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STS Consultants Ltd.
Consulting Engineers

Groundwater Extraction Program

1986 Progress Report for
Wausau Chemical Corporation

GW P+T operating as of Jan '87

Department of Natural Resources

Antigo, Wisconsin

Report

STS Consultants Ltd.
Consulting Engineers

540 Lambeau Street
Green Bay, Wisconsin 54303
(414) 494-9656

January 15, 1987

Department of Natural Resources
P.O. Box 310
Antigo, Wisconsin 54409

Attention: Mr. Jack Saltes

STS Job 12776-B

RE: Wausau Chemical Corporation Groundwater Extraction Program

Gentlemen:

On behalf of Wausau Chemical Corporation, we are submitting a progress report for 1986 concerning the above referenced project. Five copies of the report are enclosed.

Please contact us to arrange a meeting to discuss the extraction program. Also, if you have any questions concerning this report, please feel free to contact us at your convenience.

Yours very truly,

STS CONSULTANTS LTD.

Mark D. Millsop
Mark D. Millsop
Environmental Geologist

Douglas J. Hermann
Douglas J. Hermann, P.E.
Vice President-Environmental Division

MDM/ds

cc: Mr. Ray Krueger
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211 West Wisconsin Avenue
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Mr. Jim Cherwinka
Wausau Chemical Corporation
P.O. Box 953
Wausau, WI 54401

Report

Project

GROUNDWATER EXTRACTION PROGRAM

1986 PROGRESS REPORT

Client

WAUSAU CHEMICAL CORPORATION
P.O. BOX 953
WAUSAU, WISCONSIN 54401

Project # 12776-B

Date JANUARY, 1987

STS Consultants Ltd.
Consulting Engineers

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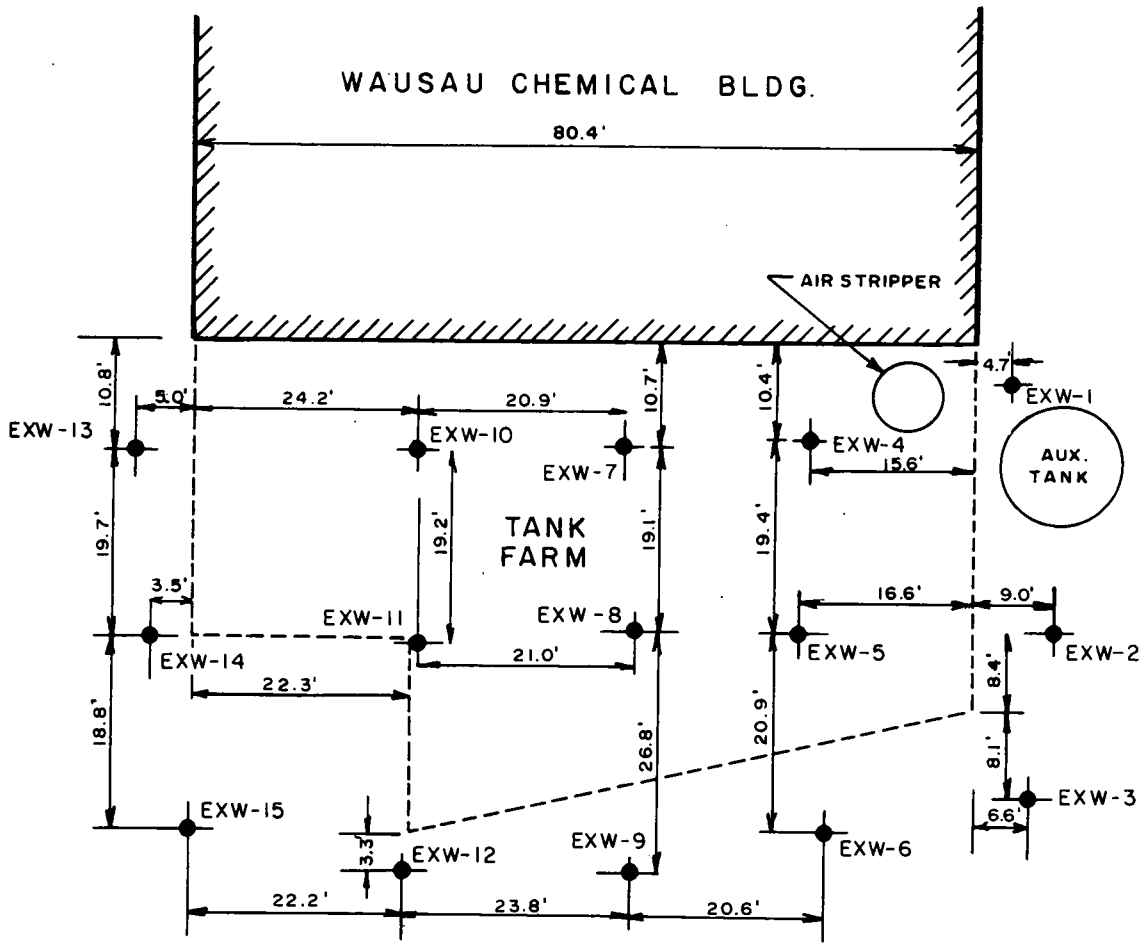
I. INTRODUCTION

The purpose of this report is to summarize the Wausau Chemical Corporation groundwater extraction system data collected in 1986 and to evaluate the effectiveness of the system to date. The system was installed in 1985 for the purpose of cleaning up spilled tetrachloroethylene; other VOC contamination also has been cleaned up by the system. This report includes 1986 water quality, water level and quantitative pumping data.

The Wausau Chemical Corporation is located on the east bank of the Wisconsin River at 2001 River Drive which is in the NW 1/4 of the NW 1/4 of Section 25, T29N, R7E of the City of Wausau, Marathon County, Wisconsin. For historical information concerning the tetrachloroethylene (also known as perchloroethylene (PCE)) spill at the site, please refer to the STS reports dated July 25, 1984 and April 3, 1985. Soil boring logs and well installation diagrams concerning the extraction well installations are summarized in the STS December 17, 1985 report. Furthermore, the groundwater extraction, treatment and monitoring procedures, and the results of pumping from well cluster 1 were described in that report.



EXTRACTION WELL LOCATION DIAGRAM
WAUSAU CHEMICAL FACILITY
FIGURE 1

N

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J.J.T	1-15-85	No Scale	12776 B

II. PROCEDURES

A. Groundwater Extraction and Treatment

The groundwater extraction and treatment system was installed per the recommendations in STS's April 4, 1985 report. Figure 1 illustrates the locations of the systems's major components. Generally, the system consists of six 1-horsepower submersible pumps installed in a cluster of six wells and an air stripper. Prior to this fall, the extracted water was pumped through hoses to an auxiliary tank which was fitted with a 3-horsepower centrifugal pump. The water was pumped from the tank to the air stripper at a rate of approximately 145 gallons per minute (gpm). However, for winterization purposes, the tank was removed; now, the water is pumped from the six wells into a header pipe in the Wausau Chemical plant. After passing through a meter, the water is pumped back outside to the top of the air stripping tower. The pressure is totally supplied by the well pumps. Because of this, the maximum pumping rate of the system has decreased to approximately 100 to 110 gpm.

After the extracted water is stripped, it is gravity drained through a 6-inch PVC pipe to a storm sewer from where it eventually is discharged into the Wisconsin River. The WPDES Discharge Permit was obtained in the spring of 1986; previously, the effluent from the air stripper was discharged into the Wausau City sewer system and was treated at the Wausau wastewater treatment plant. For winterization purposes, the PVC line was repiped this fall so that it passes into the heated Wausau Chemical plant prior to discharge into the storm sewer.

B. System Monitoring

During the extraction program, periodic water analyses were performed. The monitoring program primarily was undertaken to determine the contaminant level in the air stripper influent and effluent. The data obtained from that monitoring allowed calculation of the air stripper efficiency and, furthermore, it allowed checking of the discharge quality for compliance with the project requirements. Pumping rates were adjusted as needed to achieve compliance.

Water samples were obtained from the specially installed sample valves on the wells and were analyzed prior to a cluster move. When reasonably stable water quality was observed, extraction in a well cluster was terminated and the pumps were moved to a new well cluster (generally only 2 to 3 pumps were moved to make a new cluster).

All water samples were analyzed by Zimpro Laboratories in Rothschild, Wisconsin. In addition, pumping rates, pumping duration and water levels were measured regularly.

III. RESULTS

A. Extraction Program History

A generalized historical summary of the extraction program is presented in Table 1. Refer to the December 17, 1985 STS report for a comprehensive data summary concerning the 1985 extraction program and refer to Appendix A in this report for a comprehensive data summary of the 1986 extraction program. Thus far, as described in the table, there have been various minor problems, but overall the system has worked quite well.

The first cluster of wells that was pumped included extraction wells 10, 11, 12, 13, 14 and 15. They were pumped until November 15, 1985 when the pumps were removed from wells 13, 14 and 15, and were reinstalled in wells 7, 8 and 9. Thus, the second cluster of wells consisted of extraction wells 7, 8, 9, 10, 11 and 12. Because the system was not winterized in 1985, it was shutdown for the winter on December 5, 1985.

System start-up was attempted in late May and early June, 1986. However, difficulties were encountered because the areal groundwater table had been lowered due to increased pumping from approximately 1000 to 1400 gpm in municipal pumping well 4. The lower water table reduced the extraction well yields significantly. However, the original design concept for the extraction system provided flexibility in adapting to changes. To alleviate the problem, the submersible pumps and float controls were lowered. After a tuning period, the system was "officially" started on June 24, 1986. These operational problems generally were not encountered in 1985.

After start-up, the system was operated almost continuously until September 20 when the pumps were moved from wells 9 and 12 into wells 4 and 5. This move was based on the fact that PCE concentration stabilization had occurred in the cluster 2 configuration. Thus, on September 20, pumping commenced in cluster 3. Pumping in that cluster has continued to the present with periodic shutdowns primarily for system winterization.

TABLE 1

GENERALIZED EXTRACTION PROGRAM HISTORY

Date	Activity
1985	
Oct. 11	Stripper installation started
Oct. 23	Attempted start-up. Blower would not stay on. Determined that motor/blower combination designed incorrectly. Blower people were to install new blower Monday, October 28, but didn't come in until October 30.
Oct. 30	Started to operate but breakers would not stay on.
Oct. 31	Rewired - operated about 3 hours - mechanical operation checked out OK.
Nov. 1	Operated approximately 4 hours
Nov. 2	Operated approximately 4.5 hours
Nov. 3	Operated approximately 5 hours
Nov. 4 Nov. 5	Operated approximately a 4-hour morning - started again at 4 p.m. and operated all night and all day until 8 a.m., November 6.
Nov. 7 Nov. 8-9	Started only wells 10 and 11 at 2 p.m. and operated until system failed Friday night or Saturday morning due to snow storm. Everything had frozen.
Nov. 12	Thawed system out and restarted at 4:30 p.m.
Nov. 13	Operated only wells 10 and 11 all day.
Nov. 14	Shut system off at 2 p.m. Discussed water meter not working.
Nov. 15	Moved pumps from wells 13, 14 and 15 to wells 7, 8 and 9. Operated well 11 for only 2 hours to get water level readings.
Nov. 19	Could not start-up. Lines were frozen.
Nov. 20	Pulled pumps to remove check valves and thaw out lines. Installed heat tape on tank line valve and meter.

Date	Activity
Nov. 21	Started wells 7, 8 and 9 at 4 p.m. Operated until 4 p.m., November 22. Shutdown to take out water meter (the new meter was not working again).
Nov. 25	Meter repaired. Thanksgiving week - did not attempt to operate due to cold temperatures and manpower shortage.
Dec. 5	Started wells 7 and 10 at approximately 8:30 a.m. Operated until 10:30 a.m. when system was shutdown for the winter due to unfavorable weather conditions.
1986 Jan. 9	Meeting with DNR to discuss extraction program.
April 7	WPDES Discharge Permit issued by DNR to allow discharge of treated contaminated groundwater into the Wisconsin River.
May/June	Start-up difficulties encountered due to low areal groundwater conditions.
384 hr June 24	System start-up.
17 hr July 10	System shutdown from 8 a.m. to 4 p.m. for system maintenanc
216 July 19	System shutdown from 9 a.m. to 2 p.m. for system maintenanc
744 Aug. 19	System shutdown from 7:30 a.m. to 11 a.m. for system maintenance.
92 Aug. 23	Control box burned out sometime over weekend. System shutdown for repair.
Aug. 26	System restarted at 10 a.m.
576 — Sept. 20	Pumps removed from wells 9 and 12, and installed in wells 4 and 5 (cluster 3) at 10 a.m.
240 Oct. 1	System shutdown from 10 a.m. to 4 p.m. for winterization preparation.
0 Oct. 3-10	System partially shutdown for winterization preparation. System operation was sporadic.
336 Oct. 24- Nov. 2	Wisconsin River drawn down to allow repair of dam. Associated lower groundwater levels caused some cycling of pumps. Pumps had to be throttled back to alleviate cycling.
7	

B. Air Stripper Efficiency

1. Well Cluster 2

PCE concentrations for some cluster 2 wells, and the air stripper influent and effluent for several sampling dates are presented in Table 2. PCE concentrations in samples collected from wells 10 and 11 showed a marked decrease with time.

Air stripper influent and effluent samples were collected on twelve occasions from late June through late August for PCE analysis. The influent concentrations ranged from 9.360 to 2.630 parts per million (ppm), whereas effluent concentrations ranged from 1.475 to 0.337 ppm. Figure 2 illustrates the decrease in PCE concentration with duration of pumping in well cluster 2. The influent and effluent concentrations were reasonably stable for approximately 2 months prior to commencement of pumping in well cluster 3. Also, note that the pumping rate was reasonably constant with time.

Air stripper efficiency calculated from the influent and effluent concentrations ranged from 82.5% to 88.2% and averaged 85.6%. Thus, on the average, 85.6% of the PCE that was introduced into the air stripper was removed.

The air stripper influent and effluent also were analyzed for twelve Volatile Organic Compounds (VOCs) on June 24 and ten VOCs on July 21, August 20, August 27, and August 29. The monitoring of those ten VOCs is required by the Department of Natural Resources (DNR) on a monthly basis to satisfy WPDES Permit compliance. The air stripper efficiency for removing the 10 to 12 VOCs ranged from 83.3% to 88.0% (Table 3).

TABLE 2

MEASURED PERCHLOROETHYLENE CONCENTRATIONS - WELL CLUSTER 2

Sampling Date	Extraction Well (ppm) 10	11	12	Stripper Influent(ppm)	Stripper Effluent(ppm)	Stripper Efficiency
10-3-85	144.0					
11-14-85		9.4				
12-5-85	6.0					
6-24-86				9.360	1.475	84.2%
6-27-86				7.770	1.350	82.5%
6-30-86				6.300	1.050	83.3%
7-7-86				5.290	0.815	84.6%
7-14-86				5.150	0.770	85.0%
7-21-86				3.870	0.605	84.4%
7-28-86				2.840	0.345	87.9%
8-4-86				3.240	0.410	87.3%
8-12-86				2.810	0.340	87.9%
8-20-86				3.140	0.370	88.2%
8-27-86	1.620	5.740	0.600	2.630	0.425	83.8%
8-29-86	2.210	5.820	0.797	2.840	0.337	88.1%

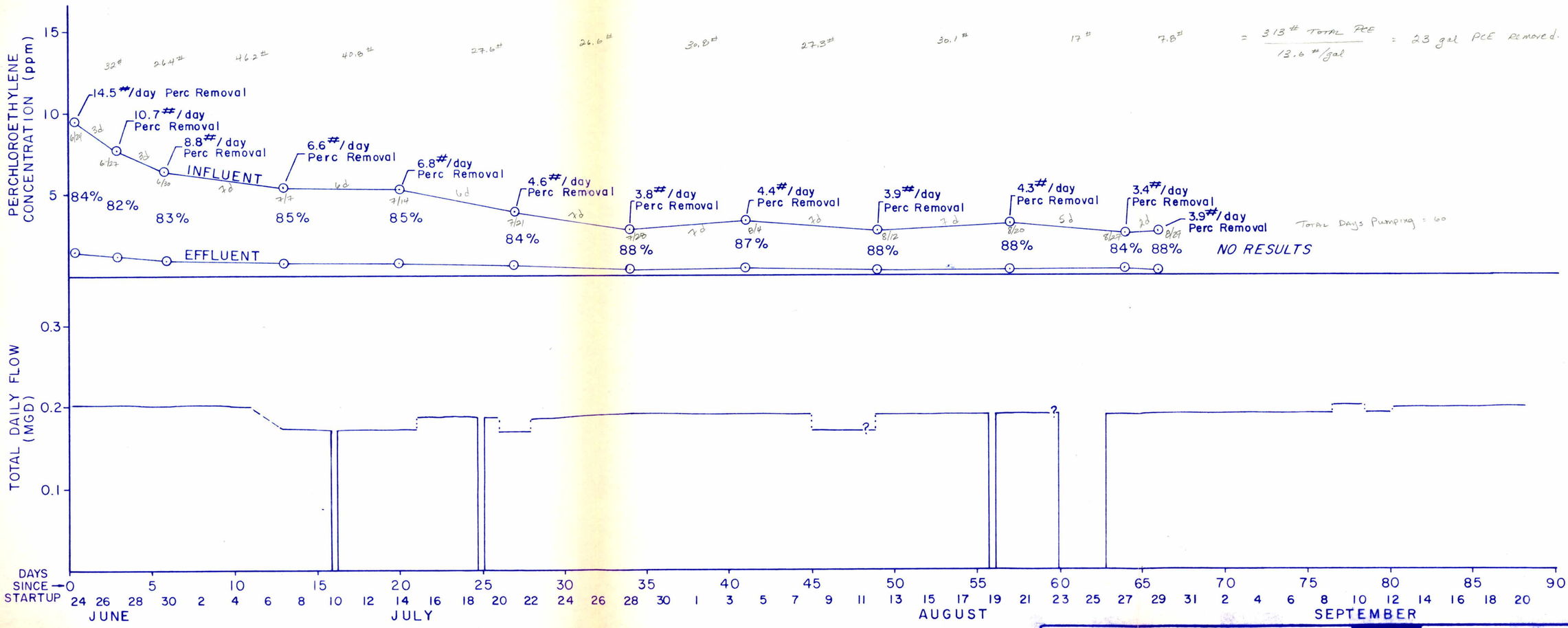

FIGURE 2: 1986 AIR STRIPPER ANALYSIS - WELL CLUSTER 2

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TABLE 3

VOC CONCENTRATIONS AND AIR EMISSIONS
WELL CLUSTER 2

Sampling Date	Stripper Influent (ppm)	Stripper Effluent (ppm)	Stripper Efficiency (%)	Air Emissions (lbs/day)
6-24-86	17.05	2.854	83.3	23.9
7-21-86	4.550	0.735	83.8	5.4
8-20-86	3.670	0.440	88.0	5.0
8-27-86	3.410	0.530	84.5	4.4
8-29-86	3.410	0.414	87.9	4.6

Chronological water quality, water level and pumping data for well cluster 2 is included in Appendix A.

2. Well Cluster 3

PCE concentrations for some wells in cluster 3, and air stripper influent and effluent are presented in Table 4. PCE concentrations have decreased significantly with time. This trend also is reflected in Figure 3, a graph of the influent and effluent concentrations, and associated pumping rates.

Air stripper influent and effluent samples were collected on 10 occasions from late September to late December for PCE analysis. The influent PCE concentrations ranged from 6.220 to 0.998 ppm, whereas effluent PCE concentrations ranged from 0.640 to 0.044 ppm (Table 4). Air stripper efficiency calculated from the influent and effluent concentrations ranged from 80.7% to 97.1% and averaged 92.2%.

TABLE 4

MEASURED PERCHLOROETHYLENE CONCENTRATIONS - WELL CLUSTER 3

Sampling Date	Extraction Well (ppm)				Stripper Influent(ppm)	Stripper Effluent(ppm)	Stripper Efficiency
	4	5	10	11			
10-3-85			144.0				
10-11-85		145.0					
11-14-85				9.4			
12-5-85		40.0	6.0				
8-27-86			1.620	5.740			
8-29-86			2.210	5.820			
9-22-86	1.420	4.460			3.540	0.255	92.8%
9-29-86					6.220	0.640	89.7%
10-22-86					4.820	0.520	89.2%
10-28-86					>0.998	0.097	90.2%
11-3-86					2.340	0.164	93.0%
11-17-86					2.115	0.0825	96.1%
12-2-86					1.510	0.0440	97.1%
12-9-86					1.940	0.0575	97.0%
12-15-86					2.295	0.443	80.7%
12-29-86					1.565	0.059	96.2%

CONCENTRATION (ppm)
TOTAL VOC ⊡
PERCHLOROETHYLENE ⊙

15
10
5
0.3
0.2
0.1
0

TOTAL DAILY FLOW (MGD)

59.5 #
142.6 #
7.2 #
15.6 #
33.6
34.5

5.2 #/day Perc Removal
8.5 #/day Perc Removal
6.2 #/day Perc Removal
WISCONSIN RIVER LOWERED
1.2 #/day Perc Removal
2.6 #/day Perc Removal
2.4 #/day Perc Removal

INFLUENT
EFFLUENT

7d
9d
23d
10d
6d
6d
14d
15d

9/22
9/29
10/22
10/28
11/3
11/18

93 %
90 %
89 %
90 %
93 %
96 %

DAYS SINCE STARTUP → 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70

20 22 24 26 28 30 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29

SEPTEMBER
OCTOBER
NOVEMBER

15.4 12.6 22.1 = 343# / 13.6 #/gal = 25 gal PCE removed.

