INDUSTRIAL HYGIENE SURVEY
OF

B.F. Goodrich Chemical Company
Polyvinyl Chloride Operations
Pedricktown, New Jersey

SURVEY DATE
August 5-9, 1974

SURVEY CONDUCTED BY
Robert Curtis
James Jones
Cheryl Rea
Preston Rea

REPORT WRITTEN BY
James Jones

DATE OF REPORT
Oct. 1975

Environmental Investigations Branch
Division of Field Studies and Clinical Investigations
National Institute for Occupational Safety and Health
Cincinnati, Ohio

Place Visited:	B.F. Goodrich Chemical Company P.O. Box 400 Pedricktown, New Jersey 08067
Date of Visit:	August 5-9, 1974
Persons Making Visit:	Robert Curtis James Jones Cheryl Rae Preston Rae
Persons Contacted:	A.R. Weber, Plant Manager J.A. Klupar C.P. Hess
Purpose of Visit:	To conduct an industrial hygiene survey of vinyl chloride polymerization operations.

INTRODUCTION

The National Institute for Occupational Safety and Health (NIOSH) has underway an industry-wide survey of the vinyl chloride (VC) industry. As part of this study industrial hygiene surveys are being conducted to determine "typical" VC exposures at plants using each of the four production processes for making polyvinyl chloride (PVC).

There are only four plants in the country using the bulk, or mass, process. Because of this and the fact that B.F. Goodrich (BFG) had offered their assistance in the VC investigations, it was decided to conduct an industrial hygiene survey at the Pedricktown plant. On August 5, 1974, an initial meeting and a plant tour were attended by Robert Curtis, James Jones, Cheryl Rae and Preston Rae. Sampling was then conducted August 5-9, 1974.

During this visit approximately 210 air samples were taken for evaluation of VC exposures. In addition, samples were taken to evaluate exposure to PVC dust. Noise measurements were also made in selected areas.

DESCRIPTION OF THE FACILITY

The Pedricktown plant is entirely a PVC production facility. Milling and calendaring of PVC is also done here. VC is currently used in two separate processes to make PVC: the mass process and the suspension process.

The plant began operations in March, 1970. Processes are computer controlled to minimize necessary labor requirements. The work force consists of 260 people, 50 of whom actually work in the PVC polymerization areas. All BFG employees are salaried and there is no union. All maintenance and cleaning operations are contracted to Allied Maintenance Company whose workers are members of Local 68 of the International Union of Operating Engineers. These employees are assigned full time to BFG and work under the direction of BFG lead technicians.

MEDICAL, INDUSTRIAL HYGIENE, AND SAFETY PROGRAMS

This facility has an in-plant dispensary with a registered nurse on duty Monday through Friday during the day shift. All lead technicians have first aid training. In addition, Dr. Charles Norton of Woodstown, N.J. visits once a week. Dr. Boyer visits once a week for the Allied Maintenance employees. Emergency arrangements have been made with the Salem, N.J. hospitals.

Pre-employment physicals are required. These include a general physical examination, audiometry and SMA-12 blood tests. The SMA-12's are repeated every 6 months.

The Safety Department consists of a safety engineer and an assistant. Hard hats, safety glasses, respirator and safety shoe programs are in operation. In addition, workers are supplied work clothes and are required to change work clothes each day. Daily showers are mandatory for workers in the polymerization areas. Workers are required to wear fresh air supplied respirators when entering vessels for cleaning or when performing other jobs, such as cleaning filters, that have a high potential for VC exposure.

Industrial hygiene monitoring is carried out by laboratory personnel. A charcoal tube absorption method is used to collect personal samples. An automatic sequential sampling system has been installed in each polymerization building.

This sample system consists of a Bendix total hydrocarbon analyzer with six sampling points. Analysis time for each point is two minutes, so each point is sampled every twelve minutes. These sample results are fed into a computer, which stores peak values for each point and calculates shift averages. It also actuates a visual alarm in the production areas whenever levels go over 25 ppm. In addition one person, per shift, spends full time on VC leak detection using a Century Organic Vapor Analyzer. When a high VC level is shown by the automatic sampler, he determines the cause of the high reading and sees that it is corrected.

