method of control are the same as for Pot Dust.

Green Dye

This is a commercial fluorescent green concentrate used in manometers to check dust collection system operating air pressures. No significant hazard as used here.

Lubricants

Varsol, Aerosol WD 40, and Never Seez Compound are used as cleaning and lubricating agents on dust collection system nuts, bolts, doors, moving parts, etc. Exposure of the skin to excessive amounts of the lubricants can cause skin irritation, and inhalation of excessive amounts of the vapors could cause a respiratory irritation. However, under normal circumstances exposures are of short duration, and rubber gloves are used.

Red Oil

Red oil is a commercial light manometer oil used in manometers in setting and checking dust collection system fluid pressures. As used, there is no significant hazard.

Used A-446 Alumina

Alumina is piped from a potroom storage tank to the A-446 units for use as a fluid bed medium to collect carbon plant furnace gas and entrained coke particles. After processing through the A-446 regenerators, it is piped back to a potroom area storage tank. From the storage tank it is blended on the alumina rail car unloading belt into fresh incoming alumina. Unless leaks to the atmosphere develop, there should be no significant hazard. If the air is contaminated, appropriate masks and/or respirators should be worn.

JANITORIAL DEPARTMENT - ROCKDALE WORKS

Bowl Cleaner

Sani Flush is used to clean toilet bowls. It contains about 80 per cent sodium bisulphate as the active ingredient. A water solution is strongly acid and in contact with the hands may cause irritation. As used, there should be little or no danger of serious burns to skin membranes.

Disinfectants

Powder Pine is used to clean, disinfect, and deodorize toilet areas. It contains coconut oil soap, pine oil, an antiseptic, and isopropyl alcohol as the active ingredients and is effective in killing the Salmonella bacteria on environmental surfaces. Repeated contact with skin could result in irritation. As used, there should be little or no danger of serious burns to skin membranes.

Insecticides

Black Flag aerosol is used to control the insect nuisance. Spraying is usually performed when there are few workers around. The only ones exposed to the vapors would be the janitors doing the work. Caution is exercised to make sure that the men will not be exposed for long periods of time in confined quarters while spraying.

Soaps and Cleaners

Various cleaning products are used in cleaning floors, windows, hands, and environmental surfaces. They may be in the form of a powder, solid, or liquid, and contain various cleaning agents, oils, glycerin, potassium soaps, ammonia, abrasives, etc. As used, the hazard is slight. If prolonged contact is necessary during cleaning operations, protection is provided in the form of rubber gloves.

Velvolum Cleaner and Protector

These products are used to clean and treat Velvolum desk tops. They are stored in closed metal cans away from heat due to their highly flammable nature and their pungent vapors. These concentrated heavy duty cleaners can be fatal if swallowed and can irritate skin and mucous membranes. Protection in the form of rubber gloves is provided, and they should be used in adequately ventilated areas.

YARD SERVICE DEPARTMENT - ROCKDALE WORKS

Abrasives

Sand and Black Beauty grit are used for impact abrasive cleaning and sand blasting. Inhalation of fine particulate could be injurious. Fresh air hood should be worn during sand blast cleaning.

Adhesives

Silastic RTV is used for miscellaneous caulking purposes. The solvent may evaporate, thus displacing air in confined spaces. It should be stored in metal cans.

Aluminum Fluoride

Yard Service cleans out wet Potroom scrubbers and spillage from the Carbon Plant A-446 units, and hauls it to the approved dump area via load lugger bucket. AlF dusts readily and can be irritating to membranes and skin. Approved dust respirators should be worn and personal hygiene exercised.

Bath

Yard Service personnel clean Potroom equipment and dig metal furnace linings. Prolonged inhalation will irritate and damage the respiratory tract; therefore, dust masks should be worn.

Brick

Yard Service personnel transport brick between points of use via truck. Demolition is also performed, with the exception of Carbon Plant furnaces, by Yard Service personnel. The only hazard encountered would consist of the dust resulting from demolition. Approved dust masks should be used as necessary.

