

**INDUSTRIAL WASTE SURVEY
Diventco Incorporated
and
Housatonic River
New Milford, Connecticut
October 21, 1971**

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DIVENTCO INCORPORATED
NEW MILFORD, CONNECTICUT
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At the request of the U.S. Attorney for Connecticut, personnel from the Environmental Protection Agency, Region 1, sampled the outfall from Diventco Inc. and the Housatonic River in New Milford, Connecticut, on October 21, 1971. Donald Porteous and Donald Berger, sanitary engineers, collected all samples. Mr. Porteous supervised the sample collection. Charles Corkin II, attorney for the Environmental Protection Agency, accompanied the sampling crew.

The objective of the study was to sample for an enforcement action against the company under the 1899 River and Harbor Act.

Diventco Incorporated

Diventco Inc. is primarily involved with the fabrication of printed circuit boards by a plating and etching process. Diventco discharges approximately 30,000 gallons per day of untreated rinsewater through a pipe located on the east bank of the Housatonic River (see Figure 1 and 5). The plant operates 10 hours per day, four days per week.

The production process requires the etching of the copper plated board with hydrochloric, sulfuric, and fluoboric acids and ammonium persulfate. Between each process bath the boards are washed with water to remove chemical films thereby preventing contamination of the baths. The baths are agitated by quantities of water to remove the tenaciously-adhering chemical film.

Sampling Procedures

On October 15, 1971, Mr. Porteous received permission from Mr. Finley, President of Diventco Inc. to sample the effluent for possible enforcement action. Dye studies performed on October 20, 1971, revealed that Diventco discharges its waste through a 6 inch pipe to the Housatonic River (Figures 2 through 4).

Sampling stations are shown in Figure 6. Table 1 gives the location of the sampling stations. The sampling crew collected samples in storage and transport containers and preserved the samples as noted below:

<u>Cubitainer Size</u>	<u>Preservation</u>	<u>Analysis</u>
One quart cubitainer	Iced	Residue series
One quart cubitainer	Iced	Acidity and alkalinity
One quart cubitainer	Iced	Total nitrogen .
One quart cubitainer	5 ml CHCl_3 and Iced	Total phosphorus
One quart cubitainer	Iced	Metals
Dissolved oxygen bottles	E.P.A. Standard Method	Dissolved oxygen

The metal samples were analyzed for copper, lead, tin and nickel by atomic absorption spectroscopy. Arsenic was analyzed by a wet chemical technique. Flow measurement was made five times using a calibrated bucket noting the volume collected during various time intervals. Sample temperature was measured in the field with a metal thermometer. The pH was measured with an electrode pH meter. Samples were preserved as shown above and returned to the Needham laboratory for analysis the day of the sampling.

Sample Identification

Each sample was tagged with one chain of custody tag giving collecting agency, laboratory number, time, date, source of sample, collector's signature and title, and witness's signature and title, plus information on the transfer of the sample. In addition a pre-numbered field data card was filled out for each collection time to record weather conditions, the temperature of the sample, and the sampling location.

Results

Tables 2 and 3 summarize the results of the laboratory analysis. Table 4 shows the loading rates of the various metals to the river.

The flow rate of the industrial discharge at the time of sampling averaged 24,600 gallons per ten hour day. Mr. Finley said his discharge rate was 30,000 gallons per ten hour day.

The pH of the discharge varied between 2.8 and 3.9 reflecting the fact that acid wash is discharged.

Sample number 29460 was collected when a foamy blue slug was flowing from the discharge pipe which appeared to be an abnormal discharge, therefore it was not included in determining average values.

Nitrogen and phosphorus are essential nutrients for the growth of aquatic organisms including algae. An overabundance of these nutrients leads to eutrophication of rivers and lakes. Diventco's waste contained both nutrients.

Diventco discharges 58.5 pounds per day of solids to the Housatonic River as measured by the total residue test. The river downstream of the Diventco plant showed an increase in total solids content.

