DELAWARE - ~~[illegible]~~
DUST SURVEY

INTER-OFFICE CORRESPONDENCE

D-118.2-B

DATE: May 3, 1972

TO: Mr. Harold Birr - Delaware City

FROM: Mr. W. E. Driscoll - S. E. E.

SUBJECT

Industrial Hygiene Survey

Attached is the report of the survey made in your Compounding Department. The report for the Paste and Suspension Bagging areas will be forthcoming just as soon as I receive the results from the lab.

WED

W. E. Driscoll

WED:mk

Attachment

OCC 11497

Compounding Department

INTER OFFICE CORRESPONDENCE

DATE: May 3, 1972

TO: Mr. Harold Birr - Delaware City

FROM: Mr. W. E. Driscoll - S. E. E.

SUBJECT: Industrial Hygiene Survey - Delaware City

Introduction

At your request, an Industrial Hygiene survey was conducted on March 27, 28, 29, 1972, in the Compounding Department and the Paste and Suspension Bagging areas of the PVC plant. A series of samples were taken to determine the concentration of airborne dust as it relates to the health and safety of the employees. According to the Occupational Safety and Health Act of 1970, Sub part G section 1910.93 (c) Table G-3: An employee's exposure to any material listed in table G-3 in any 8-hour work shift of a 40-hour work week, shall not exceed the 8-hour time weighted average limit given for that material in the table. Fifteen (15) milligrams of dust per cubic meter of air is the time weighted average for an inert nuisance dust.

Ledge dust samples were also taken throughout the compounding department to be analyzed for explosibility.

Summary of Results

Compounding Department

Blending Floor

Four of the six (6) samples taken showed dust concentrations above the time weighted average for an inert nuisance dust. This area merits attention because of the high concentrations of dust and the possibility that contaminants other than inert nuisance particles are present, especially lead as noted in the Aetna Report of April 5, 1971.

Weigh Feeders

The weigh feeders (2) are located directly below the blenders on the 2½ floor. This area sample was high at 73.6 mg/m^3.

FCM Operation

The 2nd floor at the FCM operator's station had readings of .6 mg/m^3 at the control panel and 7.1 mg/m^3 while the operator was sweeping dust off the machine.

First Floor

The first floor was relatively dust free, the sample at the operator's desk showed 0 mg/m^3.

Conclusions and Recommendations

1. The raw material handling operation on the blending floor should be evaluated to determine a more efficient means of adding the raw materials to the blenders. In the meantime, due to the high exposure during this operation, respirators should be made mandatory.

2. All cleanup operations should be done with a vacuum system as opposed to sweeping or blowing with air.

3. Minor repairs should be made on the weigh feeders to eliminate leaks. Proper gasketing and maintenance would help in this area.

4. Once repairs are made and some reasonable substitute or modified process for handling raw materials is adopted, the entire department should be vacuumed, beams and pipes included. This recommendation will be more urgent depending on the results of the dust explosibility testing which is presently underway. The results of this testing will be handled in a separate report.

Discussion

The blending floor housed the most serious problem in that the exposure is not limited to inert nuisance dusts. The chemical and toxicological properties of each material used in this area should be checked to determine what the employee may be exposed to.

The highest readings occurred during and following the loading and unloading of the large hopper of raw materials. During this operation bags of raw materials are slit and dumped into the hopper causing much visible dust in the area. Once the hopper is full, it is hoisted up and over to the blenders. The unloading also causes visible dust in the area of the operators breathing zone.

Other noticeable leakage occurred from the tops of the blenders. The ports where materials are added should be covered more securely. Also there was a leak on the #2 blender at the drive shaft where it exits from the blender on the control panel side.

On the second level at the FCM operation, the exposure was low (.6 mg/m^3) except during the cleaning of the machine. While cleaning, the operator swept the accumulated dust from the machine. This resulted in the higher (7.1 mg/m^3) reading. Cleanup in dusty areas should be done with a vacuum system not sweeping or blowing with air.

At the weigh feeders there was much visible dust resulting from leaks which could be easily corrected. Very seldom does anyone spend time in this area, however, if these were corrected it would remove much of the dust which makes housekeeping a problem.