Butts

Yard Service personnel occasionally transport "burn offs" from stockpiles outside of potrooms to an approved dump area. These carbon anode remnants contain finely divided carbon, fluoride compounds, and alumina, which can be irritating to nose and throat. Personal hygiene should be exercised and approved dust masks used as necessary.

Cement

Waterplug is a quick-setting cement used for sealing cracks in water containers. The solvent vaporizes and can be irritating to skin upon contact. Rubber gloves should be worn to avoid skin contact, and skin should be washed thoroughly for 15 minutes or more if contacted. Inhalation of fumes should be avoided and ventilation adequate.

Cement - Portland

This masonry cement is used throughout the plant for making concrete. Dermatitis is the hazard usually encountered, thus necessitating personal hygiene. In dry form, it can cause respiratory irritation if inhaled in sufficient quantities. As used here, however, this hazard is slight.

Chlorine

Yard Service personnel transport chlorine in one-ton cylinders from IGC. The gas is extremely poisonous, an irritant of the upper respiratory tract. Cylinders should be handled with extreme caution, and checks on valves and hoses should be frequent. Gas masks should be accessible for emergency use.

Coke

Yard Service personnel transport residual coke to a dump area via load lugger truck. Approved dust respirators should be worn during exposure to considerable dusting.

Creosote

On occasion, personnel of the Yard Service department handle creosoted wood. It can act as a skin irritant and result in serious dermatitis if exposure is prolonged. Skin contact should be avoided and protective clothing worn.

Dug Potlining

Handling and method of control are the same as for Scrap Iron.

Epoxy

Various brands are used to fill cracks in streets and passageways. Although not a serious industrial hazard, prolonged exposure or contact can cause irritation to eyes or skin.

Fertilizer

Various brands are used to enrich the soil for growth of shrubs, grass, etc. The materials can be irritating to skin membranes if dusting occurs, and approved masks should be used if necessary as well as personal hygiene exercised.

Floor Patching Resin Hardener

Floor patching materials can be irritating to skin and m-cous membranes with prolonged contact. Personal hygiene should be exercised.

Furnace Slag

Slag is hauled from electromelt furnaces via trucks by Yard Service personnel. There may be a slight dusting problem as it is disposed of in the dump area; therefore, approved dust masks should be worn when necessary.

Herbicides

Various brands of weed killers are used in a liquid form. Hazards include irritation to skin and membranes and probable toxic reactions if ingested. Eye protection and adequate clothing should be worn at all times and personal hygiene exercised.

Insecticides

Various types of insect killers are used in liquid and dust form. These materials are poisonous to humans as well as to insects. Personal hygiene, washing clothing after use, and wearing approved dust masks (for dust) and respirators (for fine mists) are protection against the hazard.

Insulation

Yard Service personnel tear out old hot equipment insulation and transport it to a dump area. Most insulating material consists of various silicates. Some old installations may still contain asbestos. A respirator and good ventilation protect against the possibility of silicosis when dusting is severe.

Insulating Materials

Materials used in insulating furnaces, pipes, pots, etc. are of various compositions, including asbestos and glass and wool fibers. Internal tissue irritation can result from exposure to dusting of these materials, and approved dust masks or respirators should be worn as necessary. Transportation should be in approved containers to appropriate dump areas.

Lime

Yard Service cleans up and disposes of lime from lime storage equipment. Skin and respiratory tract irritations from the powder can be minimized by personal hygiene, wearing of gloves, and wearing of approved dust masks.

Mercury

The Yard Service Department disposes of scrap equipment contaminated with mercury. Mercury poisoning can be brought about by the inhalation of the vapors. Scrap contaminated with mercury is placed in tightly closed containers, and the Yard Service superintendent is called for special pickup and disposal to a Class I dump area.

Mortar

Various brands are used for patching, concrete and other masonry repair. There are no hazards as ordinarily used. Lime may cause irritations leading to dermatitis, and inhalation of dust, especially those containing lime, may cause respiratory tract irritations. Personal hygiene is the best control, as well as the use of approved respirators during prolonged exposure to dry dust.

