

*Union Carbide*  
129-14a

PESTICIDES ENGINEERING CONTROL TECHNOLOGY  
ASSESSMENT SURVEY

PLANT E-2

*Union Carbide - Woodbine, Ga.*

Survey: January 1978  
Report: February 1980

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This report is intended to describe effective applications of control technology which may be of general use to the pesticide manufacturing and formulating industry; it is not intended to describe all aspects of control programs in this plant.

## Plant Description

Plant E-2 is a large modern formulations plant which formulates and packages two high volume pesticide products: a highly toxic product Pesticide A in a granular formulation, and a moderately toxic wettable powder - Pesticide B. Approximately 300 people are employed on-site, 200 of whom have pesticide exposure possibility. Of the 200, approximately 100 are in operating units.

The company has active industrial hygiene and health and safety programs and is very conscious of the potential health effects of the products. Because of the hazard associated with exposure to Pesticide A (oral LD<sub>50</sub> = <10mg/kg) and a moderately toxic raw material, Raw Material B (oral LD<sub>50</sub> = 50-100 mg/kg), Plant E-2 employs numerous technological controls and strictly enforces regulations concerning personal protective clothing and equipment. (Table I). Workers in the Pesticide B formulating plant adhere to the same work practices as those involved in the production of Pesticide A.

## Production

Pesticide A is manufactured in an outdoor stirred batch kettle. Raw Material A is nontoxic and presents no unusual handling problems. Raw Material B is moderately toxic, and after being received in drums or tank cars, it is pressured to a weigh vessel for charging to the reactor. The product solution is circulated through heat exchangers by a centrifugal pump equipped with a double mechanical seal and mineral oil injection in the reactor/synthesis area. Lines are welded and insulated, and the insulation appears capable of providing adequate protection against a liquid spray should a leak occur. The reaction unit is not barricaded or shielded, but protective gear is worn by operators.

Product solution is stored in three horizontal tanks which are insulated and provided with heat exchangers and pumps for warming or cooling contents. Nitrogen is used to break vacuum in the tanks, which would vent to the air if overpressured. Water is available for use should a leak occur. There is a short dike to collect rain water or leakage, which is then directed to a treatment pond where water and alkali quickly decompose Pesticide A.

## Formulation - Older Granulation Unit

In the production of Formulation A, Pesticide A is processed with ground corn cobs (grits) in either of two formulation units. In the first, older formulation unit, corn grit is received via truck and pneumatically emptied into silos (Figure 1). The grit is then pneumatically elevated to a cyclone separator, where it flows via a surge bin through two screens into weigh hoppers. Granules are coated in two batch Nauta mixers which are equipped with heating jackets. A vertical screw, anchored at the cone bottom by a universal joint and driven at the top by a mechanism traversing

Table I

## Properties of Potentially Toxic Substances at Plant E-2

Pesticide A

Physical state	solid
Melting point	99-100° C
Solubility in water	.6% by weight at 25° C
Toxicity	oral LD <sub>50</sub> (rat): <10 mg/kg skin LD <sub>50</sub> (rat): <3000 mg/kg
TLV - TWA	none

Raw Material B

Physical state	liquid or gas
Boiling point	~60° C
Toxicity	oral LD <sub>50</sub> (rat): 50-100 mg/kg inh LC <sub>50</sub> (rat): ~10 ppm/4H inh TC <sub>Lo</sub> (human): ~5 ppm
TLV - TWA	0.005 ppm (air)

Solvent A

Physical state	liquid
Boiling point	39.8° C
Solubility	2g/100ml water at 20° C completely miscible with common organic solvents
Toxicity	oral LD <sub>50</sub> (rat): ~1.6-2.0 g/kg
TLV - TWA	500 ppm (air)

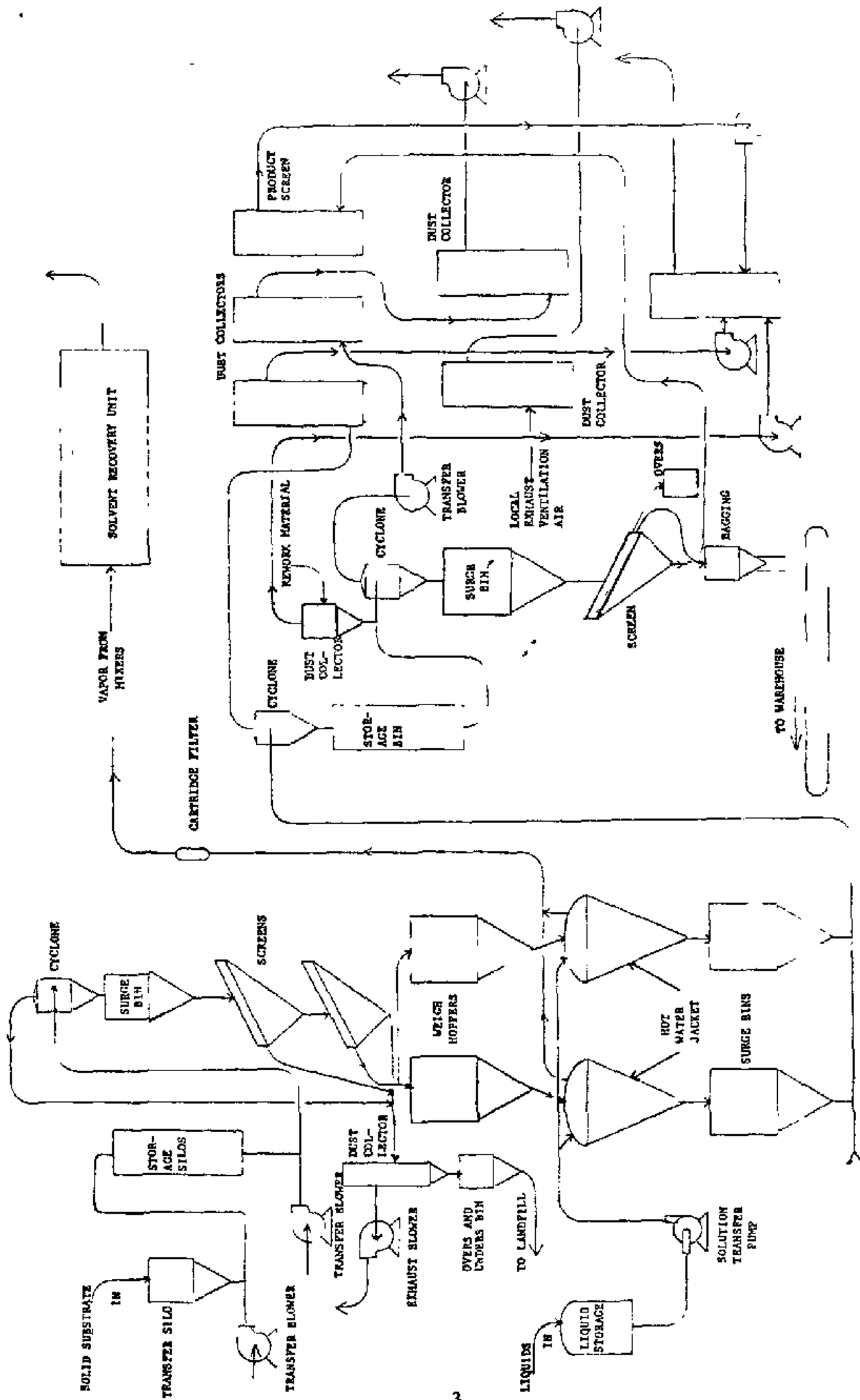


Figure 1 : Older Facility Flowscheme

the inner circumference, agitates the grit. Pesticide A solution is sprayed on top and controlled by a batching meter. Recycle product fines and Nuchar (powdered carbon) are pneumatically introduced below the mass.

Solvent, air-leakage and nitrogen (to break the vacuum) are pulled off by NASH compressors into refrigerated condensers. The condensate is pumped to a storage area, where water rises to the top. Solvent A is recovered and recycled to synthesis. Any solid Pesticide A entrained in the evaporated solvent is captured by a cartridge filter, which renders the condensate essentially nontoxic. Granules are dropped into a surge hopper for a quality control check and are then pneumatically transported to product silos.

Whenever toxic granules are pneumatically transported under negative pressure, they are subsequently separated by a cyclone and a bag filter. Residual air is passed through a secondary bag filter house as a leakage safeguard. The location of the blower at the end of the process line leaves shaft seals on items such as star valves, bin movers, mixers, and screens under negative pressure, and thus prevents leakage of toxic Pesticide A granules. From silos, the granules are moved pneumatically to a cyclone and surge bin over the screener, which narrows particle sizes to 14-40 mesh. The product screener in the older formulation unit stands on an open grate floor above the packaging area. (The newer unit has a solid floor.) The screens blind with particles and must be brushed clean about once during each shift. Solids are vacuumed after the screens are cleaned, but some granules fall to the floor; in the older unit, a significant number of granules fall through the floor grating, causing 10 mg/M<sup>3</sup> airborne solids in the packaging area below. The plant is concerned and is attempting to remedy the situation. Both multilayer stainless steel screens and Ludlow-Saylor polyester screens, which reportedly are less apt to blind, are being tested. Conclusive results were not available at the time this report was written.

#### Formulation - Newer Granulation Unit

Figure 2 depicts the newer Formulation A granulation unit. Although many operations are similar to those in the older unit, the differences are significant.

During pneumatic transport of granules, friction occurs and Pesticide A is selectively broken off from the surface of the corn grit. In the newer unit, bucket elevators replace pneumatic systems; attrition is greatly reduced and the difficulties involved in recovering fine toxic dust with bag filter systems are avoided. Bucket elevators, however, have moving parts that must be maintained and shafts which can leak.

The problem of leakage is solved by operating the elevators under negative pressure and venting to a baghouse filter and blower system. Recovery baghouses are top loaded and have smooth interiors for ease of cleaning. They are monitored for leaks by pressure differential manometers, and they have explosion panels and are grounded. Geon 12 oz. eggshell finish bags with grounding strips are used.



Bags are washed in place to remove and deactivate Pesticide A dust; washdown water is directed to disposal ponds for additional treatment.

To avoid sparks that might ignite highly explosive Pesticide A dust, metal buckets and chains have been replaced by nylon buckets and belts. The usual objection to bucket elevators--difficulty of cleaning--is less important in this case, in which the elevators remain in the same product service.

Also in the newer Formulation A unit, the Nauta mixer (S.S.) blender is being replaced by two rotary batch steel blenders developed by Plant E-2. The new blenders are expected to reduce installation and maintenance costs.

### Packaging

Granules are packed by a volumetric filler into 25-lb. multiwall sealable paper bags; there is little or no dust emission. Each bag is conveyed to a sealer and is sealed with manual assist. The packing machine and sealer are in a designated room with negative air pressure (one air change per minute) and a special air pickup at the point at which granules leave the filler. Sealed bags leave the packing room through a wall slot. Cartoning, palletizing and stretch wrapping are carried out in the main warehouse area.

### Engineering Controls

The plant believes the following engineering controls are imperative for reducing worker exposures:

- o All pneumatic conveying systems handling Pesticide A product or concentrated dust are negative pressure systems from material pickup point to blower or exhauster.
- o All air used in conveying or dust collection systems handling Pesticide A product or high concentrations of dust vents through at least two dust collectors in a series arrangement before emitting to the atmosphere. The dust collectors are of the reverse pulsaire jet type with Dacron polyester bags. The air to cloth ratio varies from 4:1 to 7:1.
- o Installed central vacuum systems are used for cleanup of granulated product or dust that has spilled or collected on equipment or structure over a period of time.
- o Air discharge points of conveying or collection systems are at high elevations, away from concentrated personnel areas.
- o Equipment that could generate dust is sealed where possible or air sweeps are installed to reduce the localized collection of large quantities of Pesticide A dust, particularly in screening equipment.
- o In the new facility incorporates the use of mechanical conveying, replacing the pneumatic conveying employed at the old facility.

The mechanical systems negate the need for large dust collection systems by reducing dust generation.

- o Material discharged from dust collectors enters closed containers only.
- o Continuous conveyor belting is not used between the bagger and warehouses area. Discontinuous belting prevents spilled material from being transported to low hazard areas.

Plant Experience - Pesticide Exposures

The plant has consistently improved its safety and health record over the past few years. This has been the result of careful attention to details and program planning. The results are shown below.

Disabling Injuries

<u>Year</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978 YTD</u>
Disabling Injuries	8.0	2.0	2.0	2.0	1.0
Frequency Rate	9.4	5.2	6.9	3.3	3.1
Severity Rate	193.1	108.4	233.0	128.0	323.0

Last "Lost Workday Case" 6 April 1978/160 Days

Recordable Injuries

<u>Year</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978 YTD</u>
Recordable Injuries/Illness	64	20	23	13	10

Pesticide A Exposure

<u>Year</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978 YTD</u>
Number of Exposures	34	15	11	4	2

Personal Protective Clothing and Equipment

Protective clothing is a major feature of toxic exposure control at Plant E-2. The cost to the plant amounts to \$7 per day per person for materials plus about 1/2 hour extra time devoted to dressing or undressing. Appendix 5, furnished by the plant, provides 17 pages of definitions and gear



specifications covering 20 safety areas or working zones. Approximate costs of protective gear are as follows:

DuPont Tyvek® coveralls	\$ 1.40	use 2-3 per day
(disposable)		
Rubber gloves	.40	
Boots	7.70	
Safety glasses	5.15	
Hard Hats	3.87 (each)	
Respirator	9.25	+ \$1.47 for a filter
Goggles	2.75	
Air hood	4.20	
Vortex tube	150.00	needs supply header, air compressor, etc.
Gas mask	75.00	
Cloth coveralls	11.00	
Wet suits	6.70	

Piped breathing air (for hoods with vortex tubes) is normally taken in for filtration and compression at a point remote from process areas. The newer Pesticide A granulation unit is now near the air compressor, which will be moved to a more remote location.

