SURVEY REPORT

UNIROYAL CHEMICAL

1. DISCHARGER IDENTIFICATION

Plant: Uniroyal Chemical
Division of Uniroyal, Inc.
P. O. Box 460
Painesville, OH 44077
AC 216-357-7574

Corporate: Uniroyal, Inc.
Oxford Management and
Research Center
Middlebury, CT 06749
AC 203-573-2387

Receiving Waters: Grand River

NPDES Application Number: OH 070 0X2 2 000 118

NPDES Permit Number: OH 0000353 (not issued)

Responsible Officials:

Plant:
Benton R. Leach, Plant Manager

Corporate:
Robert C. Niles, Director, Environmental Control

2. DATES OF SURVEY: May 6-7, 1974

3. PARTICIPANTS

Uniroyal
Walter M. Iliff, Plant Engineer
Raymond W. Kenney, Utilities Engineer

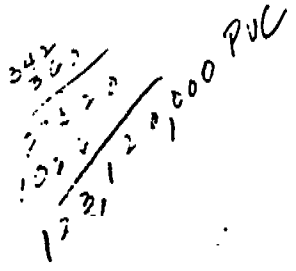
Ohio EPA
Notified but did not participate

USEPA
Martin G. Trembly
Philip E. Gehring
Charles J. Beier
Joseph S. Good
Charles E. Henricks
Harold J. Henris
Roland J. Hartranft

4. DESCRIPTION OF FACILITIES

A. Description of Discharger

Uniroyal's Painesville facilities produce PVC by suspension and emulsion polymerization, and nitrile rubber (butadiene-acrylonitrile copolymer). Nitrile rubber and PVC are also compounded to produce an ozone-resistant rubber. Volume of production is about 342,000 pounds of PVC and 82,000 pounds of nitrile rubber daily.



Raw materials include butadiene, acrylonitrile, and vinyl chloride monomer, which is received by rail. Various suspending agents (soaps) and coagulants such as acetic acid-brine solution, alum, magnesium sulfate, and others, are also classified as raw materials. Process water is purchased as raw lake water from Diamond Shamrock, and filtered, demineralized and softened at Uniroyal. Other potable water is purchased from the City of Painesville.

Present employment at Uniroyal is about 450 persons, 350 of which are hourly workers. Operations are on an around-the-clock basis.

Sanitary wastes are treated in two trickling filter systems, which are operated only when the accumulated volume of sanitary wastewater warrants their use.

B. Process Description

The Uniroyal facility is divided into two separate production areas - Area 1 and Area 4. Area 1 contains 27 kettle reactors for both emulsion and suspension polymerization of PVC.

In emulsion polymerization vinyl chloride monomer, water, and various plasticizers and suspending agents are reacted for 8 to 10 hours and the contents are sent to concentrator tanks wherein the volatile vinyl chloride is removed. The PVC is then spray-dried, ground to a finer particle size, and packaged, most frequently in bags.

Water discharges from the emulsion polymerization areas result from three processes: jacket cooling of the reactors, cleaning of reactors, and zeolite regeneration. Uniroyal is presently closing the reactor cooling system such that there is to be no cooling water discharge within a few months (June 1974). Physical reactor cleanout is done, most often by hand, normally after every fifth batch. The company is also experimenting with tetrahydrofuran (THF) dissolution of reactor deposits. With this system, the tank is washed with THF and the THF is flashed off from the solids and reused.

Additional waste may be expected from blowdown from concentrator tanks and releases of faulty batches from the kettles.

Formerly, all wastes from Area 1 were discharged to a ditch on the west end of Uniroyal property, directly to Grand River along with sanitary effluent. Presently, these wastes are sent to a combined treatment system. According to Uniroyal personnel, the only discharge directly to Grand River from Area 1 at present is storm runoff.

Area 4 includes the suspension PVC polymerization and nitrile rubber processes. In suspension polymerization of PVC, vinyl chloride and water are mixed and heated until a reaction is sustained. After about ten hours, the contents of the reactor vessels are pumped to slurry tanks in which vinyl chloride monomer is pulled off. The slurry is then centrifuged, the solid PVC being air dried, while the centrifuged water is discharged to a sewer system leading to the treatment area. Reactor cleanout wastes and defective reaction mixes also go to this sewer. A closed cycle system is employed for process cooling with blowdown being discharged to a sewer leading to the treatment system.

use slurry tanks for stripping?