Total solids are classified as dissolved solids, filterable residue, and suspended solids, nonfilterable residue. Dissolved solids, discharged at a rate of 57.3 pounds per day, can be chemically and/or biologically transformed to suspended solids in the stream. Suspended solids in the river increased below the Diventco plant. Disregarding any toxic effects, suspended solids may kill fish by causing abrasive injuries; by clogging the gills; and by blanketing the bottom killing eggs, destroying spawning beds, and killing food organisms. Indirectly, suspended solids are harmful in that they screen out light, thus preventing photosynthesis in the stream. Part of the solids discharged are heavy metals including copper, lead, nickel and tin, and since the pH of the waste is so low most of these metals are dissolved in the waste.

Diventco discharges approximately 1.7 pounds per day of copper which increases the quantity of copper in the Housatonic River. The average copper concentration below the plant was 93 ug/l which is over four and one half times the threshold concentration of 20 ug/l which adversely affects fish and aquatic organisms.

The concentration of lead and nickel in the Housatonic River also increased below the Diventco plant. Both of these metals are toxic to man and aquatic organisms.

Diventco discharges approximately 0.75 pounds per day of tin. The increase in the tin concentration in the river could not be measured due to the sensitivity of the instrument used.

The firm also discharges small quantities of arsenic.

TABLE 1
SAMPLE STATION IDENTIFICATION

<u>Station</u>	<u>Latitude</u> ° ' "	<u>Longitude</u> ° ' "	<u>Description</u>
(Outfall) D001	41 34 25	73 24 47	Industrial outfall from Diventco Inc. into Housatonic River
(River) H001	41 34 29	73 24 55	Housatonic River at Route 67 Bridge
H002	41 34 21	72 34 47	Housatonic River approximately 500 yards downstream of the outfall

SAMPLE ANALYSES

ABBREVIATIONS AND UNITS OF MEASURE

<u>Analyses Reported</u>	<u>Description</u>	<u>Measured In</u>
Temperature	Sample temperature	Degrees centigrade (°C)
pH		Standard Units (S.U.)
DO	Dissolved oxygen	Milligrams per liter(mg/l)
Acidity	Capacity of water to donate protons	mg/l as CaCO ₃
Alkalinity	Capacity of water to accept protons	mg/l as CaCO ₃
Total residue	Total solids	mg/l
Total nonfilterable residue	Total suspended solids	mg/l
TKN	Total kjeldahl nitrogen	mg/l as nitrogen
Total phosphorus		mg/l as phosphorus

Letters preceding a reported value denote the following:

- J - estimated as, value not accurate
- K - less than
- L - greater than

TABLE 2
DIVENTCO INCORPORATED
AND
HOUSATONIC RIVER
SUMMARY SHEET
OCTOBER 21, 1971

Station	Time	Temp (°C)	pH (S.U.)	TKN (mg/l)	Acidity (mg/l)	Alkalinity (mg/l)	Total Phosphorus (mg/l)	D.O. (mg/l)	Total Residue (mg/l)	Total Non- Filterable Residue (mg/l)	Lab Code
(Industrial Outfall)											
DOO1	1025	19.5	2.8	2.7	217.5		0.96		270	7.5	29451
DOO1	1040	18.0	3.2	12.0	100.5		2.20		330	2.5	29452
DOO1	1055	18.0	3.9	23.2	44.5		1.56		255	8.9	29453
DOO1	1015						1.24				29460
(River)											
HOO1	0925	12.5	7.7	1.2	3.0	82	.07	9.4	162	4.2	29454
HOO1	0940	12.5	7.4	0.4	5.8	367	.08	9.5	160	7.0	29455
HOO1	1005	12.5	7.5	0.5	4.7	95	.08	8.9	160	8.4	29456
HOO2	1110	13.0	7.6	0.4	4.0	102.5	.08	9.3	206	5.2	29457
HOO2	1125	13.0	7.7	0.5	4.3	93	.10	9.5	167	12.5	29458
HOO2	1140	13.0	7.8	0.4	2.7	107	.08	9.5	172	10.4	29459