Appendix B gives Plant E-2's procedure and dress for operators connecting and receiving drums from baghouse filters (in a silo) which collect pesticide laden dust, it also describes disposal techniques.

Appendix C gives environmental air data for various operational areas in 1978. The high values for the pack out-room in the older formulation unit reflects the grating floor under the product screener as discussed earlier.

#### AIR POLLUTION CONTROL

The ventilation air and vacuum cleanup system air is processed through baghouses that are currently collecting at least 99.9% of the particulate material. The total uncollected particulate emissions are on the order of 0.1 - 0.2 lb/hr. Since this material consists of Pesticide A (less than 1%), plastic coating material, and substrate, the actual pesticide emissions are lower, probably less than 0.0001. This rate is less than the

emissions of the wastewater treatment system, but it could contribute to a small Pesticide A exposure since it does occur in the plant area. There are no data to indicate ambient concentrations of Pesticide A. An emissions testing report is given in Appendix D.

The solvent recovery system could emit Solvent A vapors into the atmosphere. Plant E-2 has found the emissions to be excessive and is now preparing to make engineering modifications to lower them.

As with operation, maintenance on specific equipment items requires specified protective gear/suiting. Steaming and washing deactivate Pesticide A. Waste filter elements, cartridges, piping items are bagged and buried in lime.

#### WASTEWATER TREATMENT

Washdown water, condensate from the solvent recovery system, and drum wash and caustic scrubber wash from the Raw Material B handling facility are collected in holding ponds. After ten days have elapsed, the water is pumped through a neutralization pond where HCl adjusts the pH to 8.5. The neutralized water is then spray irrigated onto company-owned property.

PROCESS.                    Plant operations  
PROBLEM:                   Reporting of hazards and exposures  
SOLUTION:                  Uniform reporting format

The plant is able to call upon the services of professional industrial hygienists from the corporate staff as needed. These industrial hygienists have developed a uniform reporting format so that the plant staff will not be presented with industrial hygiene reports in widely variant formats. Two major elements of that format are shown as Figures 3 and 4.

Figure 3 (General Industrial Hygiene Survey Form) is used by the industrial hygienists to record the results of "walk-through" (preliminary) surveys, as well as to identify the current general state of control within plants. Each job is categorized in regard to potential and actual exposures to physical and chemical agents, and the controls applied.

Figure 4 (Summary of Job Exposures) is used to report the results of detailed surveys and air sampling to the plant management. Each of these forms is suitable for use in other plants and will assist in orderly recordkeeping.





PROCESS: Unloading drums of toxic pesticide and/or lachrymatory raw material

PROBLEM: Preventing toxic exposure

SOLUTION: Appropriate ventilation and piping

Plant E-2 receives Raw Material B in drums. Raw Material B is hazardous by all means of contact. It has a high vapor pressure (348 mm Hg at 20°C); it is poisonous and severely irritating to the eyes and respiratory tract. Skin contact can cause burns.

The drums are emptied into a tank that feeds a reactor. For handling the drums, unloading, and decontamination, Plant E-2 requires its workers to

1. Wear protective clothing and use an air hood.
2. Place drums on a scale in a booth or hood with ventilation to a caustic scrubber.
3. Open both top bungs.
4. Insert dip pipe (with shut-off valve and Kamlock connection) into one bung hole.
5. Connect remaining bung hole to pipe assembly, which has a rupture disc (side connection), a shut-off valve, and a Kamlock connection.
6. Connect to dip pipe manifolds for the Raw Material B tank, and connect pipe assembly to manifold for the nitrogen pressuring system.
7. Line up dip pipe valves for flow to Raw Material B tank.
8. Set up N<sub>2</sub> pressure controller, open nitrogen pressuring line, and blow drum contents forward into the Raw Material B feed tank.
9. Shut off nitrogen and shut off line to Raw Material B tank.
10. Bleed drum pressure down, venting to the cabinet vent opening (to scrubber).
11. Close off all valves and disconnect drum.
12. Move drum to decontamination bay and add a few inches of water.
13. Leave drum (closed) for 24 hours.
14. Connect drum with water hose to dip pipe and connect other drum bung to hose reel leading to a caustic trap.
15. Purge drum with water, which then flows to a sump and to a holding pond for final full destruction, by alkali, of raw material traces.
16. Blow water out of drum with nitrogen, driving water up dip pipe into sewer connection.
17. Detach all pipe fittings from drum and put on bung covers.

Figure 5 shows the piping arrangements. Figures 6 and 7 give the plan of the facilities: a covered elevated platform on which the Raw Material B unloading hood, or cabinet, and the decontamination room are in the lower right corner.

Photographs 1 and 2 show the dip pipe and nitrogen connections for Raw Material B drums. Photographs 3 and 4 show drums in the hood or cabinet. Photograph 5 shows the curtained door to the entrance room before the unloading cabinet. Photographs 6 and 7 show the platform and the roof. Two sets of sprinklers were installed; one for fire, the other for smothering a Raw Material B leak. Photographs 8 and 9 show a leak detector that alerts operators to turn on alarm and the sprinklers (sprays).