DESCRIPTION OF THE PROCESSES

Mass Resin Process

The mass process is a relatively new process in the United States. The process is licensed from a french company, Pechiney-St. Govain, and the major equipment is made in France. VC and catalyst are fed to a pre-polymerization reactor where polymer seeds are produced in slurry form. The slurry is then transferred to other reactors where the polymerization is continued to produce a free flowing powder. Only one pre-polymerization reactor is used to feed all the main polymerization reactors. When polymerization has been completed, unreacted monomer is removed from the reactor by vacuum. The off gas is compressed and the vinyl chloride condensed and then recycled to the process. The granular polymer is then conveyed with air to a series of screens and grinders where the product is ground and classified before being transferred to storage, compounding or to bagging.

Suspension Resin Process

The suspension process is the most widely used process in the United States. About eighty-five percent of all PVC resin is produced by this process. VC emulsifiers and catalysts are metered into stirred autoclaves where PVC is produced by a free radical aqueous polymerization reaction. After the reaction reaches a predetermined completion, the unreacted VC is stripped from the PVC-water slurry, condensed and then recycled to the process. The stripped PVC-water slurry is then pumped to blending tanks where batches from several autoclaves are blended for product uniformity. From the blend tanks, the PVC-water slurry is pumped to a dewatering centrifuge where approximately 90% of the water is removed. The PVC resin wet cake is conveyed from the centrifuge to a flash dryer where essentially all the remaining water is removed. The dry PVC resin is then screened and air conveyed to storage, compounding or bagging.

INSPECTION OF PLANT

Potential Health Hazards

Potential health hazards observed during this survey were as follows:

1) Respiratory exposure to VC
2) Respiratory exposure to PVC dust in bagging operations
3) High noise exposures in various production areas

SURVEY PROCEDURES

General

Air samples were collected in the plant for evaluating exposure to VC and PVC dust. A noise survey was also conducted. The following paragraphs describe the methods used to collect and analyze the air samples and take noise measurements.

Vinyl Chloride

Both personal and general area samples for VC were collected in the PVC production areas using charcoal adsorption tubes. Area samples were collected in control rooms or at operator's desks. Personal samples were collected on workers only when they left the control room. The samples were taken with Sipin SP-1 pumps at a flow rate of approximately 50 milliliters per minute for a maximum of 20 minutes. Standard SKC charcoal tubes were used. Some samples, collected on the same person on the same day, were combined for analysis in order to reduce the number of analyses. At the end of each day, all samples collected that day were packed in dry ice to prevent loss of sample. At the end of the week of sampling, these samples were shipped to the NIOSH laboratory in Salt Lake City, Utah. There, the samples were desorbed with carbon disulfide and analyzed by gas chromatography according to the procedure outlined in NIOSH Physical and Chemical Analysis Method No. 127 and the May 31, 1974 Vinyl Chloride supplement to this method.

Polyvinyl Chloride Dust

Personal samples for airborne PVC dust were collected in the bagging areas. These were total dust gravimetric samples taken for approximately 4 hours at a flow rate of 2 liters per minute.

All samples were collected on 37 millimeter diameter Mine Safety Appliance (MSA) PVC membrane filters with a 5 μm pore size. Three piece millipore filter cassettes were used with only the small plug removed (leaving a 4 mm diameter opening). A MSA Model G portable air sampling pump was used to pull air through the filter. All filters were tared and re-weighed on the 20 milligram "A" scale of a Cahn Gram Electrobalance.

Noise

In addition to air sampling, noise measurements were made in production areas. A General Radio Type 1565-A sound level meter calibrated with a Type 1562-A calibrator was used for all measurements. The meter response was set on the slow position and measurements made on the "A" weighting network.

RESULTS AND DISCUSSION

Vinyl Chloride Samples

Mass Resin Area

Results of each sample are given in Table 1 and are summarized in Table 3. The lowest personal VC concentration observed was none detected (ND) and the highest was 71.4 parts per million (ppm). Mean personal VC concentrations for the various job classifications ranged from ND to 6.4 ppm.

Area concentrations found in the control room varied from ND to 3.8 ppm with a mean of 1.0 ppm.

The workmen spend a majority of their time, when not in the process areas, in the control room. Therefore a time weighted average (TWA) exposure has been estimated for each job category based on the percentage of time spent in the control room. These TWA's ranged from ND to 4.2 ppm. The highest exposure job category was the serviceman, who cleans reactors, filters, etc.

Suspension Resin Area

Results of each samples are given in Table 2 and are summarized in Table 4. The personal VC concentrations ranged from ND to 245 ppm. The mean concentrations for job types ranged from 0.2 ppm to 28.2 ppm.