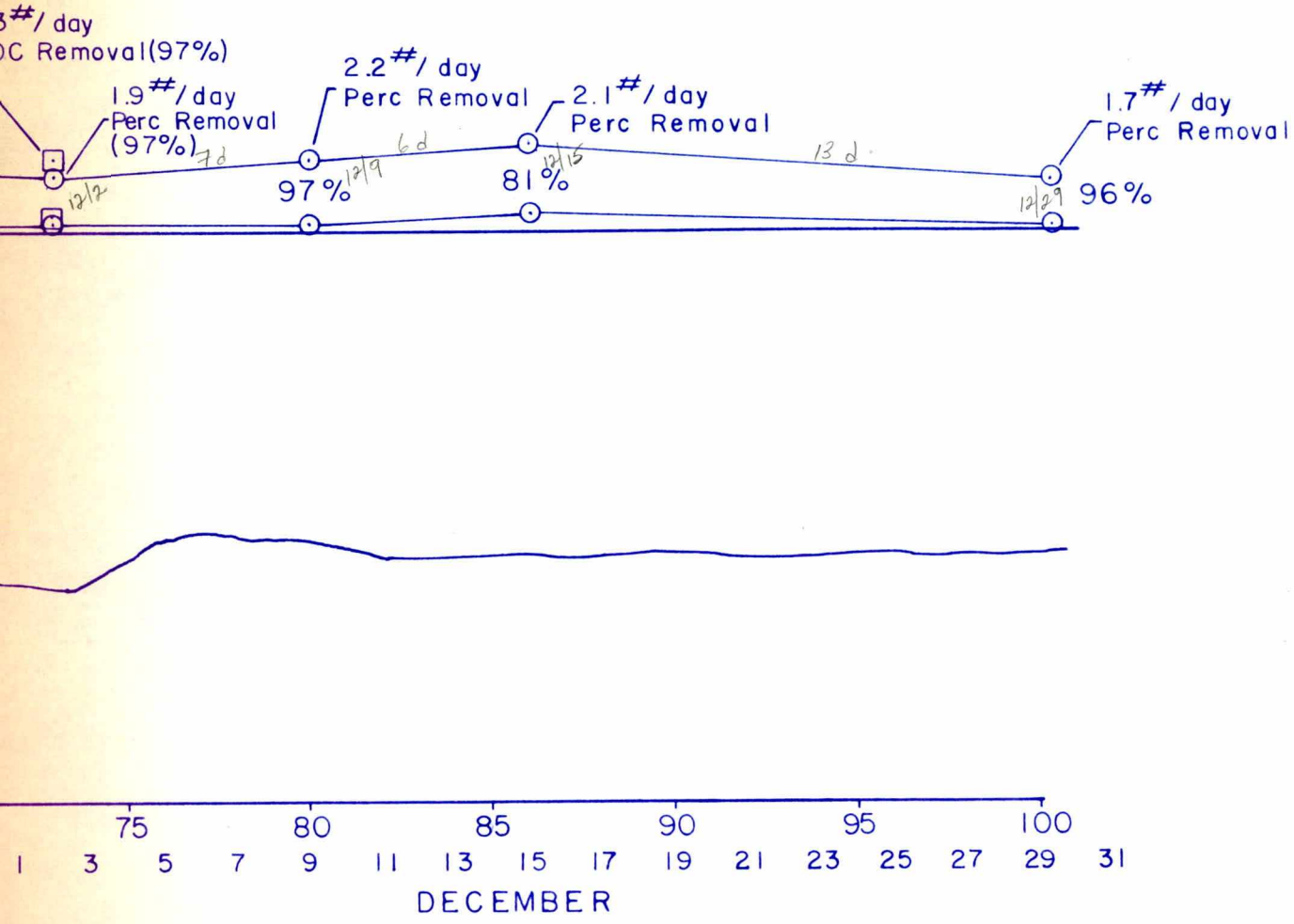

FIGURE 3 : 1986 AIR STRIPPER ANALYSIS - WELL CLUSTER 3

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Air stripper influent and effluent samples were analyzed for a full scan of VOCs on December 2, 1986. The total VOC removal efficiency was 97.0% (Table 5).

TABLE 5

TOTAL VOC CONCENTRATIONS AND AIR EMISSIONS
WELL CLUSTER 3

Sampling Date	Stripper Influent (ppm)	Stripper Effluent (ppm)	Stripper Efficiency (%)	Air Emissions (lbs/day)
12/2/86	1.795	0.054	97.0	2.3

3. Overall

The overall PCE removal efficiency for 1986 ranged from 80.7% to 97.1% and averaged 88.6%. This is very comparable to the 88% average achieved in 1985.

VOC removal efficiencies are included in Tables 3 and 5. These values are very similar to the PCE removal efficiency values on those dates.

C. Air Emissions

1. Well Cluster 2

PCE emissions from the air stripper were calculated for dates that influent and effluent PCE concentrations were measured (Table 2). PCE emissions values per day were estimated by multiplying the pumping rate times 1440 minutes times the measured influent PCE concentration in parts per million times 8.33 pounds per gallon times the calculated air stripper efficiency for that date. PCE emissions for

cluster 2 ranged from 14.5 to 3.4 pounds per day (Figure 2 and Appendix A). These values are less than the maximum allowable emissions of 15 pounds per day.

Because there were no full scan VOC analyses conducted on any samples during the period that cluster 2 pumped, we cannot calculate total VOC emissions. However, selected VOCs were analyzed for on five different occasions. It is our opinion that these selected VOCs constitute the majority (at least 90%) of the VOCs in the groundwater underlying the former tank farm. Therefore, these results were utilized to estimate total VOC air emissions. Table 3 presents a summary of the influent and effluent estimated total VOC concentrations, the air stripper efficiency and the air emissions for those sampling dates. After start-up and system adjustment, the total VOC air emissions were much less than the maximum allowable emissions. However, it should be noted that the influent and effluent concentrations and consequently, air emissions, values in Table 3 probably are slightly lower than actual total concentrations and emissions. Water quality and pumping data on which all of the above calculations are based are included in Appendix A.

2. Well Cluster 3

Daily PCE emissions were calculated for the dates that influent and effluent PCE concentrations were measured (Figure 3 and Appendix B). PCE emissions ranged from 8.5 to 1.2 pounds per day. These values are much less than the maximum allowable limit of 15 pounds per day.

Total VOC emissions for cluster 3 are presented in Table 5. The December 2, 1986 results are from a full VOC scan; only PCE was analyzed for on the the other sampling dates.

3. Overall

For 1986, PCE air emissions ranged from 14.5 to 1.2 pounds per day. Generally, PCE emissions averaged about 3 to 5 pounds per day. VOC air emissions ranged from about 23.9 to 2.3 pounds per day (Tables 3 and 5); the anomalous 23.9 pounds per day reading was measured during system start-up and adjustment. During normal operation, measured VOC air emissions were 5.4 pounds per day or lower.

IV. CONCLUSIONS AND RECOMMENDATIONS

A. Air Stripper Efficiency

1. Well Cluster 2

On the average, 85.6% of the PCE that was introduced into the air stripper was removed. Air stripper efficiency can be affected by many parameters such as influent concentrations, temperature and humidity. A general trend apparent in the PCE concentration data from cluster 2 is one of increasing air stripper efficiency with decreasing influent concentration (Figure 2).

2. Well Cluster 3

Thus far, PCE removal has averaged 92.2%. Over the time that cluster 3 has been pumped, the total daily flow has gradually decreased and now is relatively constant around 95 to 100 gpm. Generally, the data indicate that, as pumping rates decreased, the air stripper efficiency increased.

3. Overall

Overall the air stripper efficiency has been relatively good. VOC removal efficiencies are very similar to calculated PCE removal rates.

B. Air Emissions

1. Well Cluster 2

After start-up and system adjustment, the PCE and total VOC air emissions were much less than the maximum allowable emissions.

2. Well Cluster 3

PCE and total VOC emissions were well within the compliance standards.

3. Overall

The extraction and air stripper system has been very successful in meeting the emission requirements to date. After system start-up and adjustment, the system can be pumped 24 hours per day without exceeding the maximum standards of 3 pounds per hour and 15 pounds per day.

C. Perchloroethylene Clean-up Efficiency

The extraction and air stripper system has been successful in cleaning up the spilled PCE. The following facts corroborate this statement.

1. Pumping in cluster 1 and cluster 2 areas has had a significant effect on the overall groundwater quality in the former tank farm area; the beginning influent concentrations for cluster 3 were much lower than the beginning influent concentrations for cluster 1 and cluster 2.

PCE Conc - Well B-3B

5/25/84	8.2
6/8/84	4.3
10/30/84	2.1
12/2/86	0.044

2. PCE concentrations in both pumped and unpumped wells have decreased significantly from the first 1985 sampling dates (Table 6).

TABLE 6

PCE CLEAN-UP ANALYSIS

Well	Initial Concentration (ppm)/Date	Concentration at Last Analysis (ppm)/Date	Percent Clean-up
5	145.0/10-11-85	4.460/9-22-86	96.9
7	50.2/10-11-85	3.100/12-5-85	93.8
10	144.0/10-3-85	2.210/8-29-86	98.5
11	9.4/11-14-85	5.820/8-29-86	38.1
15	8.0/10-11-85	1.200/12-5-85	85.0

3. The PCE concentration in monitoring well B-3B on May 25, 1984, June 8, 1984, and October 30, 1984 was 3.200, 4.300, and 2.100 ppm, respectively. Sampling of that well on December 2, 1986, revealed that the PCE concentration in that well had decreased significantly to 0.0442 ppm.

4. In late October 1986, the Wisconsin River water level was lowered (dam controlled) by the Wisconsin Valley Improvement Company. Consequently, this caused a similar decrease in the water level of the adjoining unconfined aquifer. Fortunately, influent and effluent samples were collected during the period that the river and well water levels were drawn down. Note the decrease in PCE concentration on October 28, 1986 (Figure 3). This data indicates that most of the contamination is in the upper portion of the "normal" saturated zone and/or the lower portion of the vadose or unsaturated zone. This is evidence that the extraction well

Decrease in river level does not prove wells don't have to be installed deeper.

system is properly designed to extract the most contaminated PCE groundwater and the system does not have to be installed to a greater depth.

A maximum of approximately 900 gallons of PCE were spilled in 1983. To clean-up that spill the soils in the vadose zone were excavated. Later, the extraction and air stripper system were constructed. We estimate that the majority of the PCE spill either volatilized or was excavated immediately after the spill. Through December, 1986, we estimate that approximately 70 to 75 gallons of PCE have been recovered through the extraction system.

Unlikely that it volatilized. Amt removed is unknown.

D. Recommendations

We recommend that the following data be collected in the future:

1. Weekly influent and effluent samples should be analyzed for PCE. Once per month these influent and effluent samples should be analyzed for a full scan of VOCs.

2. Monitoring well B-3B should be sampled quarterly.

3. To determine when pumps may be moved to a new cluster, we suggest that all individual wells be sampled before moving the pumps to identify reasonably stabilized PCE water quality in each individual well.

4. Air stripper influent and effluent, and extraction wells within a cluster should be sampled during startup of a new cluster.

5. Flow rates should be monitored at least twice per week.

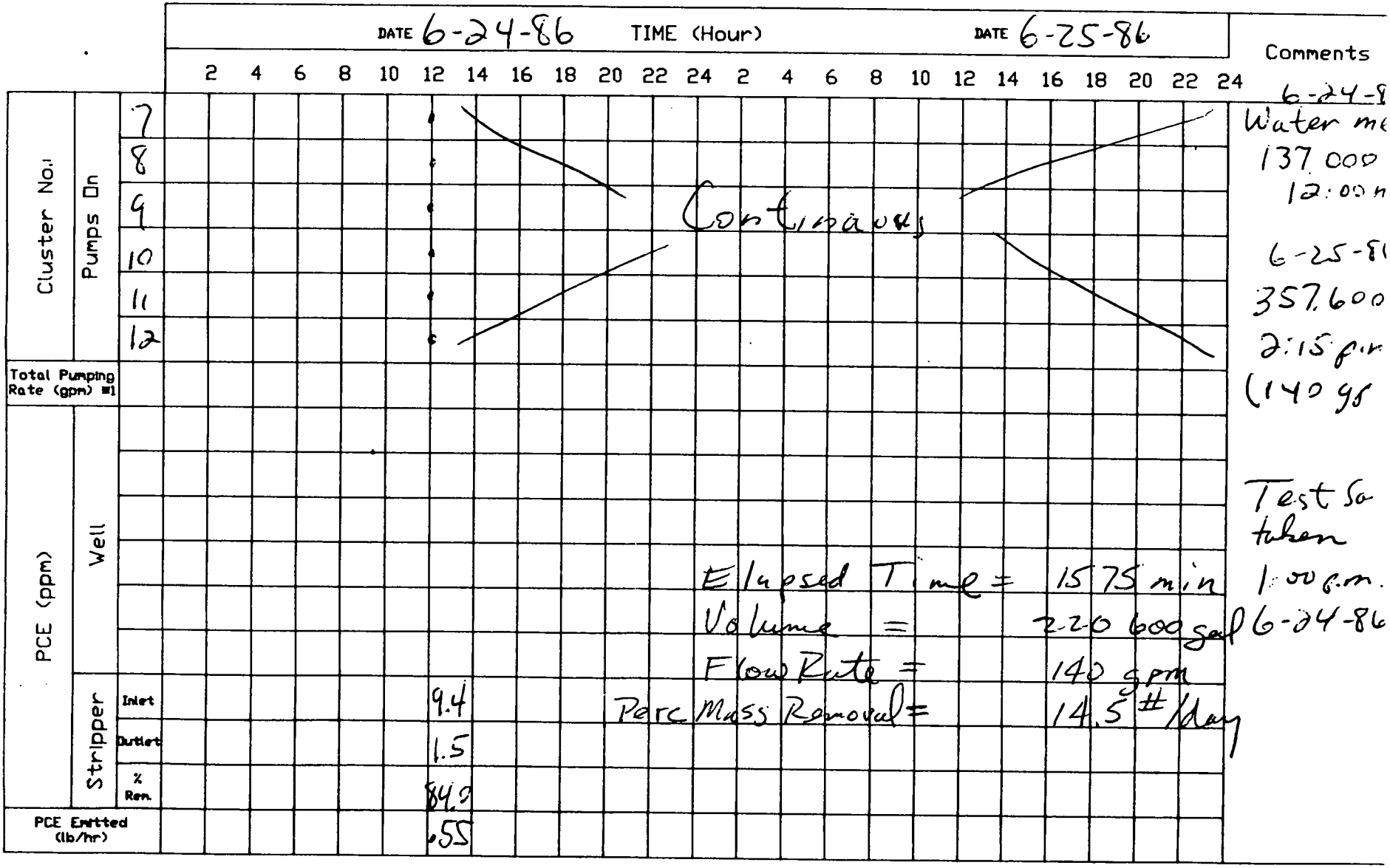
6. Groundwater elevations should be measured in all extraction wells and monitoring wells in the vicinity of the former tank farm on a semi-monthly basis.

App. A + B for gw levels

V. GENERAL QUALIFICATIONS

The analysis and recommendations submitted in this report are based on data obtained by Wausau Chemical Corporation. Our interpretations and recommendations are limited to the available data. Some calculations and associated interpretations are estimated.

WAUSAU CHEMICAL EXTRACTION PROGRAM



*1 : Estimated pumping rate = 27 gpm/pump
*2 : Limited by max. pumping capacity of 150 gpm
*3 : Using initial concentration
*4 : Using final concentration

WAUSAU CHEMICAL EXTRACTION PROGRAM

DATE 6-24-86 TIME (Hour) 1:00 p.m. DATE

2 4 6 8 10 12 14 16 18 20 22 24 2 4 6 8 10 12 14 16 18 20 22 24

Comments

Cluster No.1 — Pumps On: 7, 8, 9, 10, 11, 12

Total Pumping Rate (gpm) *1

Total VOCs (ppm) — Well

	Inlet	Outlet
Perc	9.36	1.48
Total	3.40	0.55
TCE	1.68	0.30
M-Xylene	0.45	0.08
O+P Xylene	0.56	0.13
	15.45	2.54

Total VOCs (ppm) — Stripper: Inlet, Outlet, % Rem.

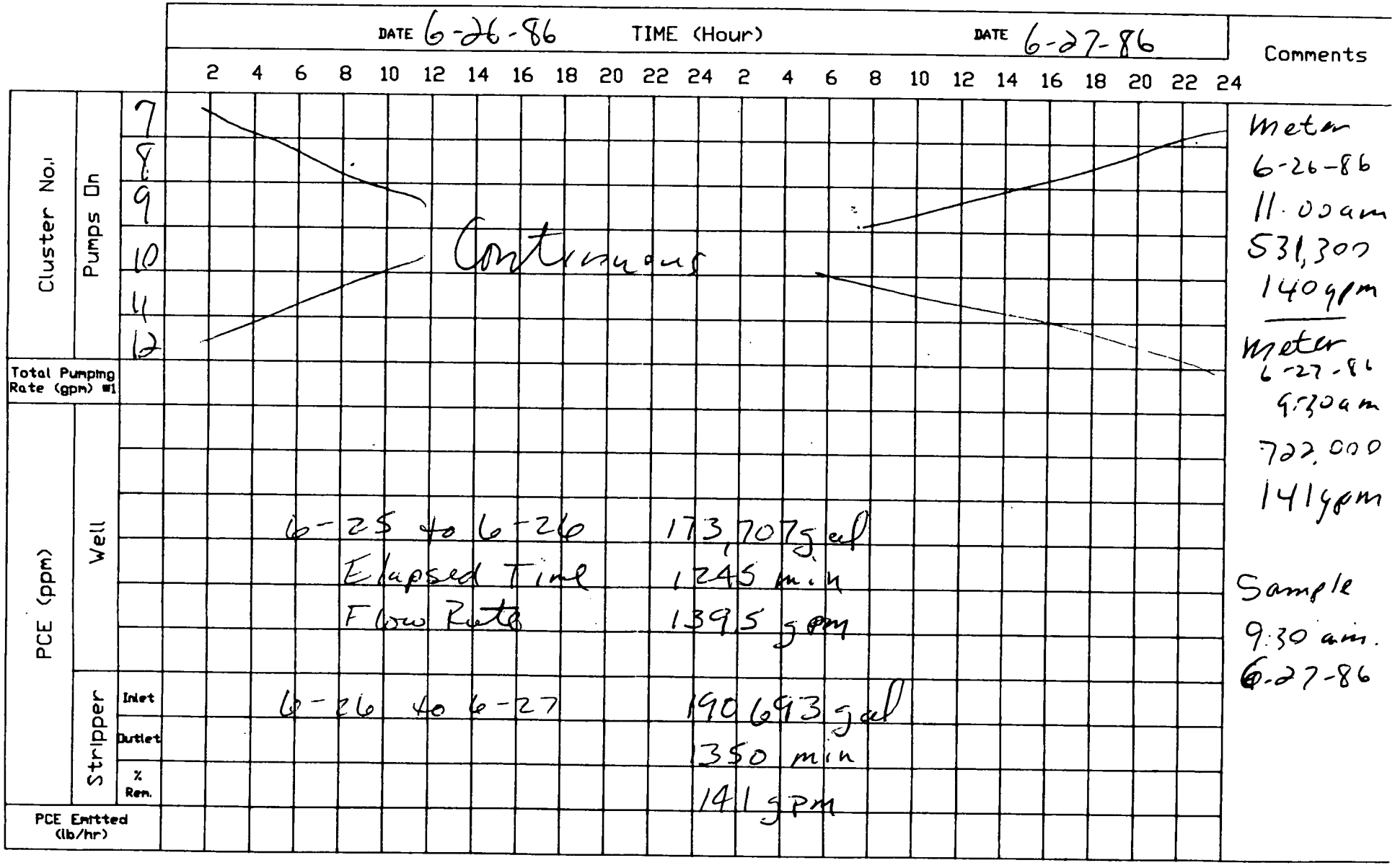
84% Removal

24 #/day

Total VOCs Emitted (lb/hr)

*1 : Estimated pumping rate = 27 gpm/pump
*2 : Limited by max. pumping capacity of 150 gpm
*3 : Using initial concentration
*4 : Using final concentration

WAUSAU CHEMICAL EXTRACTION PROGRAM



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*2 : Limited by max. pumping capacity of 150 gpm
*3 : Using initial concentration
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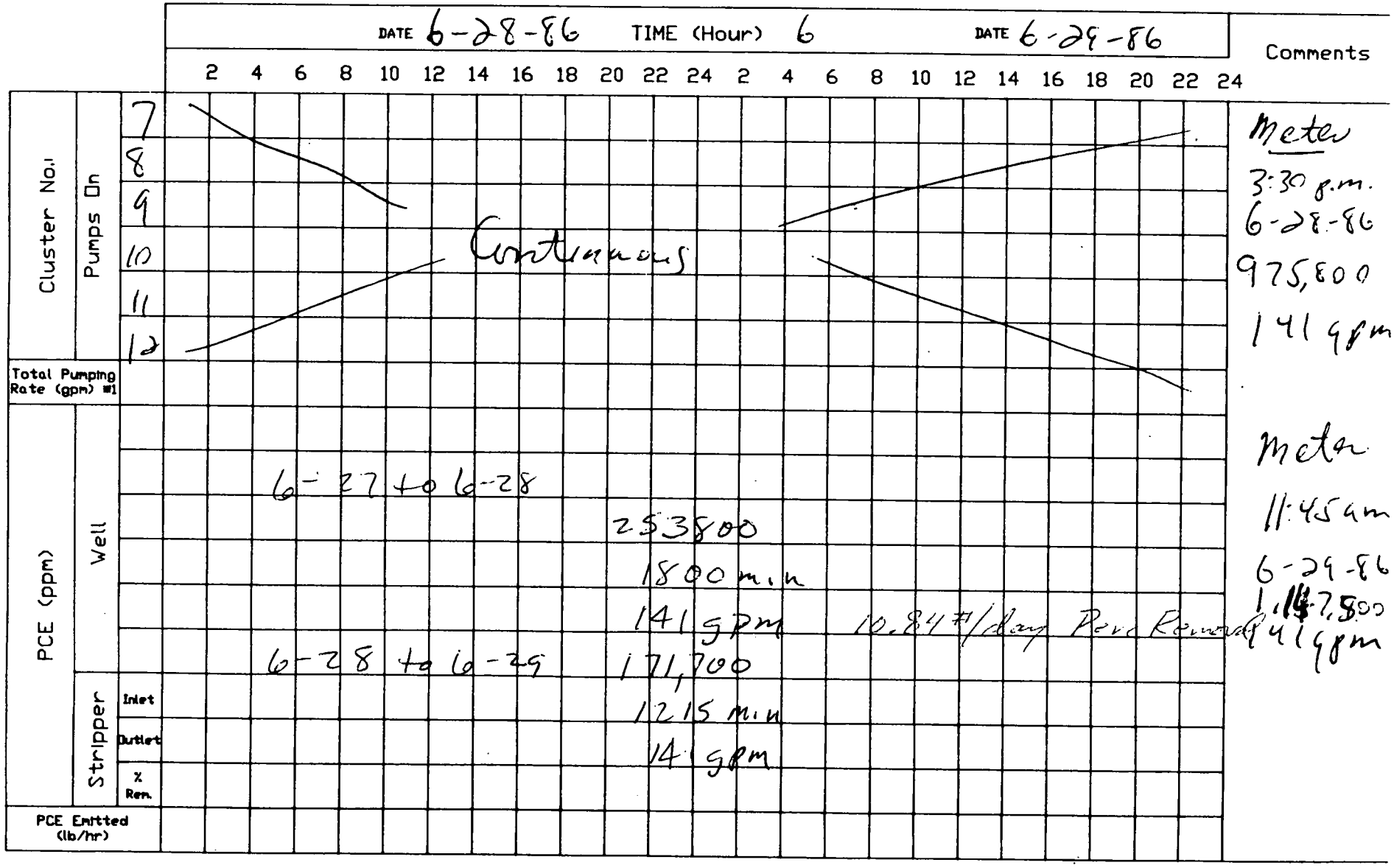
WAUSAU CHEMICAL EXTRACTION PROGRAM