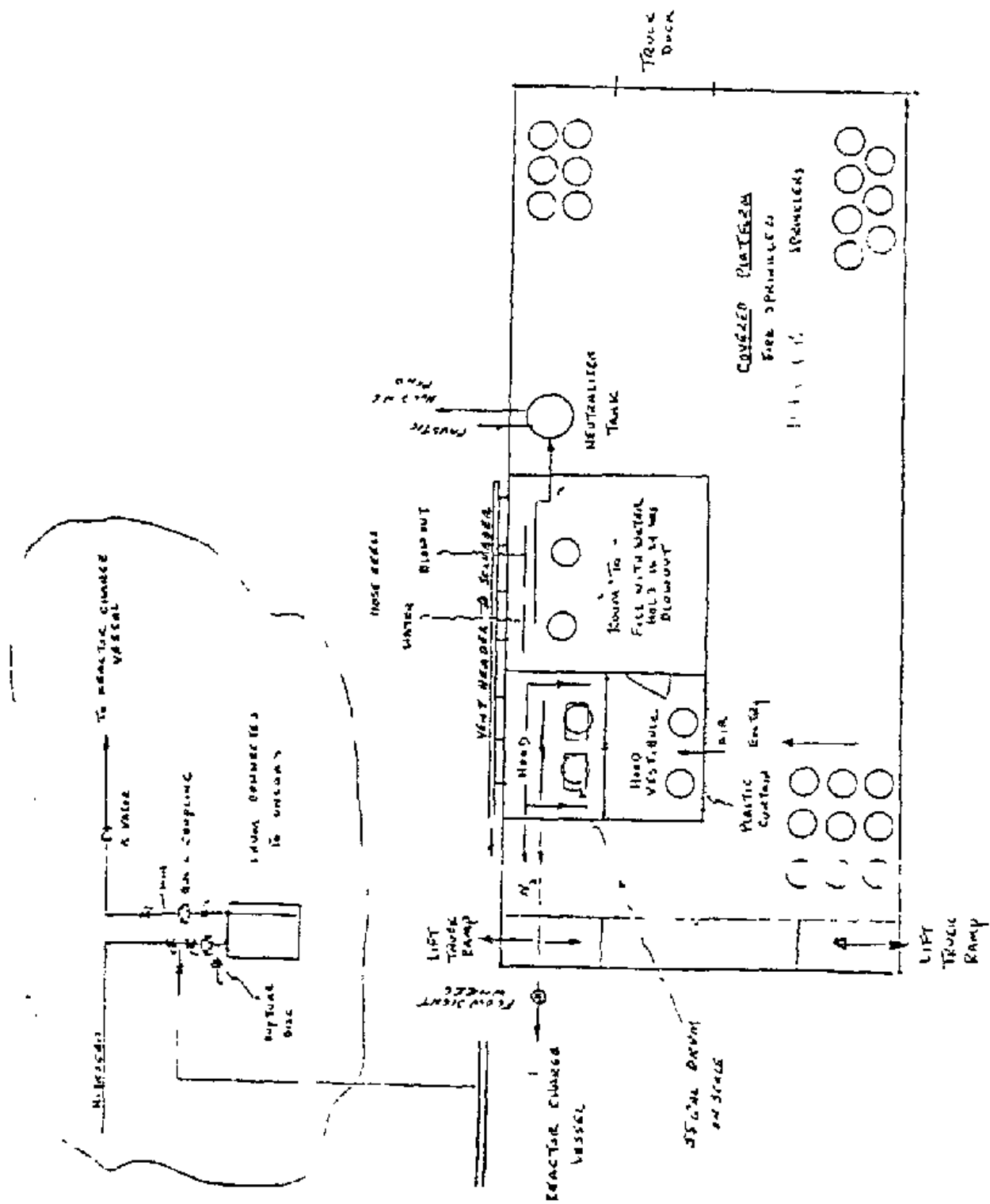


Figure 5: Raw Material B Drum Unloading





STORAGE & UNLOADING BUILDING

Figure 6 : Raw Material B Storage and Unloading Building

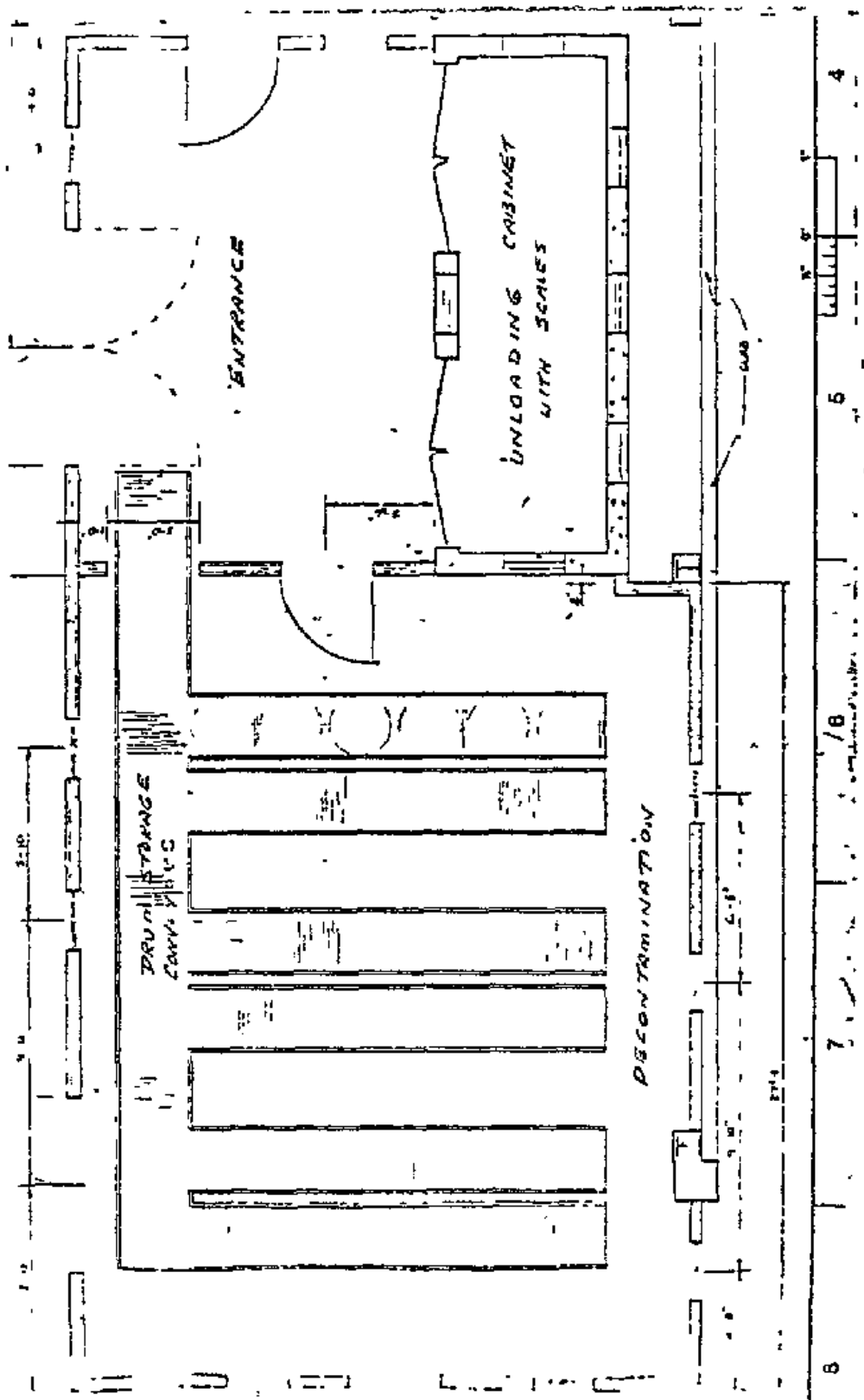
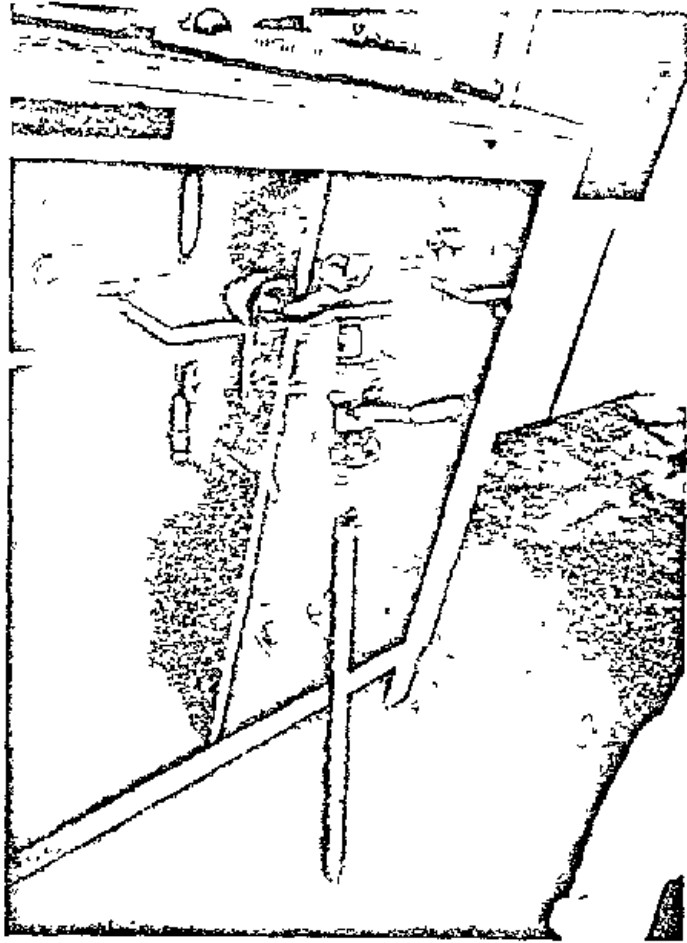
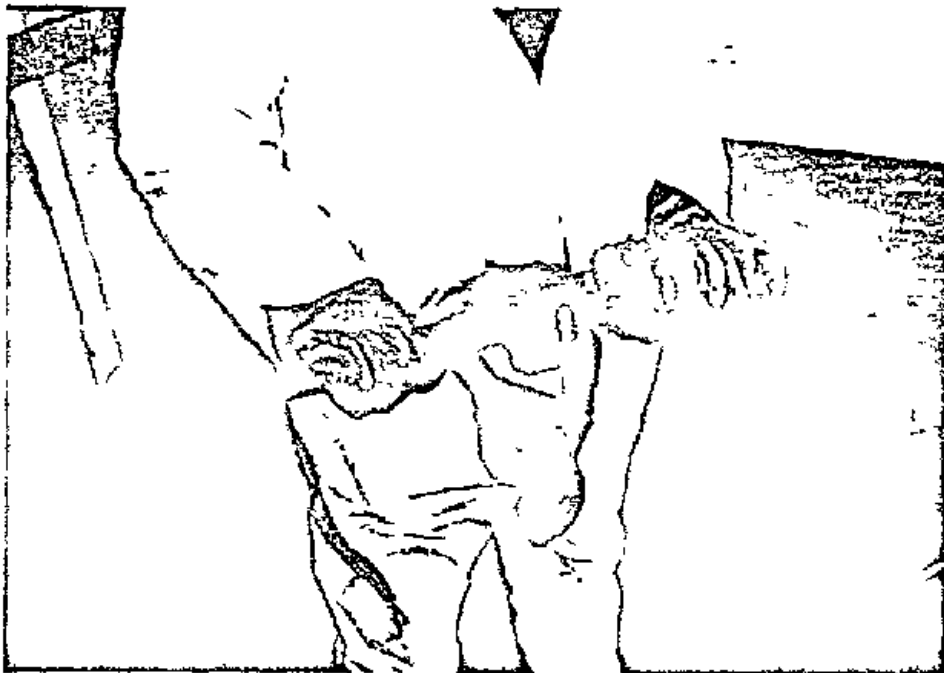


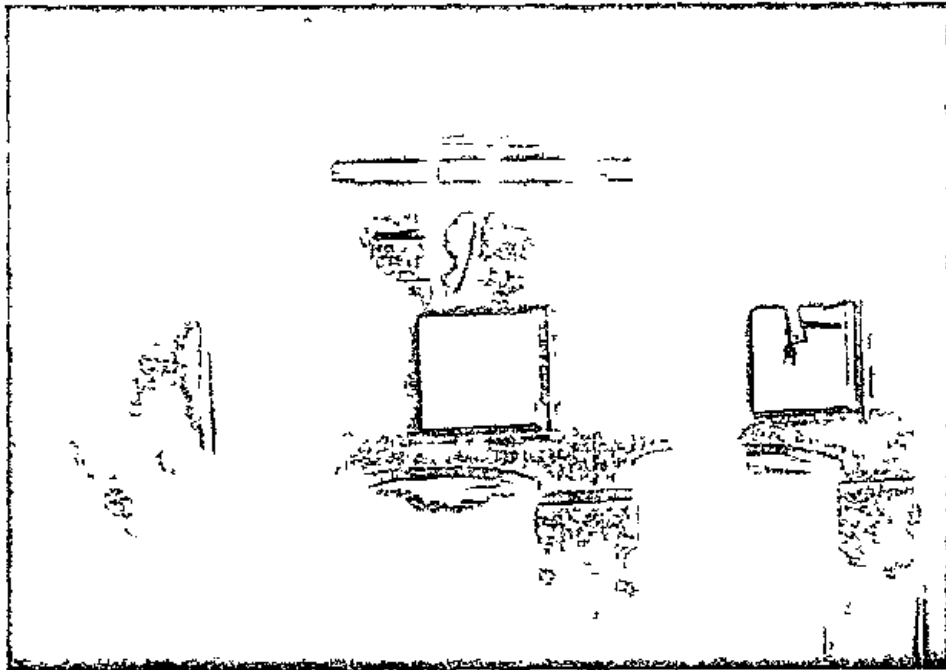
Figure 7 : Raw Material B Storage, Unloading and Decontamination