TABLE 3
DIVENTCO INCORPORATED
SUMMARY SHEET
OCTOBER 21, 1971

Station	Time	Copper (ug/l)	Lead (ug/l)	Tin (ug/l)	Nickel (ug/l)	Arsenic* (ug/l)	Lab Code
(Outfall)							
D001	1025	3120	980	6000	30	11	29451
D001	1040	9340	540	2600	20	14	29452
D001	1055	12680	240	2400	20	6	29453
D001	1015	80	30	K 1200	20	14	29460
(Housatonic River)							
H001	0925	10	10	K 1200	K 20	9	29454
H001	0940	26	20	K 1200	K 20	23	29455
H001	1005	60	30	K 1200	20	11	29456
H002	1110	70	30	K 1200	20	14	29457
H002	1125	200	40	K 1200	30	17	29458
H002	1140	10	30	K 1200	30	K1.0	29459

*Analyzed by wet chemical technique

TABLE 4
SUMMARY OF METALS LOADING

<u>Metal</u>	<u>Loading Rate</u> <u>(Pounds / day)</u>
Copper	1.72
Tin	0.752
Lead	0.121
Nickel	0.005
Arsenic	0.002
Total Residue	58.5

Basis: Discharge rate equal to 24,600 gallons per ten hour day

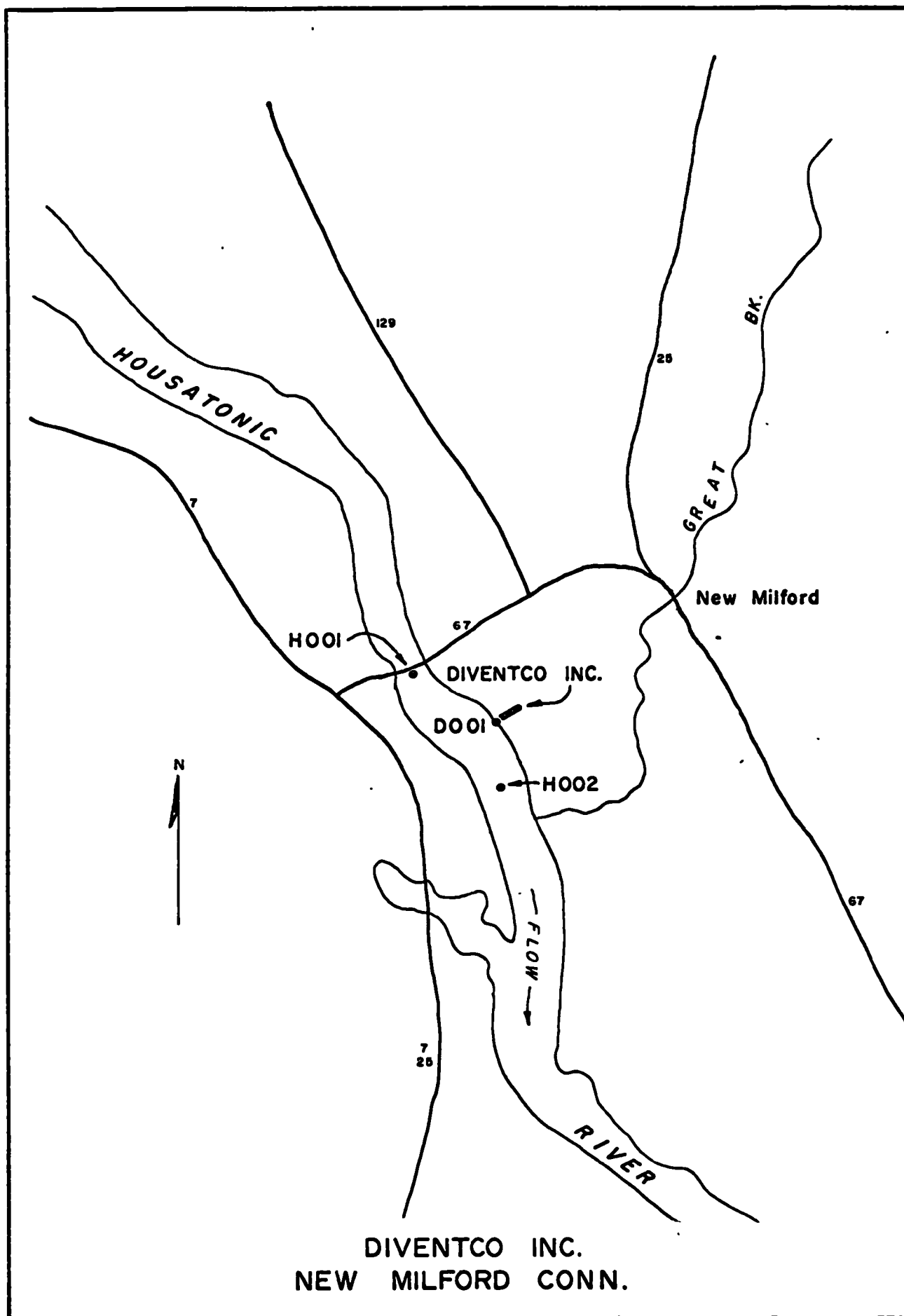


FIGURE 1

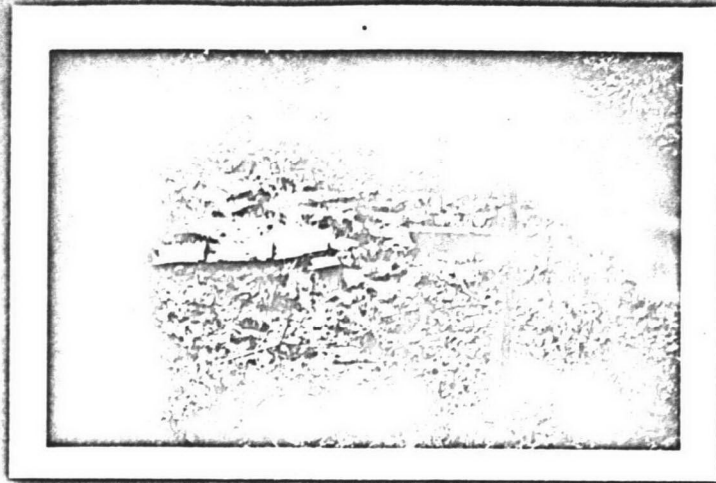


Figure 2: Dye study 1630 hours
Diventco Inc. outfall

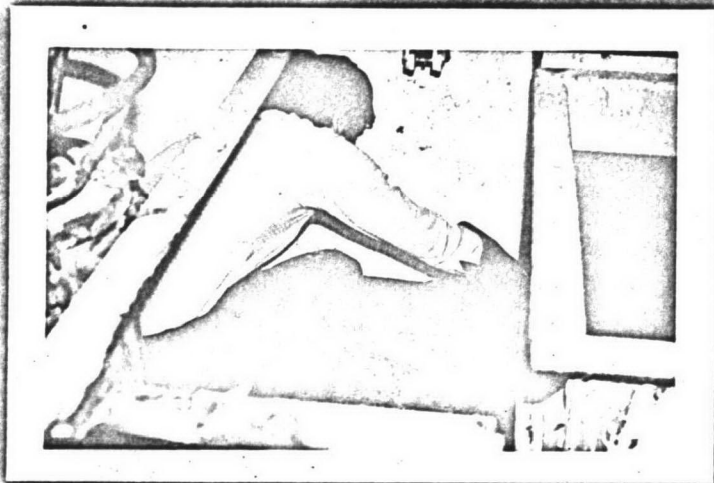


Figure 3: Dye study 1635 hours
Dye entered in process pipe