Area concentrations found in the control room varied from ND to 96.5 ppm with a mean of 14.5 ppm.

Again TWA's were calculated and ranged from 0.2 ppm to 22.7 ppm. The high concentrations were due to several process malfunctions that occurred during the survey.

Polyvinyl Chloride Dust Samples

Results of the personal PVC dust samples are presented in Table 5. Dust samples were taken only in the bagging operations since this was the only operation involving the dried resin. Local exhaust ventilation was present at each bagging station and seemed to be effective although the area did have a coating of white resin dust. The baggers wore cartridge respirators.

while performing bagging operations. Dust concentrations ranged from 0.38 mg/m^3 to 2.59 mg/m^3. The baggers spent an average of 6 hours per day bagging so TWA dust concentrations ranged from 0.29mg/m^3 to 1.94 mg/m^3.

Noise Measurements

Mass Resin Area

Noise levels in the process ranged from 85 dBA to 94 dBA. The noise level in the control room was 71 dBA. Levels above 90 dBA were predominantly on the first level around the polys and compressors.

Suspension Resin Area

Noise levels in the suspension resin poly building ranged from 88 dBA to 93 dBA. The noise level in the control room was 76 dBA. Essentially the whole building, except for the control room, had noise levels of 90 dBA or above.

Noise levels at the bagging stations were quite high. Levels ranged from 106 dBA at the local exhaust ducts to 92 dBA at the loading pallets. A level of 100 dBA was found at the operator's ear position while inserting and removing bags from the bag filler nozzle.

CONCLUSIONS AND RECOMMENDATIONS

Although differences in VC concentrations were noted for the mass and suspension resin areas, the difference seemed to be more related to attitudes of supervisory personnel than actual differences in the two processes. Lead technicians in the mass resin area indicated genuine concern about controlling VC exposure and relayed this concern to the other workers, while in the suspension resin area there seemed to be much less concern about high VC levels. This difference in concern for VC exposure can be exemplified by the following: in the mass resin area, fresh air masks were hung in a readily available location and were cleaned after each usage. In the suspension resin area the first time the VC alarm went off during our survey, the men had to hunt through a storage cabinet to find the air masks. In the mass resin area, as soon as a VC alarm went off, a man was dispatched to find the cause and then the cause was remedied as soon as possible. In the suspension area, the men would push a button that would turn off the alarm. If the alarm continued to come back on several times, a man would finally go to determine the cause. Increased worker education on the necessity for controlling VC emmissions is needed. Therefore it is difficult to account for higher VC exposures in the suspension resin area by process differences alone.

In both areas the VC concentrations for the most part would not meet the present OSHA standard of 1 ppm TWA. However they were generally below the 50 ppm standard in effect at the time of the survey. Higher levels are in part caused by plant VC emmisions being drawn back into the buildings by the ventilation systems. This occurred even though the intakes were well removed from the building. Changes were underway at the time of the survey that would eliminate or at least minimize this problem. These changes consisted primarily of higher stacks for exhausting contaminated air. All emission sources were to be vented to common points to facilitate the later addition of VC removal equipment to exhaust vents. With these changes, better maintenance and closer leak surveillance, VC levels should be lowered to near the OSHA standard.

TABLE 1

MASS RESIN AREA VINYL CHLORIDE SAMPLE RESULTS

	Date	Shift	Location or Job Title	No. of Tubes Combined	V.C. Concentration ppm
1.	8-5-74	4-12	Control Room	2	3.8
2.	8-5-74	4-12	Control Room	2	3.6
3.	8-6-74	4-12	Control Room	1	ND
4.	8-6-74	4-12	Control Room	1	0.9
5.	8-6-74	4-12	Control Room	1	ND
6.	8-6-74	4-12	Control Room	1	2.0
7.	8-6-74	4-12	Control Room	1	1.7
8.	8-7-74	8-4	Control Room	2	1.8
9.	8-7-74	8-4	Control Room	2	1.8
10.	8-8-74	8-4	Control Room	1	ND
11.	8-8-74	8-4	Control Room	1	ND
12.	8-9-74	12-8	Control Room	1	ND
13.	8-9-74	12-8	Control Room	1	ND
14.	8-9-74	12-8	Control Room	1	ND
15.	8-9-74	12-8	Control Room	1	ND
16.	8-5-74	4-12	Lead Technician	1	2.2
17.	8-5-74	4-12	Lead Technician	1	ND
18.	8-6-74	4-12	Lead Technician	1	7.3
19.	8-6-74	4-12	Lead Technician	1	4.0
20.	8-6-74	4-12	Lead Technician	1	19.9
21.	8-6-74	4-12	Lead Technician	1	ND