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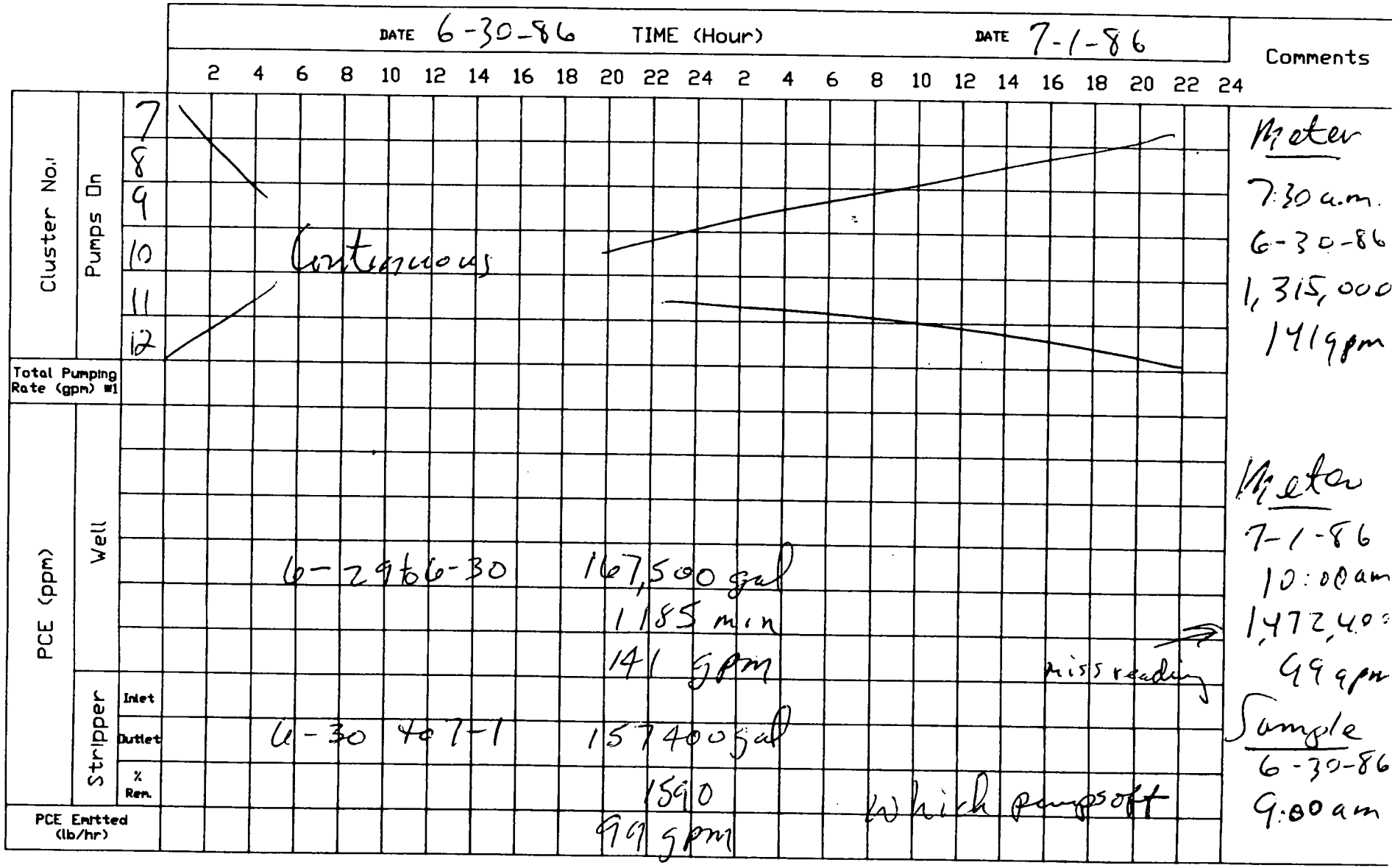
WAUSAU CHEMICAL EXTRACTION PROGRAM



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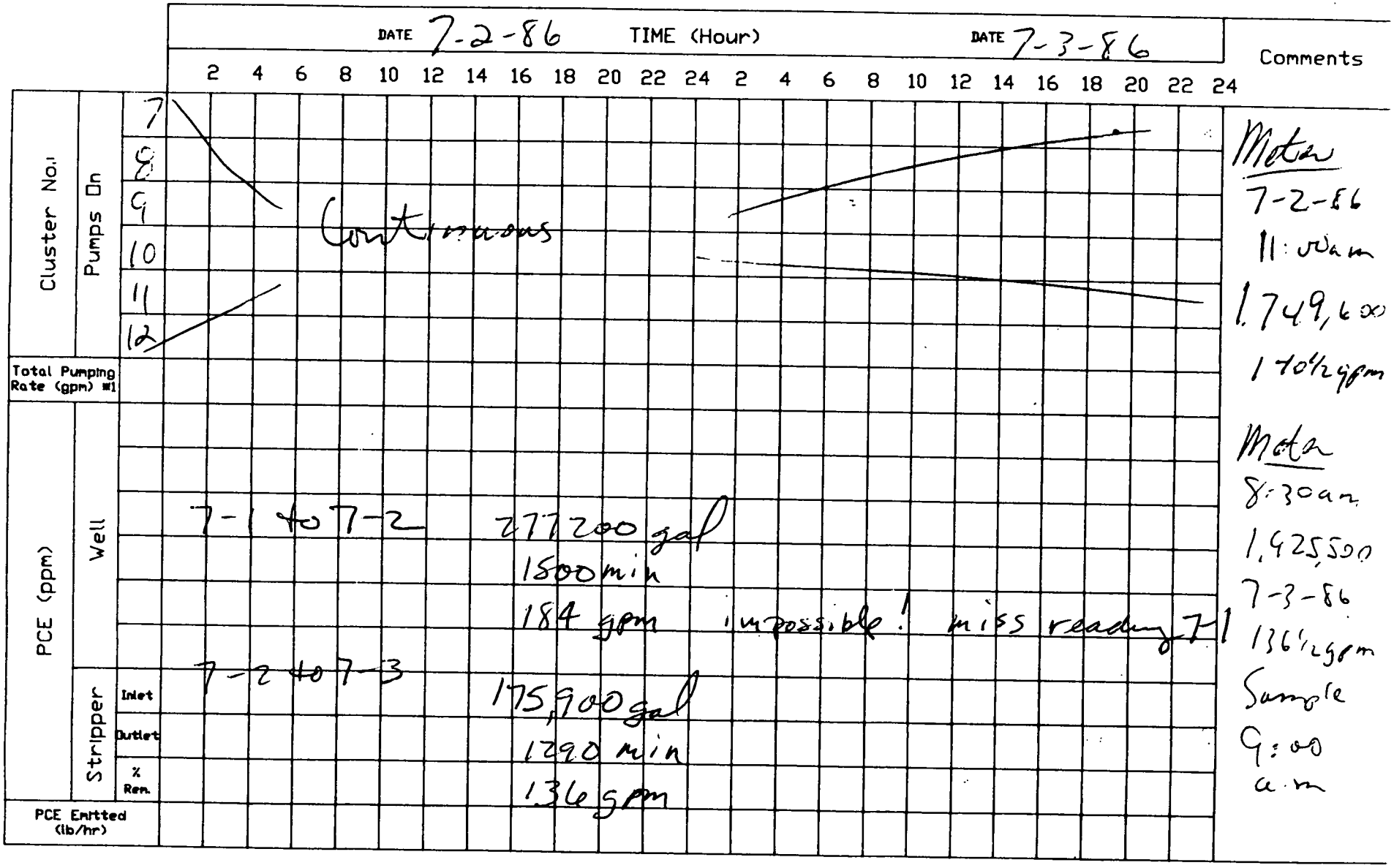
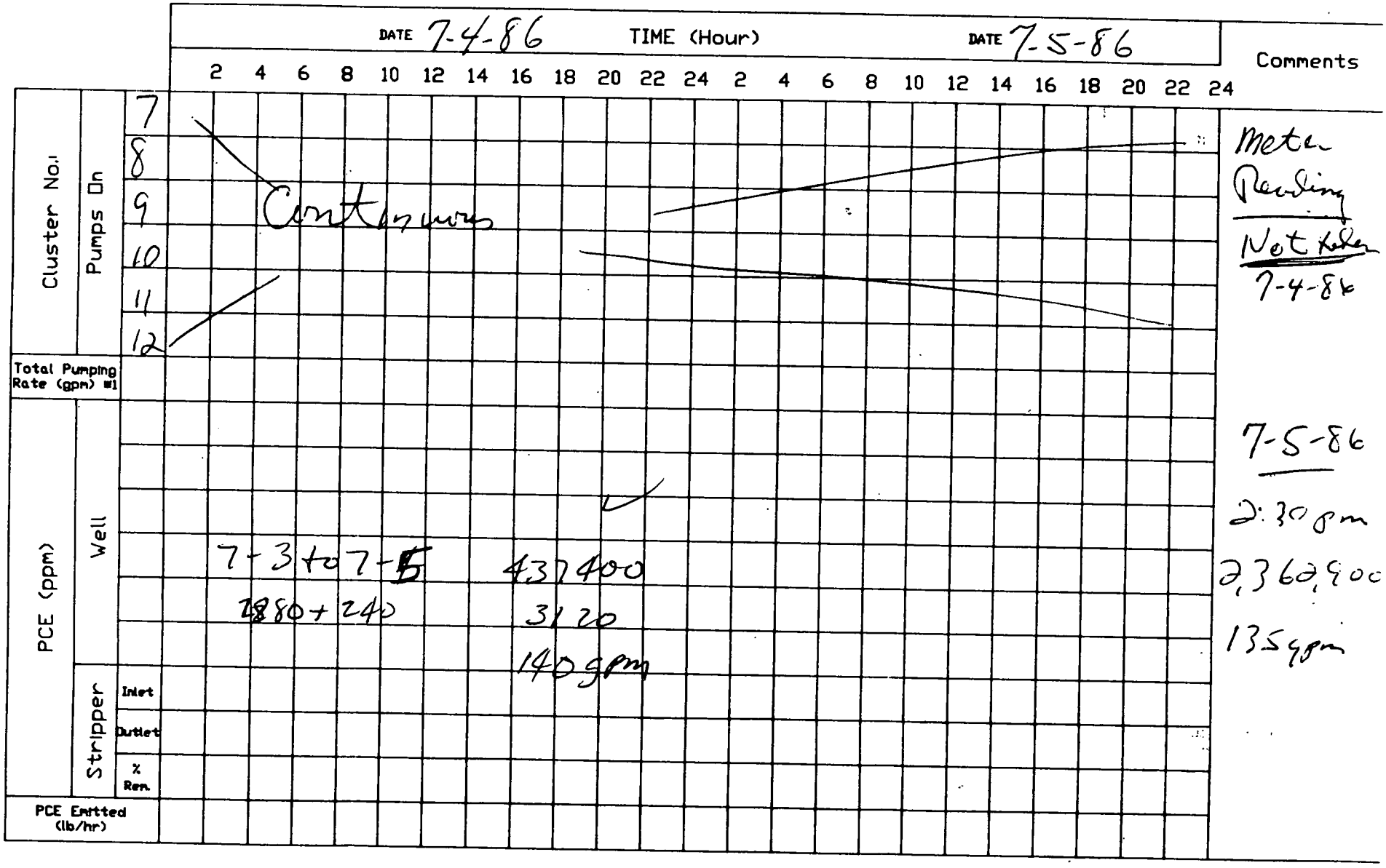
*4 : Using final concentration

WAUSAU CHEMICAL EXTRACTION PROGRAM



*1 : Estimated pumping rate = 27 gpm/pump
*2 : Limited by max. pumping capacity of 150 gpm
*3 : Using initial concentration
*4 : Using final concentration

WAUSAU CHEMICAL EXTRACTION PROGRAM



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*3 : Using initial concentration
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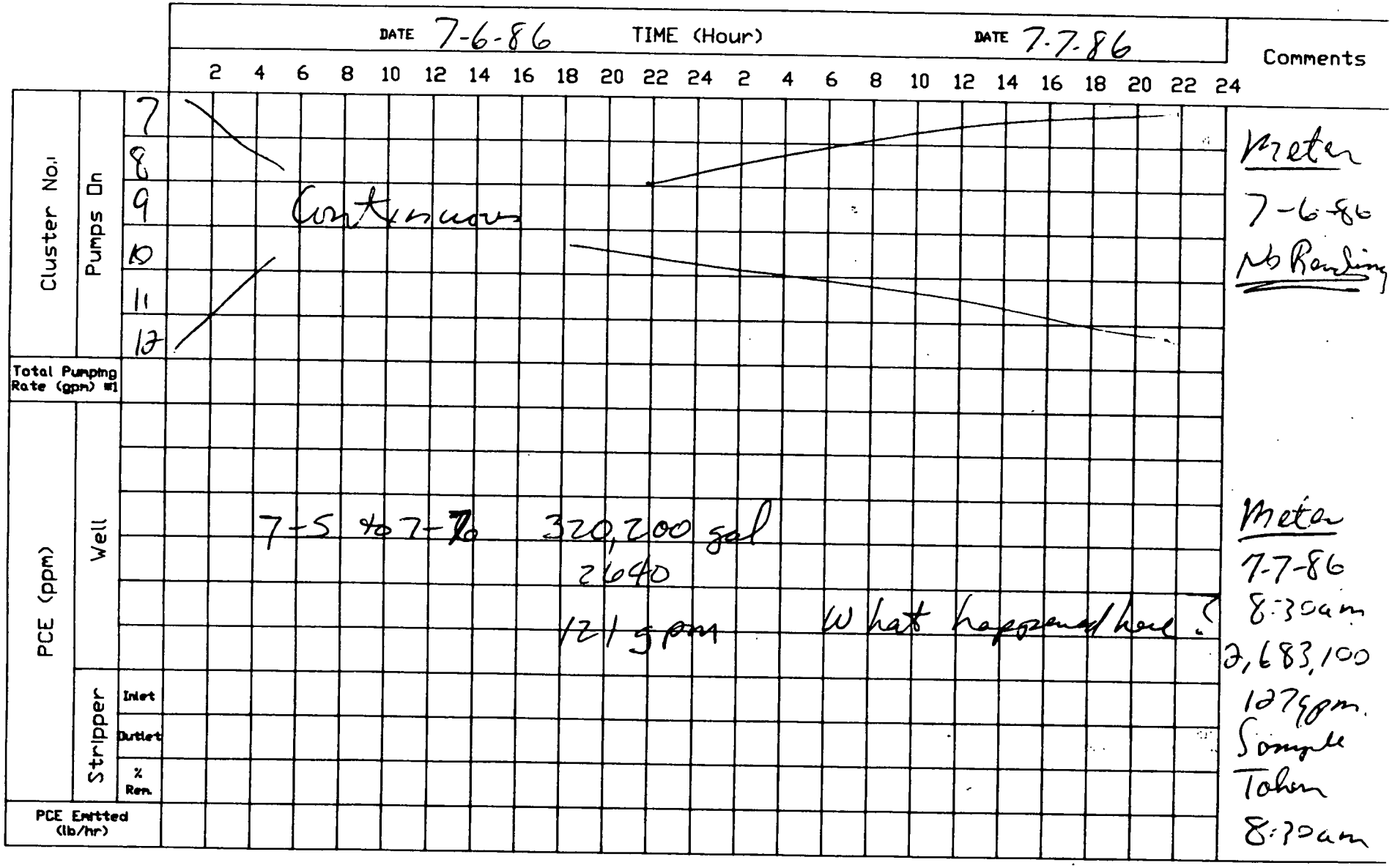
WAUSAU CHEMICAL EXTRACTION PROGRAM



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*3 : Using initial concentration
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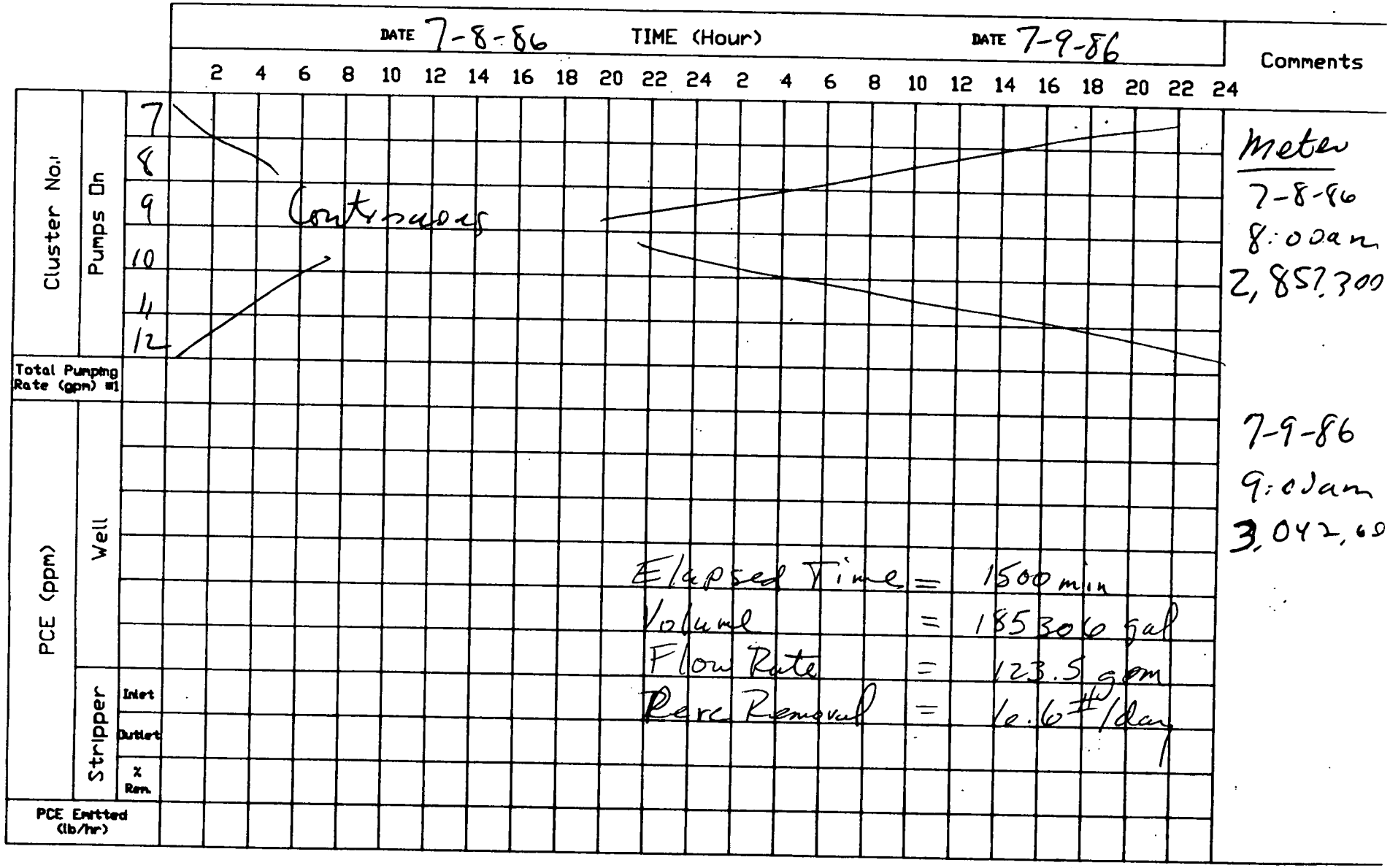
WAUSAU CHEMICAL EXTRACTION PROGRAM



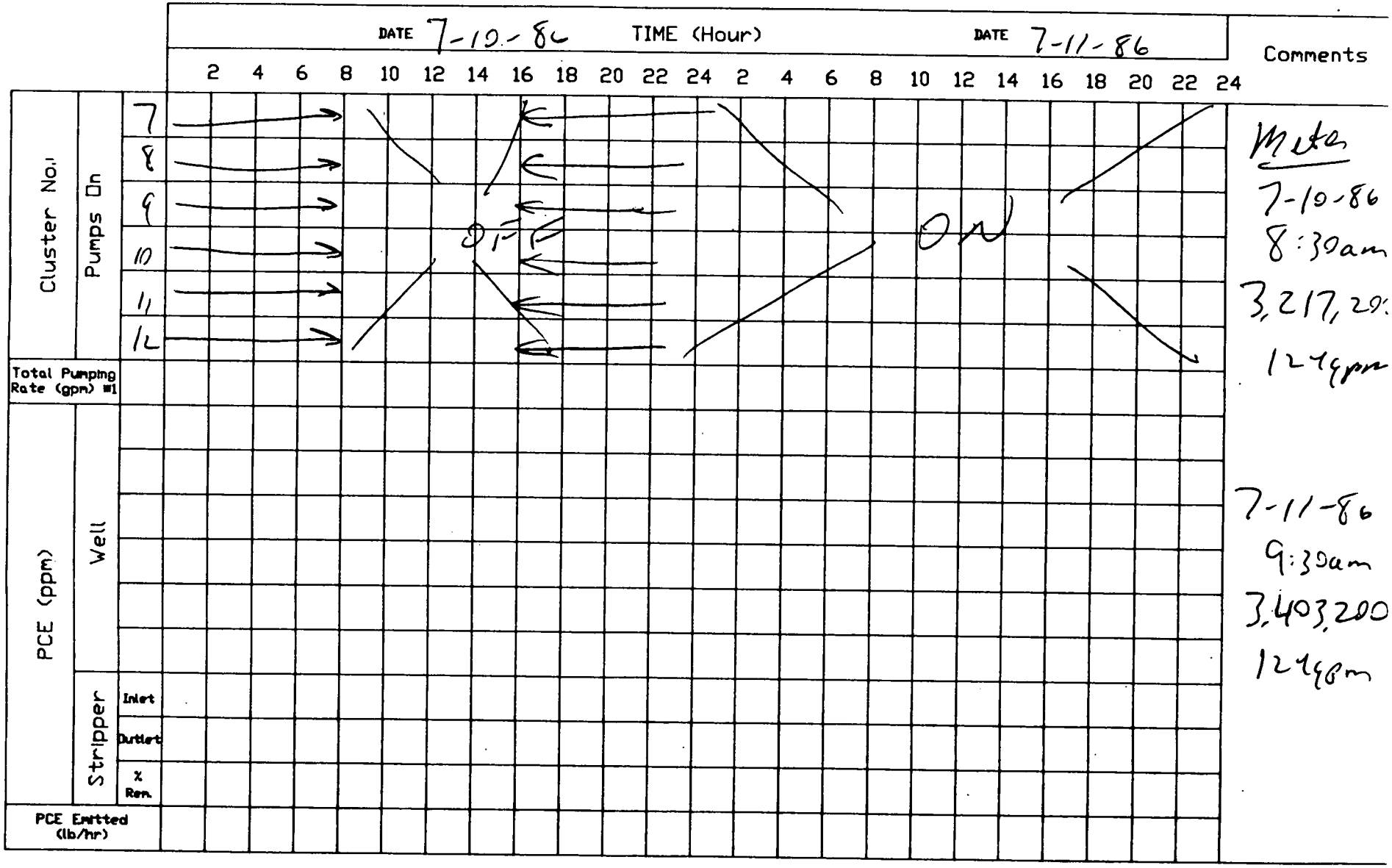
Meter

7-8-86
8:00 am
2,857,300

7-9-86
9:00 am
3,042,60

*1 : Estimated pumping rate = 27 gpm/pump
*2 : Limited by max. pumping capacity of 150 gpm
*3 : Using initial concentration
*4 : Using final concentration