Oakite

This material is used for cleaning machine parts. It is a trade name for several kinds of cleaners, both acid and alkaline. All should be treated as hazardous. Contact may cause irritation of skin membranes, and personal hygiene, wearing protecting clothing, as well as careful handling to avoid splashing should be exercised.

Pitch

The Yard Service Department cleans up pitch from areas and transports it to the disposal area via lugger buckets. This black solid with the "tar" odor contains phenolic compounds which may cause burns through contact with skin and eyes. Protective skin creams used prior to exposure, plus washing of the skin thoroughly, minimize hazards.

Potlining Scrap

Scrap metal, including used dust collector bags, are transported to a dump area by Yard Service personnel via flat bed truck or load lugger truck. The danger here is from any pitch contained in the scrap.

Premixed Grout

Embeco 153 and 713 are used as grouting, contained in sacks, and transported via truck by Yard Service personnel. It dusts readily when dry, and continued inhalation of fine particles may cause respiratory tract damage. Approved dust masks should be worn.

Raw Sewer Sludge

The hazards involved here are bacteriological and disease-related. Boots and gloves should be worn, with thorough washing of body and clothes after exposure.

Scrap Boxes and Bags

These materials are disposed of by Yard Service personnel via load lugger buckets and flat bed trucks. The only hazard involved would be from residual dusts from such items as coral plastic containers, etc. Care in handling and personal hygiene should be exercised.

Scrap Drums

These are handled in the same manner as above.

Scrap Iron

Scrap iron is hauled from point of generation to scrap metal yard by Yard Service via flat bed and standard dump truck. Scrap may be contaminated with used bath materials, pot linings, etc., which could result in dermatitis and skin burns. Prompt, thorough washing of exposed skin areas, wearing of dust masks if dusting is unavoidable, and wearing gloves will minimize the hazard.

Sewer Gas

Sewer gas enters sewer lines as a waste product or is formed in the sewers. The hazards in sewers and manholes are those associated with the hazards due to flammable gases, a diminution of oxygen with possible asphyxiation if such an atmosphere is entered, and to poisonous gases. Continuous ventilation by blower ventilators of the lift stations and processing plant is recommended. Analysis of gas samples should be made for the presence of oxygen and combustible gases. If needed, forced fresh air ventilation shall be provided.

Tar

Asphalt, or "tar," is mixed and used to patch floors and roads. Fumes given off will contain phenolic compounds, toluene, and benzene. Adequate ventilation and avoidance of skin contact is recommended.

Water Soluble Oil

This material is disposed of to dump site or onto roadways (to settle oil). Wearing of proper protective clothing--rubber boots, gloves,-etc. should minimize danger of skin irritation.

Wood and Blacktop Sealer

Squeege-Cote is flammable and resistant to oils, gasoline, and solvents. It is a skin and eye irritant, and protective clothing and equipment should be worn to avoid exposure.

CARBON RODDING - ROCKDALE WORKS

Abrasives

Carborundum abrasive discs are used for occasional, limited-time cleaning of copper anode bars when shot blast cleaning equipment is down. The danger here is inhalation of the fine copper dust produced which could cause metallic poisoning. Ventilation should be provided and approved dust masks worn during the operations, which are limited.

Asbestos

This material is used in heat-protective gloves. The hazard involved here involves the dust particles inside the glove which remain attached to shirt sleeves after removal of gloves. Scrap gloves should be disposed of via approved scrap containers and care taken not to inhale any particles (wiping face with sleeve, glove, etc.)

Bath

Small quantities of bath may adhere to the cast iron or stubs as they are returned from the potrooms in trailers. Any loose bath in the trailers is shoveled into a storage bin. Dusting of the bath may occur whenever handled. Fluoride compounds comprise the majority of this dust which may lead to skin eruptions and nose and throat irritations. The quantity of bath handled is very small so the health hazard should not be serious.