TABLE 1 (CONT'D)

	Date	Shift	Location or Job Title	No. of Tubes Combined	V.C. Concentration ppm
22.	8-6-74	4-12	Lead Technician	1	ND
23.	8-6-74	4-12	Lead Technician	1	ND
24.	8-7-74	8-4	Lead Technician	1	4.2
25.	8-7-74	8-4	Lead Technician	1	2.1
26.	8-7-74	8-4	Lead Technician	1	ND
27.	8-8-74	8-4	Lead Technician	1	2.5
28.	8-8-74	8-4	Lead Technician	1	22.6
29.	8-8-74	8-4	Lead Technician	1	4.9
30.	8-8-74	8-4	Lead Technician	1	ND
31.	8-8-74	8-4	Lead Technician	1	14.8
32.	8-9-74	12-8	Lead Technician	1	ND
33.	8-9-74	12-8	Lead Technician	1	ND
34.	8-9-74	12-8	Lead Technician	1	ND
35.	8-5-74	4-12	Operating Technician	2	6.3
36.	8-5-74	4-12	Operating Technician	2	9.3
37.	8-6-74	4-12	Operating Technician	1	2.8
38.	8-6-74	4-12	Operating Technician	1	7.6
39.	8-6-74	4-12	Operating Technician	1	7.0
40.	8-6-74	4-12	Operating Technician	1	3.0
41.	8-7-74	8-4	Operating Technician	1	ND
42.	8-7-74	8-4	Operating Technician	1	2.9

TABLE 1 (CONT'D)

	Date	Shift	Location or Job Title	No. of Tubes Combined	V.C. Concentraction ppm
43.	8-7-74	8-4	Operating Technician	1	2.8
44.	8-7-74	8-4	Operating Technician	1	3.4
45.	8-8-74	8-4	Operating Technician	1	ND
46.	8-8-74	8-4	Operating Technician	1	13.7
47.	8-8-74	8-4	Operating Technician	1	ND
48.	8-8-74	8-4	Operating Technician	1	1.5
49.	8-9-74	12-8	Operating Technician	1	ND
50.	8-9-74	12-8	Operating Technician	1	ND
51.	8-9-74	12-8	Operating Technician	1	1.6
52.	8-5-74	4-12	Serviceman	1	2.9
53.	8-5-74	4-12	Serviceman	2	2.7
54.	8-5-74	4-12	Serviceman	1	20.7
55.	8-5-74	4-12	Serviceman	1	2.0
56.	8-5-74	4-12	Serviceman	2	13.4
57.	8-6-74	4-12	Serviceman	1	1.8
58.	8-6-74	4-12	Serviceman	1	1.5
59.	8-6-74	4-12	Serviceman	1	2.0
60.	8-6-74	4-12	Serviceman	1	4.7
61.	8-6-74	4-12	Serviceman	1	0.9
62.	8-6-74	4-12	Serviceman	1	ND
63.	8-6-74	4-12	Serviceman	1	2.3
64.	8-7-74	8-4	Serviceman	2	2.2

TABLE 1 (CONT'D)

	Date	Shift	Location or Job Title	No. of Tubes Combined	V.C. Concentraction ppm
65.	8-7-74	8-4	Serviceman	2	5.1
66.	8-7-74	8-4	Serviceman	1	1.8
67.	8-7-74	8-4	Serviceman	1	4.4
68.	8-4-74	8-4	Serviceman	1	5.3
69.	8-7-74	8-4	Serviceman	1	11.1
70.	8-8-74	8-4	Serviceman	1	14.3
71.	8-8-74	8-4	Serviceman	1	ND
72.	8-8-74	8-4	Serviceman	1	11.7
73.	8-8-74	8-4	Serviceman	1	71.4
74.	8-8-74	8-4	Serviceman	1	10.9
75.	8-8-74	8-4	Serviceman	1	1.4
76.	8-8-74	8-4	Serviceman	1	ND
77.	8-9-74	12-8	Serviceman	1	ND
78.	8-9-74	12-8	Serviceman	1	ND
79.	8-9-74	12-8	Serviceman	1	5.9
80.	8-9-74	12-8	Serviceman	1	ND
81.	8-9-74	12-8	Serviceman	1	ND
82.	8-9-74	12-8	Serviceman	1	ND
83.	8-9-74	12-8	Serviceman	1	3.1
84.	8-8-74	8-4	Bagger	2	ND
85.	8-8-74	8-4	Bagger	2	ND

