MONSANTO COMPANY

ANNISTON, ALABAMA

STANDARD OPERATING INSTRUCTIONS

FOR

AROCLORS

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Prepared by: J. W. Molloy
Production Supervisor

R. G. Moody
Production Superintendent

CONFIDENTIAL

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OPERATING INSTRUCTIONS
ARCLORS

B. SAFETY AND HOUSEKEEPING

Safety of operations in the Aroclor Plant depends on the individual operator. Materials being handled and operations must be observed closely to guard against the following:

	Cause & Action to Prevent
1. Chlorine Gas	Chlorine gas is a very toxic corrosive gas. Leaks or high pressure can occur to liberate it.
	Action to Prevent:
	a. Report Chlorine gas exposure immediately for treatment with Antidote. Milk may be used in mild cases to relieve throat irritation. Oxygen from the resuscitator in the Dispensary is available.
	b. Keep gas mask in good condition. Keep a good canister in the mask. Use these type masks only in Chlorine concentrations to 2-3% Chlorine in air.
	c. Use a Scott Air Pak in concentrations of Chlorine gas above 3% in air. Three units are available in the Aroclor-Biphenyl Department.
	d. If caught in Chlorine gas without a mask, hold your breath and go cross wind until you are out of range of the gas. Place a handkerchief over your nose in small quantities of Chlorine.
	e. Report all Chlorine leaks for repair immediately Make temporary repairs with tape if possible.
	f. In case of a major Chlorine leak the source of Chlorine gas must be stopped.
	Notify the Chlorine Plant immediately if the pressure on the Chlorine manifold exceeds 30 psig. Cut off liquid Chlorine from the car.
2. Thermal Burns	Contact with hot uninsulated product lines at the chlorinators and still areas. Contact with uninsulated steam lines and open steam. Contact with hot Aroclors from broken lines or leaks. Contact with open flames at stills or from heating lines in the department.

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2. Thermal Burns (Cont'd.)

Action to Prevent:

a. Know that contact with equipment and product will cause a thermal burn due to the high temperatures. Make changes in operations with this hazard in mind.

b. Know the first aid treatment for burns. Cold Water Treatment (See Appendix A - Emergency Section).

c. Wear gloves and long sleeve shirts with the sleeves rolled down when operating. Gloves and clothing can make the differe between first and second degree burns.

d. Report uninsulated lines for repair of insulation.

e. Use only steam lines with hose and hose clamps in good condition.

f. The following operations are hazardous and should be done with care:

(1) Catching samples at the Arocler chlorinator circulating pumps.

(2) Sampling the Solid Arocler still receiver.

(3) Drawing bottoms on the Arocler still.

3. Explosion

An explosion could occur in the chlorina by slugging liquid chlorine to the distributor or shutting off the water discharge valve on the chlorinator cooling coil. Slugs of Liquid Chlorine could react fast enough to cause excessive pressure in the vessel. A rupture of the chlorinator could occur. Closing the water discharge valve on the chlorinator cooling coil isolates water in the coil. As the reaction occurs releasing heat, the water will vaporize and could split a coil and tank.

Action to Prevent:

a. Observe operation of the Chlorine vaporiz and do not let liquid Chlorine get into the rotameters. Pipe lines will be frosted.

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3. Explosion (Cont'd.)

b. In case Chlorine feed lines are froste close liquid Chlorine feed valve to th vaporizer. Check steam addition to th vaporizer. Inspect operation of the vaporizer. Do not start up until sourc of trouble has been located.

c. Do not close valve in water discharge line from the chlorinator coil.

d. Observe temperature of the chlorinator periodically and be sure it is not too hot (180°C maximum).

4. Falls

Slipping on cement floors, stairs, Aroc on floor, ice conditions; tripping over objects (hose, pipe, valve handles, etc or losing footing on ladders, etc., can cause falls.

Action to Prevent:

a. The majority of minor, serious, and near miss injuries in the Aroclor Dept. are the result of falls. Prevention is alwa within the ability of the operator by us of expert operating practices.

b. The following items should be done:

(1) Return hose to rack after using.

(2) Keep operating areas clean of all foreign objects.

