

C. J. [unclear]

MONSANTO COMPANY
Plastics Division
Springfield, Massachusetts

PROCESS SAFETY AUDIT

85 BUILDING

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DATE: MAY 1965

RSV 0008874

*→ Dave Frazer -
Thanks for doing this job -
It's a good report and the section
outline should be reviewed
for future technical
improvement in 85.
One question - I don't see
the reference to target area
in Sec. II. I suggested you note
Sec II? I suggested you note
this as an additional feature.
It is a significant feature.
don't want to leave out an
you need PTE help on this
of these.*

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I. INTRODUCTION

A process safety audit of 85 Building operations was undertaken to insure conversion of current technology for production of PVC Films and Compounds into safe manufacturing operations.

II. SUMMARY AND CONCLUSIONS

85 Building is strictly a physical processing area, and does not contain the same type of hazard normally associated with a chemical plant. There are essentially no volatile or explosive materials handled, and no chemical reactions take place during normal processing.

The Audit was aimed at answering the following questions:

1. What are the hazards of the raw materials used, and are proper handling procedures in effect?
2. What hazards exist if the process is upset by operator error or equipment malfunction, and have proper safeguards been taken?
3. Are the emergency procedures in effect adequate to safely operate the process?

In practically all cases, it was found that adequate procedures are in effect and proper processing safeguards have been taken. The areas requiring upgrading and additions to procedures are tabulated in Section III along with recommendations, responsibilities, and target dates for completion. Section IV contains a listing of all raw materials used and the toxicity and flammability hazard of each.

III. SUMMARY OF PROCESS SAFETY HAZARDS

<u>POTENTIAL HAZARDS</u>	<u>CONCERNS</u>
<u>A. Raw Materials</u>	
1. Shipping & toxicity hazard from spillage.	Better handling of G-62 for Rigid Compound required. More emphasis on immediate cleanup required. Mechanical seals on plasticizer pumps desirable. 2 (2) P
2. Possible plasticizer & stabilizer splashes into eyes.	Eye wash station needed in 4th floor color weigher area. P
3. Dusting of hazardous materials from blenders.	Formal exhaust duct cleaning schedule needed. P
4. Easy ignition of Dyphos stabilizer.	Continued monitoring of usage and highlighting of hazard required. P
5. Toxicity of raw materials.	Continued emphasis on personal hygiene, and personnel training necessary. Adequate personnel protective equipment is available and used. P
6. Exhausting toxic dusts to the yard area in the rear of 85 Building.	The possibility of exhausting toxic dusts on personnel or areas frequented by personnel to the rear of 85 Building exists. Samples of residue in various locations at the rear of the building should be taken and analyzed for lead to determine the extent (if any) of the problem. P
<u>B. Processing</u>	
1. Mischarge of blender.	Materials are compatible and no chemical reaction hazard exists. Use of an excess of a toxic material could present a fuming hazard but adequate blender ventilation exists if ducts are in good condition. See Item A-3.

III. SUMMARY OF PROCESS SAFETY HAZARDS

<u>POTENTIAL HAZARDS</u>	<u>COMMENTS</u>
<u>B. Processing (continued)</u>	
2. Degradation of material in the Banbury due to operator error or equipment malfunction.	Fume respirators are available at Banbury and Mill Rolls. A Scott Air Pak should be placed at both calender strainers for use on the first floor.
3. Dusting of toxic materials at Banbury during cleaning.	Respirators are available. Continued review of toxic hazards required.
4. Slippage at Banbury areas due to oil, water, and material leakage.	Housekeeping in the Banbury area requires more shift to shift emphasis. A positive solution to stopping or containing oil leaks is necessary, especially at #2 Banbury.
5. Rupture of Banbury Mixer due to water in the premix or mixing chamber.	Although this possibility exists, it is remote. The present Banburys are loose fitting enough to relieve the type of pressure buildup that could be encountered in the operation. Consideration should be carefully given to this problem, however, if a close fitting ram is ever contemplated. This hazard should be periodically reviewed with all operators.
6. Excessive fuming at calenders or mill rolls.	All ducts equipped with steam snuffers for fire protection. Exhaust ducts need periodic cleaning and a formal cleaning schedule should be established.
7. Degradation of stock in the strainer due to power failure or plugged screen.	A Scott Air Pak should be provided at both the strainers. Procedure for handling this situation should be reviewed with foremen and operators.
8. Rupture of Supertherm or Hydrotherm system due to operator error or malfunction.	Both systems are adequately protected with relief valves and vented enclosures in critical areas. Operating procedures & training are adequate for heating and cooling systems.