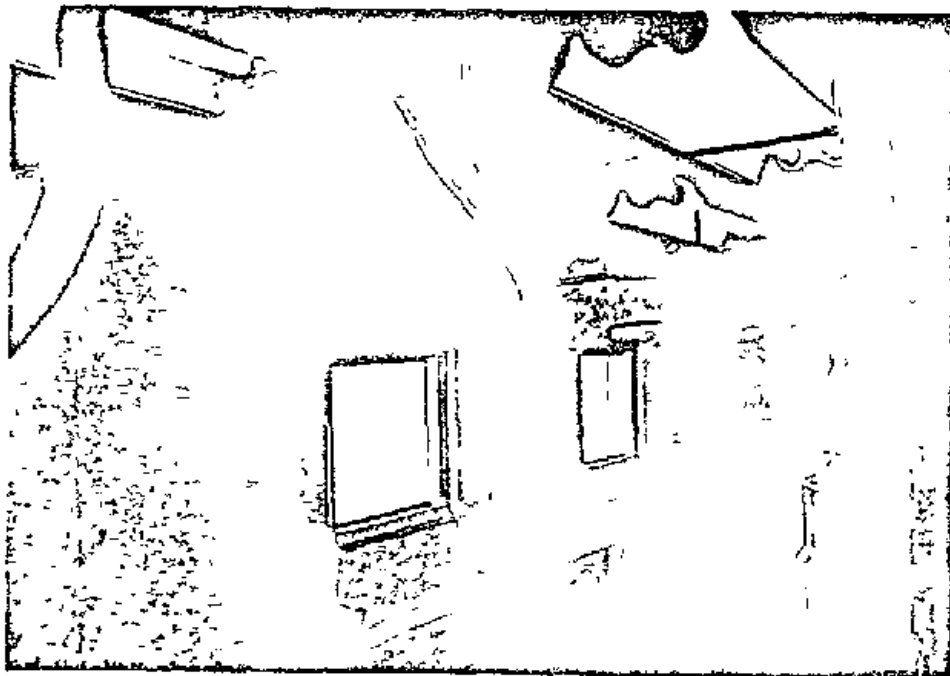
Photograph 1



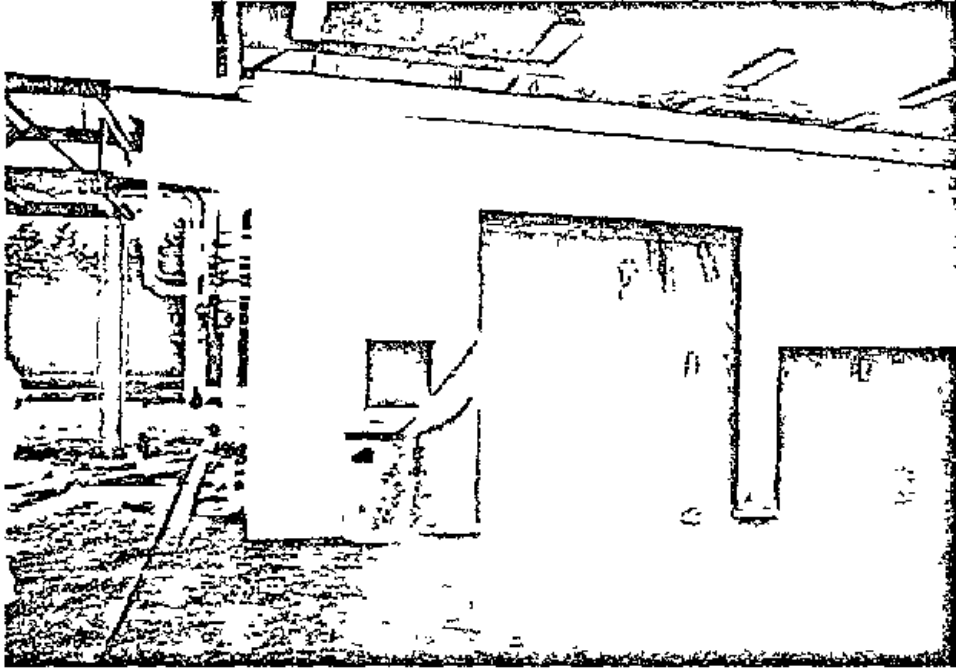
Photograph 2



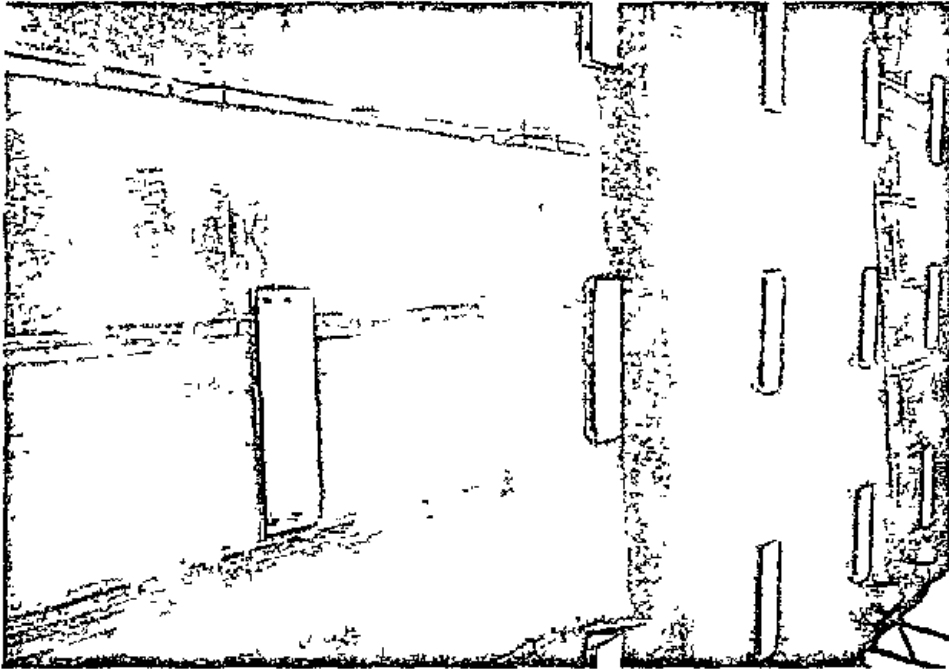
Photograph 3



Photograph 4



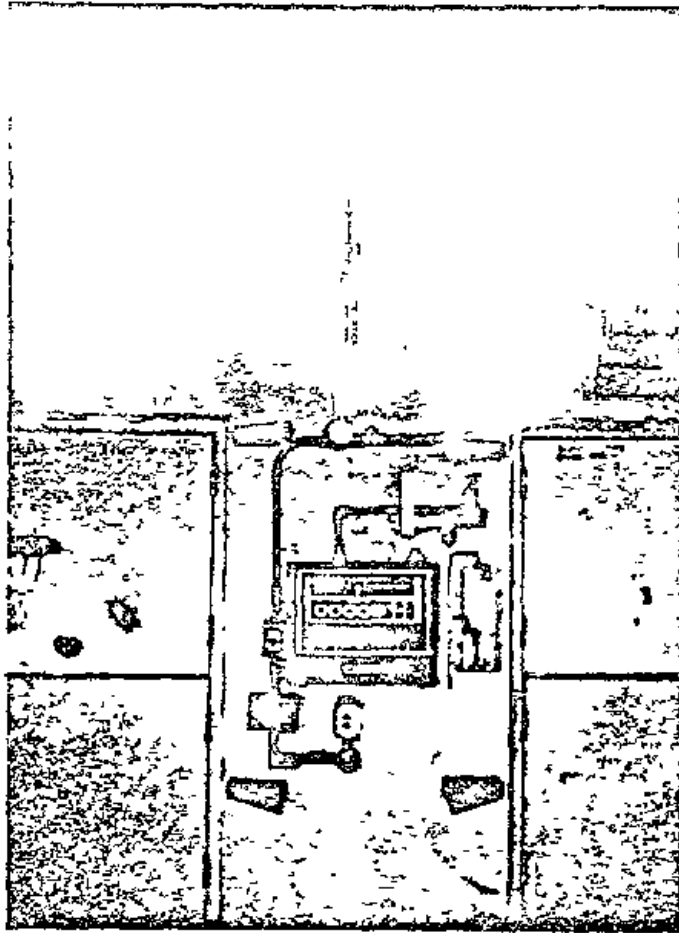
Photograph 5



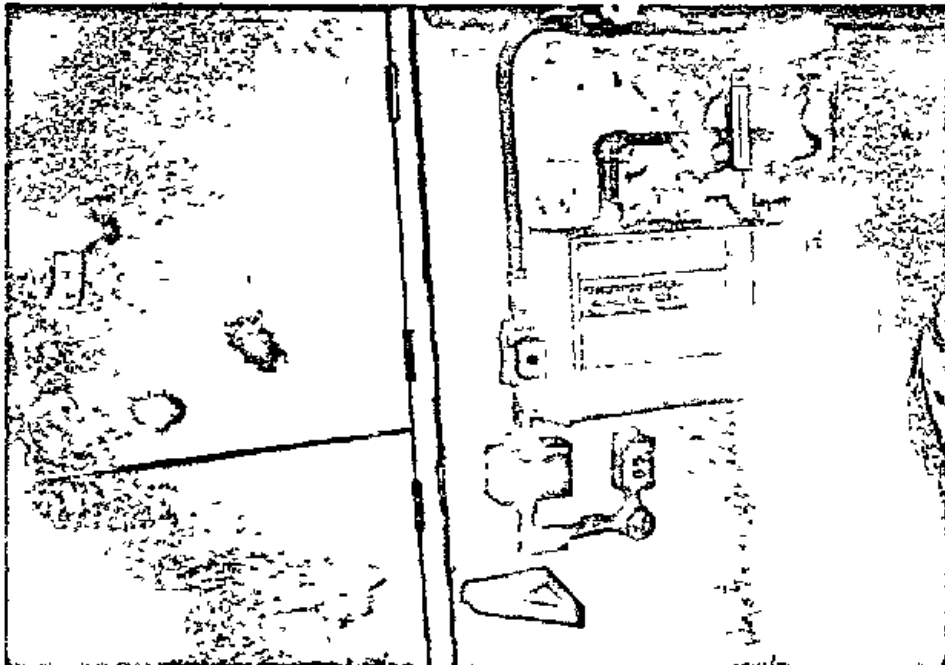
Photograph 7



Photograph 6



Photograph 8



Photograph 9

PROCESS: Storage and transport of highly toxic pesticide solutions

PROBLEM: To maintain uniform temperatures during storage and prevent leakage during transportation

SOLUTION: Diked tanks with available heat exchanger and water for hydrolysis of Pesticide A.

Pesticide A in storage tanks can be circulated through a heat exchanger to warm or cool as needed. Should a leak occur, water is available to hydrolyze the pesticide. MRT piping in the area is welded with covers on flanges, and pumps are equipped with double mechanical seals and a sealant fluid.

The entire storage area is diked. Any liquid from the area (rain, drainage water, etc.) goes to waste water collection and hydrolysis (by caustic and water) which rapidly deactivates any pesticide present.





PROCESS                    Insecticide granular formulation

PROBLEM:                    Agglomeration and static charging of fines

SOLUTION:                    Powdered charcoal (NUCHAR®) injection

The granule formulation process consists of mixing and spraying the pesticide solution (with a proprietary resin added) on corn grit granules (14-40 mesh). The solution coats the grit granules and upon solvent evaporation by mild heating and vacuum, leaves the grit covered with specks of pesticide fastened by the resin. It was found that significant static charges could be built up on the granules, and that the final product screening was ineffective in removing the agglomerated, charged fines. The plant now adds NUCHAR® during the mixing/coating operation. This has been found to be effective in dispelling static charge (the charcoal is more conductive than the granules alone), and thus the fines do not agglomerate and are readily removed during screening.

An unanticipated benefit has been that the charcoal makes the final product much darker and more visible, aiding in effective housekeeping by readily indicating contaminated areas.

PROCESS: Manufacturing and formulating highly toxic chemicals  
PROBLEM: Avoiding skin contact  
SOLUTION: Extensive use of Tyvek® disposable coveralls

Although engineering controls are also used in the plant and most areas are adequately controlled, protective clothing is widely used, because of the inherent skin toxicity of (particularly) Pesticide A. The plant has evaluated several options, and has chosen to use disposable Tyvek® coveralls as the principal item of protective clothing. Their choice was based upon comfort, acceptability, cost and performance in protection. Figures 8, 9, and 10 show the performance of Tyvek® material in prevention of permeation of general materials in laboratory testing performed by DuPont.

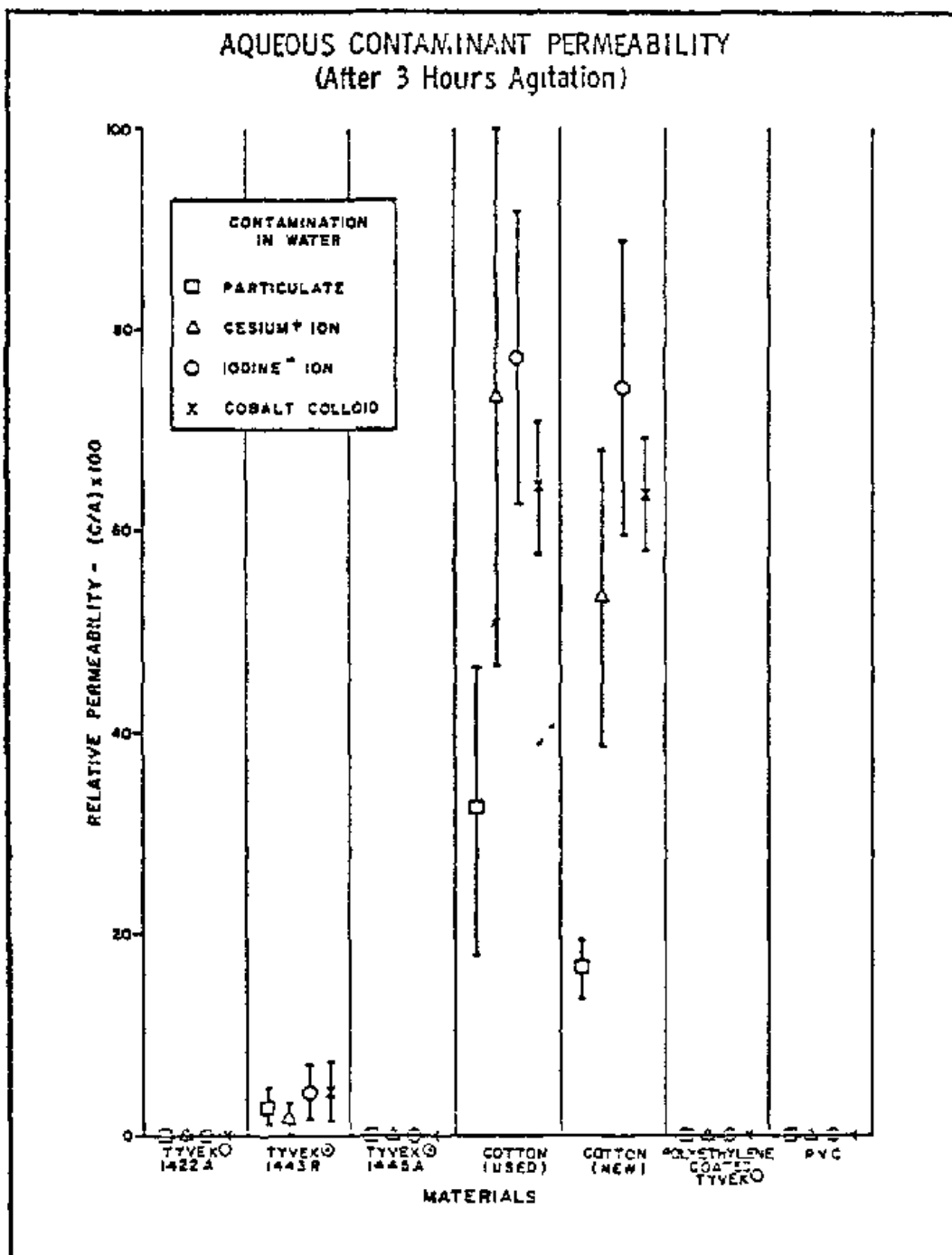


FIGURE 8 Tyvek® Performance Data

DRY PARTICULATE PERMEABILITY  
(After 1 Hour Agitation)

PARTICULATE SIZE  
DISTRIBUTION

39% - 0-5 MICRONS  
18% - 5-10 MICRONS  
16% - 10-20 MICRONS  
18% - 20-40 MICRONS  
9% - 40-80 MICRONS

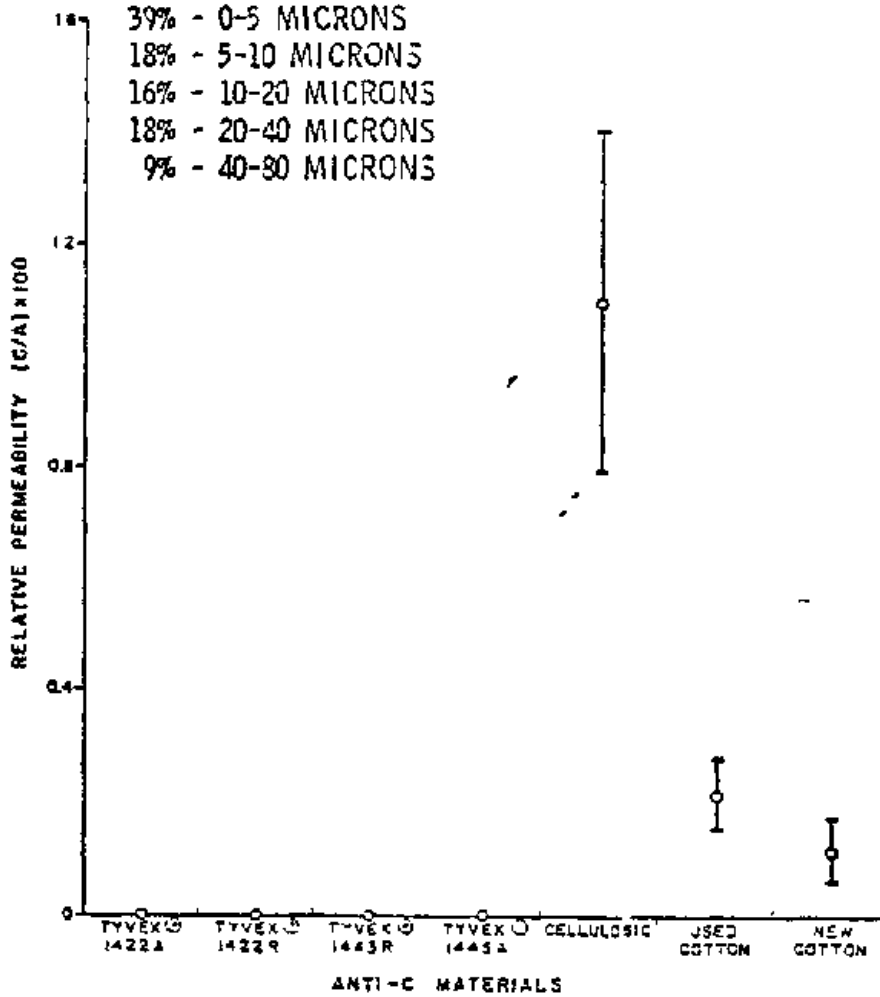
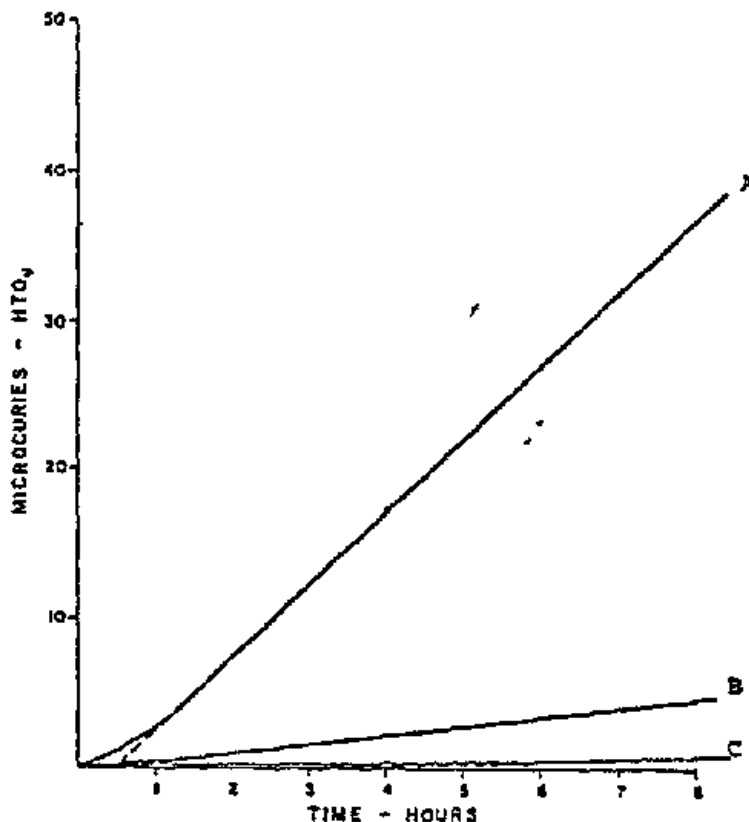