Procedure

Samples were taken with a Gelman midget impinger, and MSA portable vacuum pump (Monitaire). The air sample was drawn at 0.1 cubic feet per minute through distilled water. The trapped dust was filtered and weighed using type HA Millipore filter (0.45 micron pore size). Both the filter paper and collected samples were dried to a constant weight at 105°C.

Sample Calculation

Sample #1 Length of Sample (27 Minutes) Result of Analysis (6 Mg.)

$$\frac{(27 \text{ Minutes})}{} \left| \frac{(0.1 \text{ f}^{+3})}{\text{Minutes}} \right| \frac{\text{M}^3}{35.3 \text{ f}^{+3}} = .077 \text{ M}^3$$

$$\frac{6 \text{ Mg}}{.077 \text{ M}^3} = \underline{78.4 \text{ Mg/M}^3}$$

W E Driscoll
W. E. Driscoll

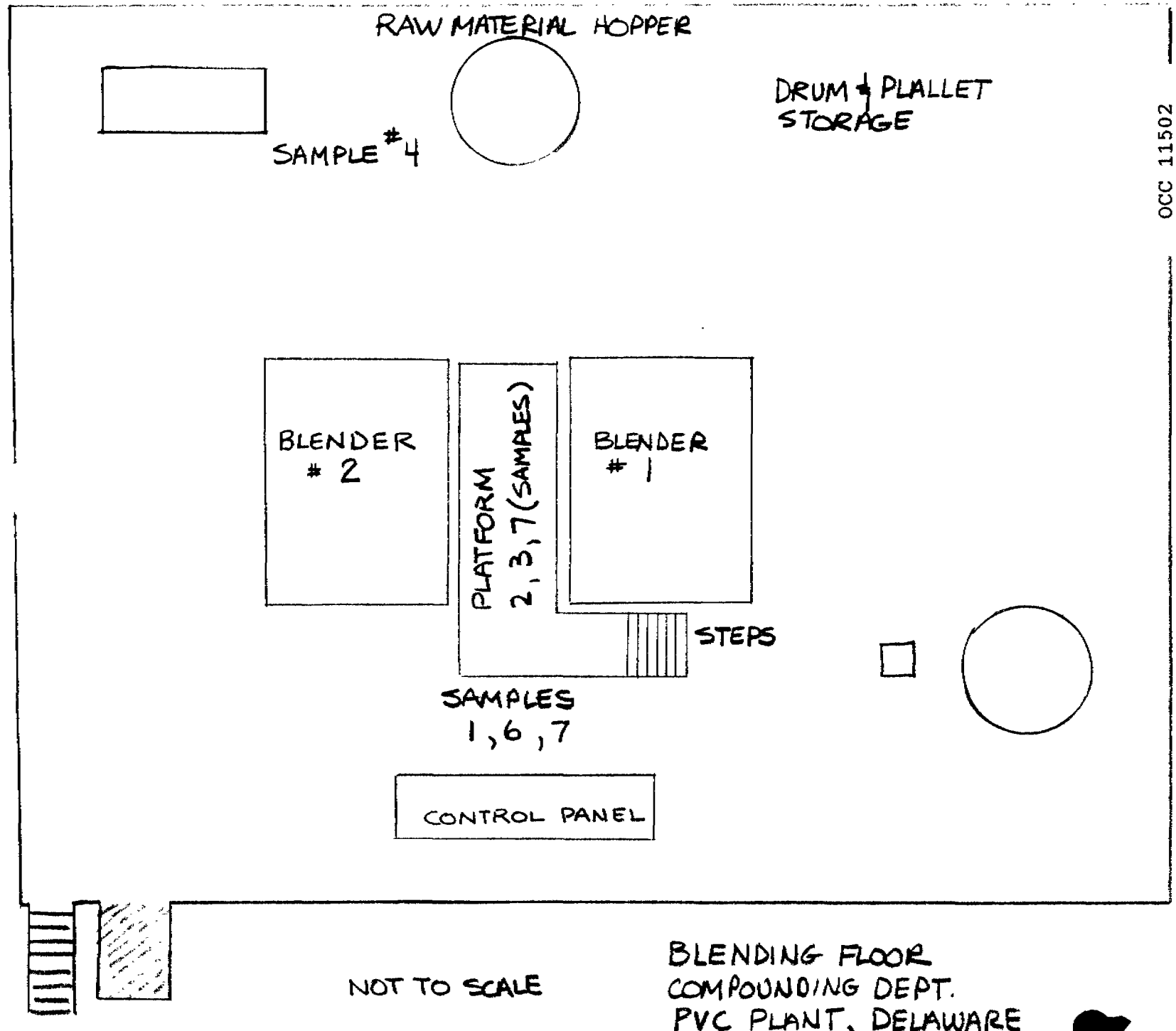
WED:mk
Attachments

cc: Mr. J. Zimmerman - IP 349
cc: MR REFREY
MR A KOVER

COMPOUNDING DEPARTMENT

Sample #	Result (Mg/M^3)	Time Started	Total Time	Dust Content of Sample Mg	Description
1.	7.8	11:03 a.m.	27 Min.	.6	At control panel on blending (3rd, floor)
2.	23.0	11:06 a.m.	23 Min.	1.5	On platform between mixers - mixers operating
3.	79.4	11:40 a.m.	4 Min.	.9	On platform between mixers while unloading bucket
4.	111.8	11:45 a.m.	6 Min.	1.9	Operators breathing zone while filling bucket
6.	8.5	2:43 p.m.	54 Min.	1.3	Blending floor at control panel (same as #1.)
7.	15.5	3:38 p.m.	75 Min.	3.3	On platform between mixers and also at control panel
9.	73.6	4:30 p.m.	24 Min.	5.0	On 2½ level between weigh feeders
5.	.6	2:38 p.m.	62 Min.	.1	2nd floor at FCM Control Panel
10.	7.1	5:06 p.m.	20 Min.	.4	2nd floor at FCM control panel - operator was cleaning machine (sweeping dust off on to the floor)
8.	0	3:00 p.m.	180 Min.	0.0	At operator's desk - 1st floor

OCC 11501



NOT TO SCALE

BLENDING FLOOR
COMPOUNDING DEPT.
PVC PLANT, DELAWARE

OCC 11502

SHEET NO. ____ OF ____
JOB NO. ____
SUBJECT ____
BY ____ DATE ____
CHKD. BY ____ DATE ____