III. SUMMARY OF PROCESS SAFETY HAZARDS

<u>POTENTIAL HAZARDS</u>	<u>COMMENTS</u>
<u>B. Processing (continued)</u>	
9. Spontaneous ignition of oily rags or Stearic Acid containing rags in contact with oil and plasticizer.	Metal containers for dirty rags are located throughout the building and emptied daily. Cans need repainting and restenciling with "Dirty Rags".
10. Utility Failure.	Failure of utilities do not present any process associated hazard other than stock degradation. Respirators are available if fumes become uncomfortable and evacuation and emergency procedures cover the situation adequately. Instruments are fail safe.

C. Emergency Procedures

- | | |
|--|--|
| 1. Man caught in a calender or mill roll. | Current release team of four selected men per crew is unwieldy because of rapid personnel changes. Recommend training each foreman and Parrel calender operator in the release procedure with these personnel directing the removal of anyone caught in the equipment. Review should be every 6 months, and at the change of any of these personnel. |
| 2. Communications to and from other areas in the event of an emergency in any South Plot area. | A formal system should be established to insure good and prompt communications. |

IV. TABULATION OF RAW MATERIAL HAZARDS

The following table lists all of the raw materials currently in use in 85 Building and the toxicity and flammability hazards of each. Listings of raw materials in the groups noted as "Plasticizers", "Lead Stabilizers", etc. follow the tabulation. In a few cases, no positive toxicity information was available because actual toxicity tests have not been made. In these cases, toxicity hazards were based on what information was available.

IV. TABULATION OF RAW MATERIAL HAZARDS (Continued)

Current raw material handling practices in 85 Building are considered adequate to safely handle these materials. Coveralls are worn by personnel with exposure to the hazards of the materials and strict eating and washup rules are adhered to. Goggles, respirators, and rubber gloves are available for use when the situation warrants and the personnel are well educated to the hazards involved.

Definition of hazard degree are as follows:

Slight - Readily reversible changes which disappear after end of exposure.

Moderate - May involve both irreversible and reversible changes; not severe enough to cause death or serious, permanent, physical impairment.

High - May cause death or permanent injury after very short exposure to small quantities.

MATERIAL	FORM	TOXICITY	FLAMMABILITY
Plasticizers	Liquids	No appreciable hazard	Not easily ignited but will burn on contact with flame
Lead Stabilizers	Powders	High ingestion hazard. Moderate inhalation hazard. Slight absorption hazard. Highly toxic fumes when subjected to fire.	No appreciable hazard except Dypk which will burn and support its own combustion.
Ba, Cd, Zn, Stabilizers	Liquids, and Powders	High to moderate ingestion and inhalation hazard. Moderate irritant hazard. Highly toxic fumes when subjected to fire.	Liquids have relatively low flash point (125°F) and will burn on contact with flame.
Fillers	Powders	No appreciable hazard	No appreciable hazard
Waxes, lubricants, and miscellaneous rubber compounds	Flakes, Liquids, Powders, and Solids.	No appreciable hazard	Not easily ignited but will burn on contact with flame
Pigments	Powders	High to slight ingestion and inhalation hazard depending on pigment. Highly toxic fumes when subjected to fire.	Dust explosion hazard for some pigments.

IV. TABULATION OF RAW MATERIAL HAZARDS (Continue)

MATERIAL	FORM	TOXICITY	FLAMMABILITY
Ultraviolet screeners UV9, UV531, Tinopal PCRP	Powders	No positive toxicity information but most likely not hazardous	No appreciable hazard
Antimony Oxide, Oncor 23A	Powder	Highly toxic ingestion hazard. Moderate inhalation hazard. Moderately toxic fumes when subjected to acid or fire.	No appreciable hazard.
Agerite Stalite	Liquid	High to moderate inhalation and ingestion hazard. Moderate irritant hazard.	Not easily ignited but will burn on contact with flame
Barium Stearate	Powder	Slight hazard	No appreciable hazard.
Calcium Stearate	Powder	No appreciable hazard	No appreciable hazard.
Carbon Black	Powder	Slight toxicity and irritant to eyes and mucous membranes	Dust explosion hazard.
Ethyl Cellulose N100V	Powder	No positive toxicity information. Most likely not hazardous	Moderate fire hazard. Dust explosion hazard
Ferro Stabilizer 5221	Liquid	High to moderate inhalation and ingestion hazard. Moderate irritant hazard	Not easily ignited but will burn on contact with flame
Fungicides Bionet #5, #6, #21, Permachem PP	Liquids	High absorption, ingestion and inhalation hazards. Moderate irritant hazard.	Not easily ignited but will burn on contact with flame
Acryloid K120N	Powder	No appreciable hazard	Dust explosion hazard
Mark XX, Triphenyl Phosphite	Liquids	Moderate ingestion, irritant, and inhalation hazards. Highly toxic fumes when heated to decomposition	Not easily ignited but will burn on contact with flame