Nitrile rubber is formed by mixing butadiene and acrylonitrile in 10,000 gallon reactors, along with various emulsifiers, for about 20 hours. The resultant product is an emulsion containing crumb rubber, which is pumped to 20,000 gallon blowdown tanks, the added capacity being necessary to accommodate large quantities of foam generated in the pumping process. Butadiene is flashed off in the blowdown tanks, and acrylonitrile is recovered using steam in a packed column and reused. Recovered butadiene is shipped out of the plant by rail for repurification.

The emulsion is pumped to blend tanks for equalization and then to a finishing line, in which coagulants are added to increase crumb size. The most common coagulants used are "salt acid" (brine-acetic), alum, magnesium sulfate, calcium chloride, and barium chloride. The choice of coagulant depends on the characteristics of the rubber being made. Wastewater originates

in the finishing line and from boiler blowdown, zeolite regeneration, reactor cleanout, and raw material or product spills. Reactor cleanout occurs approximately once per year.

Storm water drainage from Area 4 is directed to the 48" sewer which runs along the eastern boundary of Uniroyal property. According to the company, there is no other water discharge to the 48" sewer, except the sanitary effluent from this Area.

Process water from both Areas 1 and 4 flows through sumps in the respective areas, which act as primary solids traps. Partially polymerized defective batches which are dumped are effectively caught in these traps and removed manually by laborers and hauled away to landfill. Process wastewaters from Areas 1 and 4 combine and flow to the treatment system.

C. Waste Treatment Facilities

The process waste treatment system was started up in August 1971. Wastes enter an equalization lagoon at a rate of about 1.5 mgd and a pH of 4 to 5. The capacity of the lagoon is between 20 and 25 million gallons, although the water level is held at about 5 million gallons under normal operation. According to Uniroyal, the equalization lagoon will provide about two weeks of holding capacity should the rest of the treatment system be shut down.

Three pipes laid lengthwise in the pond pick up equalized liquid waste at various points in the lagoon and direct this water to a chemical addition facility in which lime is added

to bring the pH to the range of 9 to 10, and then alum and polyelectrolyte are added in four mix tanks to facilitate settling. The mixture is pumped to a flocculator-clarifier at a rate of 800 to 1,000 gpm at normal operation. Higher flow-through rates may be expected if the system has been shut down and must handle additional accumulated wastewater.

Clarifier sludge is continuously pumped to one of a pair of sludge lagoons (sand beds), both with overflow drains for supernatant water, which discharge to the same ditch to Grand River which receives clarifier effluent. However, problems in sludge settling and collection in the clarifier are evident. The company is experimenting with different chemicals and/or dosing rates to aid settling in the clarifier, but due to the low density of the sludge, it is extremely difficult to achieve adequate settling. Clarifier sludge and some other solid wastes are disposed of in a private disposal area across Route 535 from Uniroyal. Other PVC-containing solid wastes are hauled to a landfill near Kirtland, Ohio by Geauga Disposal Company.

Separate trickling filter systems treat sanitary wastes from Areas 1 and 4. Neither effluent is disinfected. The sanitary system discharge from Area 1 enters the west drainage ditch, while the effluent from Area 4 is discharged to the 48" sewer.

5. DESCRIPTION OF SAMPLING PROGRAM

A. Sampling Locations

Composite samples from 1130 EDST on May 6 to 0930 EDST on

May 7, 1974, were obtained from Outfalls 001 (Plant 1 drainage ditch), and 002 (main outfall), and the intake pump house. Samples were withdrawn every two hours and composited according to flow at Outfall 002, and equal-volume composited at the intake and Outfall 001. In addition, a grab sample of water overflowing from a clarifier sludge holding lagoon was obtained.