(3) Return ladders to racks when not in use.

(4) Keep gloves on and hands out of pocke especially going up stairs.

(5) Place guards around any area that presents a hazard that should be guarded.

c. Poor lighting due to burned out bulbs should be corrected at once. Poor lighting due to inadequate facilities should be reported.

d. Spills must be cleaned up immediately following their occurrence. Report any spill that can not be cleaned up within the shift to the Chief Operator. Spill- are to be reported in the log book.

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5. Fires

Fires can occur by:
Biphenyl, Santowax R, or Santowax ignition.
Chlorine problems in the vaporize allowing reaction with steam to release Hydrogen.
Furnace burner backfire.
Wood, rags, or paper on hot lines.
Sparks from welding apparatus or open flames.

Action to Prevent:

a. Area must be clear of trash or flammab materials. Use trash skips and cans.

b. Smoke only in areas so designated.

c. Use spark producing equipment only wit a fire permit and proper inspection.

d. Use care in lighting gas torchs or the still furnaces.

e. Fire fighting equipment includes:

(1) Two wheeled dry powder units.

(2) Hose house with 200 ft. of hose.

(3) Two dry powder hand extinguishers, One CO_2 hand extinguisher.

(4) Two 3/4" water hoses.

(5) Hose connection north of Santowax.

(6) Scott Air Paks.

(7) Fire truck in fire house.

f. Observe visitors in the plant and be sur they observe safety rules.

6. The following is a list of the chemicals handled in the Arocler Plant operations and the precautions to be taken during their handling:

a. Chlorine Gas

Chlorine is a very toxic corrosive gas. Lea or back pressure can occur and liberate chlo rine gas in the area. Operators should have their cartridge type respirators handy at all times while in the area. Use of gas masks is explained in Section B-1.

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6. a. Chlorine Gas (Cont'd.) If you are caught without a gas mask and large amounts of chlorine gas are liberate hold your breath and go cross wind until you are out of range of the gas. Once out of the area, obtain an emergency gas mask and return to the area and correct the tro

A victim of chlorine gas fumes must be rem as quickly as possible from the gaseous ar Place patient on his back with head and ba elevated. Milk may be used in mild cases a relief from throat irritation. If the patient has stopped breathing, start artificial respiration immediately.

b. Biphenyl — Biphenyl is a flammable material which will burn. Burning should not be done in the presence of Biphenyl or Biphenyl vapors. T melting point is 68.7°C., flash point 106°C the fire point 124°C., and the auto ignitio temperature is 258°C. Inhalation of Biphen fumes is not recommended since it can cause a drugged effect on the person.

c. Santowax R — Santowax R is a flammable material which wi burn. It is relatively non-toxic to human beings. However, the vapors of Santowax R are irritating to the mucous membranes and bronichial tract. Prolonged breathing of the vapors should be avoided. The melting point is 140°C.

d. Santowax C — Same as Santowax R, since it is the crude material prior to distillation.

e. Ferric Chloride — Ferric Chloride is a black-brown solid. It causes only slightly irritating effects on the skin or mucous membranes. When heated it will decompose and release toxic fumes of HCl (hydrochloric acid). It will react with water to produce toxic and corrosive HCl fumes.

f. Attapulgus Earth — This material is a dried earth. No danger in handling. Wash off with water to clean.

g. Hydrated Lime — No particular hazard in handling this materi The dust is irritating to the eyes and skin and should be washed off with water.

h. Crude Aroclors — Crude Aroclors are hot since all are handled in steam traced or jacketed lines. They can easily cause thermal burns in contact with

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6. h.	Crude Arocleors (Cont'd.)	the skin. Prior to air blowing, the material has HCl fumes entrained in it which are irritating to the skin or mucous membranes.
i.	Hydrogen Chlorine Gas	This a corrosive gas which is toxic. It is irritating to the mucous membranes, t the eyes, and to the respiratory tract. It will react with water to form Hydrochloric Acid.
j.	Still Bottoms or Residue	Fumes from still bottoms are toxic. They are extremely irritating to the mucous membranes, to the eyes, and respiratory tract.

