

PROGRESS REPORT

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JOB NO.

REPORT NO.

DATE

TECHNICAL SERVICES DEPT. W. G. KRUMRICH PLANT

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TITLE: Aroclor Removal Experiment - WGK Waste Water

PERSONNEL: M. Foresman (C. F. Buckley)

PROBLEM: Removal of Aroclor from WGK Waste Water

SUMMARY

During December 1970, a large scale experiment was conducted at the Village of Sauget Waste Treatment Plan to evaluate whether Aroclor in acidic waste waters could be effectively reduced by precipitation and settling of Ca++, Mg++, etc. when the waste water is neutralized by the addition of lime.

The experiment was conducted for a total of 72 hours with the amount of waste water neutralized averaging 23.3 MGD. A total of 90 samples were collected from the influent and effluent. Eighteen shift samples covering the 72-hour period were analyzed for Aroclor and removal efficiencies were calculated.

CONCLUSIONS:

1. Aroclor removal efficiency not increased by neutralization.
2. Further analysis of samples not justified because consistent results were obtained from the 18-shift samples.

Mike Foresman

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Pollution Control

pd

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AROCLOR REMOVAL EXPERIMENT

PURPOSE: To conduct a large scale experiment under field conditions to determine if Aroclor in acidic waste waters can be reduced by precipitation of Ca^{++} and Mg^{++} , etc. when the waste water is neutralized by the addition of lime.

DISCUSSION: The test was conducted at the Sauget Village Treatment Plant for a period of 72 hours starting on Tuesday morning, December 15, at 8:00 A.M. The pH of the total influent to the treatment plant was controlled to between six and nine by the addition of lime from Department 265. Samples of the influent and effluent at the treatment plant were collected by automatic samplers and analyzed for Aroclor content.

PROCEDURE:

1. On December 15, at 8:00 A.M., lime was added to the treatment plant influent in a quantity sufficient to maintain the pH between six and nine. Department personnel were required to regulate the addition of lime to the north area sewer.
2. After the pH of the influent had stabilized between six and nine (approximately two hours), continuous hourly samples and composite shift samples were collected at the influent and effluent to the treatment plant.
3. The pH of the influent was monitored with a recording pH meter connected to the Parshall flume at the treatment plant. Monsanto personnel monitored the pH meter so that fluctuations in pH were controlled by regulating the lime addition from Department 265.
4. After the test had been in progress for 16 hours, the two sets of shift samples were analyzed by the laboratory. The results showed that the removal efficiency was not significantly greater than the control efficiency so it was decided to continue the test for the full 72-hour period.
5. A control removal efficiency was calculated as 64.2% by using data from unneutralized influent and effluent samples analyzed during the last six months.
6. All samplers used were reconditioned, using new tubing and each sample was collected in a separate clean bottle to insure that Aroclor contamination did not occur.
7. All of the shift samples were analyzed by the laboratory with a total of 12 shift samples analyzed for a 48-hour test, or 18 samples for a 72-hour test. If the results of these samples were not consistent, selected hourly samples could be analyzed as needed to establish the Aroclor removal efficiency.

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TABLE #1. AROCLOR CONTENT SHIFT SAMPLESINFLUENT SAMPLES

<u>SAMPLE #</u>	<u>SAMPLE DESCRIPTION</u>	<u>PCB (ppb)</u>	<u>TYPE</u>
1	Day - 12/15	170	1242
2	Middle - 12/15	241	1242
3	Late - 12/15	802	1242
4	Day - 12/16	69	1242
5	Middle - 12/16	249	1242
6	Late - 12/16	107	1242
7	Day - 12/17	147	1242
8	Middle - 12/17	206	1242
9	Late - 12/17	106	1242

EFFLUENT SAMPLES

10	Day - 12/15	5	1242
11	Middle - 12/15	121	1242
12	Late - 12/15	375	1242
13	Day - 12/16	18	1242
14	Middle - 12/16	70	1242
15	Late - 12/16	42	1242
16	Day - 12/17	145	1242
17	Middle - 12/17	149	1242
18	Late - 12/17	356	1242

TABLE #2. REMOVAL EFFICIENCY - SHIFT SAMPLES

<u>#</u>	<u>INFLUENT</u>	<u>#</u>	<u>EFFLUENT</u>	<u>% REMOVED</u> (1.0 - EFF/INF)
1	170	10	5	97.1
2	241	11	121	49.8
3	802	12	375	53.3
4	69	13	18	74.0
5	249	14	70	71.9
6	107	15	42	60.8
7	147	16	145	- *
8	206	17	149	27.7
9	106	18	356	- *

Ave. (7 samples) = 62.0%

* Increase in Aroclor content from influent to effluent due to scour and short circuiting of settling basins.