FIGURE 9 Tyvek® Performance Data

Diffusion (Permeation) of Tritiated Water Vapor

<u>Graph</u>	<u>Anti-C Material</u>	<u>Diffusion Rate (slope) <math>\mu\text{C/hr.}</math></u>	<u>Delay Time hr.</u>	<u>Saturation Time hr.</u>
A	- 4 mil P.V.C. film	4.93	0.5	1.2
B	- Polyethylene Coated Tyvek®	0.63	0.5	1.2
C	- "Saran" Laminated to Tyvek®	0.12	3.1	5.5



At 8 hours:

- P.E. coated Tyvek® has protected against HTO<sub>v</sub> permeation equivalent to P.V.C. at 1-1/2 hours.
- "Saran" laminated Tyvek® has protected against HTO<sub>v</sub> permeation equivalent to P.V.C. at ~20 minutes, or P.E. coated Tyvek® at ~1-1/2 hours.

FIGURE 10: Tyvek® Performance Data

PROCESS:                   Transport of friable granules

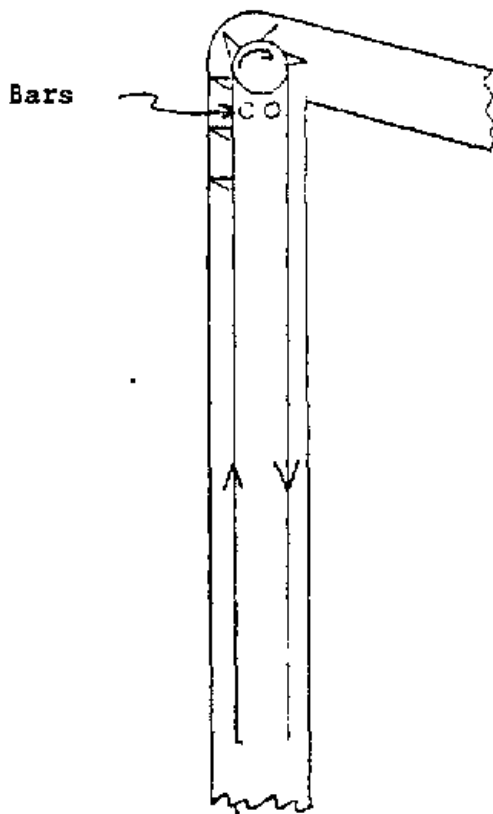
PROBLEM:                   Attrition of the pesticidal coating on granules  
                          during transport

SOLUTION:                  Bucket elevator

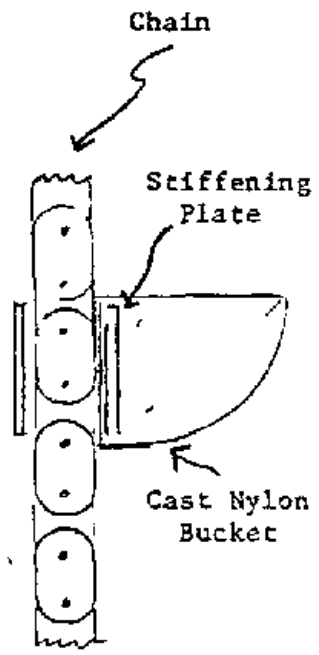
The plant produces a granule coated with a highly toxic pesticide. In a previous installation, it was found that pneumatic transport of the granules led to attrition of the coating, and occasionally excessive contamination of the air in the plant. Good quality, sturdy, bucket elevators are now being used as replacements for pneumatic transport. They are operated under a slight vacuum, with air going to a building ventilation air filter. The elevators are used exclusively in one product service so that the common difficulty of frequent clean-out for changing formulation services does not apply here. Granule coating attrition has been reduced substantially. Toxic exposure could arise from seal and joint leaks; however, good quality construction plus the use of local exhaust ventilation avoids such exposure.

Chain or sprocket shaft breakage or buckets coming loose will necessitate removing panels for repairs. Again, better quality will obviously reduce exposure opportunities. Bars installed, as shown in Figure 11, will catch the chains should the sprocket shaft break, so that maintenance workers do not have to dismantle the elevator (with the possibility of excessive exposure). Buckets are made of nonsparking material (i.e., cast nylon), and reinforced back plates will help keep buckets in the chains.

Figure 12 (ACGIH Ventilation Manual) shows the placement of ventilation pickups.



Bars Mounted in Elevator



Bucket Mounting

Figure 11 : Bucket Elevator



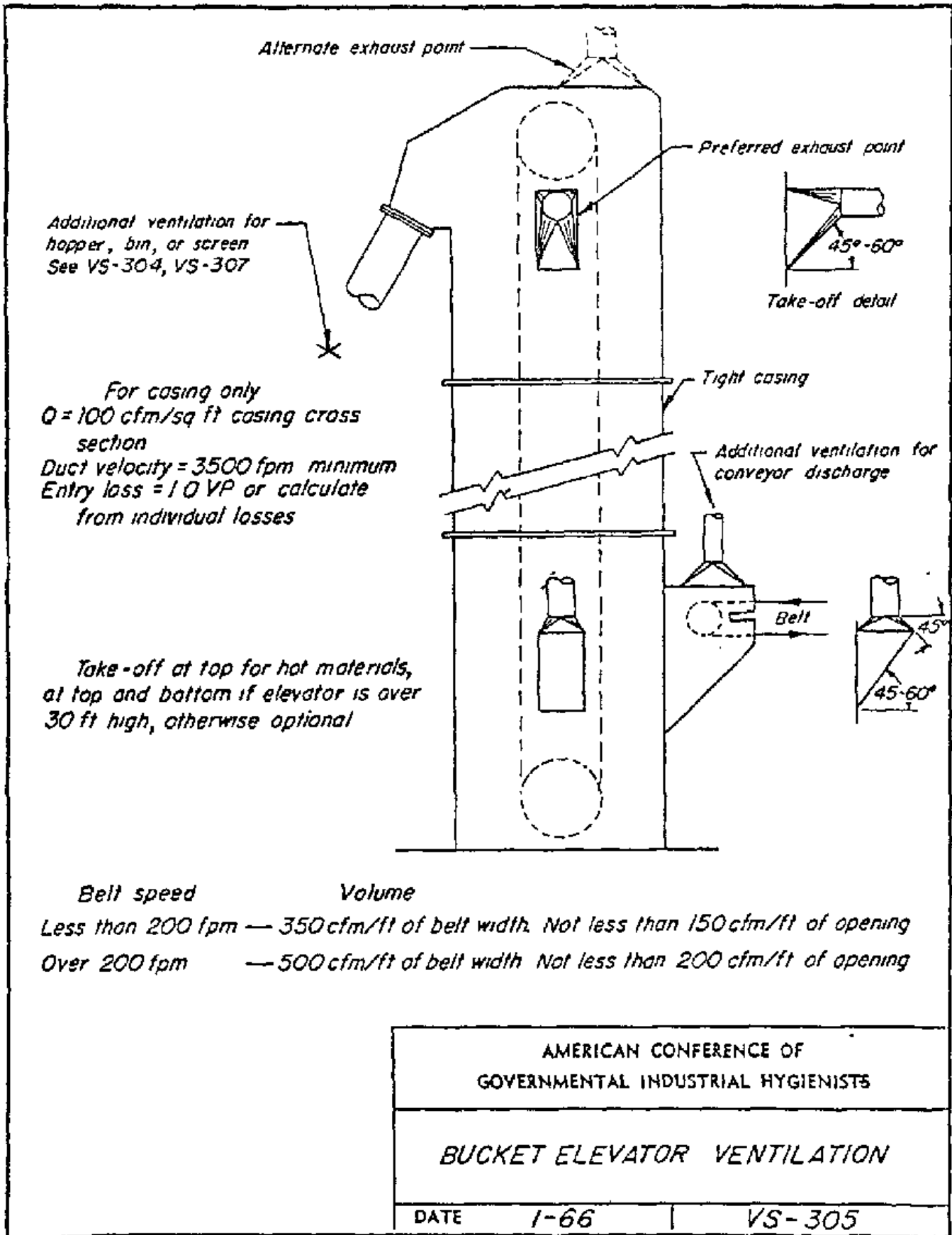


FIGURE 12

PROCESS                    Filtration of highly toxic dust from air/gas streams

PROBLEM                    Servicing or replacement of filter bags that have residual toxic dust on them

SOLUTION:                  Plenum chamber or separate buildings.

The baghouse filter should have a large outlet plenum chamber or be enclosed or in its own building, as at Plant E-2. This will allow capture (by building air filtration) of any dust coming off bags as they are removed, rather than dispersion to the wind when out of doors. Plant E-2 used top-loaded baghouses, which can be entered on the clean side of the filter houses for adjustment and bag replacement. At Plant E-2, the baghouse filters were of the reverse pulse air jet type, with micron polyester bags. The air-to-cloth ratios varied from 4:1 to 7:1. The baghouses can also be disconnected from other equipment and washed down inside to remove pesticide and, in this case, to deactivate it also before bag removal. This procedure, used when all general bag filters are replaced, requires drying out the isolated baghouse and its internals.

The baghouse interior construction should be smooth, with minimal seams or crevices, to ease clean-out. The baghouse should be electrically grounded and have explosion panels. A tandem or a second baghouse downstream was used at Plant E-2 to safeguard against bag filter leakage.

At Plant E-2, bags were overpacked with plastic bags and sent to toxic burial, with lime treatment for alkali hydrolysis to destroy the pesticide residues in the soil.

PROCESS: Wastewater treatment

PROBLEM: To eliminate environmental release of highly toxic Pesticide A contained in wastewater

SOLUTION: A chemical treatment system with long retention times and low energy mixing to convert Pesticide A to nontoxic material and simultaneously limit the production of an aerosol that could expose plant personnel to Pesticide A.

The wastewater consists primarily of washdown water, condensate from the solvent recovery system, and drum wash and caustic scrubber water from the Raw Material B handling facility. The aqueous solutions of the chemicals involved have very low vapor pressures, and worker exposure to evaporated Pesticide A has been limited. The water is collected in one of two plastic-lined holding ponds. The lining eliminated ground and water pollution from untreated or partially treated waste water components. The caustic scrubber water contains sufficient alkalinity to raise the pH of the whole pond to above 9. The ponds are filled in an alternating sequence to provide an adequate reaction time for all of the waste water components. The water is held in the pond and mixed, using a recirculation pump for a period of 10 days, in order to allow chemical hydrolysis to occur. Under conditions in the pond, the half-lives of the Pesticide A and its major breakdown products are less than an hour. At the end of the holding period, the concentration of Pesticide A is less than 7 ppm.

After the holding period, the water is pumped through a neutralization pond, where hydrochloric acid is used to adjust the pH to 8.5. The neutralized water is irrigated onto a company-owned forest, thus limiting worker and general population exposure to any unreacted Pesticide A in the effluent. The Pesticide A deposit on the forest is limited to 4 lb/day by permit. Monitoring wells show that Pesticide A and toxic breakdown products are not migrating into the ground water table. Studies are underway to determine the impact of the irrigation on plant and animal life in the area, but no data are available. The only obvious effect appears to be some salt damage to the vegetation caused by the hydrochloric acid neutralization.