Solid waste samples were obtained as follows:

1. Clarifier sludge from south sludge holding lagoon.
2. Clarifier sludge and other solid wastes in a company disposal area across Route 535 from the plant.
3. Sample of "off-grade PVC, reactor scale, and other solid PVC wastes from a disposal bin in Area 1 of the plant. These wastes are removed by Geauga Disposal Co. and hauled away to a landfill near Kirtland, Ohio. The sample was dry upon collection.
4. Floating residue from a settling pit for reactor clean-out and cooling water in Area 1. This residue goes partly to the treatment system and partly to a landfill via Geauga Disposal Co.
5. Sample from a waste bin containing nearly dry "off-grade PVC resin at Area 4. This is also hauled away by Geauga Disposal.
6. Clarifier sludge from the north sludge holding lagoon.

Data are presented in this order in Table 1.

B. Methods Statement

Throughout this survey, standard USEPA Region V sampling, preservation, and custody methods were followed. Analyses were performed by the Region V Central Regional Laboratory.

C. Discharger Participation

Uniroyal chemical personnel were very cooperative in directing the MODO sampling crews to the proper sampling locations. The company did not obtain split samples for purposes of comparison.

6. GENERAL CONDITIONS

Plant operations during this survey were normal. At Cleveland Hopkins Airport, approximately 38 miles southwest of the plant site, weather conditions for the survey dates are summarized below:

	5/6/74	5/7/74
High Temp.	47	49
Low Temp.	33	30
Precipitation (inches)	0.48	0.01

Strong northwest winds predominated during the survey. Rainfall on these dates may be expected to have diluted plant wastewaters in Outfall 001, as storm drains are connected to this discharge point. However, the main treatment system outfall (002) was not appreciably affected by the precipitation.

7. DISCUSSION OF RESULTS

A. Wastewater

As expected, the background level of vinyl chloride in

Lake Erie intake water was undetectable. Based on the wastewater analysis results (Table 1), it appears that significant amounts of vinyl chloride are entrained in water which has been in contact with finished resin. Outfall 001, which contains indirect cooling water, shows no detectable VC, while Outfall 002, which discharges treated reactor cleanout and centrifuge wastes, contains a significant concentration of vinyl chloride. On May 6-7, about 34 pounds of monomer were discharged. It is not possible, however, to determine whether this VC is dissolved in water or contained within suspended solids particles. If further sampling is to be done, this should be evaluated by analyzing both filtered and not filtered samples.

A significant concentration of VC is also discharged at the sludge holding lagoons. This is not surprising since fine PVC particles make up the bulk of the clarifier sludge contained in the lagoons. However, the loading is relatively low compared to Outfall 001 based upon flow rates.

B. Solid Wastes

Fresh residue from the reactor cleanout process and from floor washings yielded the highest concentration of vinyl chloride. Relatively high concentrations were also found in "old" solid waste taken from a company landfill area, and in dry waste which is hauled away by private contractor to an outside landfill. Negligible amounts appeared in this company's treatment system sludge. It should be noted, however, that Uniroyal Chemical has experienced chronic problems with adequate sludge settling in their clarifier system.

Generally, these data indicate that "old" solid wastes generated by this PVC facility are not necessarily innocuous. Landfilling of these wastes may not be an acceptable final disposal method, as vinyl chloride continues to be given off for weeks or months.