REPORT OF

TECHNICAL SERVICES STUDY

PREPARED FOR: DIAMOND SHAMROCK COMPANY
DELAWARE CITY, DELAWARE

SUBJECT— INDUSTRIAL HYGIENE SURVEY

PREPARED BY— E. B. ENGEL
INDUSTRIAL HYGIENIST

SURVEY DATE— APRIL 5, 1971

P.S. PERSONAL SERVICE
FROM THE OFFICE OF— ALEXANDER & ALEXANDER, INC.

This study has been made to assist the named insured in a loss control program. It is confidential and is not to be used for any other purpose. It does not purport to include every loss potential, code violation or exception to good practice but relates only to those hazards specifically examined and described herein.

OCC 11503

DIAMOND SHAMROCK COMPANY
DELAWARE CITY, DELAWARE

April 5, 1971

PURPOSE: At the request of Charles Burkins, Assistant Employee Relations Manager, an industrial hygiene survey was conducted to evaluate employee exposures to lead compounds being used in the PVC Compounding Department. In addition to lead measurements, we also measured levels of cadmium and tested the explosibility of dust which had settled out on building ledges.

CONTACTS: Mr. C. Burkins, Assistant Employee Relations Manager, and R. Zorich, Process Engineer, were contacted at this visit. We were accompanied on this survey by R. Willing, Ætna Engineering Representative from our Wilmington, Delaware, Office, who regularly services this location.

CONCLUSIONS: Concentrations of lead greatly in excess of the threshold limit value were measured in the breathing zone of an employee loading bags of dibasic lead stearate into the hopper prior to loading the blenders. Air samples for lead in other areas and all samples for cadmium were below the threshold limit values for these metals.

The sample of ledge dust was found to be explosive in our laboratory.

RECOMMENDATIONS:

A. Dust-control equipment should be installed on the loading hopper to control dust emission when bags of lead compounds are being loaded.