HOUSEKEEPING

The Arocler chlorinator and still operators are responsible for housekeeping during their shift. Good housekeeping is the mark of good operations, safety practices, quality, and costs.

Housekeeping duties are equal in importance with all other operating duties

Poor Practices	Action to Prevent
1. Hoses, valve handles, dip sticks, rags, and other material on ground or floor.	a. Replace after use.
	b. Have place to store all necessary operating aids.
	c. Report needs to supervision.
2. Product leaks	a. Tighten valve packing glands and flange bolts.
	b. Report leaks to Chief Operator for maintenance alteration.
3. Trash and crude drums	a. Contact chief to have drums moved from area.
	b. Use trash skip in area
4. Product spills or clean out masses	a. Prevent necessity of clean-out by keeping tracing, insulation, or jacket in good repair by getting items turned in for maintenance work.
	b. Spills must be cleaned up when they are made. Clean up will continue through the following shifts to finish the job.

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DETAILED INSTRUCTIONS

III. Loading Refined Aroclors

Aroclors are shipped in five gallon cans; 55 gallon drums; 4,000, 7,000, and 8,000 gallon tank cars; and 3,000 or 4,000 gallon tank trucks to customers.

a. Spotting Tank Cars

Normally the railroad switch crew will spot cars at the Aroclor loading dock. Occasionally it will be necessary to move a car. When it is necessary use the half track and pull the car into position.

(1) Obtain help to move the car.

(2) Attach hook on cable at front of the half track to a strong part of the car. Do not hook onto the ladder or other weak parts.

(3) Release the winch and let out 15 to 20 feet of cable to connect to the car.

(4) Release the brakes on the car.

(5) Use the half track to pull the car into position. Put the half track in four wheel drive. Do not use the winch to pull the car.

(6) Stop pulling the car when it is in position.

(7) Set the brake on the car.

(8) Remove the cable hook from the car and wind up on the winch drum.

b. Filling Tank Cars or Trucks

Aroclors are shipped in lined vessels to protect the electrical properties from contamination. Most vessels are lined with aluminum or a zinc-tin lining.

(1) Inspection of car or truck for loading:

(a) Enter each car or truck for inspection prior to loading. If necessary clean out the vessel. All material in the tank should be removed. Damaged lining areas should be cleaned of rust particles. Report damaged areas.

(b) Use a tank entering permit and a fire permit when entering a car. Observe safety rules for each permit.

(c) A fellow worker must be on top of the car holding the rope harness. Wear the safety belt harness, an air mask, gas test the car, and use a light when entering a tank car or truck.

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III. b. (1) (d) Fill out tank inspection sheet.

(2) Put steam on the car after it is clean.

(3) Check to be sure there is enough material in a storage tank to load a car or truck as required. (An 8,000 gallon car requires about 63" of material in #2, #3, and #4 storage tanks.

(4) Circulate the material in the storage tank for two (2) hours, sample the tank, and have the sample checked for loading by the laboratory. If material is in specification proceed with loading of the tank.

(5) Install diaper cloth sock in the filter in the loading line and place a sock over the end of the loading line extension.

(6) Attach extension to the loading line at the dock and place sock end into the dome of the car.

(7) Connect ground wire to the car.

(8) Set valves in the loading line from the storage tank to the loading dock. Do not open valve in line at the car.

NOTE: Care should be taken to see that the correct valves are opened so only the desired Aroclor enters the loading line.

(9) Start pump at the storage tank.

(10) Open valve in drain line at the loading dock and allow one drum of Aroclor to flow through the line to flush out the loading line.

(11) Close valve in drain line and open valve in line to the car. Approximately 2½ hours is required to load a car.

(12) When the car is loaded, stop the pump, and close valve to the loading line. Fill car up one to two feet into the dome of the car.

(13) Remove loading line from car.

(14) Take samples from car and send to laboratory for final analysis. (See Schedule)

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SAMPLES TO BE TAKEN FOR LIQUID AROCLOR LOTS

MATERIAL	TANK CARS - TRUCKS or DRUMS
1221	2 x 1/2 Gallon
1232	2 x 1/2 Gallon
1242	3 x 1/2 Gallon & 1 x 5 Pint
1248	2 x 1/2 Gallon
1254	3 x 1/2 Gallon & 1 x 5 Pint
1260	3 x 1/2 Gallon
1262	2 x 1/2 Gallon

(15) Close and tighten lid on car.