TABLE 2

SUSPENSION RESIN AREA VINYL CHLORIDE SAMPLE RESULTS

	Date	Shift	Location or Job Title	No. of Tubes Combined	V.C. Concentrations ppm
1.	8-5-74	4-12	Office	2	8.3
2.	8-5-74	4-12	Office	1	8.2
3.	8-6-74	4-12	Office	1	43.0
4.	8-6-74	4-12	Office	1	23.8
5.	8-6-74	4-12	Office	1	8.7
6.	8-6-74	4-12	Office	1	96.5
7.	8-6-74	4-12	Office	1	50.6
8.	8-7-74	8-4	Office	2	ND
9.	8-7-74	8-4	Office	2	2.2
10.	8-7-74	8-4	Office	1	4.1
11.	8-8-74	8-4	Office	1	2.6
12.	8-8-74	8-4	Office	1	4.1
13.	8-8-74	8-4	Office	1	1.8
14.	8-8-74	8-4	Office	1	6.4
15.	8-9-74	12-8	Office	1	ND
16.	8-9-74	12-8	Office	1	ND
17.	8-9-74	12-8	Office	1	ND
18.	8-9-74	12-8	Office	1	ND
19.	8-5-74	4-12	Pearl Technician	1	8.0
20.	8-5-74	4-12	Pearl Technician	2	4.7
21.	8-5-74	4-12	Pearl Technician	1	2.3

TABLE 2 (CONT'D)

	Date	Shift	Location or Job Title	No. of Tubes Combined	V.C. Concentrations ppm
22.	8-6-74	4-12	Pearl Technician	1	11.5
23.	8-6-74	4-12	Pearl Technician	1	30.6
24.	8-6-74	4-12	Pearl Technician	1	18.6
25.	8-6-74	4-12	Pearl Technician	1	36.8
26.	8-7-74	8-4	Pearl Technician	1	245.0
27.	8-7-74	8-4	Pearl Technician	1	8.0
28.	8-7-74	8-4	Pearl Technician	2	6.6
29.	8-7-74	8-4	Pearl Technician	1	ND
30.	8-7-74	8-4	Pearl Technician	1	3.1
31.	8-7-74	8-4	Pearl Technician	2	1.0
32.	8-8-74	8-4	Pearl Technician	1	4.7
33.	8-8-74	8-4	Pearl Technician	1	7.6
34.	8-8-74	8-4	Pearl Technician	1	22.4
35.	8-9-74	12-8	Pearl Technician	1	1.7
36.	8-9-74	12-8	Pearl Technician	1	ND
37.	8-9-74	12-8	Pearl Technician	1	54.5
38.	8-9-74	12-8	Pearl Technician	1	ND
39.	8-9-74	12-8	Pearl Trainee	1	ND
40.	8-9-74	12-8	Pearl Trainee	1	6.2
41.	8-9-74	12-8	Pearl Trainee	1	191.0
42.	8-9-74	12-8	Pearl Trainee	1	ND
43.	8-5-74	4-12	Paste Technician	1	8.7
44.	8-5-74	4-12	Paste Technician	1	3.1

TABLE 2 (CONT'D)