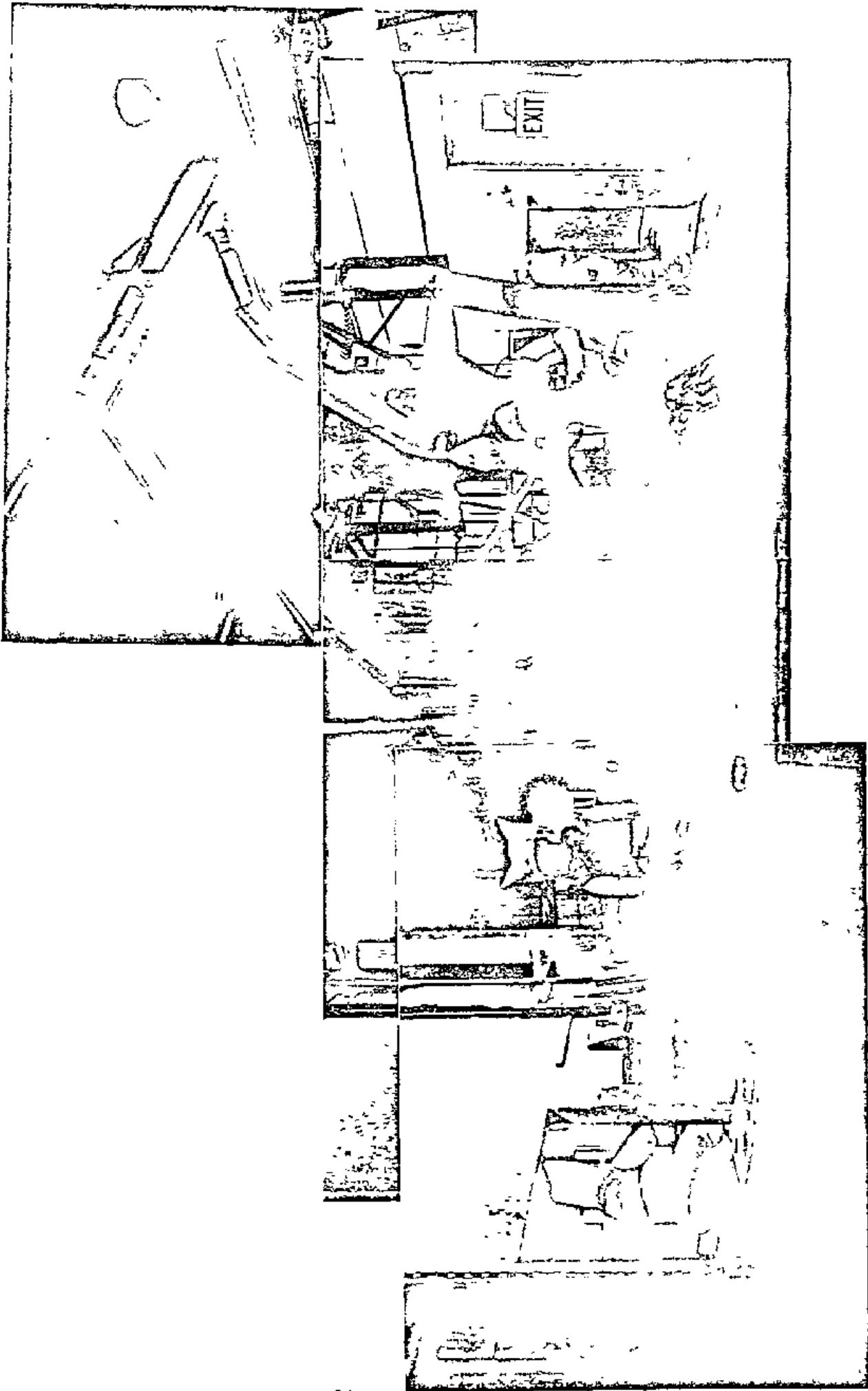
PROCESS·                   Packaging pesticide granules into multi-wall paper bags (25 lb.) at Plant E-2

PROBLEM·                   Attrition of Pesticide A and worker exposure

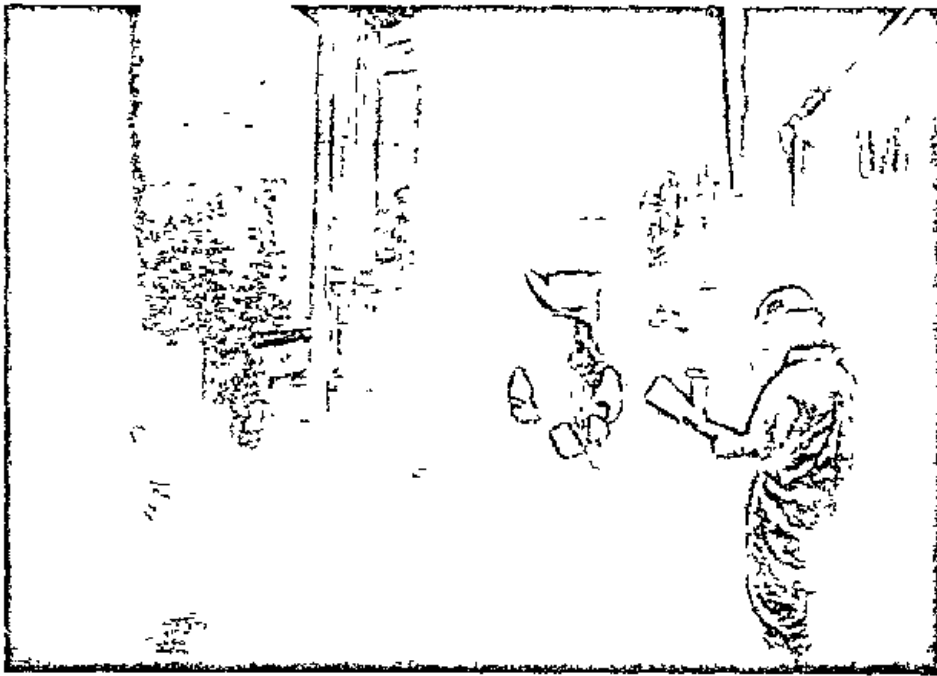
SOLUTION·                   Product screening for fines removal, segregation of packaging and sealing operations in well ventilated areas, personal protective clothing and equipment.

Photograph 10 shows Plant E-2's granule packaging room. In Photograph 11, one operator, with supervisor standing by, hand feeds bags to a Howe-Richardson E-50 bagging machine. The bagger has a dribble filler attachment for weight control and is equipped at strategic points with air pickup or ventilation ducts. Photographs 12 and 13 show other aspects of the packaging operation.

Open bags proceed on a conveyor to a second operator who checkweighs bags and manually makes adjustments. The bags then pass through a slot in the wall to another small room. Here the bags are sealed shut by a "Punch-Pak" sealer which is manually fed. A second conveyor carries them out through a wall slot into the main warehouse for overwrapping, cartoning and palletizing. The two stage conveyor arrangement prevents any spilled granules from the packing or sealing rooms from entering the warehouse. The separate rooms confine the areas where maximum protection and ventilation are needed and minimize the number of personnel employed in areas of greatest potential exposure.



Photograph 10



Photograph 11



Photograph 12



Photograph 13

## Appendix A

### Standard Operating Procedure (SOP No 0034) For Manufacturing and Formulation of Pesticide A (PA)

#### 1.00 Definitions

- 1.10 Casual - A casual is a transient, someone not engaged in physical work in the plant area. This is normally all salaried personnel with the exception of the manufacturing foreman. Casuals shall not handle or touch equipment or product.
- 1.20 Manufacturing Personnel - Anyone doing physical work in the plant area excluding Maintenance personnel. This term is used to include anyone assigned to the Manufacturing Department, the Quality Control Department, and/or anyone performing a manufacturing function.
- 1.30 Maintenance Personnel - Anyone assigned to the Maintenance Department performing a maintenance function, and/or anyone physically disassembling or assembling any type of equipment in the plant area.
- 1.40 Taped Suit - A suit which has all exposed openings and joints wrapped with masking tape.
- 1.50 Wet Suit - A rain suit made of rubberized fabric, water resistant usually in two-piece pants and pullover with attached hood
- 1.60 Contractors - The term contractor and/or seller shall mean the individual, partnership, Corporation or Association contracting with the plant to furnish any article(s) and/or service(s) described and set forth in a contract. All contractor personnel shall comply with this SOP.

NOTE All contractor personnel shall dress the same as maintenance personnel.

- 1.65 Clerks - In the warehouse area, they will wear safety shoes, paper suits and head cover. Should clerical personnel have to enter other areas of the production facility they will have to comply with the dress code for that particular area.
- 1.70 Visitors - A person or persons who is not a member of this Plant, a transient who makes a social, professional or sales call, a person who will be at this Plant temporarily

Where visitors are allowed, they must be accompanied by a Pesticide A (PA) plant employee.



- 1.80 Personnel Hygiene - All PA plant personnel, Manufacturing, Maintenance and Quality Control are required to shower with soap and water at the changehouse provided for both men and women.

The procedures are as follows:

1. Minimum requirement NO EXCEPTIONS:
  - a) All personnel will shower at the end of shift before wearing street clothing
2. Additional showers are required after working in any of the following areas:
  - a) Reclaim silos immediately after any exposure to high concentration of dust.
  - b) Any contact with the PA technical solution.
  - c) Packout shaft immediately after exposure to high concentration of dust.
  - d) Mixer building immediately after any exposure to PA technical solution or to high concentration of dust (i.e., Mixer repair, piping repair, Rework).
  - e) In short, an additional shower is required after any suspected skin, eyes, or breathing exposure to PA or after extensive exposure (regardless of protective clothing worn) to a high concentration of PA dust or technical solution.

Other Personnel - For nonassigned or contractor personnel who are assigned interim or short-term work in the area, the above same rules apply.

NOTE: Regardless of the following general rules, the on duty foreman, area supervisor, PA plant manager, or Safety Engineer may at any time decide any person is not properly clothed for the area in question and order him out of the area.

## 2.00 Use of Sketch #165-567A and Visitor control

Sketch is located at the end of this procedure. Each building and working area of the PA facility is designated by a designation number on this sketch.

### 3.00 Warehouse, 165 (Designation #1)

#### 3.10 Dangerous Materials

- a) PA products in closed containers, open containers are not allowed in warehouse.
- b) PA spills

#### 3.20 Dress

3.21 Casuals - Notify foreman and/or PEO of presence. No protective equipment required if stay will be less than 1/2 hour.

#### 3.22 Manufacturing Personnel

- a. Rubber Boots
- b. Long sleeve coveralls (NO street clothing allowed)
- c. Hard hats or head covers
- d. Rubber gloves or furnished work gloves.

#### 3.23 Maintenance Personnel

- a. Rubber boots
- b. Long sleeve coveralls
- c. Hard hat or head cover
- d. Rubber gloves

NOTE: No one will enter the warehouse wearing or carrying a contaminated wet suit. Place contaminated wet suits in closed container located outside the control room.

### 4.00 Packout Surge Ramp - 164 to 165 (Designation #2)

#### 4.10 Dangerous Materials

PA products in closed containers (All products)

#### 4.20 Dress

4.21 Casuals - Foreman permission required.

- a. Rubber boots
- b. Paper suit
- c. Hard hats or head cover
- d. Rubber gloves

#### 4.22 Manufacturing Personnel

- a. Rubber boots
- b. Long sleeve coveralls
- c. Paper suit
- d. Hard hats or head cover
- e. Rubber gloves

#### 4.23 Maintenance Personnel

- a. Rubber boots
- b. Long sleeve coveralls
- c. Hard hat or head cover
- d. Rubber gloves
- e. Paper suit

**5.00 Bag Sealing Room, 164 (Designation #3)****5.10 Dangerous Materials**

5.11 PA products in unsealed containers

5.12 PA in Poly bags

5.13 Any PA spills

**5.20 Dress**

5.21 Casuals - By foreman permission only - No casuals allowed in this area unless dressed as manufacturing personnel.

- a. Rubber boots
- b. Taped paper suit
- c. Respirator (15 minutes only)
- d. Rubber gloves
- e. Head cover
- f. Air hood (longer than 15 minutes)

**5.22 Manufacturing Personnel**

- a. Rubber boots
- b. Long sleeve coveralls
- c. Taped paper suits
- d. Air hood for Sealer Operator only
- e. Rubber gloves
- f. Respirator (15 minutes only)
- g. Head cover

**5.23 Maintenance Personnel**

- a. Rubber boots
- b. Long sleeve coveralls
- c. Taped paper suit
- d. Respirator and head cover or air hood
- e. Rubber gloves

**6.00 Packout Room, Building 164 (Designation #4) Packout Shaft**

6.10 Dangerous Materials - All PA products - 5G, 10G, 15G, etc.

6.11 Product in unsealed bags

6.12 Dust

6.13 Product in conveying lines

**6.20 Dress**

6.21 Casuals - by Foreman permission only

1. Ground Floor
  - a. Rubber boots
  - b. Long sleeve coveralls

## 6.21 Casuals - by Foreman permission only (Continued)

- c. Taped paper suit
- d. Air hood\* or gas mask & hood type head cover
- e. Rubber gloves
- f. Respirator acceptable in lieu of gas mask if equipment closed up and stay does not exceed 15 minutes