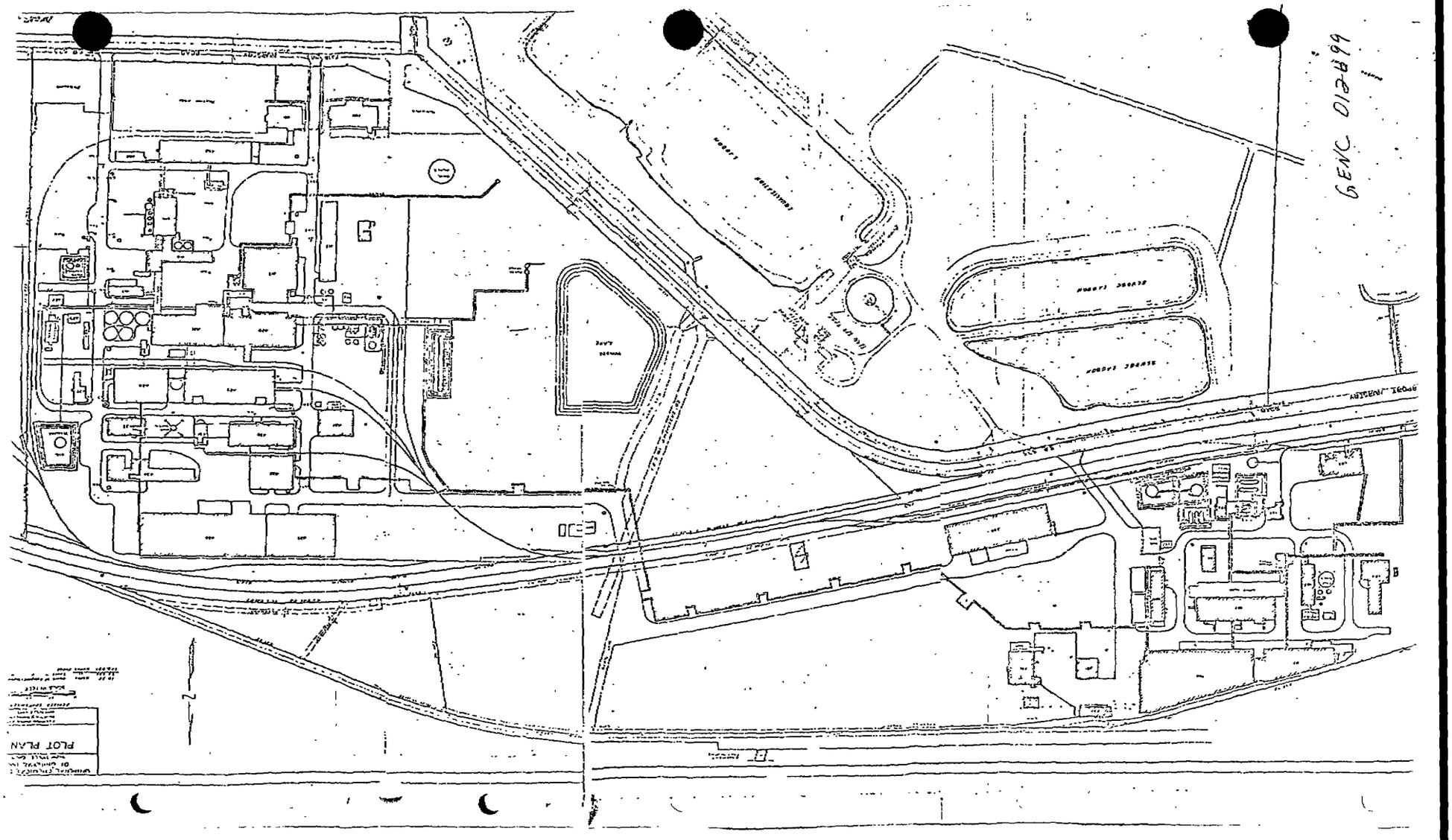


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TABLE 1

DISCHARGER: UNIROYAL CHEMICAL
PAINESVILLE, OHIO

Source	Sample Type	Sample Date	Sample Time(EDST)	Flow (MGD)	Vinyl Chloride Concentration	Loading
Wastewater						
Intake	24C	5/6-7/74	1130-0930	-	<200 µg/l	-
Outfall 001	24C	5/6-7/74	1130-0930	0.288(est)	<200 µg/l	-
Outfall 002 (main)	24C	5/6-7/74	1130-0930	1.109	3700 µg/l	34.2 #/day
Sludge lagoon overflow	G	5/6/74	1400	-	1100 µg/l	-
Solid Wastes						
South sludge lagoon (2)	G	5/6/74		-	14 µg/g	-
Company disposal area (3)	G	5/6/74		-	2140 µg/g	-
Area 1 waste bin (2)	G	5/6/74		-	620 µg/g	-
Area 1 settling pit (1)	G	5/6/74		-	3520 µg/g	-
Area 4 waste bin (2)	G	5/6/74		-	1340 µg/g	-
North sludge lagoon (2)	G	5/7/74		-	9 µg/g	-

Notes: 1. Composite types - 24C = 24-hour composite
G = Grab

2. Relative solid waste ages
1. Fresh (Two hours or less)
2. Intermediate (Several hours to several days)
3. Old (Several weeks to several months)