(16) Seal car and record seal number and car number in Aroclor log book.

c. Filling Drums

Liquid Aroclor can be drummed from the storage tanks or the filtrate receiver. Solid Aroclors that are drummed are normally filled from the still receiver. Solid Aroclors 1268 and 5460 are normally flaked and bagged. Aroclor 2565 is a non-distilled product which is drummed from the blowing tanks.

The following steps should be followed when material is to be drummed:.

(1) Send a representative sample (1/2 Gal. for Liquid Aroclors) of the material to the laboratory for inspection. If the material is via storage tank it should be circulated for two (2) hours. Material in a filtrate receiver or blowing tank should be agitated for 20 to 30 minutes. If material is in specification proceed with drumming.

(2) Check the scales to be used. Set the scales for the weight specified for each drum (See Table IV).

(3) Start the pump.

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TABLE IV
AROCLOR FINISHED GOODS
DRUM WEIGHTS

Material	Drum Weights Lbs. - 5 Gals. & 55 Gals.
1221	50 or 520
1232	50 or 550
1242	55 or 600
1248	55 or 600
1254	60 or 600
1260	60 or 600
1262	60 or 600
1262 - 10% Toluene	60 or 600
1262 - 10% Xylene	60 or 600
1260 - 10% Toluene	60 or 600
A13B3B	65 or 675
5442	50 or 450
2565	500
4465	50 or 500
Interteen PPO	65, 360, or 674

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C. DETAILED INSTRUCTIONS

IV. Flaking Aroclors

Aroclors 1268, 5460, and 5060 are flaked on a drum flaker and bagged in 100 lb. bags.

a. Preparation for Flaking

(1) Place hot Aroclor heat on the pipe lines, valves, and flaker hold tank. Heat the Aroclor system up to 250°C. Observe temperature on the multi-point recorder in the chlorinator control room.

(2) Pump Aroclor to be flaked into the flaker hold tank.

(3) Check temperature of material in the hold tank. It should be 220°C. min. Temperature recorded on #3 still multi-point recorder.

b. Start-Up of Flaker System

(1) Turn electrical heat in the flaker pan on about 20 to 30 minutes before start-up.

(2) Open valve in water line feed to the flaker drum.

(3) Start the flaker drum. Start breaker at discharge of flaker.

(4) Open valve at bottom of the flaker hold tank.

(5) Open valve at sight glass to start Aroclor feed into the flaker pan. Observe flow in sight glass. Adjust valve to maintain the level in the flaker drum about one inch from the top of the drum.

(6) Observe operation to be sure the drum is picking up the material.

(7) After the flaker has run 15 to 20 minutes notify the Chief Operator material is in the hopper to be bagged.

(8) Continue to flake until the flaker hold tank is empty.

c. Shutdown of Flaker

(1) Normally the flaker will be run until the hold tank is empty.

(2) Allow the drum to pick up material from the pan until it will no longer contact the hot liquid product.

(3) Stop the flaker drum and the breakers.

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VI. Milling Aroclors

Aroclor 1268 is the only Aroclor which is sold as a milled product. The material must first be flaked.

a. Select the drums of material to be milled.

b. Check the scales to be used. Place a new drum under the milling machine to collect the 1268.

c. Crushed dry ice is used during milling to keep the machine cool. This keeps the Aroclor 1268 from clogging up the machine.

d. Start the mill and auger.

e. Fill the bucket with crushed 1268.

f. Blend dry ice with the 1268 and feed it into the hopper over the mill. Use approximately five pounds of dry ice to each 100 pounds of Aroclor 1268 that is milled.

g. Fill the drums to the specified weight (normally 200 lbs.). Stencil the drums with the name of the product, lot number, net weight of each drum, and the initials of the person doing the work.

h. Continue this operation until the required number of drums are filled. Then stop the milling machine and clean up the scales, the milling machine, and the milling room.

i. All drums filled are palletized and moved to the loading platform for transfer to the warehouse.

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