Copper Dust

This dust is generated during the cleaning of the copper anode bars. In this operation small steel shot are used to blast clean the contact surfaces of the bars. The resulting dust, composed mainly of metallic copper and copper compounds and a small amount of bath and alumina, is contained within the wheelabrator and pulled into a dust collector where it settles. The dust is dumped each morning into a load lugger bucket which, at regular intervals, is taken to the dump and emptied. The dust collector is emptied as early as possible in the morning in order to minimize the exposure of day shift personnel to this dust, which can irritate skin and membranes and cause metallic poisoning.

Diesel

Diesel is diluted with light oil for roll conveyor roller lubricant. It is flammable, and volatilized can be an asphyxiant and explosive in excessive concentrations. Adequate ventilation, care in handling, and personal hygiene should be exercised.

Ferrosilicon

An alloy of iron and silicon is used to add silicon to steel and iron. The silicon content may vary from 14% to 90%. Ferrosilicon with a silicon content of 45% to 70% will evolve poisonous gases when moisture is present.

Fuel Gas, Bottled

MAPP gas is used as a fuel for metal cutting torches and is enclosed in steel cylinders. It is flammable, explosive, and an asphyxiant in vapor phase in the air. Care in handling and storage are imperative.

Furnace Gases

The Lectromelt furnaces produce very few fumes or gases, and those fumes or gases which are produced are pulled into dust collectors and vented outside the building. The greatest danger is from fluorides. Bath and other fluoride materials are added to the furnaces each time they are charged with scrap castings. The furnace exhaust system kept in proper operation minimizes any danger.

Furnace Slag

Slag is the fused product which separates in metal smelting and floats on the top of the metal. Metallic fumes are evolved when molten and metallic dusts when handled cold. It is raked out of iron-melting furnaces to a slag pan, dumped into lugger boxes, and hauled to an approved dump. Care in handling is exercised and dust masks are worn if necessary.

Mortar

Various types of mortar are used to repair spouts on molten cast iron crucibles. There are no hazards as ordinarily used. Skin irritations may erupt from the lime and inhalation of the lime-containing dust could cause respiratory tract irritations; however, personal hygiene and respirators are the best control.

Nitrogen

Nitrogen is used as a reserve supply of pressurized gas for operation of restubbing press and on fork trucks to keep line pressurized if a hydraulic brake leak occurs. There are no significant hazards as used if care in handling the pressurized steel cylinders is exercised.

Welding Rods and Wire

Coated rods release iron oxide and fumes which may be harmful only in confined quarters with no ventilation. Protective goggles and clothing should be worn and fans used to assist ventilation.

MECHANICAL MAINTENANCE DEPARTMENT - ROCKDALE WORKS

Abrasives

The Mechanical Department uses abrasives throughout the Plant. At some time they have used practically every abrasive material available and in practically every fabricated shape or form, including abrasive sawing. Most work using abrasives is conducted in large, well-ventilated areas or in areas where exhaust hoods are available. However, occasionally some work must be done in a confined area. When this happens workers are provided with approved respirators, or the ventilation in the area is improved.

Acetylene

This is a colorless, highly flammable and explosive gas used as a fuel in conjunction with oxygen for welding and cutting of metals. It is received in steel cylinders under pressure and dissolved in acetone. Since acetylene has one of the widest explosive ranges known, the cylinders should be stored upright in a cool, well-ventilated area and checked periodically for leaks. Acetylene is an asphyxiant, but it may contain as impurities such toxic gases as arsine, phosphine, carbon monoxide, and hydrogen sulfide. For this reason welders using acetylene in restricted areas should be provided with adequate ventilation.

Aerosol

Various aerosols are used as lubricants and paint forms. They are stored in self-contained cans and carried to work site. The substances are flammable and dangerous if the cans are punctured or stored near heat. They should be used in well ventilated areas.