WAUSAU CHEMICAL EXTRACTION PROGRAM



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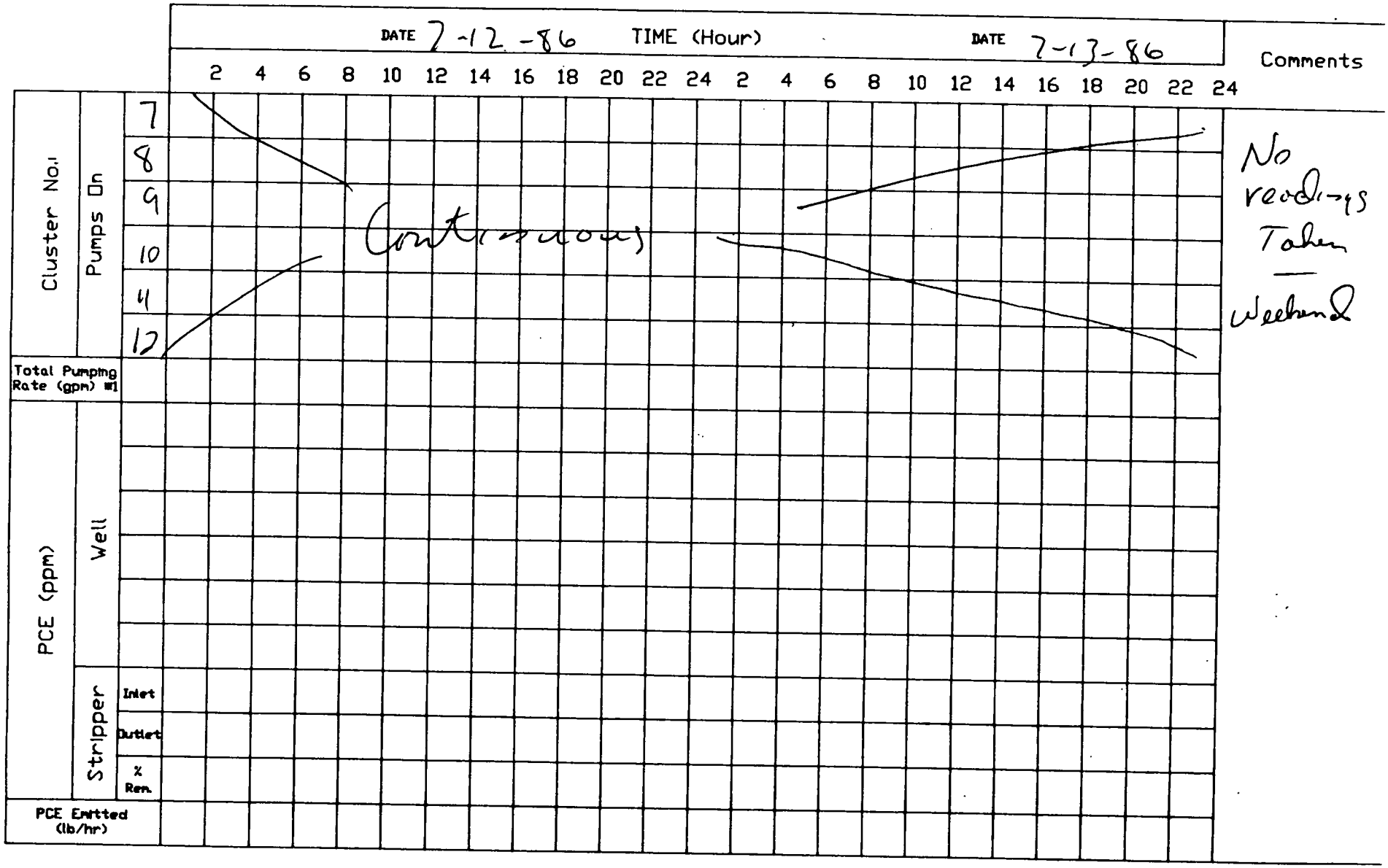

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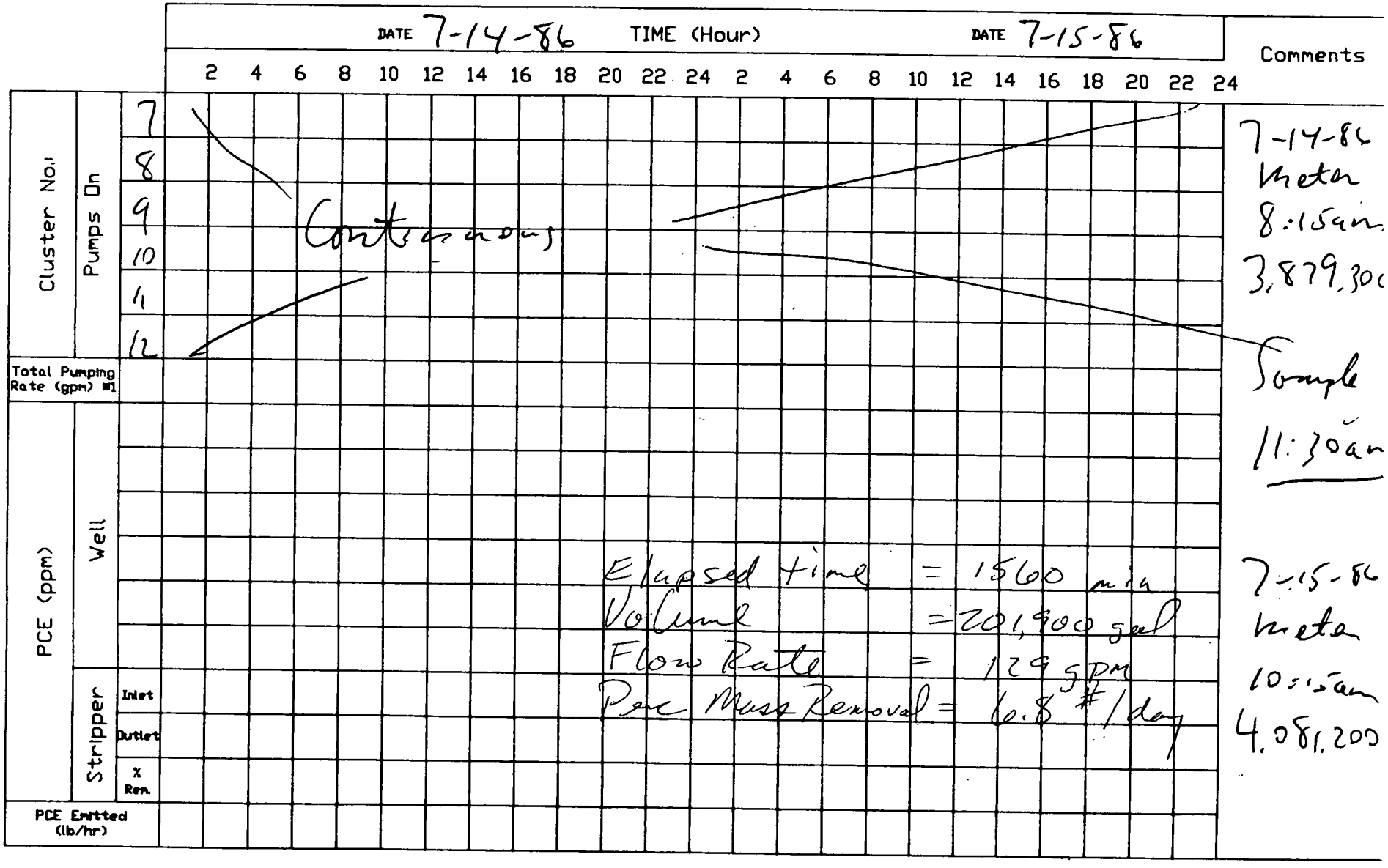

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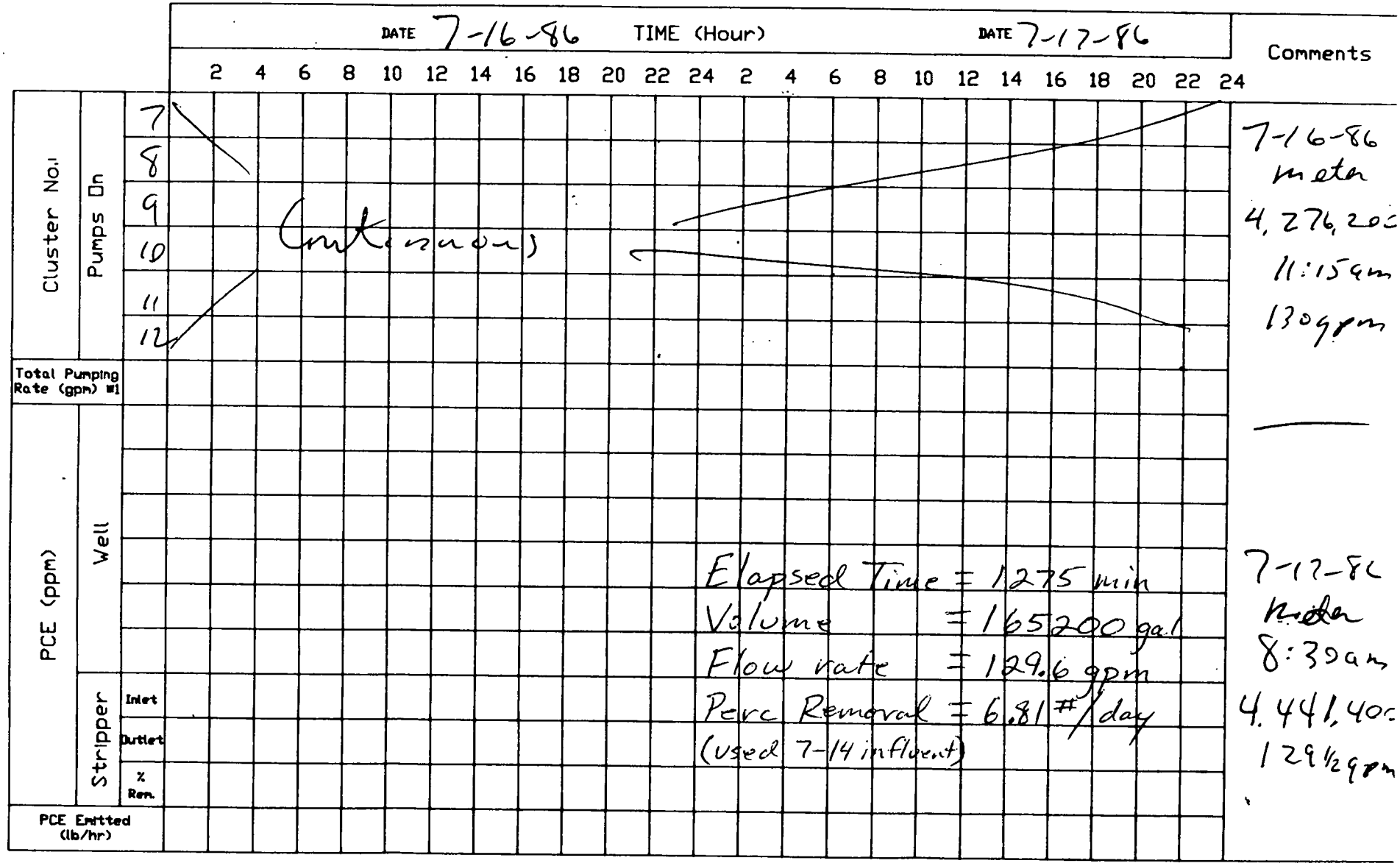

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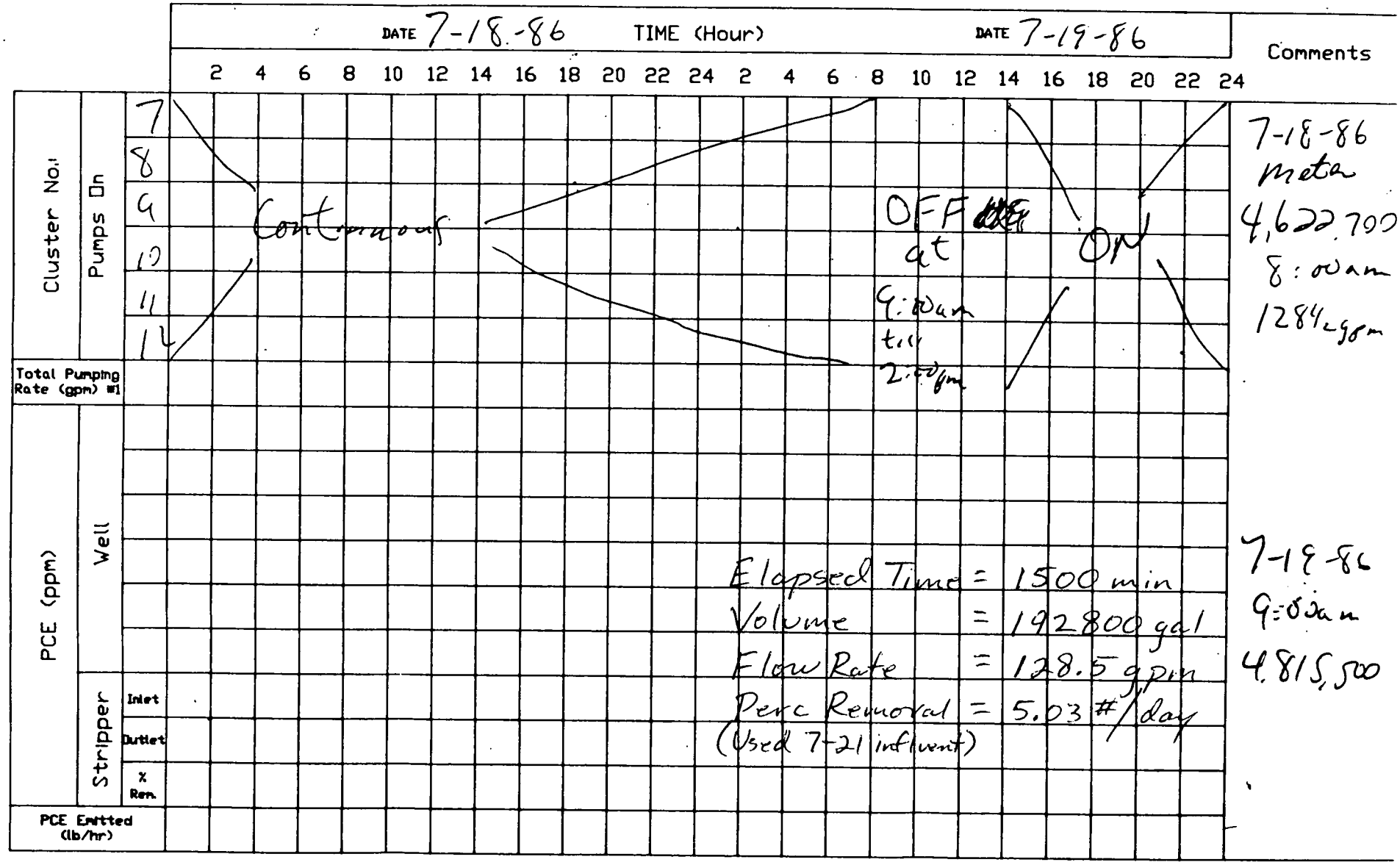

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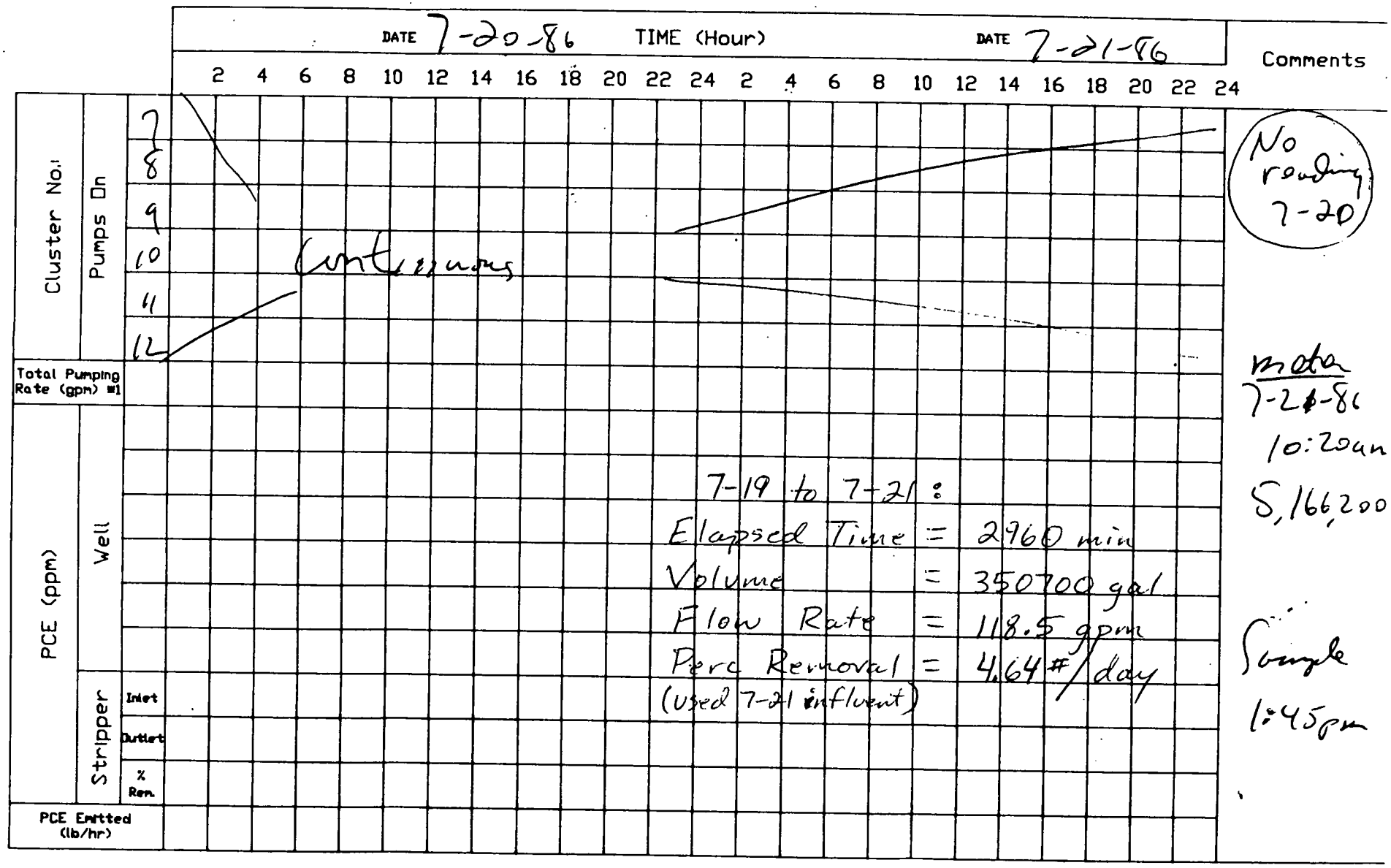
WAUSAU CHEMICAL EXTRACTION PROGRAM



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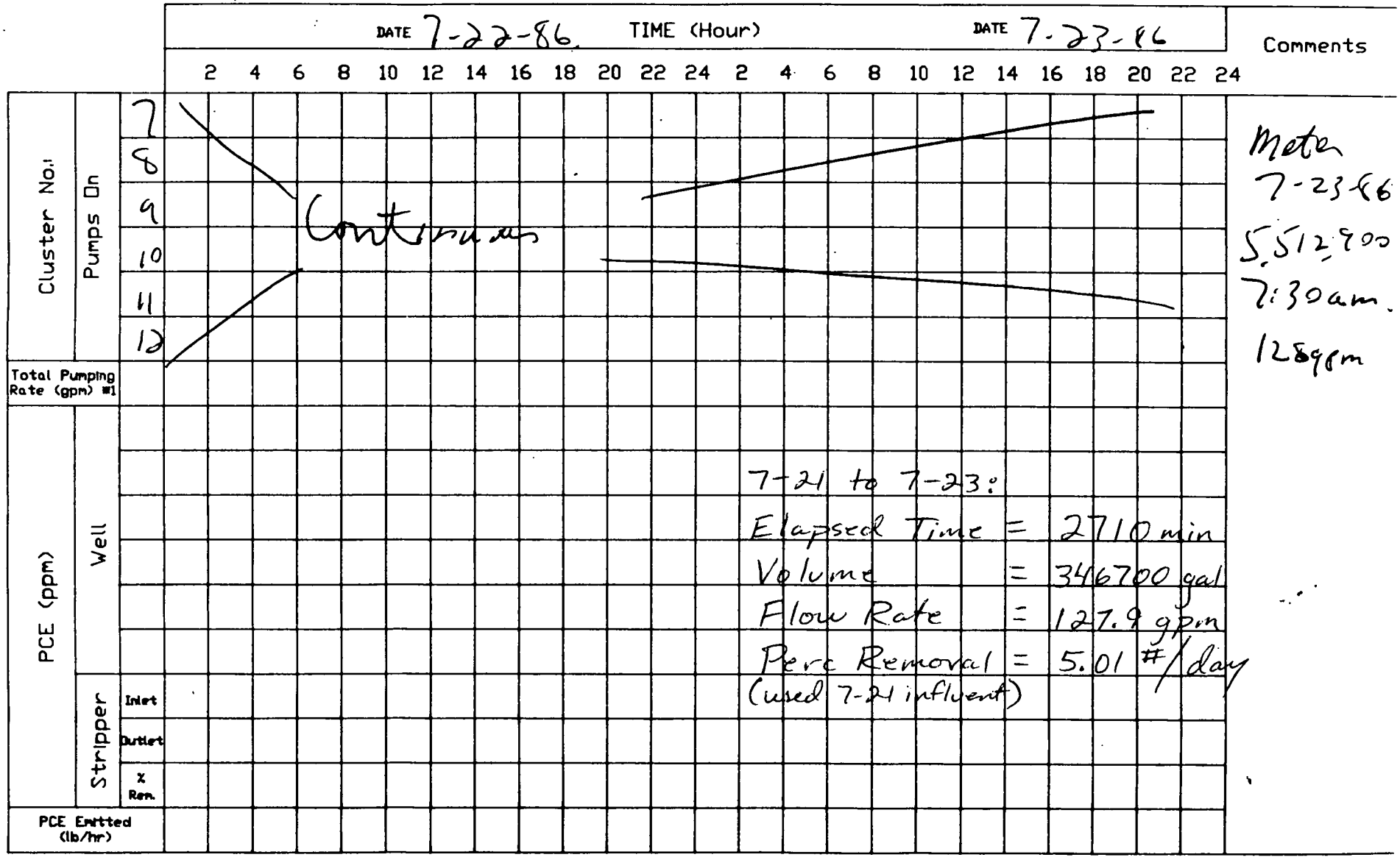