B. A housekeeping program should be adopted to frequently and regularly clean the building and equipment to prevent build-up of dust.

PROCEDURES: Air samples for lead and cadmium compounds were collected by drawing air at the rate of 20 liters per minute through membrane filters. The filters were returned to our Hartford Laboratory where the amounts of lead and cadmium were determined by digesting the filters with concentrated nitric acid, placing the metal salts in solution and analyzing by atomic absorption spectrophotometry.

The explosibility of the ledge dust was determined by producing a cloud of this dust in a chamber through which an electric arc was passing.

RESULTS: The results of our air sampling are listed in the Appendix.

The sample of ledge dust was found to explode in our laboratory test chamber.

DISCUSSION: In evaluating the results of air samples, we use as guides Threshold Limit Values, which have been adopted by the American Conference of Governmental Industrial Hygienists. The threshold limit values refer to airborne concentrations of substances and represent conditions under which it is believed that nearly all workers may be repeatedly exposed, day after day, without adverse effect. Because of wide variation and individual susceptability, exposure of an occasional individual at or even below the threshold limit value may not prevent discomfort, aggravation of a preexisting condition, or occupational illness. Threshold limit values should be used as guides in the control of health hazards and should not be regarded as fine lines between safe and dangerous conditions.

The two lead compounds being used at the time of our survey were dibasic lead stearate and dibasic lead phthalate. Threshold limit values have not been established for these two compounds. As a general rule, lead exposures are evaluated on the basis of the lead itself under the assumption that most lead compounds will be broken down in the body and their toxic action will be related to the lead content itself. The threshold limit value for lead is 0.2 milligrams per cubic meter of air.

Our Appendix lists the results of our air sampling for lead. While lead was measured in several areas, only one area was above the threshold limit value. This sample was taken in the breathing zone of an employee while he was emptying bags of dibasic lead phthalate into the hopper that loads the blenders. This operation was extremely dusty and our results were more than nine times the threshold limit value. Either local exhaust ventilation should be installed to control the dust generated by this procedure or another means should be developed of loading the blenders which will not produce dust clouds.

The threshold limit value for soluble salts of cadmium is 0.2 milligrams per cubic meter, expressed as cadmium. While we were able to detect cadmium in certain operations, our results were well below this threshold limit value.

Although this particular plant has been in operation less than a year, there is a considerable build-up of dust on building structures, especially the top levels. Our laboratory tests show that this dust presents a serious explosion hazard. A housekeeping program is urgently needed, which will regularly clean all of the building surfaces to prevent the accumulation of this explosive dust. Dust was noticed escaping from equipment on the top deck by materials being transported from storage bins to the mixers, in the areas of blenders, hand-loading of the hopper, area of the weigh scales, and around the mill. Reworking these pieces of equipment to reduce the amount of dust given off would greatly assist the housekeeping program.

Since this dust will explode, it is imperative that there be no open flames, direct heat, or sparks, or other sources of ignition in areas where the dust becomes airborne. Cleaning should be done using a vacuum cleaner rather than a broom or other means which would stir up the dust.

Edward B. Engel

Edward B. Engel
Industrial Hygienist

APPENDIX A

DIAMOND SHAMROCK CO.
DELAWARE CITY, DELAWARE

April 5, 1971

Results of Dust Samples

Location	Cadmium Concentration	Lead Concentration
1. Top deck in aisle, just below exhaust fan.	0.0017 mg/m^3	0.098 mg/m^3
2. Between blenders.	0.014	0.044
3. Weigh feeder deck.	negative	0.006
4. Mill control station.	negative	0.004
5. Mezzanine over roll mill.	negative	
6. Roll mill operator.	trace	trace
7. Beside conveyor line for bagger.	negative	not taken
8. OBZ loading hopper with dibasic lead phthalate.	not taken	1.82

mg/m^3 - milligrams per cubic meter of air
OBZ - Operator's breathing zone

Concentrations are expressed as mg of metal either lead or cadmium

Threshold Limit Values: Lead 0.2 mg/m^3
Cadmium (soluble salts as Cd) 0.2 mg/m^3