Alcohol, Denatured

This substance is used as antifreeze for water in propane gas storage tanks and as a solvent in the Auto Shop. It is poiwonous when taken internally and warning labels should signify such. Personal hygiene and proper ventilation minimize irritation of mucous membranes.

Ammonium Hydroxide

This solution is used in the Ozalid machine in the production of blueprints. "Leak-tec" is used in the detection of chlorine leaks. As used, the danger is slight; however, the liquid will cause burns to the eyes, and goggles should be worn when handling the solution.

Babbitt Metal

Babbitt metal is a group of soft alloys used for bearings, etc. Mechanical Maintenance makes up poured cable ties with a mixture of Babbitt and lead metals. They may be used as cast or machined. The two main types are lead base and tin base Babbitt, but other types are as follows: lead silver base Babbitt, cadmium base Babbitt, arsenical Babbitt, and white metal bearing alloys. They all contain metals such as lead, antimony, cadmium, and arsenic which when heated may give off fumes which are either toxic or may cause metal fume fever. Any dust created during grinding or machining of these alloys also presents a hazard.

Brazing Alloys

These are nonferrous alloys used for welding above 800. However, several of the silver brazing alloys are used at temperatures as low as 600. These alloys are composed of such metals as copper, zinc, tin, antimony, lead, silver, cadmium, phosphorus, nickel, and manganese. Many of these metals when heated to working temperatures will give off fumes which are either toxic or may cause metal fume fever. Under normal conditions the concentrations of these fumes probably never reach dangerous levels. However, if brazing operations are conducted in confined areas, it would be quite possible to reach or exceed safe levels for these fumes.

Carbon and Carbon Dust

This material is used as electrodes in the Shop for cutting purposes. As used, the hazard is slight.

Carbon Dioxide and Carbon Monoxide

Carbon dioxide is formed during the complete combustion of any carbonaceous material, and carbon monoxide is formed during the incomplete combustion of any carbonaceous material. Both are colorless, essentially odorless, and both are likely to be found to some extent any place where such fuels as natural gas, oil, or coal are being burned to provide heat.

Carbon dioxide is heavier than air and tends to settle in low places such as tunnels, pits, or manholes. If the concentration is high enough, it may cause asphyxiation and death. Lesser concentrations may cause a form of intoxication with symptoms such as excitement, headache, drowsiness, and dizziness.

Carbon monoxide is highly poisonous. Exposure to as little as 200 ppm may cause a headache. Greater exposures may cause nausea, dizziness, and finally collapse and possibly death.

For these two gases to present much of a hazard, it would be necessary for exhaust and ventilation systems to fail and burner systems to be out of adjustment.

Cement, Refractory

Coral Plastic is used by brickmasons in metal furnace lining and holding furnace lining and patching. Prompt personal hygiene after contact with skin minimizes the hazard of skin irritation.

Chlorine

Liquid chlorine is received in 150 pound steel cylinders. It is used to chlorinate the potable water and the effluent of the sewage disposal plant. Exposure to the gas would be limited to mechanical failure of some part of the chlorinator, maintenance of the chlorinator, and when changing cylinders.

The Mechanical Department is also responsible for changing the one ton cylinders of chlorine used in the Ingot Casting Department and also for the maintenance of the piping system associated with the use of this chlorine.

Coal

Bituminous coal is used as a fuel in the Blacksmith Shop forges. Exhaust hoods and proper ventilation remove such products of combustion as CO_2 , CO, and SO_2 .

Copper and Copper Dust

In the fabrication of new anode bars, collector straps, and busses a certain amount of machining, grinding, and welding must be done. The machining work creates very little copper dust, but the grinding and welding produce both copper dust and fumes. Most of the grinding or sanding is done before welding with only a small amount done later. The welding is done with copper rod and using an inert gas shielded welding process. The welding and most of the grinding or sanding is done in front of an exhaust hood.

Diesel

Diesel is used in the Paint Shop occasionally as a surface cleaner for pre-cleaning, cleanup, and cleaning of equipment. It is also mixed with light oil to lubricate carbon conveyor rollers. Excessive exposure can be irritating to tissues, and personal hygiene should be exercised. The substance is also flammable.