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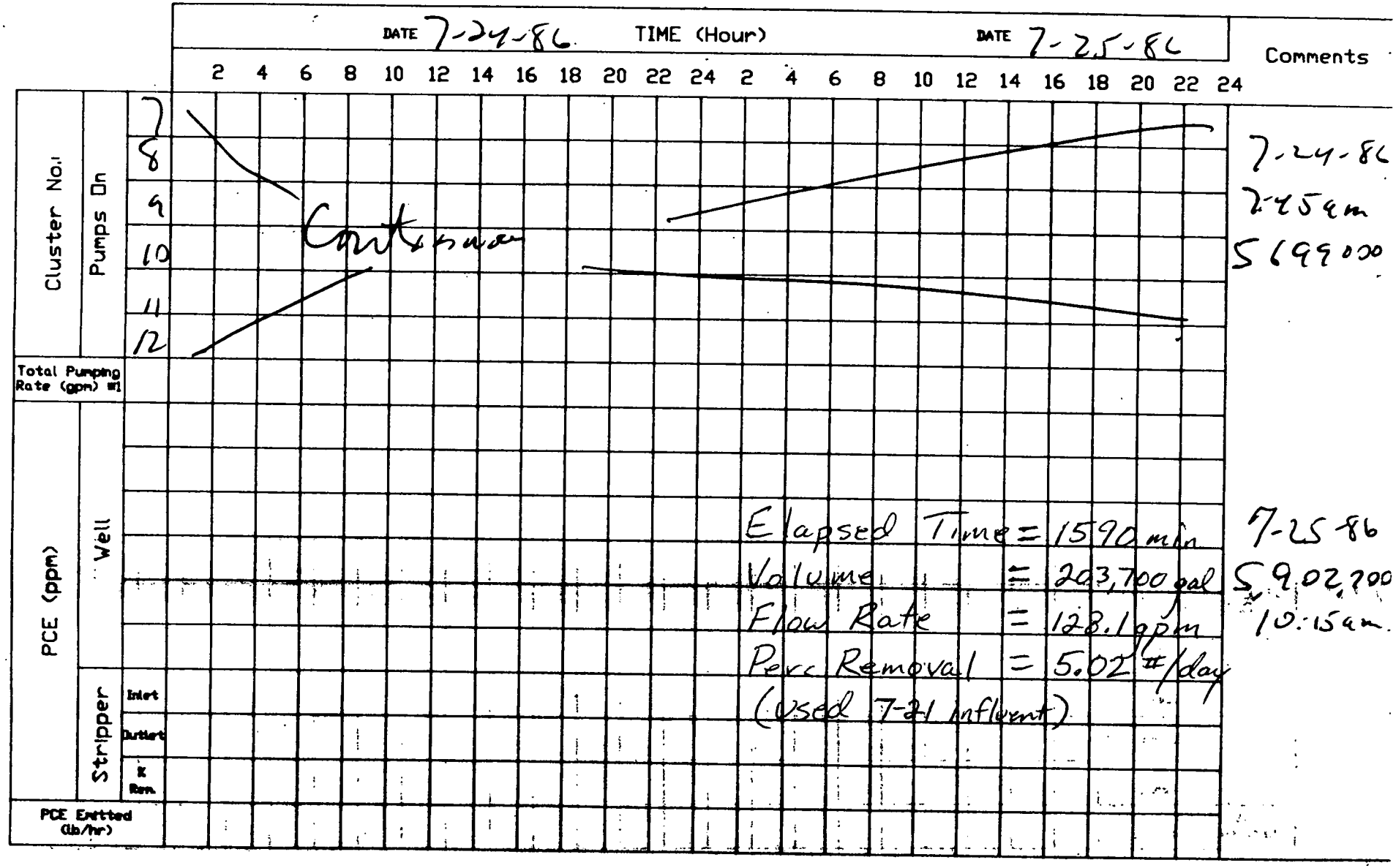
WAUSAU CHEMICAL EXTRACTION PROGRAM



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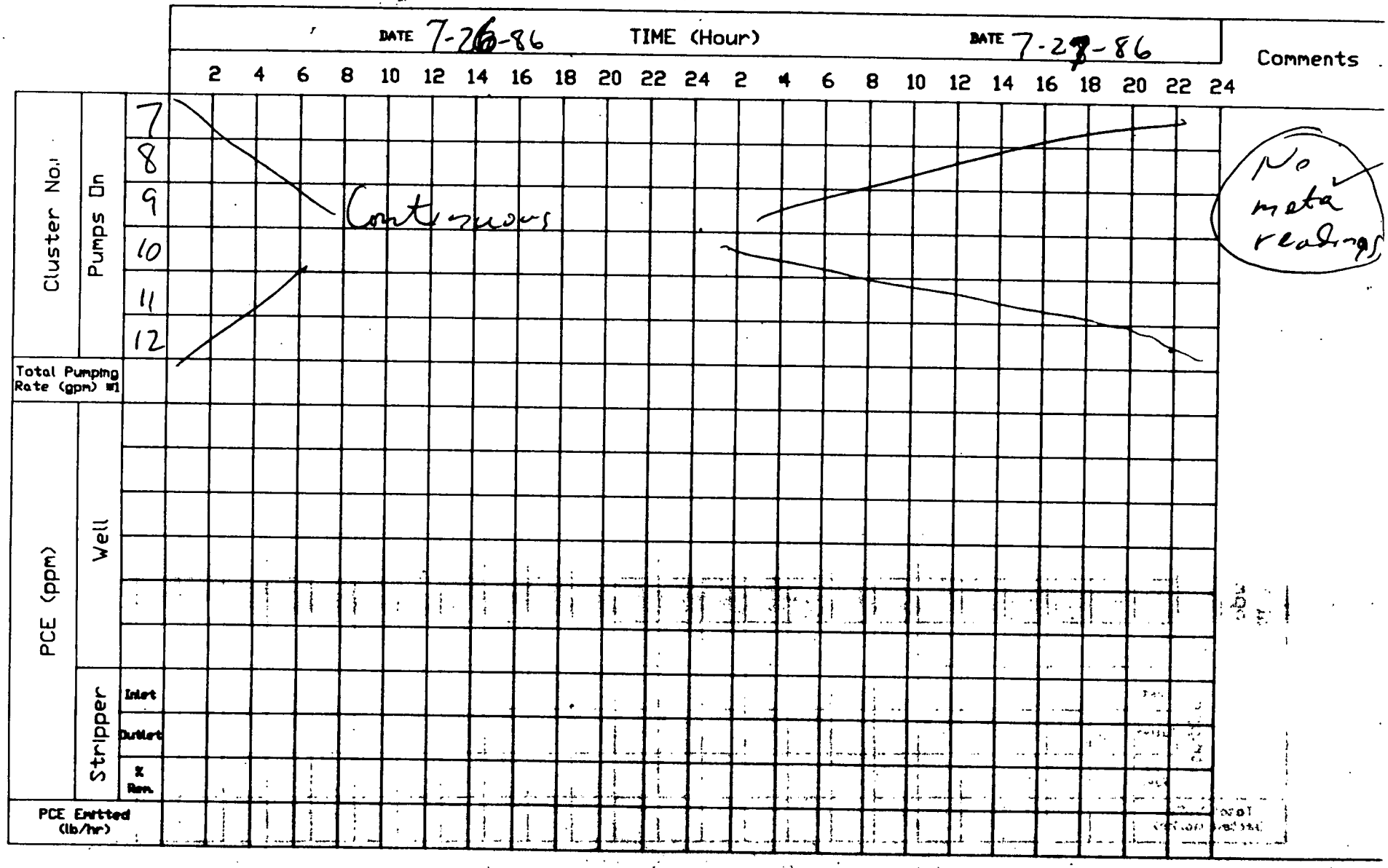
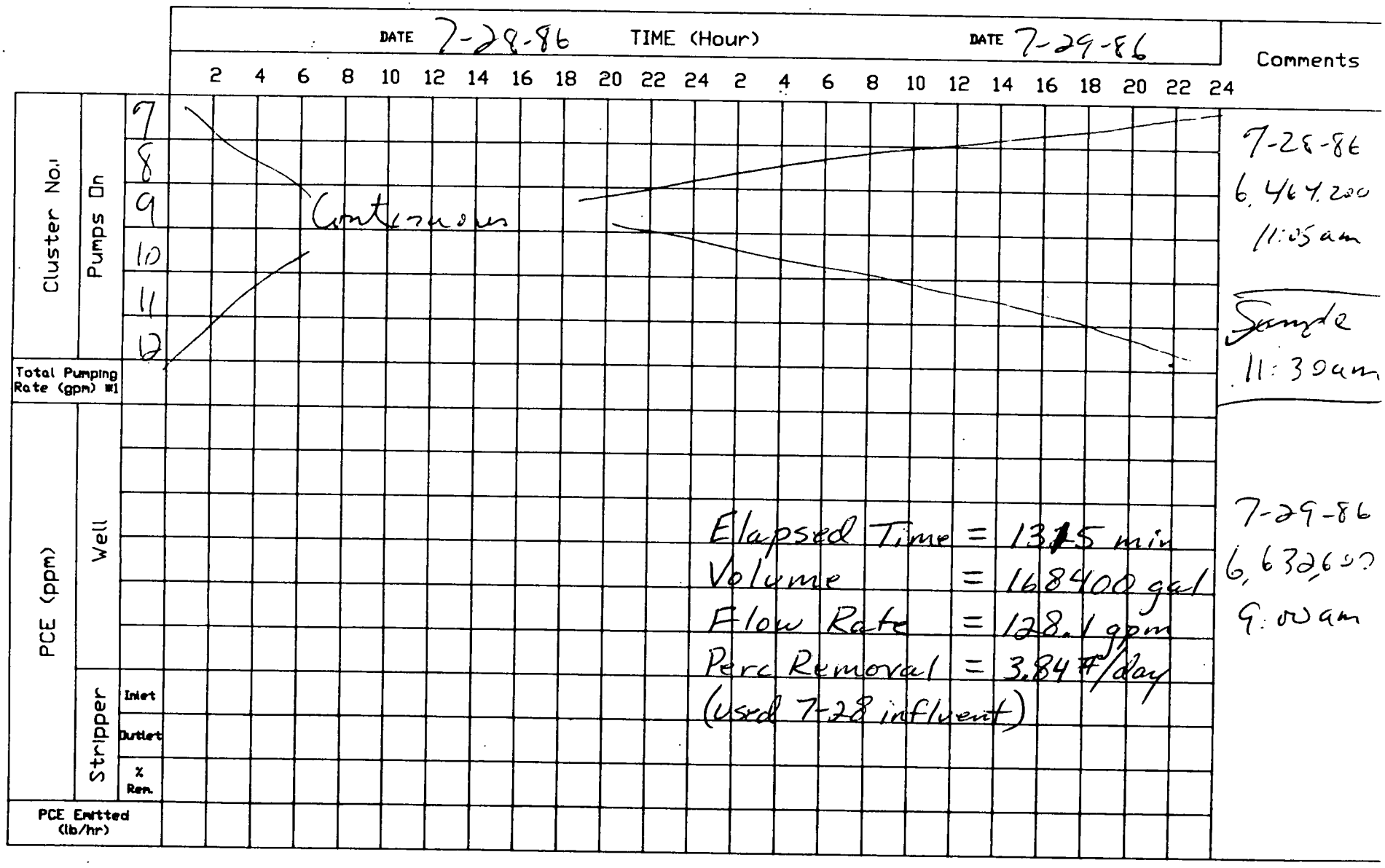
WAUSAU CHEMICAL EXTRACTION PROGRAM



#1 : Estimated pumping rate = 27 gpm/pump
#2 : Limited by max. pumping capacity of 250 gpm
#3 : Using initial concentration
#4 : Using final concentration

WAUSAU CHEMICAL EXTRACTION PROGRAM



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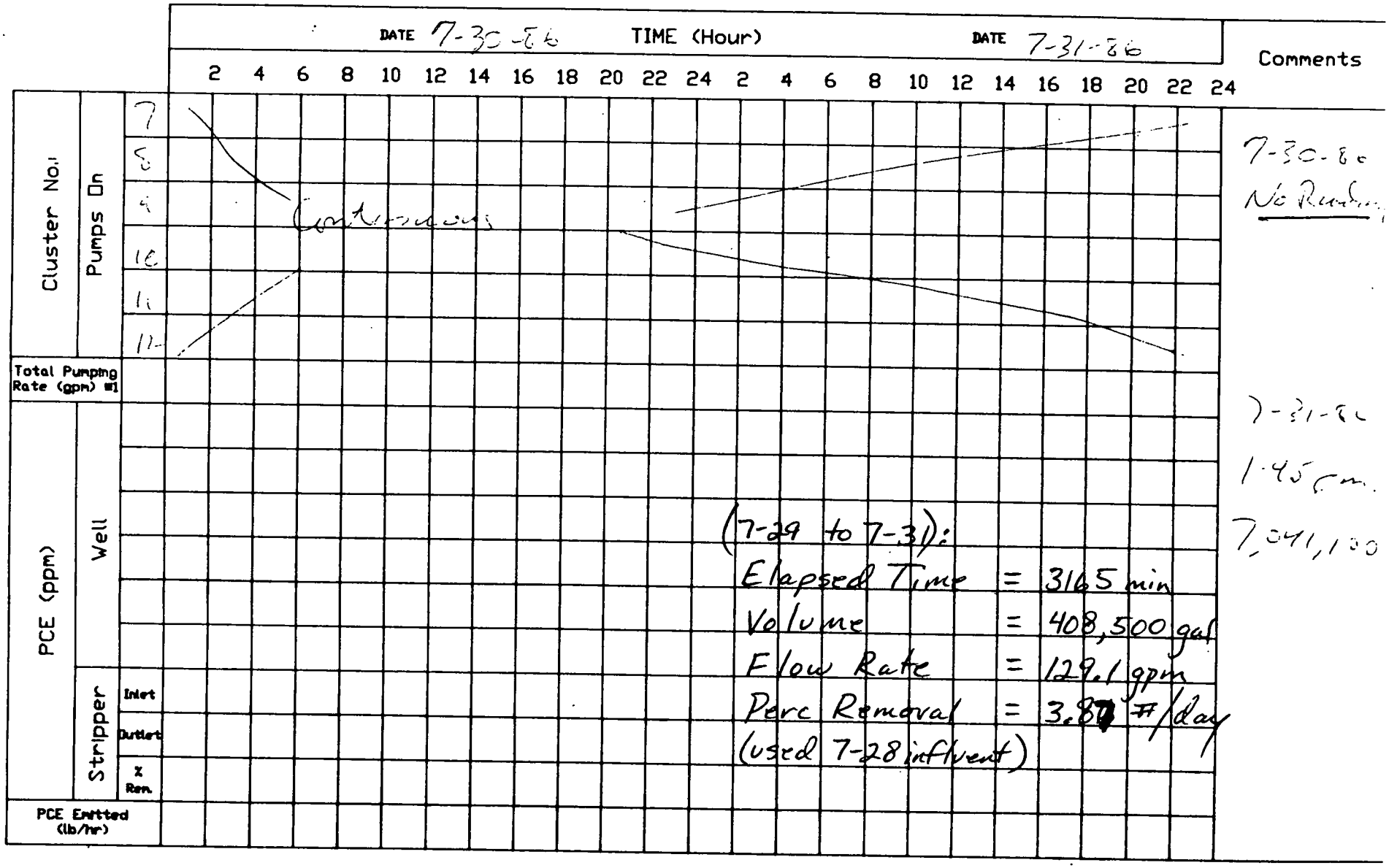
WAUSAU CHEMICAL EXTRACTION PROGRAM



#1 : Estimated pumping rate = 27 gpm/pump
#2 : Limited by max. pumping capacity of 150 gpm
#3 : Using initial concentration
#4 : Using final concentration

WAUSAU CHEMICAL EXTRACTION PROGRAM

DATE 8-1-86 TIME (Hour) DATE 8-2-86

Cluster No.	Pumps On		2	4	6	8	10	12	14	16	18	20	22	24	2	4	6	8	10	12	14	16	18	20	22	24	Comments
		7																									
		8																									8-1-86
		9			Continuous																						8-main
		10																									182,100
		11																									
		12																									
Total Pumping Rate (gpm)																											

PCE (ppb) — Well / Stripper (Start, Middle, End)

PCE Stripped lbs/day

(7-31 to 8-1):
Elapsed Time = 1095 min
[illegible] = [illegible]
Flow Rate = 168.8 gpm
Perc Removal = 3.86 #/day
(used 7-28 influent)

Final Concentration ... Removal ... [illegible]

WAUSAU CHEMICAL EXTRACTION PROGRAM

DATE 8-3-86 TIME (Hour) DATE 8-4-86

2 4 6 8 10 12 14 16 18 20 22 24 2 4 6 8 10 12 14 16 18 20 22 24

Cluster No.1

Pumps On: 7, 8, 9, 10, 11, 12

Continuous

Total Pumping Rate (gpm)

PCE (ppm)

Well

Stripper: Inlet, Outlet, Air Emission

PCE Emitted (lbs/hr)

(8-1 to 8-4):

