ONTARIO DEPARTMENT OF [illegible]
INDUSTRIAL HYGIENE LABORATORIES
360 Christie Street, Toronto 4, Ont.

To: R. G. Elson	Report No. 12,367
	Date: Oct. 21, 1965
re: Air samples for vinyl chloride taken at B.F.Goodrich Canada Ltd., Port Robinson, Ont. Company contacts: Mr. E. R. Clayson, Mgr., Mr. J. Nagy, Safety Supervisor. Requested by Dr. Mastromatteo.	Copies to: Mr. J. Nelson Dr. Mastromatt Dr. Sutherland
	From: H. Wall

In this plant vinyl chloride is polymerized to polyvinyl chloride by batch processes. After completion of the reaction it is necessary to enter a reactor and scrape the adhering polymer from the inside before the next batch is started. The safety precautions observed for the entry and scraping were described by Dr. Mastromatteo in a report dated June 18, 1965. The air samples described in this report were taken as an aid in assessing the present safety precautions.

All air samples were taken at the operator's breathing level while working under the conditions described in Dr. Mastromatteo's report. The air was pumped from the sampling sites into bottles. The air in these bottles was subsequently analyzed in the laboratory for chlorine and from this the concentration of vinyl chloride in the air sample was calculated. The results are given in the following table.

Location			Vinyl Chloride PPM
Inside	#4 Reactor	Scraping Top	31
"	#4 "	" Bottom	52
"	#21 "	" Bottom	68
"	#16 "	" Top	44
"	#16 "	" Bottom	22

There appeared to be much more adhering polymer in reaction #4 than was the case in reactors #16 and #21. #4 and #16 reactors were small, #21 reactor was large.

For a continuous forty-hour per week exposure to vinyl chloride a threshold limit value of 500 ppm has been suggested.

KITAGAWA VINYL CHLORIDE DETECTOR TUBES

These tubes are made in Japan. In taking a sample, air is drawn through the tube for three minutes by means of a special pump. According to the manufacturer's literature, when vinyl chloride is present the orange color of the tube changes to green. The amount of vinyl chloride in the air is estimated by the length of the green stain. Ahead of the green stain in the tube there is a red stain which is ignored. The lower limit of detection is stated to be 500 ppm with a three minute sample.

When a mixture of vinyl chloride from a valve end air was drawn through the tube, the color changes described by the manufacturer were found to occur. There was no difficulty in detecting the end of the green stain.

is continuously drawn into the flame ionization cell, where it contacts a hydrogen flame. A portion of the carbon compound (s) present in the sample burns in the hydrogen flame. This results in carbon ions being present in the flame. An electrical potential is provided across the flame jet, and an electrode located above the flame in the combustion products stream. An electrometer circuit measures the ion current which flows between the flame jet, and the collector electrode above it. We checked 25 polymerizer entries.

Results of gas tests:

Average large poly readings 33 ppm

	0-10 ppm	10-20 ppm	20-30 ppm	30-40 ppm	40-50 ppm	50-60 ppm	60-80 ppm	80-100 ppm	Total
# of Rdgs.	3	13	20	27	5	0	2	1	71

All high readings were only momentarily.

Average small poly readings (without Vinyl Acetate) 23 ppm

ppm	0-10	10-20	20-30	30-40	40-50	50-60	60-80	80-100	Total
	17	30	15	16	7	2	2	1	90

All high readings were only momentarily.

Average small poly readings (with Vinyl Acetate) 95 ppm

ppm	0-10	10-20	20-30	30-40	40-50	50-60	60-100	100-200	200-500	Tot
# of Rdgs.	4	5	4	6	3	2	1	2	6	

Average floor readings 6 ppm (Readings as low as 2ppm were recorded)

Conclusions of these tests:

a) Flame Ionization Tester is a very sensitive instrument and is able to measure readings from 2 ppm up.

b) Entries are made under conditions well below the recommended safe limits, (see page 199 Documentation of Threshold Limit Values, Committee on Threshold Limit Values, Copyright 1966 by American Conference of Government Industrial Hygienists.)
and are kept below this level

( ) Confidential ( ) August 15/60

Julius Nagy

olymerizer Entry

We have 9 large polymerizers @ 3300 gallons each and
11 small polymerizers @ 1100 gallons each

These polymerizers are located on the 3rd floor of the Process Building. Maximum distance between polymerizers is 80 feet.

After any charge of Geon has been dropped from a polymerizer, there is always a residue of material on the polymerizer walls, the agitator blades, baffles, roof, etc. Some of this material is loose and may be removed by simply rinsing with water. The rest is partially fused material which must be removed by scraping with a sharp tool. This is the reason why polymerizer must be entered for cleaning.

Once the charge has been dropped, it is recovered to 25-27" Hg vacuum. Even after this we still have an explosive atmosphere in the polymerizer.

A Poly Safety Check Sheet is then completed to prevent the possibility of any polymerizer still under pressure from being opened.

Once opened the polymerizer is locked out, isolated and using the polymerizer exhaust system cleared of all remaining gas to a safe entry level.

The Gas Analizer is able to detect gas concentration as low as 2 ppm.

In order to enter, the Gas Analizer reading must be below the safe level and Poly Safety Check must be completed by the cleaner and a check-out man.

During cleaning, the atmosphere inside the polymerizer is kept at a safe level by an exhaust hose. The polymerizer exhaust system consist of an Exhaust Blower of 2500 scfm capacity and the necessary ductwork to provide each polymerizer with an exhaust station.

The maximum number of exhaust stations to be used at any one time is four (4) and under these conditions we get the following air changes:
large poly 1.4 changes/min. or 84 changes/hour (theoretical)
small poly 4.25 changes/min. or 254 changes/hour (theoretical)

A Portable Flame Ionization Meter (Davis Instruments, Divison of Davis Emergency Equipment Co. Inc., 47 Halleck St., Newark 4, N.J., U.S.A.) Model No. 11-654, was used to conduct tests on polys to determine gas concentrations during cleaning.

This instrument is designed to detect trace amounts of hydrocarbons in air and is calibrated for vinyl chloride. Six range selections were available from 2 ppm to 20,000 ppm. Speed of response varies directly with sample flow-rate, 2-3 seconds, exclusive of external sample transport.

The basic principle of operation of this detector is ionization of hydrocarbon molecules in a hydrogen flame. The sample being analyzed

Welland, Ontario | E.R. Clayson | Akron-D/0020-B/5-H

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Apparently the Ontario Department of Labor is doing what is currently being proposed by the American Conference of Governmental Industrial Hygienists in the United States, namely, to reduce the TLV for vinyl chloride from 500 to 50 ppm. I am familiar with this intent and although it has not been made final, I strongly expect that it will be done. We, of course, do not like it, but I am afraid that we will have to live with it.

I appreciate your calling this to our attention. We will want to review your operations from time to time to be sure that they do meet the new requirements. If you feel there is any question about this, we will be glad to arrange for doing this in the very near future.

W.K. McCormick

cc: F.R. Hoddle
P.B. Mason
J. Nagy
J.H. Hyslop

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