Epoxy

Epoxy is occasionally used in the department as a miscellaneous cement. As used, there is no particular hazard.

Ether

Ether (Serc) is used in the Auto Shop for quick start on vehicles. Adequate ventilation and sparing use minimize the hazard of O₂ displacement.

Fiberglass

Fiberglass cloth and sheet are used for heat insulation by the carpenters. Skin irritation can be minimized by personal hygiene.

Freon

Freon is used in air conditioning cooling system maintenance. Goggles are required when handling freon, and approved respirators should be worn.

Hydraulic Fluid

Fyrquel 220 R & D is used as a hydraulic press fluid. It is a fireproof liquid, containing tri-aryl phosphate, and emits toxic vapors if heated to boiling point. It is a skin irritant and harmful if swallowed or allowed to come into contact with eyes. Normal hygiene practices should be observed after handling.

Insulation

Fiberglass, Kaowool, and a small amount of old asbestos heat insulation are used in hot equipment insulation, thermal insulation on regenerators (R-446), and carbon plant mixers. If deteriorating, dusting can be an irritant and respirators should be worn. Old asbestos should be handled carefully without creating a dust cloud, with disposal to an approved dump area.

Kerosene

See Diesel.

Lead

Lead is used most commonly as a joint material. It is present in certain alloys such as Babbitt and solder. The greatest hazard associated with lead is present when it is used as a joint material. Since it must be melted before use, there is danger of inhaling lead fumes from the molten metal.

Lime

Lime is received in hopper bottom railroad cars and transferred to a storage tank at the Lime Treatment Plant. From storage it is conveyed to a lime slaker, and then in the form of a slurry it is added to the incoming water from the potroom gas scrubbers. The lime causes the fluorides in the scrubber water to precipitate, and after a short settling period which removes the bulk of the precipitated material, the water is pumped back into the system.

Metalizing Metal

This metal in the form of wire is passed through a gun where burning gases melt it, and then with compressed air the molten metal is atomized and sprayed onto a surface. Various metals such as stainless steels, brass, and aluminum may be used. This process is rarely used at the present time, but when it is used, the work is done in open well-ventilated areas.

Mortar

Mortar is used by the brickmasons, and there are no hazards as ordinarily used. Lime may cause skin irritations, but personal hygiene is the best control.

Naphtha

Naphtha is used as a cleaner for spray hoses, etc. at the Paint Shop. Inhalation of the fumes causes headaches and nausea, and skin contact causes cracking and scaling. Rubber gloves, eye protection, and adequate ventilation are provided.

Natural gas

Natural gas is used in various areas of the plant. Mechanical Department workmen may be exposed to this gas while working on or near pipes carrying the gas and equipment where gas is burned to provide heat. Natural gas is highly flammable and explosive, is an asphyxiant, and while burning, if burners are not adjusted properly, may release such toxic products as carbon monoxide.

Paints, Enamels, Thinners, and Removers

These materials are used throughout the Plant for protective coatings and for decorative purposes. Some men work in the Paint Shop while others work on jobs around the plant.

The paints are usually prepared in the Paint Shop. The paint is mixed,

and vehicle, dryer, thinner, etc. are added as required. These materials are volatile. If the fumes are allowed to accumulate in confined areas, they are a serious source of hazard. Adequate ventilation controls this danger in the shop. A large percentage of the painting is performed on exterior surfaces where the hazard resulting from fumes is slight.

Occasionally on an interior job, the painters are in a position where the fog from the spray guns collects on exposed skin surfaces and the area becomes contaminated with the fog and fumes. In such areas, respirators are worn for protection.

Penetrating Oil

Various brands, including So'k and Liquid Wrench are used throughout the Mechanical Department to loosen rusted or corroded parts. As used, and with personal hygiene, there should be no serious danger.

Plaster

Plaster is used for occasional wall patching by carpenters. Dry plaster from the bag may dust during handling, and the principal constituent, lime, acts as a skin irritant. There should be no hazards associated with mixed plaster ready for use.