Elapsed Time = 4720 min

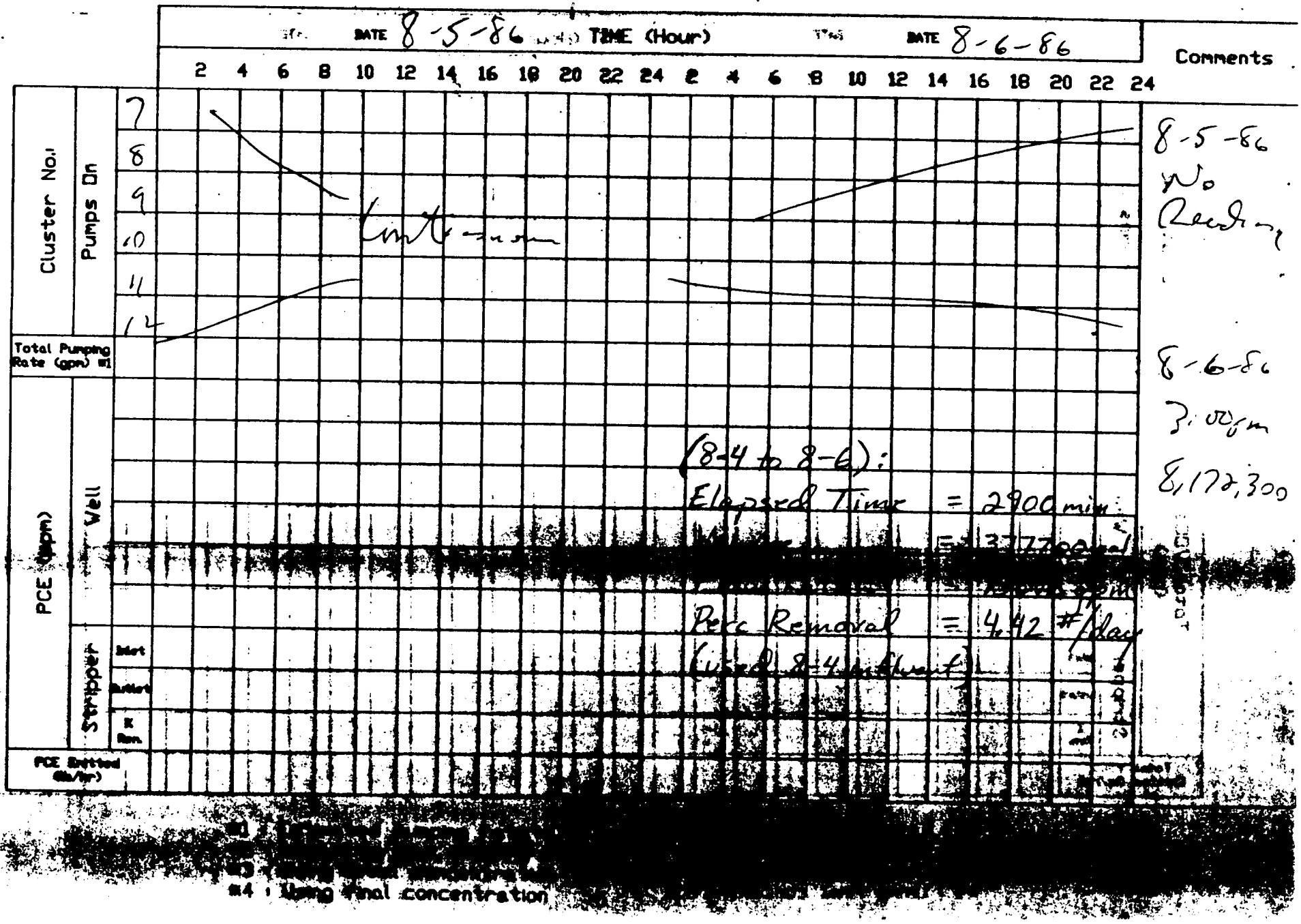
PCE Removal = 4.40 #/day

Comments

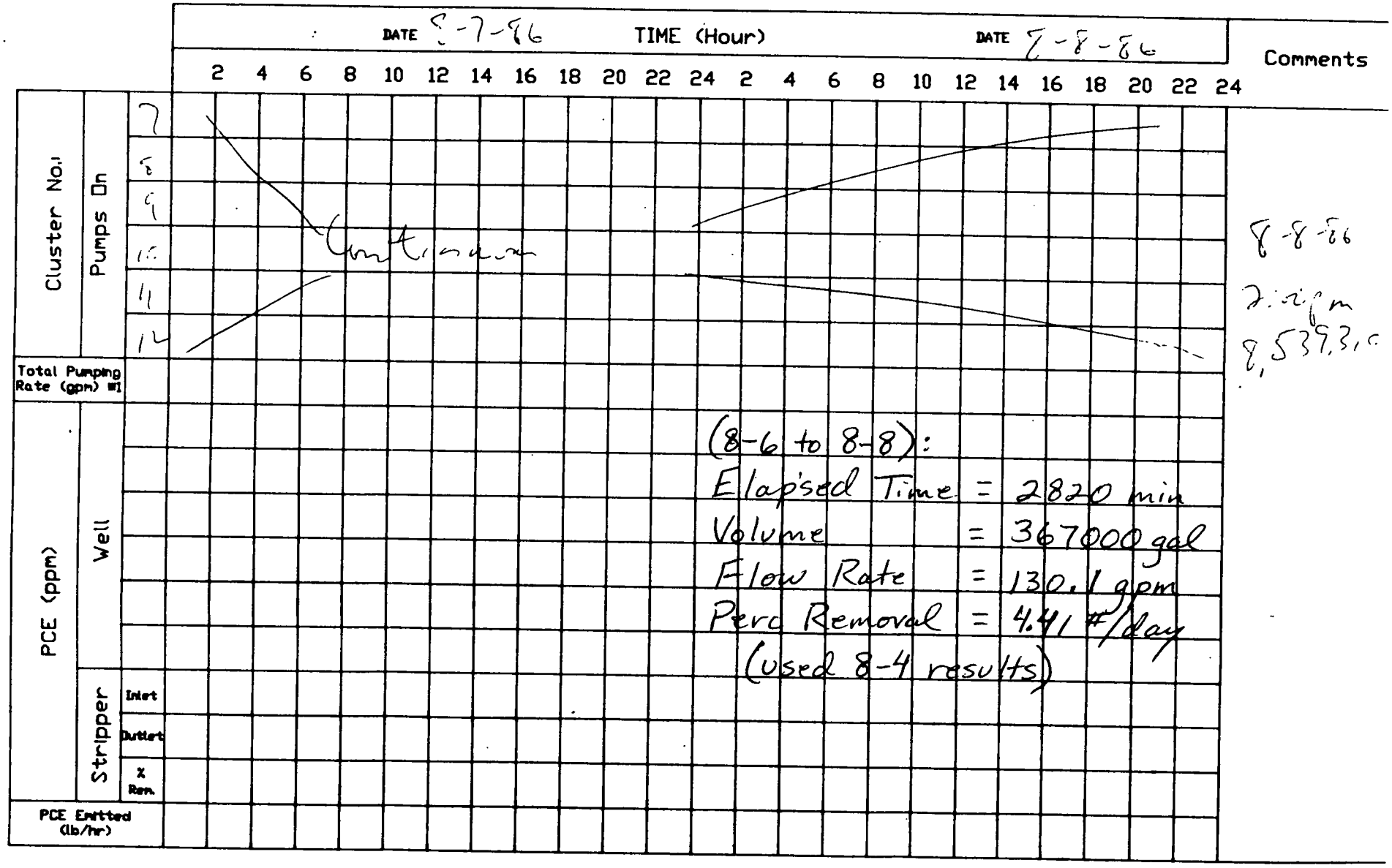
8-3-86
No Readings

8-4-86
7,794,600
2:40 pm
Sample
3:00 pm

WAUSAU CHEMICAL EXTRACTION PROGRAM



WAUSAU CHEMICAL EXTRACTION PROGRAM



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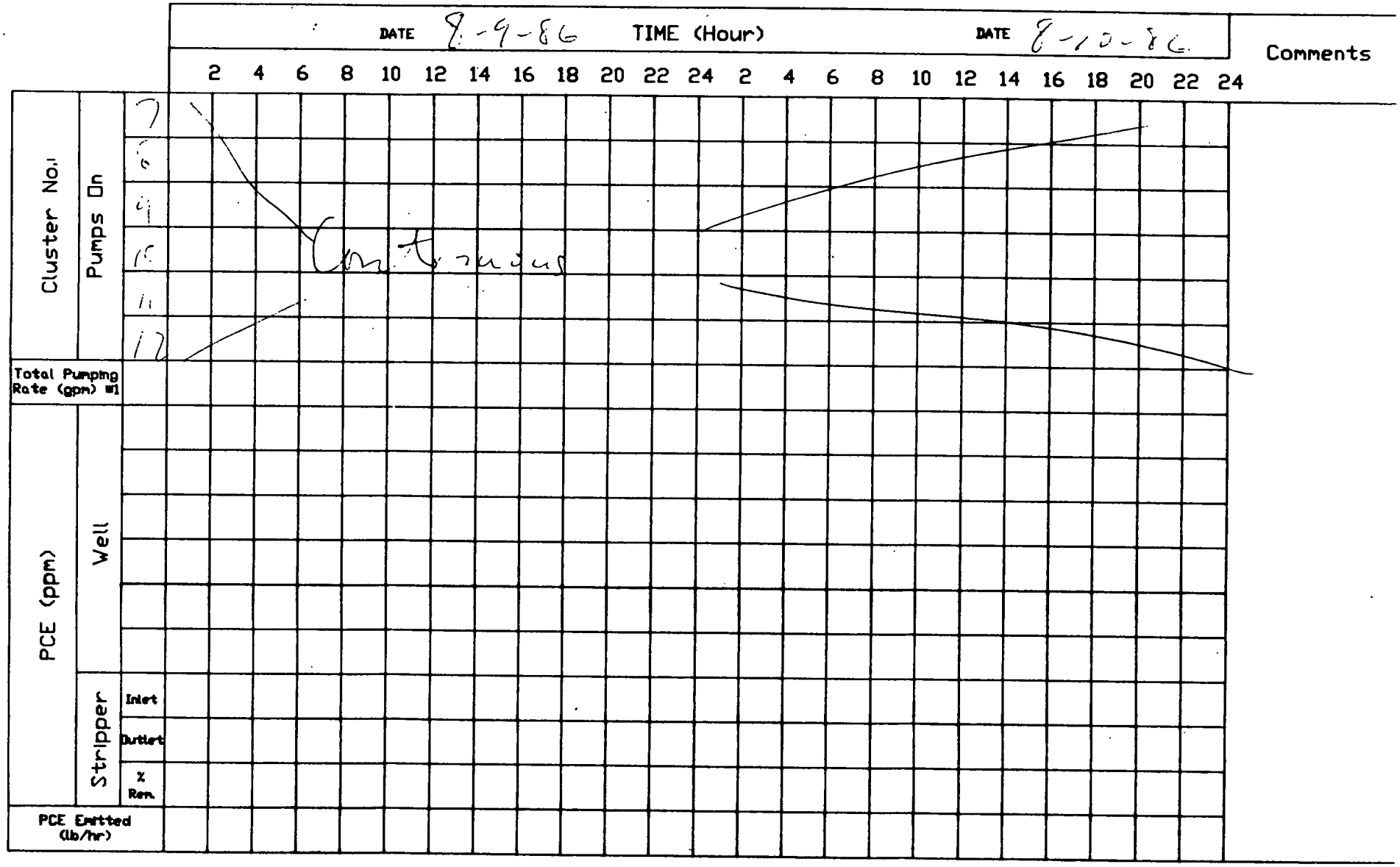
WAUSAU CHEMICAL EXTRACTION PROGRAM



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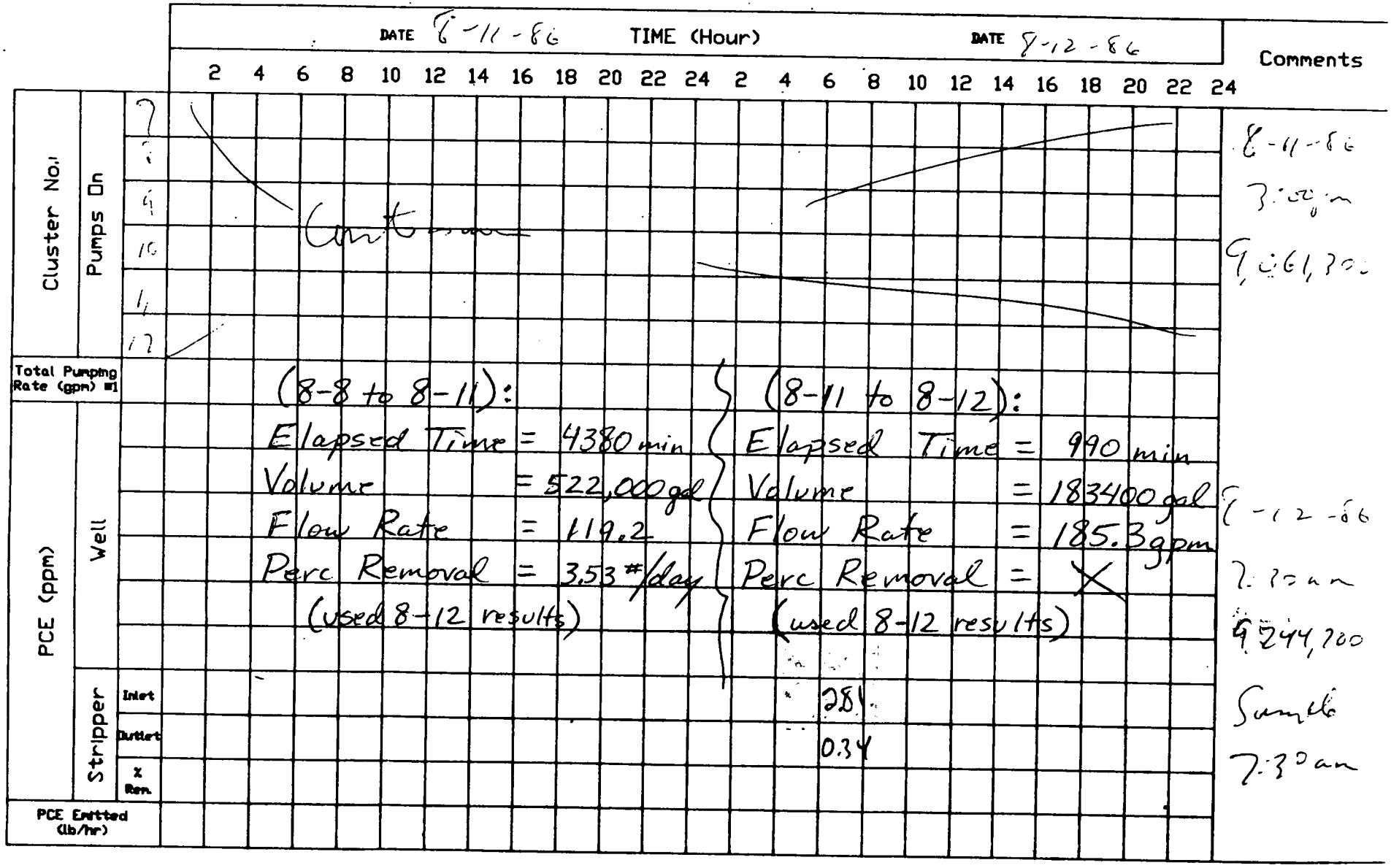
WAUSAU CHEMICAL EXTRACTION PROGRAM



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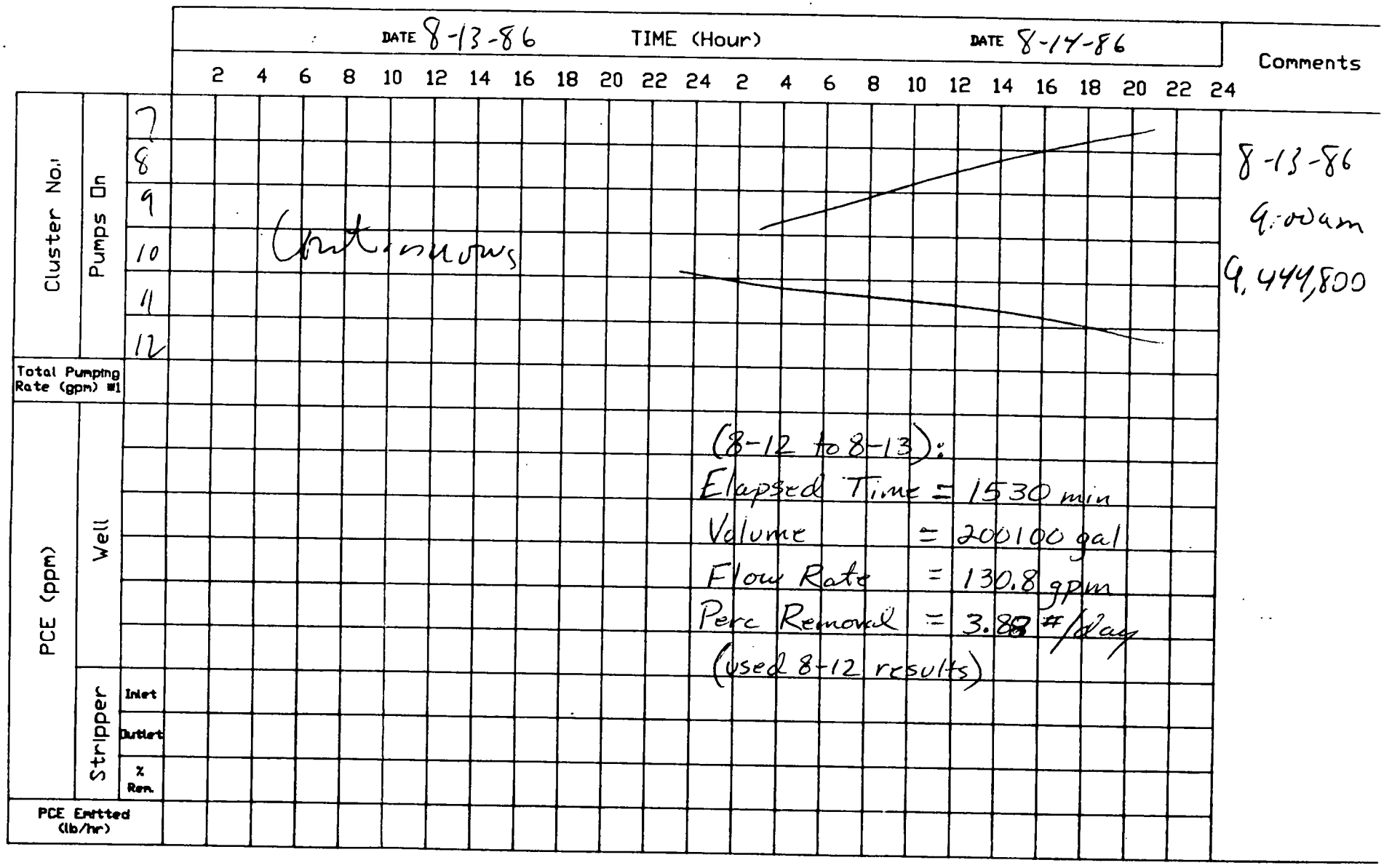

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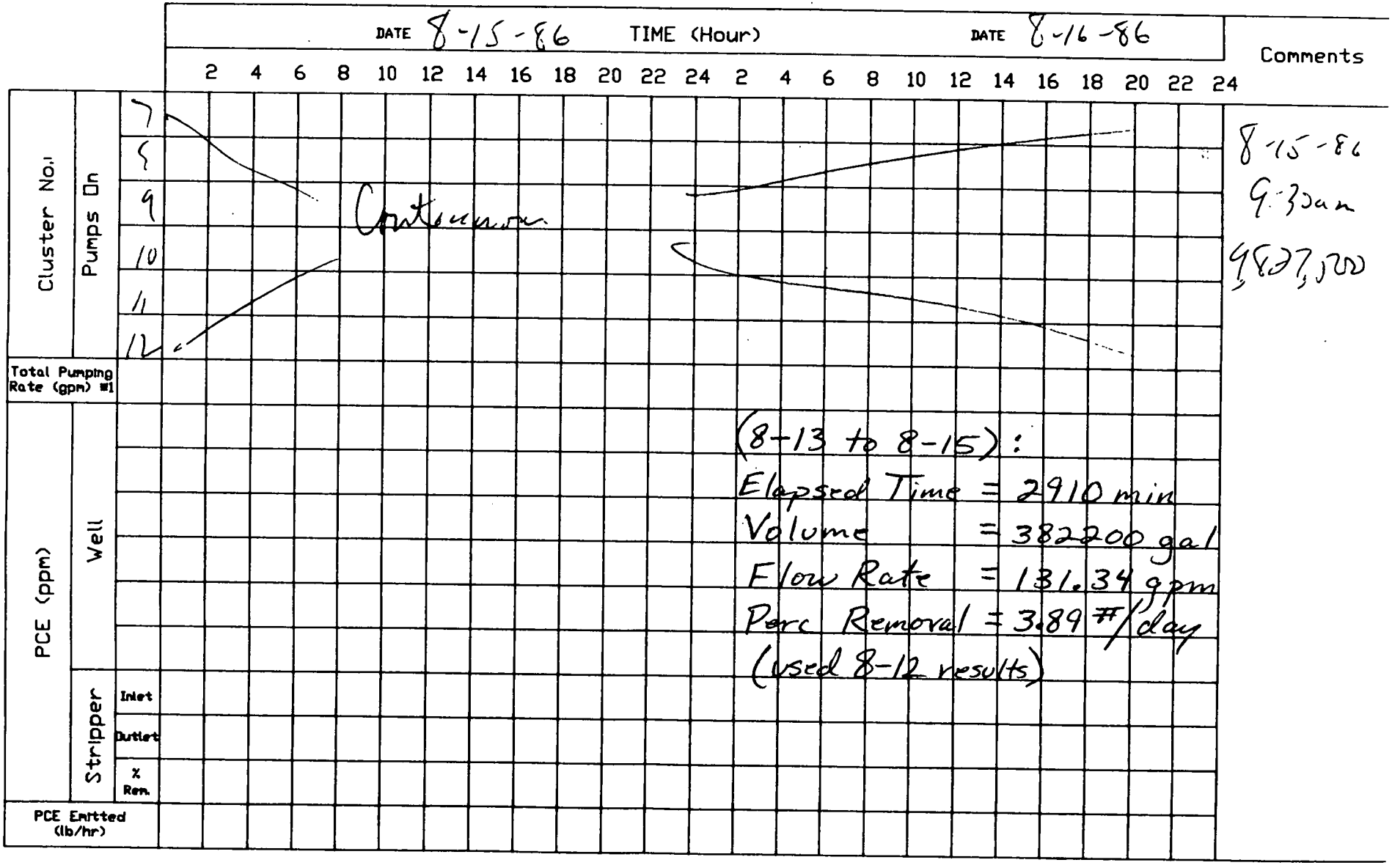

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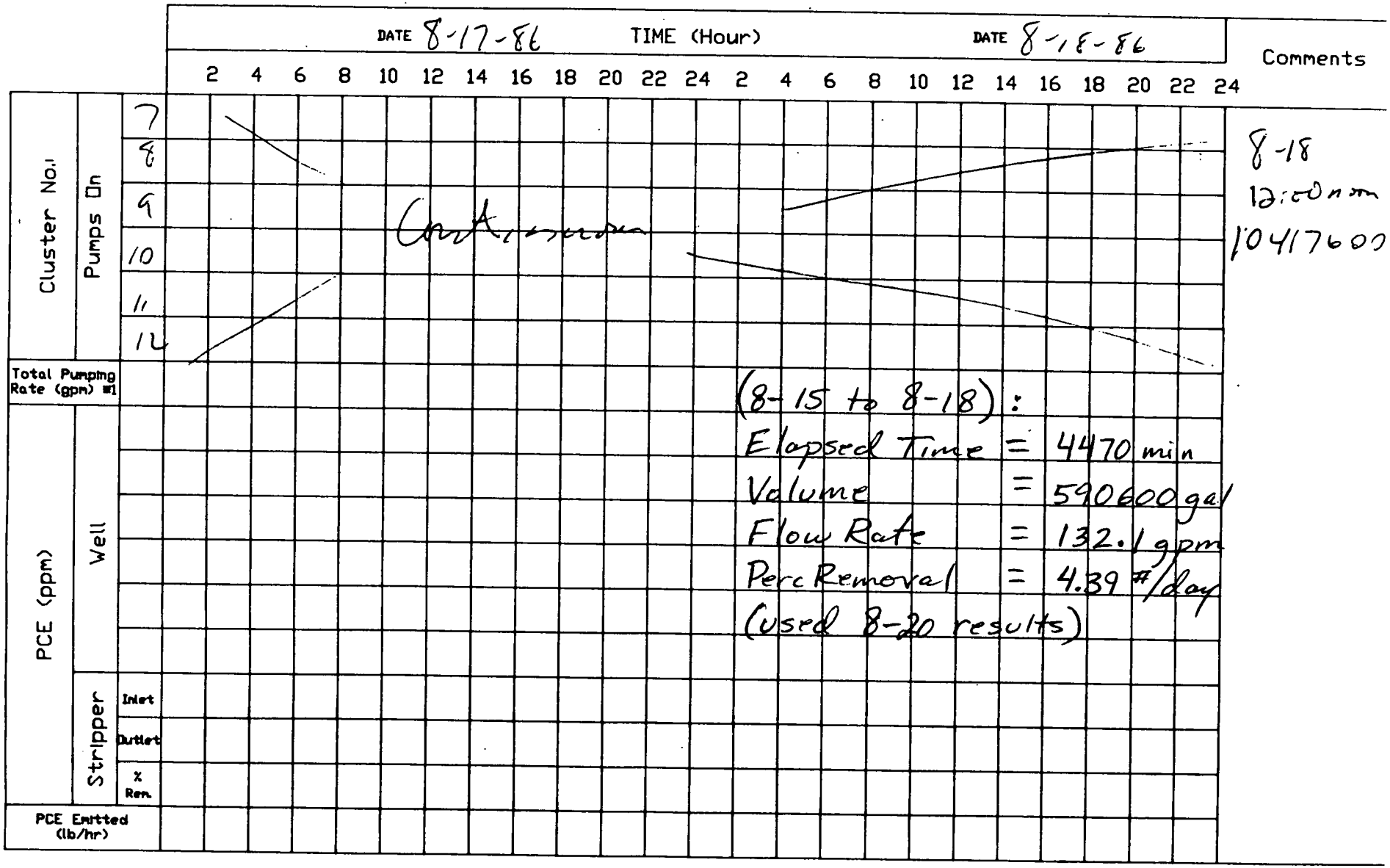