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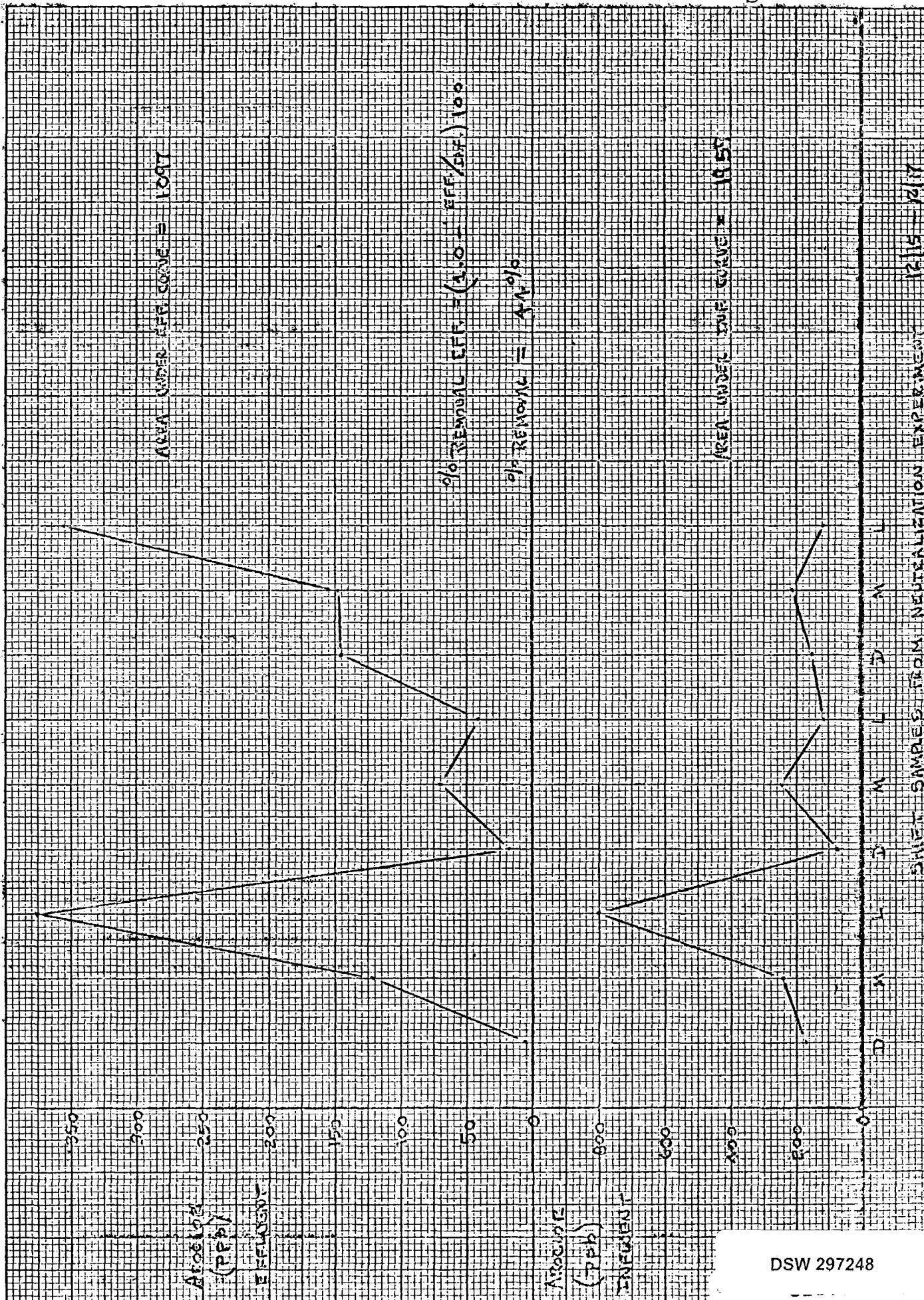


FIGURE # 4.

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SUMMARY:

The eighteen shift samples collected during the 72-hour period of the experiment were analyzed by the W GK laboratory for Aroclor content with the results as shown in table #1. The removal efficiencies were calculated for each shift and then averaged as shown in table #2.

Because of the wide range in Aroclor content of the shift samples (5 ppb → 375 ppb), a second method was used to calculate the removal efficiency. Influent and effluent curves were plotted as Aroclor content (ppb) versus time and then a total removal efficiency was calculated by using the areas under both curves as shown in figure #1. This method gave an Aroclor removal efficiency of 44% as compared to a 62% removal efficiency when calculated as shown in table #2. More sophisticated methods of data analysis were not justified due to the small number of samples analyzed.

CONCLUSIONS:

1. The neutralization of the treatment plant influent did not increase the removal of Aroclor in the settling basins. Efficiency calculated at 62% compared to 64% for unneutralized influent.
2. Because the average removal efficiency was lower than the control, further analysis of the hourly samples is not justified.

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