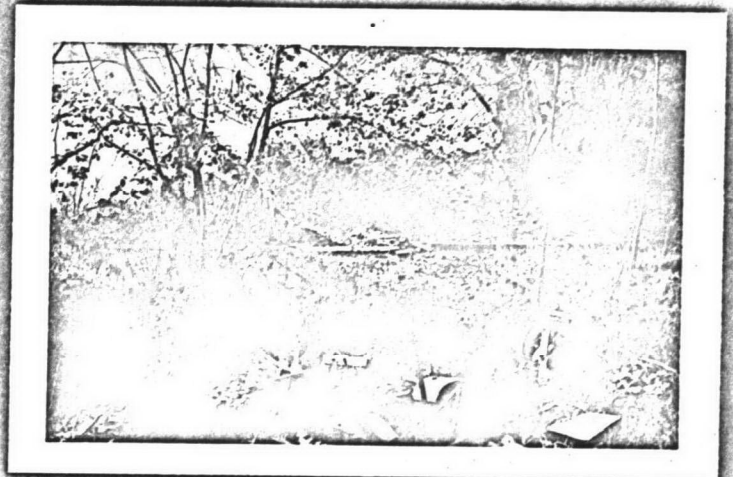


Figure 4: Dye study 1640 hours
Showing dye flowing from pipe

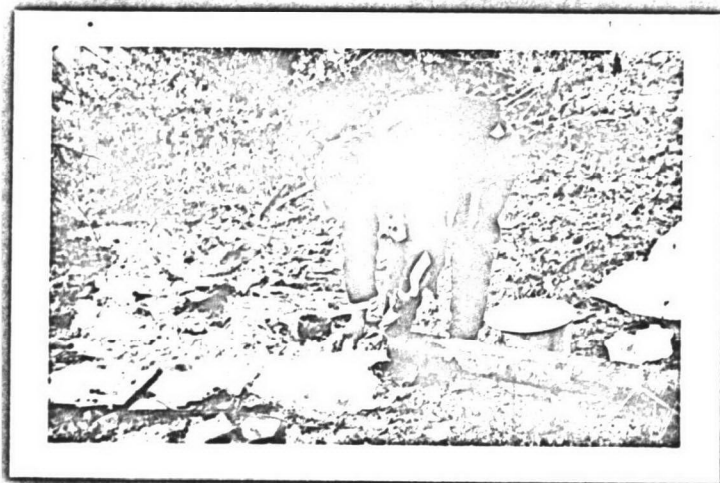


Figure 5:
Showing flow from Diventco Inc.
outfall directly into river

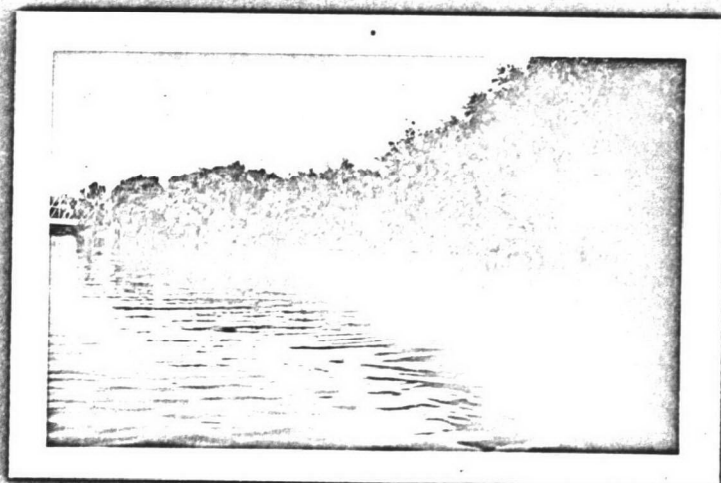
Figure 6:
Sampling stations



H001



D001



H002

References

1. Jack E. McKee and Harold W. Wolf,
California State Water Quality Control Board, 1963.
2. Methods For Chemical Analysis Of Water And Wastes;
Environmental Protection Agency Water Quality Office,
Cincinnati, Ohio, 1971