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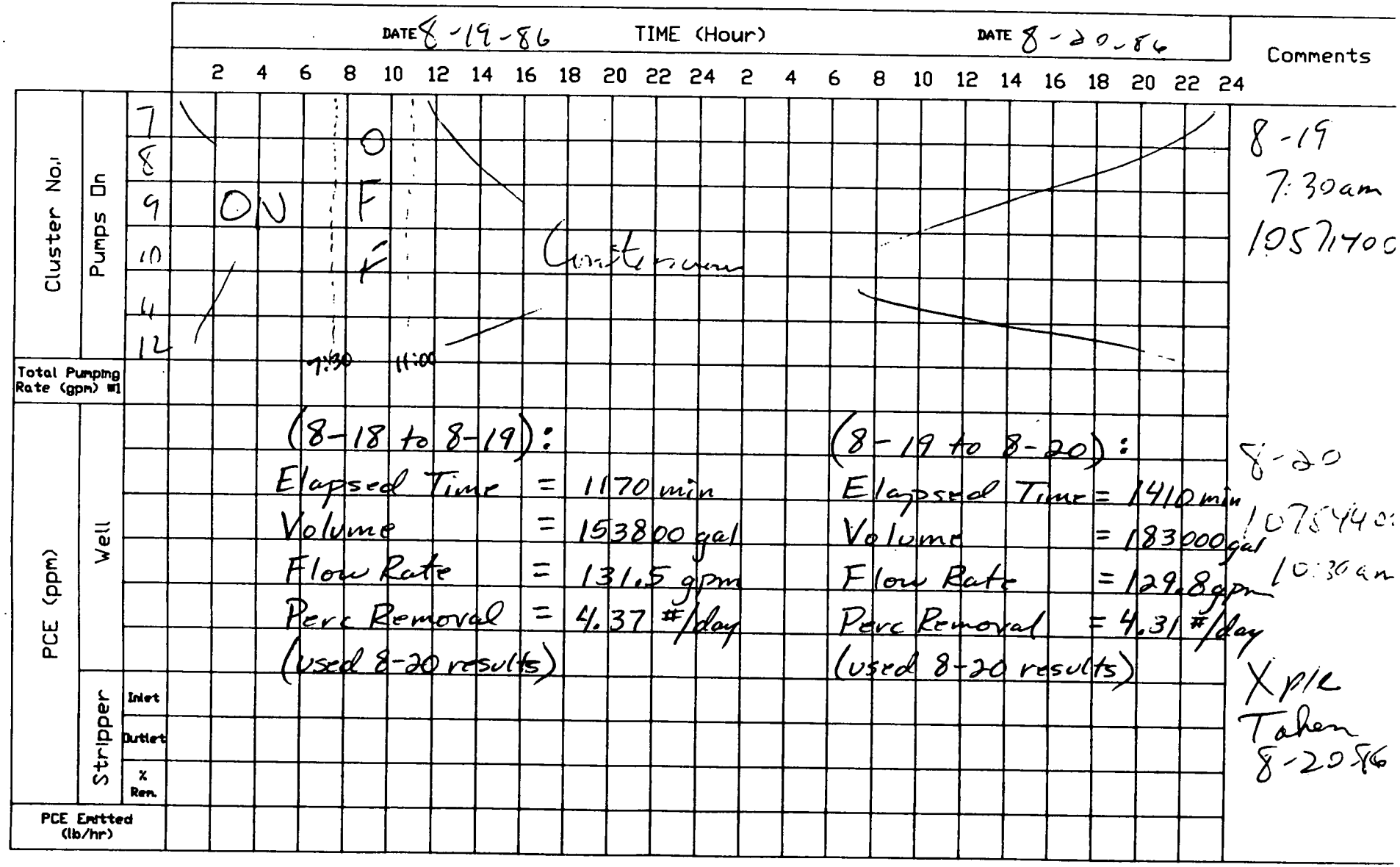

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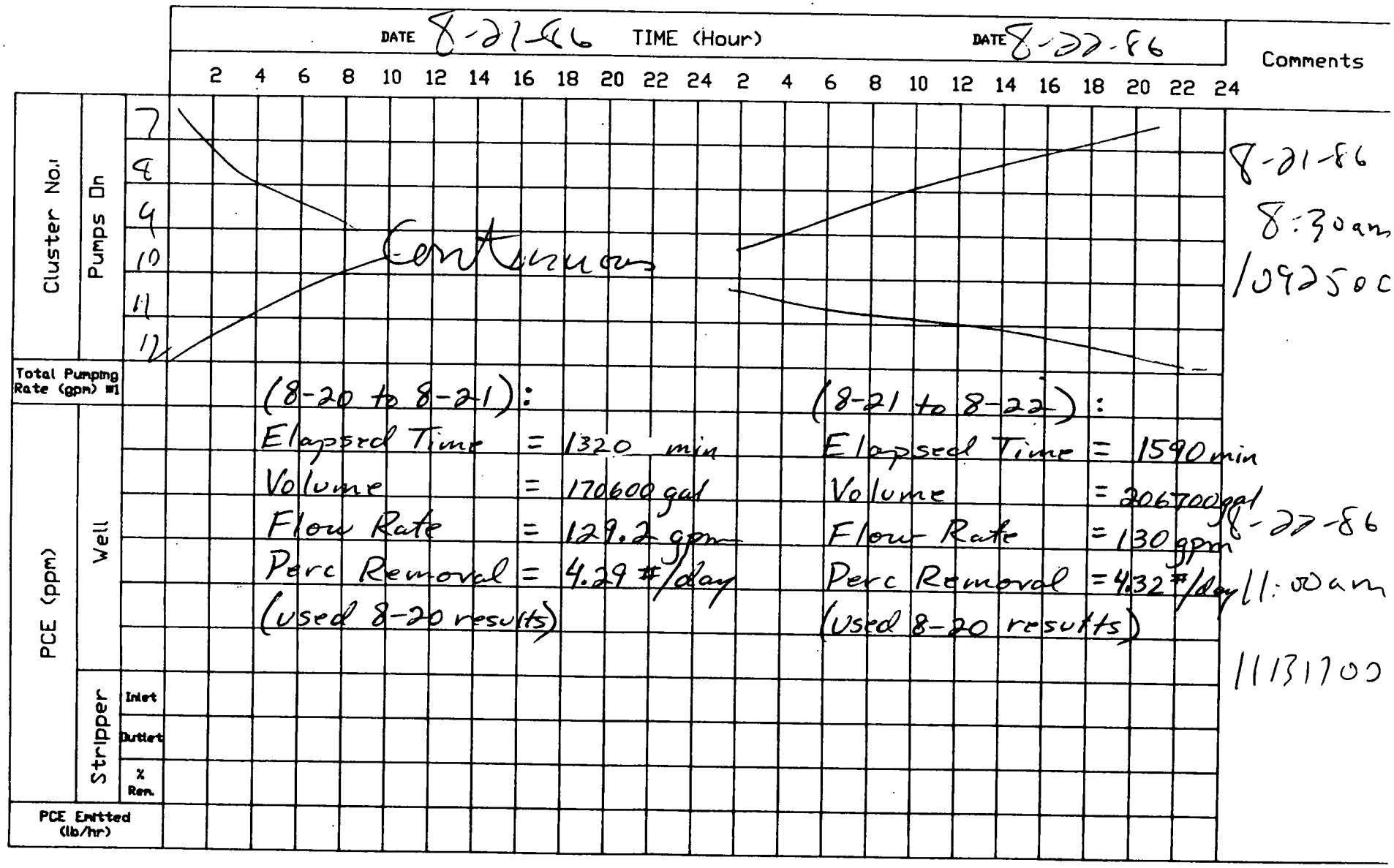

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WAUSAU CHEMICAL EXTRACTION PROGRAM

DATE 8-23-86 TIME (Hour) DATE 8-24-86

2 4 6 8 10 12 14 16 18 20 22 24 2 4 6 8 10 12 14 16 18 20 22 24

Comments

Cluster No.: Pumps On

7 8 9 10 11 12

Sometime over weekend control box shorted out & burned out wiring which shut system down. Discovered Monday morning 8-25-86 about 10:00 am. Meter reading 14,230,480

Total Pumping Rate (gpm) #1

PCE (ppm) Well

Stripper: Inlet, Outlet, % Rem.

PCE Emitted (lb/hr)

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*2 : Limited by max. pumping capacity of 150 gpm
*3 : Using initial concentration
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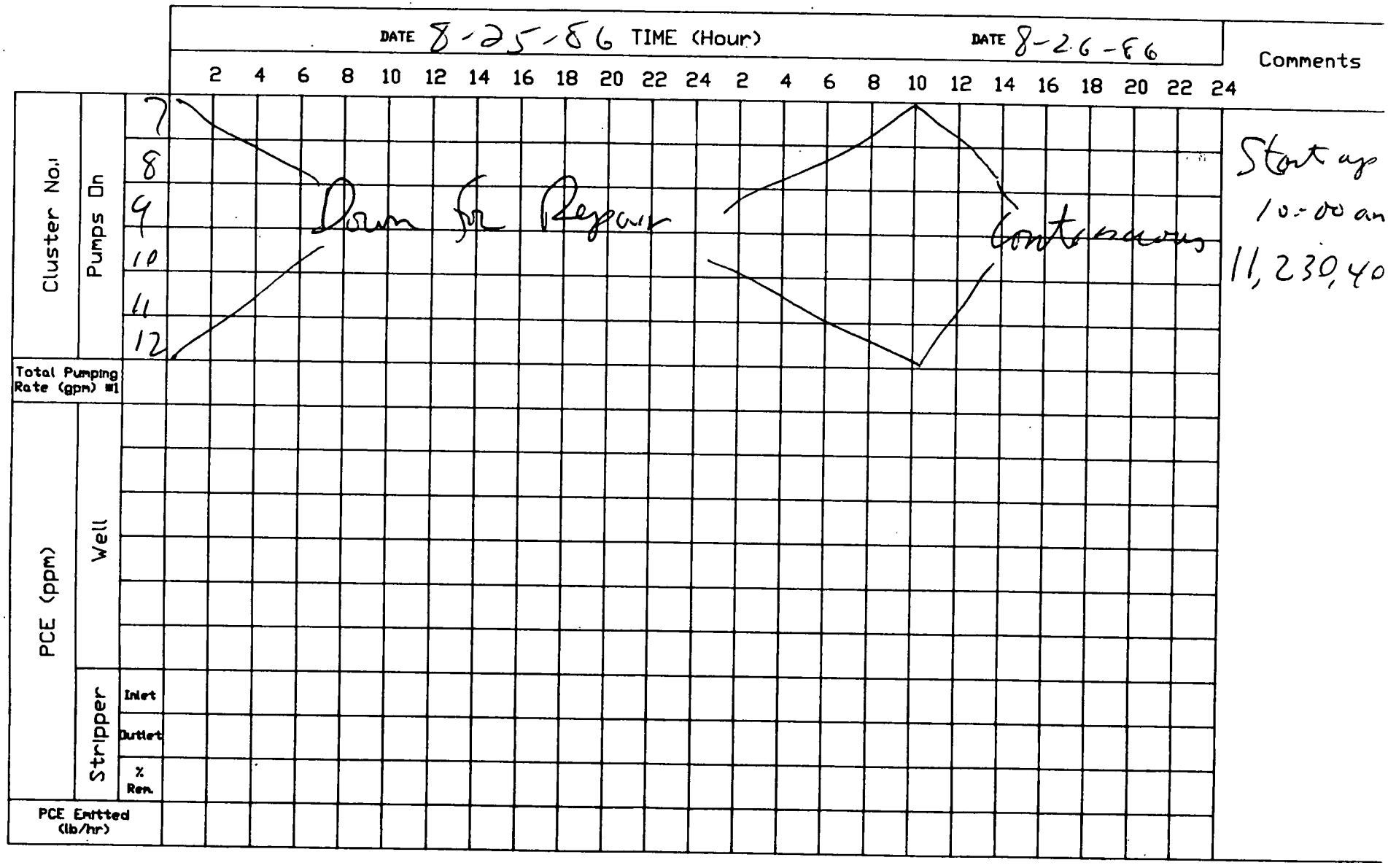
WAUSAU CHEMICAL EXTRACTION PROGRAM



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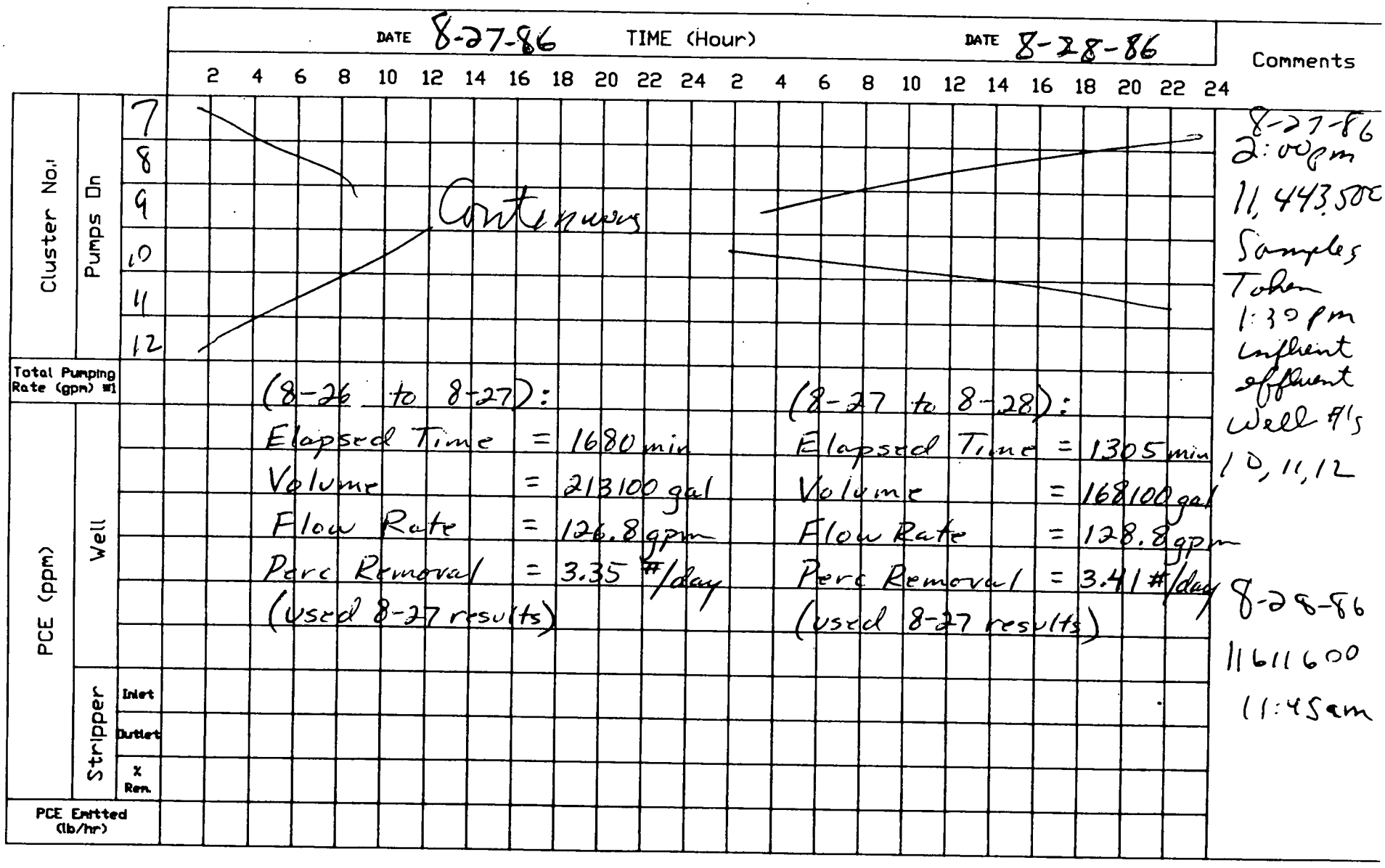

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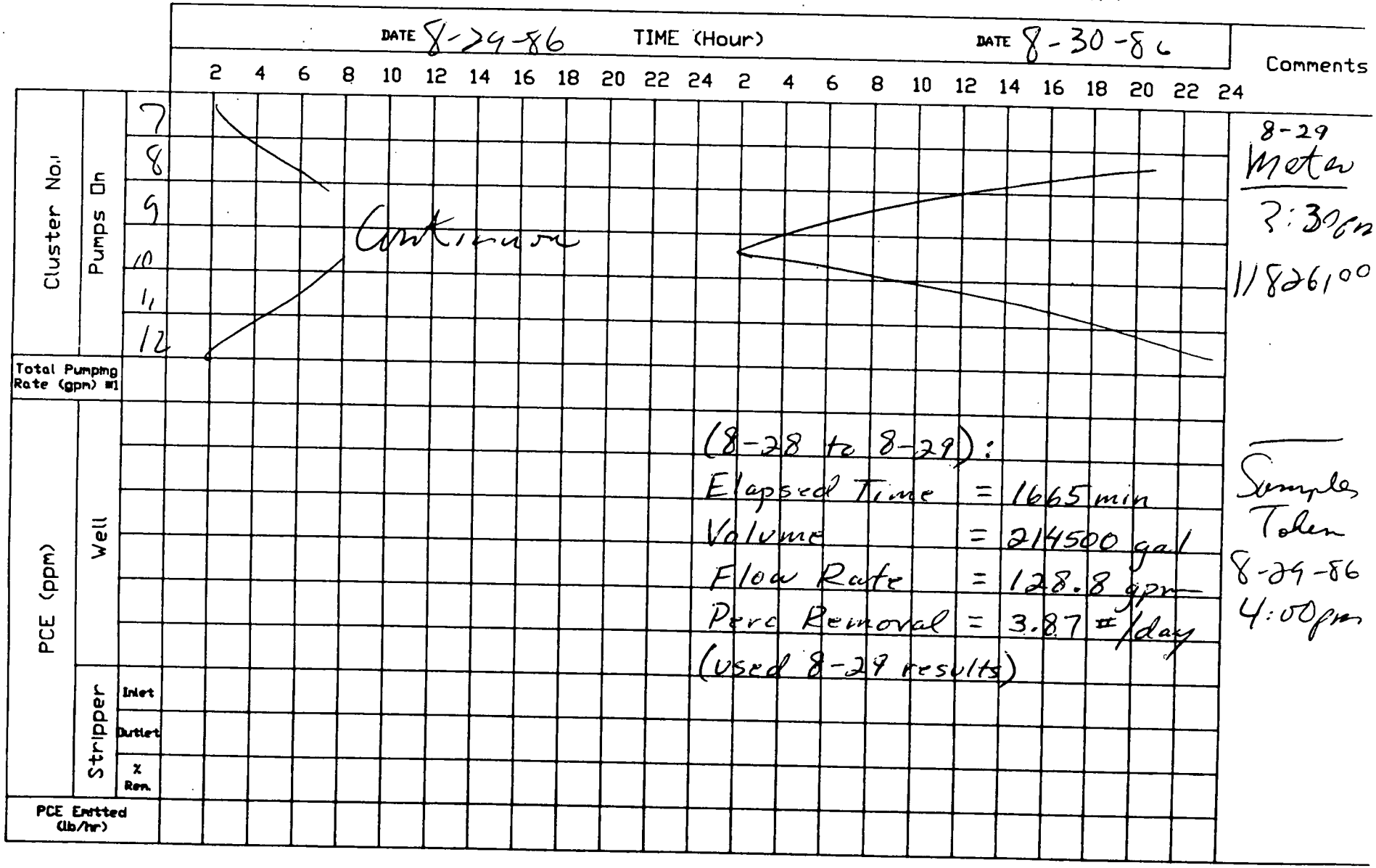

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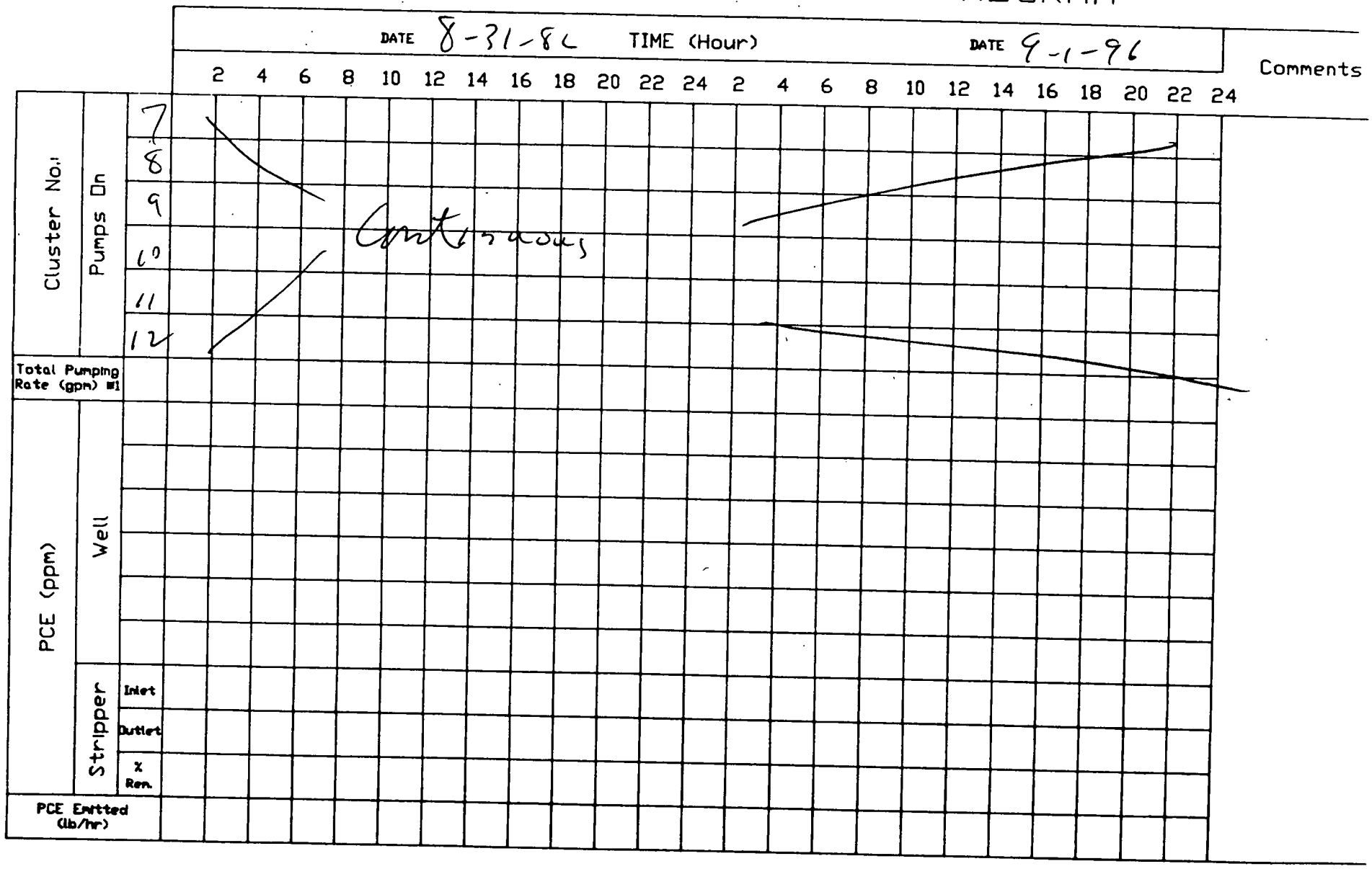