## 2. Upper Level

- a. Rubber boots
- b. Coveralls
- c. Taped paper suit
- d. Gas mask & hood type head cover or air hood\*
- e. Respirator acceptable in lieu of gas mask if equipment closed up and stay does not exceed 15 minutes

## 6.22 Manufacturing Personnel

## 1. Ground Floor

- a. Rubber boots
- b. Long sleeve coveralls
- c. Taped paper suit
- d. Air Hood\* or gas mask and hood type head cover
- e. Rubber gloves
- f. Respirator acceptable under the following conditions:
  1. Equipment running, stay of less than 15 minutes and no severely contaminated equipment touched
  2. Equipment not running, stay of less than 15 minutes and no severely contaminated equipment touched

## 2. Upper Level

- a. Rubber boots
- b. Coveralls
- c. Taped paper suit
- d. Gas mask and hood type head cover or air hood\*

\* Air hood connected to air supply

- f. Respirator acceptable under the following conditions:
  1. Equipment running, stay of less than 15 minutes and no severely contaminated equipment touched.
  2. Equipment not running, stay of less than 15 minutes and no severely contaminated equipment touched

## 6.23 Maintenance Personnel

## 1. Equipment checks

- a. Rubber boots
- b. Long sleeve coveralls
- c. Taped paper suit
- d. Gas mask and head cover or air hood
- e. Rubber gloves
- f. Respirator acceptable under the following conditions.
  1. Equipment running, stay of less than 15 minutes and no severely contaminated equipment touched

- f. Respirator acceptable under the following conditions: (Cont'd.)
  - 2. Equipment not running. Stay of less than 15 minutes and no severely contaminated equipment touched.
- 2. Disassembly of equipment
  - a. Rubber boots
  - b. Long sleeve coveralls
  - c. Taped rain suit
  - d. Gas mask and head cover or air hood\*
  - e. Rubber gloves
  - f. All joints taped
  - g. Respirator acceptable under the following conditions:
    - 1. Equipment running, stay of less than 15 minutes and no severely contaminated equipment touched.
    - 2. Equipment not running. Stay of less than 15 minutes and no severely contaminated equipment touched.

\* Air hood connected to air supply

NOTE: While maintenance work is being performed on an above ground level, all personnel on lower levels shall evacuate the room.

"NO EXCEPTIONS"

## 7.00 Control Room and Corridors, 164 (Designation #5)

### 7.10 Dangerous Materials

Possible open containers of PA outside packout room door.

### 7.20 Dress

#### 7.21 Casuals - by Foreman permission only.

- a. Rubber boots
- b. Paper suit
- c. Hard hat or head cover
- d. Rubber gloves

#### 7.22 Manufacturing Personnel

- a. Rubber boots
- b. Long sleeve coveralls
- c. Paper suit
- d. Hard hat or head cover
- e. Rubber gloves optional in the control room, required in other areas.

#### 7.23 Maintenance Personnel

- a. Rubber boots
- b. Long sleeve coveralls
- c. Hard hat or head cover
- d. Rubber gloves optional in the control room, required in other areas.

- 7.24 If handling open containers of PA products in corridors, personnel must wear the following: Open containers are not allowed in Control Room.

Manufacturing & Maintenance Personnel

- a. Rubber boots
- b. Long sleeve coveralls
- c. Taped paper suits
- d. Respirator and head cover
- e. Rubber gloves

- 8.00 PA Storage Bins and Blowers, and Pad outside Reclaim Silo (Designation #6 & #7)

8.10 Dangerous Materials

- 8.11 Possible PA dust and/or products

- 8.12 PA in bins and conveying lines

8.20 Dress - Normal conditions

- 8.21 Casuals - by Foreman permission only

- a. Rubber boots
- b. Paper suit
- c. Hard hat or head cover
- d. Rubber gloves

8.22 Manufacturing Personnel

- a. Rubber boots
- b. Long sleeve coveralls
- c. Paper suit
- d. Hard hat or head cover
- e. Rubber gloves

8.23 Maintenance Personnel

- a. Rubber boots
- b. Long sleeve coveralls
- c. Taped paper suit
- d. Hard hat or head cover
- e. Respirator if opening contaminated equipment
- f. Rubber gloves

8.24 Manufacturing Personnel cleaning out industrial drain

- a. Coveralls
- b. Bottoms to rubber suit taped at legs
- c. Rubber boots
- d. Paper suit
- e. Rubber gloves
- f. Head covering

## 9.00 Reclaim Silo (Designation #8) See SOP No. 0043

## 9.10 Dangerous Materials

## 9.11 PA dust

## 9.20 Dress

## 9.21 Casuals - by Foreman permission only

- a. Rubber boots
- b. Long sleeve coveralls
- c. Taped rubber suits
- d. Gas mask
- e. Rubber gloves

## 9.22 Manufacturing Personnel

- a. Rubber boots
- b. Long sleeve coveralls
- c. Taped rubber suits
- d. Gas mask or air hood
- e. Rubber gloves
- f. At the option of the Production Supervisor, a paper suit taped at boots, gloves, and front may be required in addition to the standard apparel above
- g. Taped paper suit, respirator, head cover will be acceptable if duration of stay is less than 5 minutes and all equipment is closed up and the interior of the silo is free from dust

NOTE: To ensure that personnel required to dress in wet suits are properly suited, the Foreman will inspect each person prior to entering the Reclaim silo

NOTE: Air hoods can only be used to remove drums on the bottom floor of Reclaim

## 9.23 Maintenance Personnel

- a. Rubber boots
- b. Long sleeve coveralls
- c. Taped rubber suit
- d. Gas mask or air hood
- e. Rubber gloves
- f. Taped paper suit, respirator, and head cover will be acceptable if duration of stay is less than 5 minutes and all equipment is closed up and the interior of the silo is free from dust

10.00 Deleted

11.00 Solid Incinerator (Designation #9)

11.10 Dangerous Materials - Used packing materials

11.20 Dress Casuals - by Foreman permission only  
No special clothing required if the casual  
remains clear of loading operations.  
Otherwise, see 11.22

11.21 Operations Services trash pick up same as Manufacturing Personnel

11.22 Manufacturing Personnel (For loading only)

- a. Rubber boots
- b. Long sleeve coveralls
- c. Paper suit
- d. Hard hat or head cover
- e. Rubber gloves
- f. Respirator in possession

11.23 Maintenance Personnel (For loading only)

- a. Rubber boots
- b. Long sleeve coveralls
- c. Paper suit
- d. Hard hat or head cover
- e. Rubber gloves
- f. Respirator in possession

12.00 Mixer Building (Designation #13)

12.10 Dangerous Materials

12.11 PA solution in lines

12.12 PA products in surge bins and conveying lines

12.20 Dress

12.21 Casuals - by Foreman permission only

- a. Rubber boots
- b. Taped paper suit
- c. Hard hat or head cover
- d. Respirator
- e. Rubber gloves

12.22 Manufacturing Personnel

- a. Rubber boots
- b. Long sleeve coveralls
- c. Paper suit (taped if near open contaminated equipment  
(i.e. open dump valve)
- d. Hard hat or head cover
- e. Respirator
- f. Rubber gloves



2.00 Mixer Building (Designation #13)

12.22 Manufacturing Personnel (Continued)

NOTE: When reworking dress required is as that in Reclaim silo Section 9

12.23 Maintenance Personnel

- a. Internal Mixer
  - 1. Rubber boots
  - 2. Long sleeve coveralls
  - 3. Taped rubber suit - all joints taped
  - 4. Supplied air mask
  - 5. Rubber gloves

NOTE: Refer to Vessel Entry Procedure, SOP No. 0162

- b. Open PA
  - 1. Rubber boots
  - 2. Long sleeve coveralls
  - 3. Taped rubber suit - all joints taped
  - 4. Gas mask or air hood
  - 5. Rubber gloves
- c. Work other than a or b above
  - 1. Rubber boots
  - 2. Long sleeve coveralls
  - 3. Paper suit (taped if near open contaminated equipment)
  - 4. Hard hat or head cover
  - 5. Respirator
  - 6. Rubber gloves

13.00 Vacuum line filters (Designation #14)

13.10 Dangerous Materials

13.11 Solvent contaminated with PA in lines

13.12 PA contaminated sludge in filters

13.20 Dress

13.21 Casuals - by Foreman permission only

- a. Rubber boots
- b. Paper suits
- c. Hard hat or head cover
- d. Rubber gloves

13.22 Manufacturing Personnel

- a. Rubber boots
- b. Long sleeve coveralls
- c. Paper suits
- d. Hard hat or head cover
- e. Rubber gloves

3.00 Vacuum line filters (Designation #14)

- 13.23 Maintenance Personnel
  - a. Rubber boots
  - b. Long sleeve coveralls
  - c. Hard hat or head cover
  - d. Paper suit (taped when replacing filter)
  - e. Rubber gloves
  - f. Respirator (when changing filters)

14.00 Vacuum Pumps (Designation #15)

14.10 Dangerous Materials

- 14.11 Contaminated solvent in lines

14.20 Dress

14.21 Casuals - by Foreman permission only

- a. Rubber boots
- b. Paper suit
- c. Hard hat or head cover
- d. Rubber gloves

14.22 Manufacturing Personnel

- a. Rubber boots
- b. Long sleeve coveralls
- c. Paper suit
- d. Hard hat or head cover
- e. Rubber gloves

14.23 Maintenance Personnel

- a. Rubber boots
- b. Long sleeve coveralls
- c. Paper suit
- d. Hard hat or head cover
- e. Face shield, if opening lines
- f. Rubber gloves

15.00 Refrigeration Building (Designation #16)

15.10 Dangerous Materials

- 15.11 Ammonia in line

15.20 Dress

15.21 Casuals - by Foreman permission only

- a. Rubber boots
- b. Paper suits
- c. Hard hat or head cover
- d. Rubber gloves

## 5.00 Refrigeration Building (Designation #16)

## 15.20 Dress (Continued)

## 15.22 Manufacturing Personnel

- a. Rubber boots
- b. Long sleeve coveralls
- c. Paper suits
- d. Hard hat or head cover
- e. Rubber gloves

## 15.23 Maintenance Personnel

- a. Rubber boots
- b. Long sleeve coveralls
- c. Hard hat or head cover
- d. Paper suit
- e. Rubber gloves
- f. Face shield if opening lines

## 16.00 PA Tank Farm (Designation #17)

## 16.10 Dangerous Materials

16.11 PA solution in lines and tanks

16.12 Caustic in lines and tanks

## 16.20 Dress

## 16.21 Casuals - by Foreman permission only

- a. Rubber boots
- b. Paper suit
- c. Hard hat or head cover
- d. Rubber gloves

## 16.22 Manufacturing Personnel

## 1. Operations excluding unloading PA tanker

- a. Rubber boots
- b. Long sleeve coveralls
- c. Paper suit
- d. Hard hat or head cover
- e. Rubber gloves

## 2. Unloading PA Tanker

- a. Rubber boots
- b. Long sleeve coveralls
- c. Rubber suit taped joints
- d. Hard hat or head cover
- e. Air hood
- f. Rubber gloves

NOTE: A one piece rubber suit that includes boots and an air supplied hood and approved by the Safety Department is suitable as a substitute for 2 above.



16.00 PA Tank Farm (Designation #16) (Continued)

16.23 Maintenance Personnel

- a. Rubber boots
- b. Long sleeve coveralls
- c. Rubber suit (if opening lines, otherwise paper suit is sufficient)
- d. Hard hat or head cover
- e. Face shield (if opening lines)
- f. Rubber gloves

17.00 Grit Storage Bins (Designation #18)

17.10 Dangerous Materials - None

17.20 Dress

17.21 All Personnel

- a. Gloves if climbing ladder
- b. Hard hat when required

NOTE: Maintenance will set up two (2) signs (one South and one West of silos) indicating "HARD HAT AREA" when working overhead

18.00 Waste solvent Storage Tanks (Designation #19)

18.10 Dangerous Materials

18.11 Contaminated solvent in tanks and lines

18.20 Dress

18.21 Casuals - by Foreman permission only

- a. Rubber boots
- b. Paper suit
- c. Hard hat or head cover
- d. Rubber gloves

18.22 Manufacturing Personnel

- a. Rubber boots
- b. Long sleeve coveralls
- c. Paper suit
- d. Hard hat or head cover
- e. Rubber gloves

18.23 Maintenance Personnel

- a. Rubber boots
- b. Long sleeve coveralls
- c. Paper suit (Rubber suit instead if opening lines)
- d. Hard hat or head cover
- e. Rubber boots
- f. Face shield (If opening lines)

19.00 Liquid Incinerator (Designation #20)

19.10 Dangerous Materials

19.11 Contaminated solvent in lines

19.20 Dress

19.21 Casuals - No protective clothing required if acetone feed system is intact

19.22 Maintenance Personnel - When solvent system is intact

- a. Rubber boots or safety shoes
- b. Long sleeve coveralls

19.23 Maintenance Personnel - When opening solvent lines

- a. Rubber boots
- b. Long sleeve coveralls
- c. Paper suit
- d. Rubber gloves
- e. Face shield