	Date	Shift	Location or Job Title	No. of Tubes Combined	V.C. Concentrations ppm
45.	8-5-74	4-12	Paste Technician	2	23.8
46.	8-6-74	4-12	Paste Technician	1	37.9
47.	8-6-74	4-12	Paste Technician	1	51.4
48.	8-6-74	4-12	Paste Technician	1	80.0
49.	8-7-74	8-4	Paste Technician	1	1.6
50.	8-7-74	8-4	Paste Technician	2	3.8
51.	8-7-74	8-4	Paste Technician	1	4.7
52.	8-8-74	8-4	Paste Technician	1	3.4
53.	8-8-74	8-4	Paste Technician	1	8.4
54.	8-8-74	8-4	Paste Technician	1	8.3
55.	8-9-74	12-8	Paste Technician	1	1.8
56.	8-9-74	12-8	Paste Technician	1	28.1
57.	8-9-74	12-8	Paste Technician	1	158.8
58.	8-9-74	12-8	Paste Technician	1	27.6
59.	8-5-74	4-12	Rover Technician	2	11.5
60.	8-5-74	4-12	Rover Technician	1	6.0
61.	8-5-74	4-12	Rover Technician	1	10.7
62.	8-5-74	4-12	Rover Technician	1	25.8
63.	8-6-74	4-12	Rover Technician	1	8.1
64.	8-6-74	4-12	Rover Technician	1	14.5
65.	8-6-74	4-12	Rover Technician	1	22.9
66.	8-7-74	8-4	Rover Technician	4	1.9
67.	8-8-74	8-4	Rover Technician	1	2.2

TABLE 2 (CONT'D)

	Date	Shift	Location or Job Title	No. of Tubes Combined	V.C. Concentrations ppm
68.	8-8-74	8-4	Rover Technician	1	8.9
69.	8-8-74	8-4	Rover Technician	1	ND
70.	8-9-74	12-8	Rover Technician	1	2.5
71.	8-9-74	12-8	Rover Technician	1	46.7
72.	8-9-74	12-8	Rover Technician	1	5.0
73.	8-5-74	4-12	Utility Man	2	7.2
74.	8-5-74	4-12	Utility Man	2	3.2
75.	8-6-74	4-12	Utility Man	1	ND
76.	8-6-74	4-12	Utility Man	1	23.6
77.	8-6-74	4-12	Utility Man	1	16.0
78.	8-8-74	8-4	Utility Man	1	6.9
79.	8-8-74	8-4	Utility Man	1	16.9
80.	8-8-74	8-4	Utility Man	1	ND
81.	8-8-74	8-4	Utility Man	1	ND
82.	8-7-74	8-4	Bagger	2	ND
83.	8-7-74	8-4	Bagger	1	ND
84.	8-7-74	8-4	Bagger	2	ND
85.	8-7-74	8-4	Bagger	1	ND
86.	8-7-74	8-4	Bagger	2	ND
87.	8-7-74	8-4	Bagger	1	ND
88.	8-8-74	8-4	Bagger	2	0.6
89.	8-8-74	8-4	Bagger	2	0.7

TABLE 2 (CONT'D)

	Date	Shift	Location or Job Title	No. of Tubes Combined	V.C. Concentrations ppm
90.	8-8-74	8-4	Bagger	2	0.9
91.	8-8-74	8-4	Bagger	2	ND

TABLE 3

MASS RESIN AREA MEAN VINYL CHLORIDE SAMPLING SUMMARY

Location or Job Title	Mean Concentration ppm	Standard Deviation	Range Low High	Percent of Time Out of Control Room	8hr. TWA ppm
Office	1.0	1.4	ND-3.8		
Lead Technician	4.4	7.0	ND-22.6	75	3.6
Operating Technician	3.6	3.9	ND-13.7	50	2.3
Serviceman	6.4	12.9	ND-71.4	60	4.2
Bagger	ND	-	-	100	ND

TABLE 4

SUSPENSION RESIN AREA MEAN VINYL CHLORIDE CONCENTRATIONS

Location or Job Title	Mean Concentration ppm	Standard Deviation	Range Low High	Percent of Time Out of Control Room	8hr. TWA ppm
Office	14.5	25.3	ND-96.5		
Pearl Technician	27.7	60.7	ND-245.0	60	22.4
Paste Technician	28.2	41.1	1.6-158.8	60	22.7
Rover Technician	11.9	12.6	ND-46.7	90	12.2
Utilityman	8.2	8.7	ND-23.6	75	9.8
Bagger	0.2	0.4	ND-0.9	100	0.2

TABLE 5

SUSPENSION RESIN AREA POLYVINYL CHLORIDE DUST CONCENTRATIONS

Date	Shift	Job Title	Concentration mg/m^3
8-7-74	8-4	Bagger	0.69
8-7-74	8-4	Bagger	0.72
8-7-74	8-4	Bagger	2.50
8-8-74	8-4	Bagger	1.02
8-8-74	8-4	Bagger	0.70
8-9-74	12-8	Bagger	0.38
8-9-74	12-8	Bagger	1.06
8-9-74	12-8	Bagger	0.57