Sand

Sand is used as a grouting base by brickmasons. Continued inhalation of fine particles may be hazardous; however, as used, there should be no problem.

Sewer Gas

Employees of this department are assigned the job of cleaning and unplugging sewers and manholes throughout the Plant. In many cases, the sewer or manhole can be cleaned from the top using long-handled shovels and equipment. Sometimes it is necessary to enter the hole to unplug the drain. These men may come in contact with various gases originating in the plant processes as well as sewer gas.

Before entering, the manhole should be ventilated and the ventilation should be continued while the men are working in the hole. This is especially important in the sections of the Plant where fluoride fumes are prevalent.

Compressed air can be used to vent a hole in many cases; but when air is not available, a manhole ventilator should be used. All safety regulations should be carefully observed for the protection of the worker.

Sodium Hydroxide

Caustic Soda, or "lye," is used in cleaning air compressor valves, in washbasin drain pipes, and heat exchanger tubes. It can cause severe burns to skin and eyes, and rubber gloves, apron, face shield, or goggles should be worn.

Solder and Flux

Various types of solder and soldering flux are used by welders. No special control is required.

Solvent Trichloroethylene
Steam Boiler Treatment Additive

Nalpac is used as a steam boiler tube surface scale preventative. It is a rust and corrosion inhibitor which can cause skin and tissue irritation and eye injury if allowed to come in contact. Care in handling should be exercised to avoid splashing and goggles or face shield should be worn when transferring from 55-gallon drums.

Steam Cleaning Fluid Additive

"APL Jenny No. 60" is an all-purpose liquid cleaning compound added to fluid used for steam cleaning. It is a strong, biodegradable oil and grease solvent which is safe on aluminum and magnesium. Excessive contact could cause dermatitis and eye contact could result in severe irritation. Care in handling should be exercised as well as personal hygiene.

Tar

Tar is used occasionally in sealing small roof leaks. Since most of the work is done outside, there should be no particular hazard.

Solvent:
Trichloroethylene

This low boiling solvent is used in the vapor degreasing unit. In this unit the solvent is heated until it vaporizes. The vapor is allowed to rise in a tank until it encounters several rows of cooling coils where it condenses. The liquid solvent returns to the bottom of the tank, and the process is repeated again. Metallic parts needing degreasing are suspended in the vapor area and washed clean by the condensing vapors. Unusually dirty parts are sprayed with the liquid solvent while suspended in the vapor area.

The degreaser is located in a room where air currents are not likely to draw vapors from the unit, and it is located under a hood which tends to remove most of the vapor which escapes the unit. When not in use, the unit is kept covered. Plastic gloves and safety glasses are used when removing material.

Turpentine

See Paints.

Welding Fluxes, Fumes, Rods

Several different kinds of fluxes are used in the Plant. The specific flux used on any job is determined by the metal being joined and the welding or brazing alloy being used.

The flux serves two purposes. It first aids in the free flowing of the welding or brazing alloy. Its second purpose is to help clean the area being joined and to prevent the formation of oxides during the joining process.

The fluxes may be either acid or alkaline in nature and can cause burns if allowed to remain in contact with the skin. Other fluxes when heated may liberate toxic fumes or gases. The fluxes probably do not constitute a great hazard unless they are used in a confined area with poor ventilation.

Many different types of welding rods are used. They are received in different sizes, coated with different fluxes, and composed of different metals or combinations of metals. While being used these rods will liberate metal fumes and fumes or gases from the constituents of the flux coating the rod. The greatest hazard exists when these rods are used in confined areas or areas with poor ventilation.

Welding fumes are toxic. There should be adequate ventilation, and approved respirators should be used.

White Lead

A mixture of basic lead carbonate and oil is used as a pipe joint compound and occasionally as a lubricant in machining operations. It may also be present as a pigment in some white paints. Since only small amounts of this material are used, it probably does not represent a serious hazard.