IV. TABULATION OF RAW MATERIAL HAZARDS (continued)

MATERIAL	FORM	TOXICITY	FLAMMABILITY
Stearic Acid	Flakes	Slight hazard	Slight hazard but will spontaneously heat
Thermolite T24 and T26	Liquids	High to moderate inhalation, and ingestion hazard. Moderate irritation hazard.	Not easily ignited but will burn on contact with flame
Tinuvin P	Powder	No positive toxicity information. Moderate hazard indicated.	No appreciable hazard.
Trioctyl Phosphate	Liquid	No positive toxicity information. Moderate hazard indicated.	Not easily ignited but will burn on contact with flame.
Tricresyl Phosphate	Liquid	High ingestion hazard, moderate absorption and inhalation hazard.	Not easily ignited but will burn on contact with flame.
Bisphenol A (BPA)	Powder	Slight toxic hazard. Moderate irritant hazard to eyes and mucous membranes.	No appreciable hazard.
CN-56	Powder	No appreciable hazard.	Dust explosion hazard with ground material.
Pool Bottoms (Mixed plasticizers and stabilizers)	Liquid	Could be toxic because of stabilizer content. See Ba, Cd, Zn, Stabilizers.	Not easily ignited but will burn on contact with flame.
Anti-yellow Agent A-8	Powder	No positive toxicity information. Moderate hazard indicated.	No appreciable hazard
Advastab TM180 Advastab TM918	Liquid	No positive toxicity information. Moderate hazard indicated.	Not easily ignited but will burn on contact with flame.
Cardinal C14M	Liquid	No positive toxicity information. Moderate hazard indicated.	

IV. TABULATION OF RAW MATERIAL HAZARDS (continued)

Raw Material Groupings

Plasticizers

Admex 761
 Drapex 4.4
 Epoxal 9-5
 Flexol EPO
 Monoplex S71
 Monoplex S73
 Monoplex S90
 Mobisol L
 Paraplex G62
 Paraplex G60
 Paraplex G25
 Plasticizer NTM
 Starlex 628
 Elastex 61P
 Hercoflex 707

Santicizer 140
 Santicizer 141
 Santicizer 160
 Santicizer 462
 Santicizer 409
 Santicizer 483
 HB-40
 DOP
 DNODP
 DOA
 DIDA
 DIDFE
 DNODA
 DTDP

Lead Stabilizers

Basic Carbonate of White Lead (BCWL)
 Dythal
 Dythal XL
 Dyphos
 Dyphos XL
 Basic Silicate of White Lead (BSWL)
 Lead Stearate
 DS-207
 Tribase

Tribase XL
 Tribase E
 Lectro 60
 Lectro 60XL
 Lectro 77
 Scotch Laddie 810
 Plumb-O-Sil C
 Leadstar

Barium-Cadium-Zinc Stabilizers

Ferro 5250
 Mark 180
 Nispel Stabilizer 12V6
 Nispel Stabilizer 12V66A
 Nispel Stabilizer 1212A
 Mark WS
 Mark WS/99
 Mark C

Mark KCB
 Mark LL
 Mark PL
 Mark Q153
 Mark Q189
 Mark TT
 Mark XI

Fillers

Alcoa 705
 Atomite
 Camel Wite
 Burgess #30 Clay
 SP33 Clay
 Millicarb H
 Onya BLR3
 Onya ESH

T1 Pure R500
 T1 Pure R610
 T1 Pure FF
 Titanox RA
 Unitane OR342
 Unitane OR450
 Unitane OR640
 Micro Cel T38

IV. TABULATION OF RAW MATERIAL HAZARDS (continued)

Raw Material Groupings

Waxes, Lubricants, Miscellaneous Rubber Compounds

Aristowax 165
Diglycol Stearate
Circosol 410
Primol 205
Advax 140
Acrowax C
Hypalon LD184

Chemigum N8
Paracril 2812
Polyethylene 6A
Polyethylene 629
Elvax Resin 260
Aldo MR lubricant
Aldo S2031
HY Fac 442

V. REFERENCES

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