20.00 Negative Air System

20.10 Dangerous materials

20.11 PA Dust

20.20 Dress - Normal conditions - All equipment closed and operating

20.21 Casuals

- a. Rubber boots
- b. Paper suit
- c. Hard hat or head cover
- d. Rubber gloves

20.22 Manufacturing and Maintenance Personnel

- a. Rubber boots
- b. Long sleeve coveralls
- c. Paper suit
- d. Hard hat or head cover
- e. Rubber gloves

20.30 Dress - Opening contaminated equipment or emptying collectors

20.31 Casuals - Not allowed

20.32 Manufacturing and Maintenance Personnel

- a. Rubber boots
- b. Long sleeve coveralls
- c. Paper suit (Taped)
- d. Hard hat or head cover
- e. Rubber gloves
- f. Respirator (Full face if available)

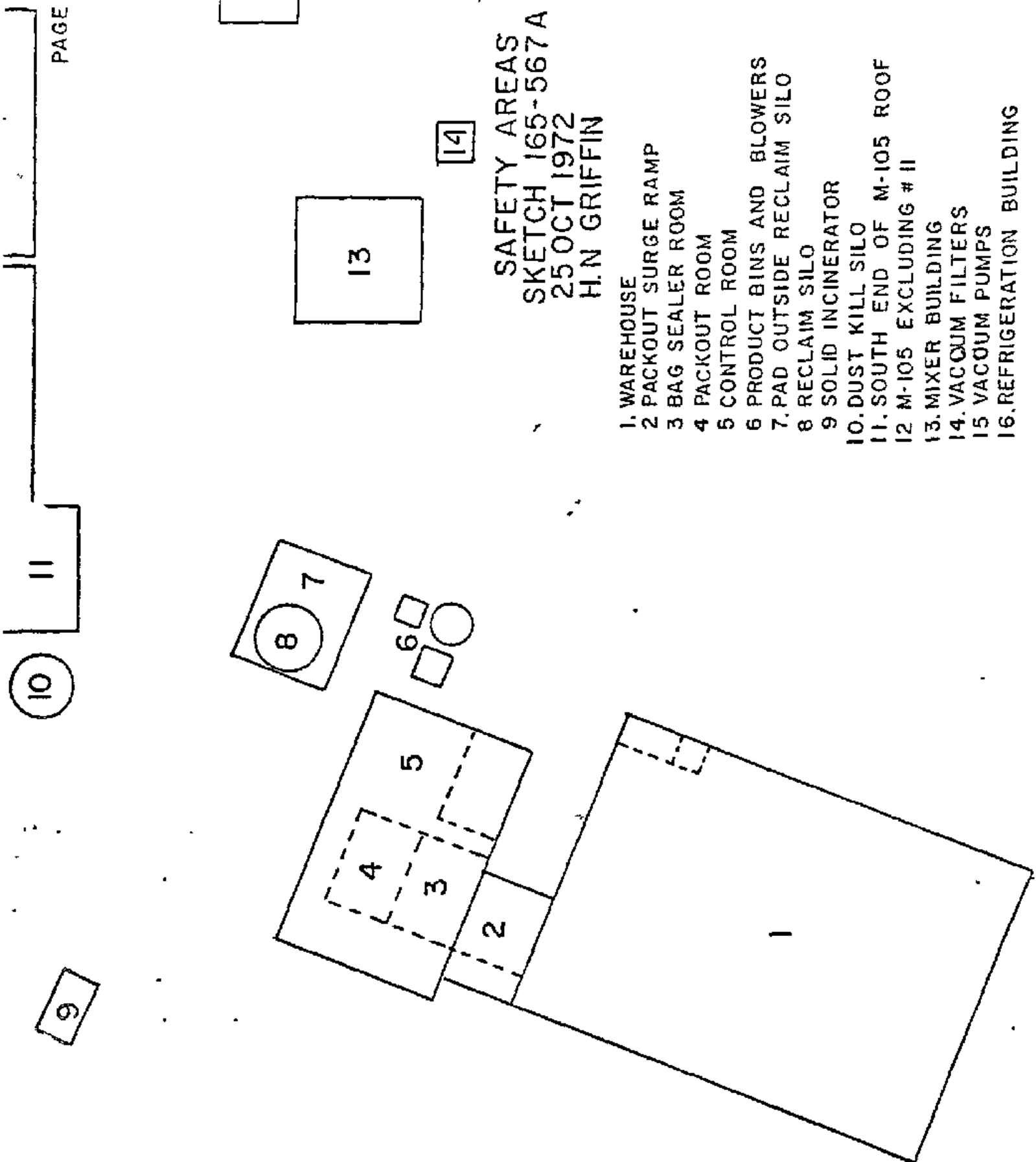
21.00 Cleanliness of protective equipment

The protective equipment discussed in this S.O.P. is only protective if the following rules are followed.

21.10 Never reuse disposable protective equipment (i.e. gloves, paper suits, paper hats). Once they have been removed properly dispose of them. If at any time, one of these items becomes highly contaminated from a spill or other such accident, remove it and throw it away immediately.

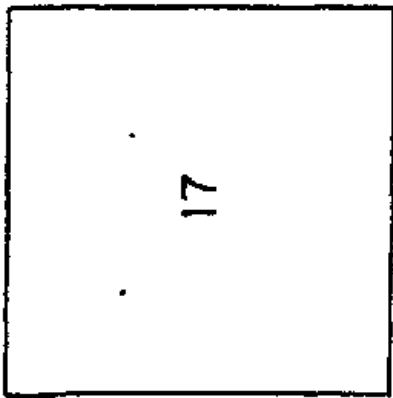
21.20 Always thoroughly clean reuseable protective equipment (i.e. respirators, boots, gas mask, air hoods) after each use and carefully inspect it for cleanliness before each use.

21.30 When using totally enclosing protective equipment (i.e. air hoods, gas masks, wet suits, taped paper suits) be sure to carefully clean the outside of that equipment before removal from the body. Removing contaminated equipment from your body is when you are most susceptible to exposure.



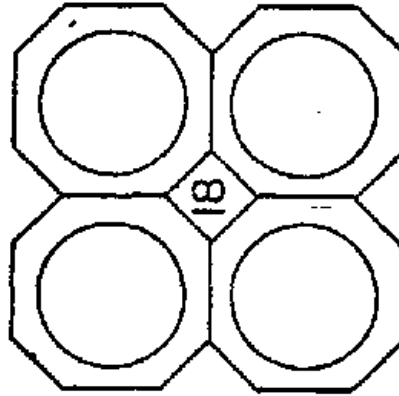
SAFETY AREAS  
 SKETCH 165-567A  
 25 OCT 1972  
 H.N GRIFFIN

- 1. WAREHOUSE
- 2. PACKOUT SURGE RAMP
- 3. BAG SEALER ROOM
- 4. PACKOUT ROOM
- 5. CONTROL ROOM
- 6. PRODUCT BINS AND BLOWERS
- 7. PAD OUTSIDE RECLAIM SILO
- 8. RECLAIM SILO
- 9. SOLID INCINERATOR
- 10. DUST KILL SILO
- 11. SOUTH END OF M-105 ROOF
- 12. M-105 EXCLUDING # II
- 13. MIXER BUILDING
- 14. VACUUM FILTERS
- 15. VACUUM PUMPS
- 16. REFRIGERATION BUILDING



SKETCH 165-567 A

- 17 M-105 TANK FARM
- 18 GRIT STORAGE SILOS
- 19 LIQUID WASTE STORAGE TANKS
- 20. LIQUID INCINERATOR





APPENDIX B

STANDARD OPERATING PROCEDURE

SOP NO. 0129

FOR

DRY DISPOSAL OF PESTICIDE A RECLAIM DUST

---

1.00 Purpose

The purpose of this Standard Operating Procedure is to define a satisfactory method for collecting, transporting, and disposing of the dry PA dust discharge from the three dust collectors inside the Reclaim Silo, or from other sources.

2.00 Equipment and Materials Required

- 2.10 The discharge of each dust collector in Reclaim has been modified. An 8" flex hose runs from under the air lock valve to a modified drum lid which sits atop a special fiber pak (34" high by 19" diameter)
- 2.20 Reusable drums with lids (34" high by 19" diameter)
- 2.30 Polyethylene bags
- 2.40 Hydrated lime

## 2.00 Equipment & Materials Required (Continued)

2.50 Pallets

2.60 Flatbed truck

## 3.00 Dangerous Materials

3.10 High concentration of Pesticide A in dust

## 4.00 Procedure at Reclaim Silo

### 4.10 Clothing Requirements

#### 4.11 Inside Silo

- a. Coveralls
- b. Taped paper suit\*
- c. Rubber boots
- d. Rubber gloves
- e. Gas mask with taped plastic hood or an air hood

#### 4.12 Outside Silo

- a. Paper suit
- b. Rubber boots
- c. Rubber gloves
- d. Head covering

### 4.20 Procedure

- 4.21 Line the inside of special fiber pak (34" high by 19" diameter), or other container, with a 6-mil or thicker polyethylene bag, draping excess over the outside of the drum. Tape the excess around the container. Place the container under the special lid below the dust collector.
- 4.22 Periodically inspect (3 to 6 times per shift) the three (3) fiber paks under 8" flex hoses from the dust collectors in the Reclaim Silo (bottom floor). As each one fills, replace it with another that has been prepared as in step 4.21 above, being careful to limit spill to as little as possible.
- 4.23 When full, remove from underneath the special lid, remove tape and pull the excess polyethylene bag up from around the fiber pak. Twist and tape it closed with several wraps of masking tape. Roll outside silo and weigh, then palletize.
- 4.24 Upon the foreman's direction, remove the full, sealed fiber paks, set them on a flat bed truck, and take them to the contaminated waste pit, approximately once per day.

\*Tyvek® suit

5.00 Procedure at Contaminated Waste Pit

5.10 Clothing Requirements

- a. Coveralls
- b. Taped paper suit
- c. Rubber gloves
- d. Rubber boots
- e. Gas mask (dust type) and taped Nylon hood.

5.20 Procedure

5.21 NOTE: It will be the responsibility of the PA dust dumping crew to keep the area clear of other people during dumping. NEVER DUMP IF ANY PERSON IN SIGHT IS NOT DRESSED AS DESCRIBED IN 5.10.

↕ 5.22 Dump one 25lb bag of lime on the bottom of each pit before dumping dust.

5.23 Let polyethylene bag fall out into pit, taking care not to rip bag. Save drum for reuse.

5.24 After all polyethylene bags of waste dust have been dumped into the trench, slit each polyethylene bag twice, while standing at ground level, using a knife with an extension handle. (Do not enter trench.)

5.25 Onto the top of each slit bag pour approximately one-half sack of lime (25 lbs). (A 24-drum standard truck load of dust requires twelve sacks of lime)

5.26 Drums should be returned to Bldg. 164 or 104 for re-use.

5.27 Remove protective clothing and take a shower.

5.28 GENERAL: Trench should never be filled to within less than two feet of ground level. (Notify for new trench arrangements.)

5.29 GENERAL: The PA dust disposal area is under the jurisdiction of the Environment and Occupational Health Coordinator.

5.30 GENERAL: The PA dust disposal area is off-limits to unauthorized personnel. Nothing but PA waste or waste containers should ever be disposed of in this area.

5.31 GENERAL: All waste spilled onto ground level must be shoveled into the trench prior to the dump crew leaving the area.

↕ 5.32 GENERAL: It is important that the bottom of each pit be covered with lime. Special attention should be paid to 5.22 above.



APPENDIX D  
SUMMARY OF BAGHOUSE EMISSIONS TESTS  
PERFORMED BY CONTRACTOR  
AT PLANT E-2

May 5 & 6, 1978

I. INTRODUCTION

The plant has two units that formulate pesticide. Each unit operates on a batch basis and has two series baghouses for the control of dust off the bagging operation. Each of these baghouse systems was sampled for particulate emission using the modified EPA Method 5 sampling train.

II. SUMMARY AND DISCUSSION OF RESULTS

Results of the tests are summarized in Tables D-1.

The particulate emissions are quite low as would be expected and well within compliance limitations.

The old facility primary dust collector 362 ("Product Screen" in Figure 1) operated at an average pressure drop of 7.5" H<sub>2</sub>O while the secondary baghouse 390 averaged 0.35" H<sub>2</sub>O during the test period.

Similar data for the new facility averaged 3.4" H<sub>2</sub>O for the primary and 0.4" H<sub>2</sub>O for the secondary baghouse (see Figure 2).

TABLE 2  
BAGHOUSE EMISSION SUMMARY

SOURCE	RUN NUMBER	DATE	EMISSION LBS/HR	VOLUMETRIC		PERCENT ISOKINETIC	PERCENT PESTICIDE A
				FLOW SCFMD			
Old facility	1	5/5/78	0.083	3579		98.1	0.21%
	2	5/5/78	0.059	3549		99.8	0.26%
	3	5/5/78	0.077	3702		98.1	0.25%
	MEAN		0.073	3610		98.7	
New facility	1	5/6/78	0.074	5977		91.6	1.26%
	2	5/6/78	0.081	5269		89.5	0.96%
	3	5/6/78	0.102	5243		93.4	1.81%
	MEAN		0.086	5496		91.5	

E165 = allowable emissions = 9.86 LB/HR

E104 = allowable emissions = 9.66 LB/HR