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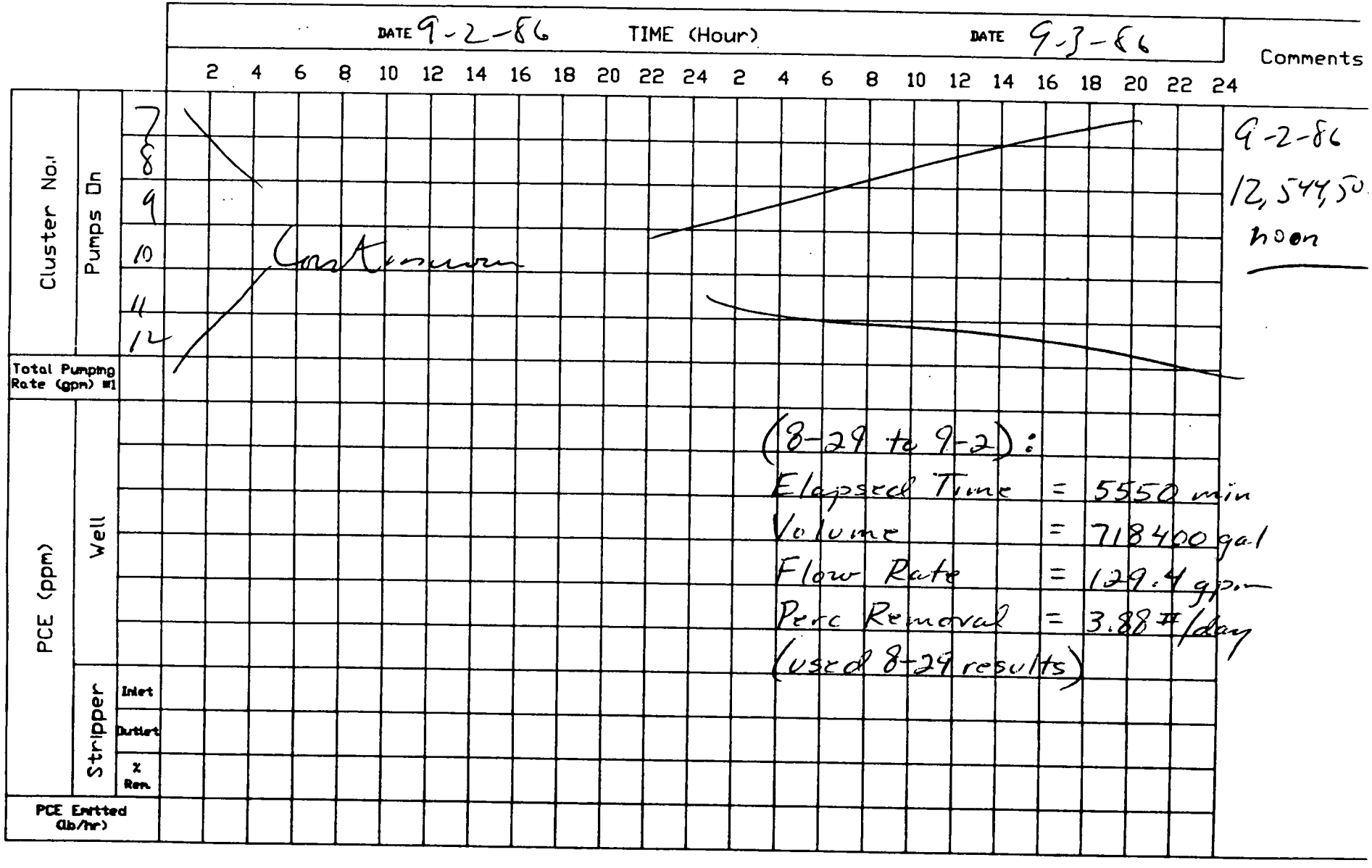

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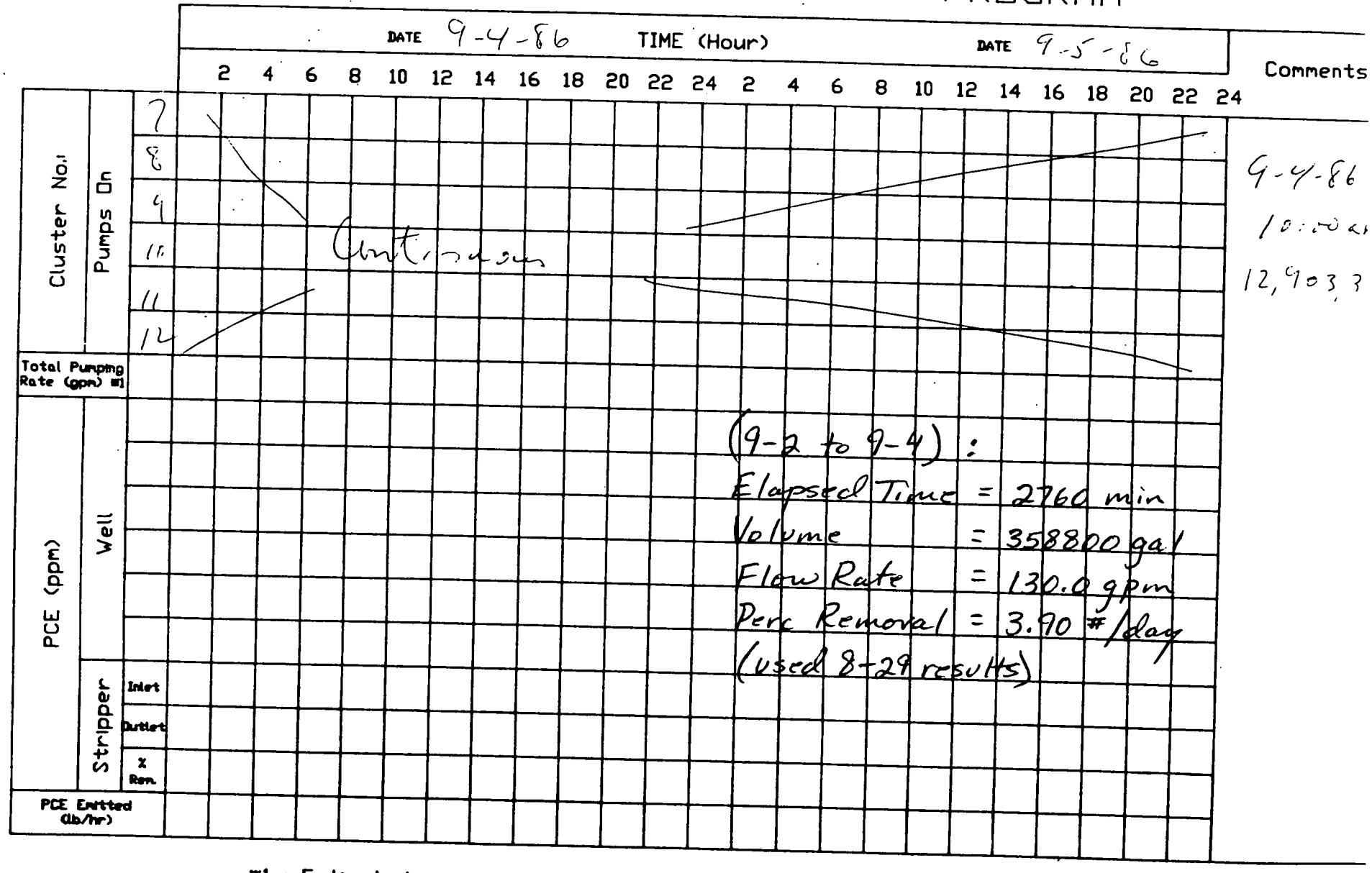

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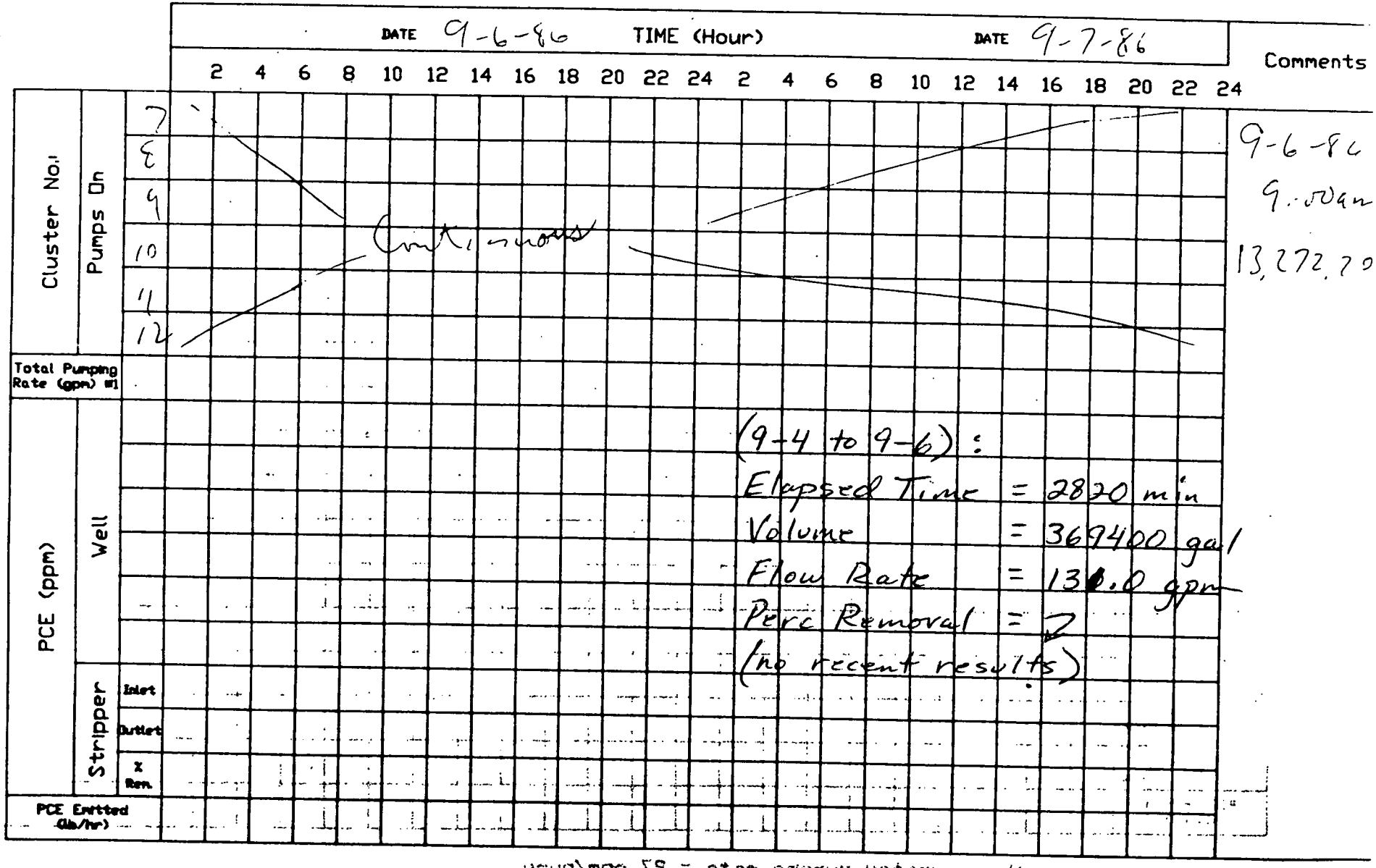

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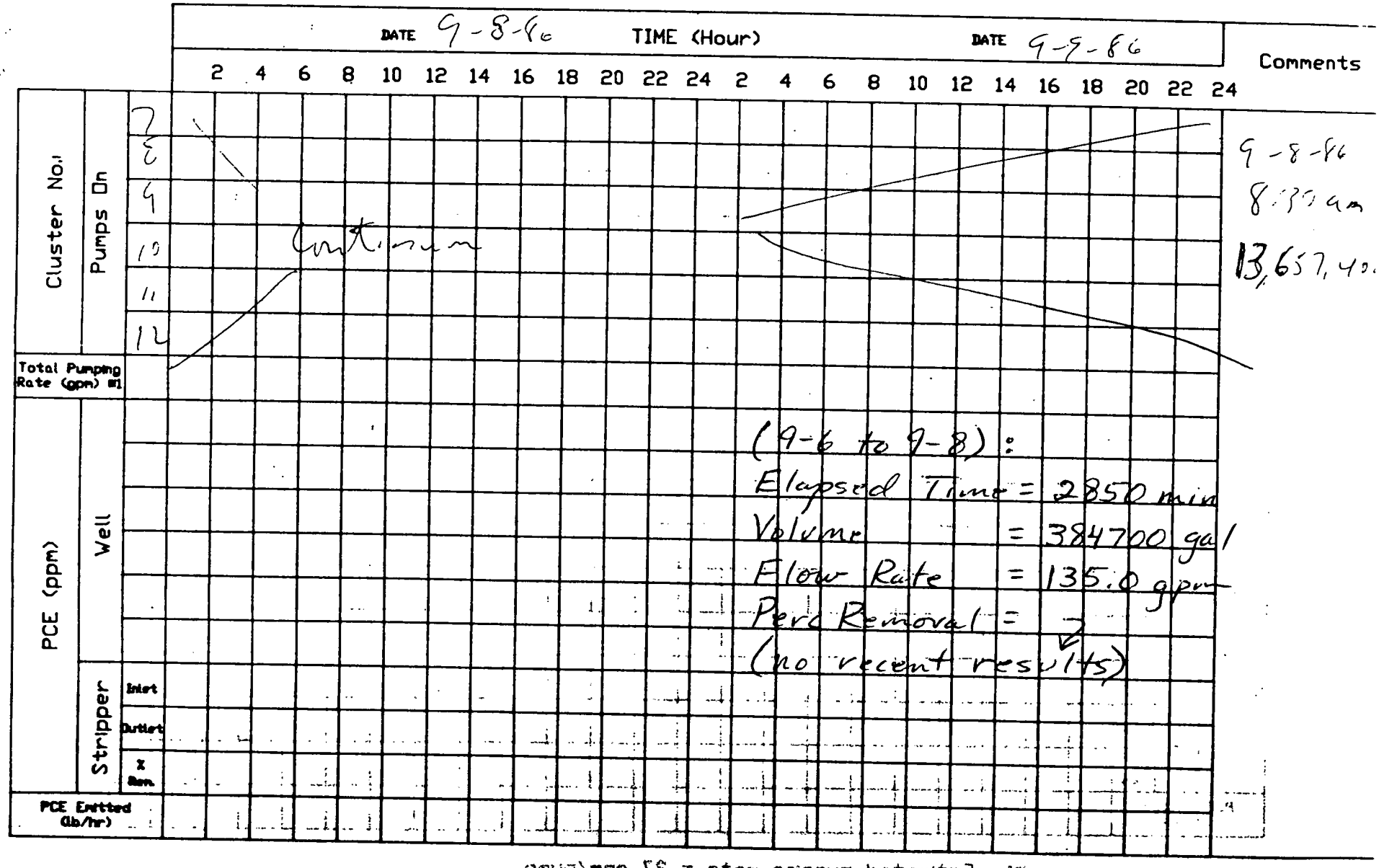

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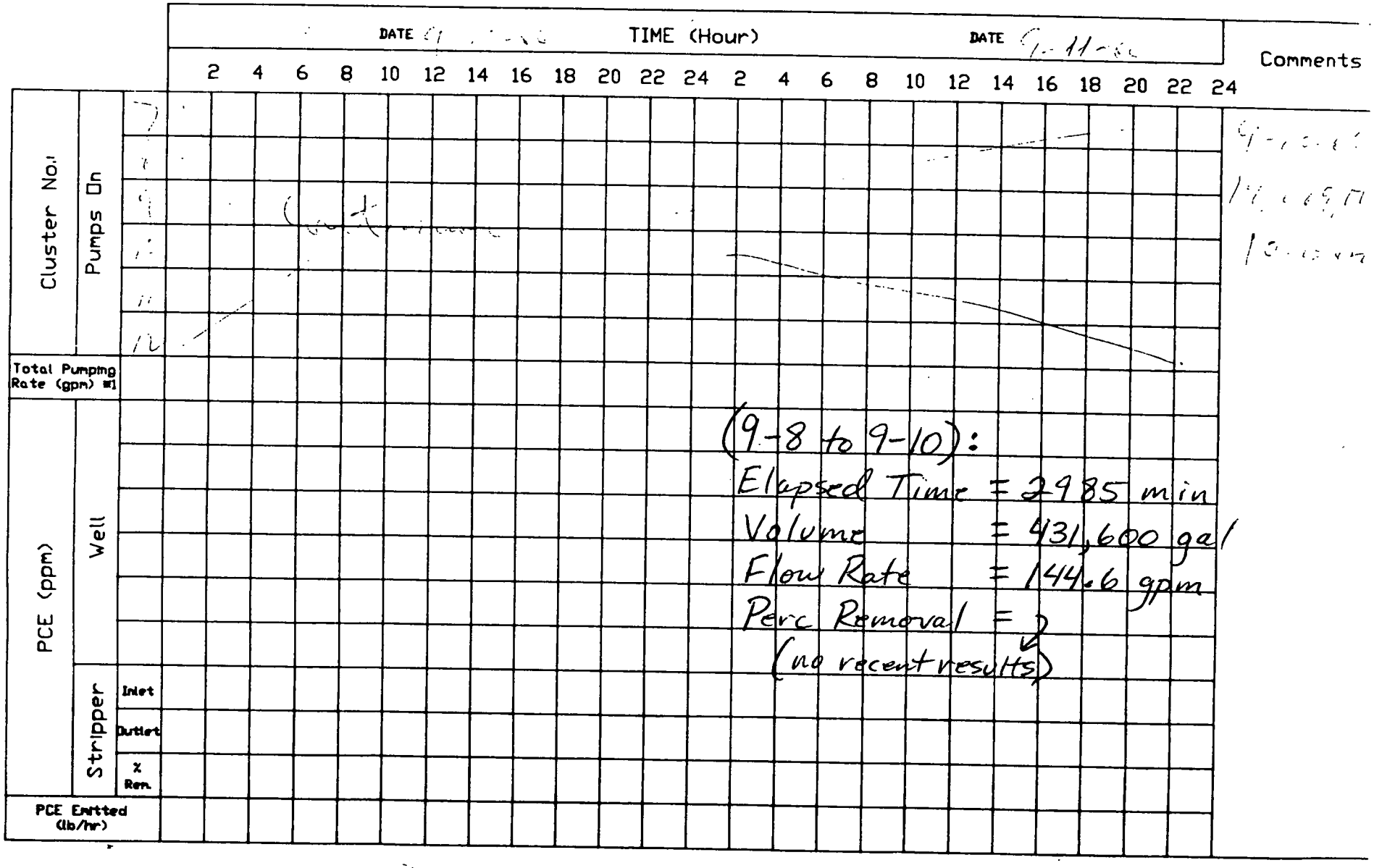

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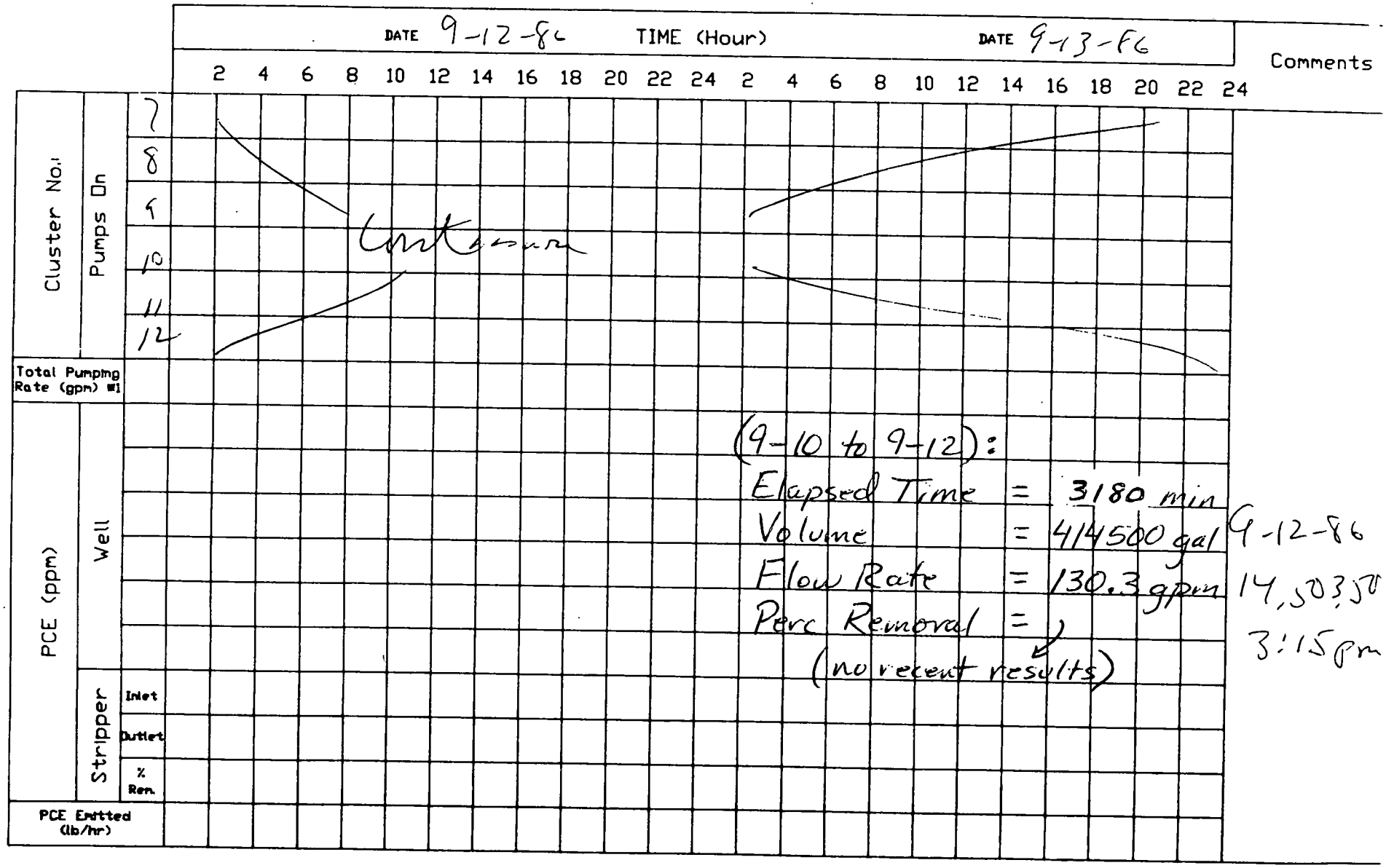

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*3 : Using initial concentration
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STS Consultants Ltd.
Green Bay, WI
540 Lambeau [illegible]
(414) [illegible]

RECORD OF PHONE CALL

JOB NO. 1D[illegible]6B

DATE: 1-26-86 START: 10:30 FINISH:

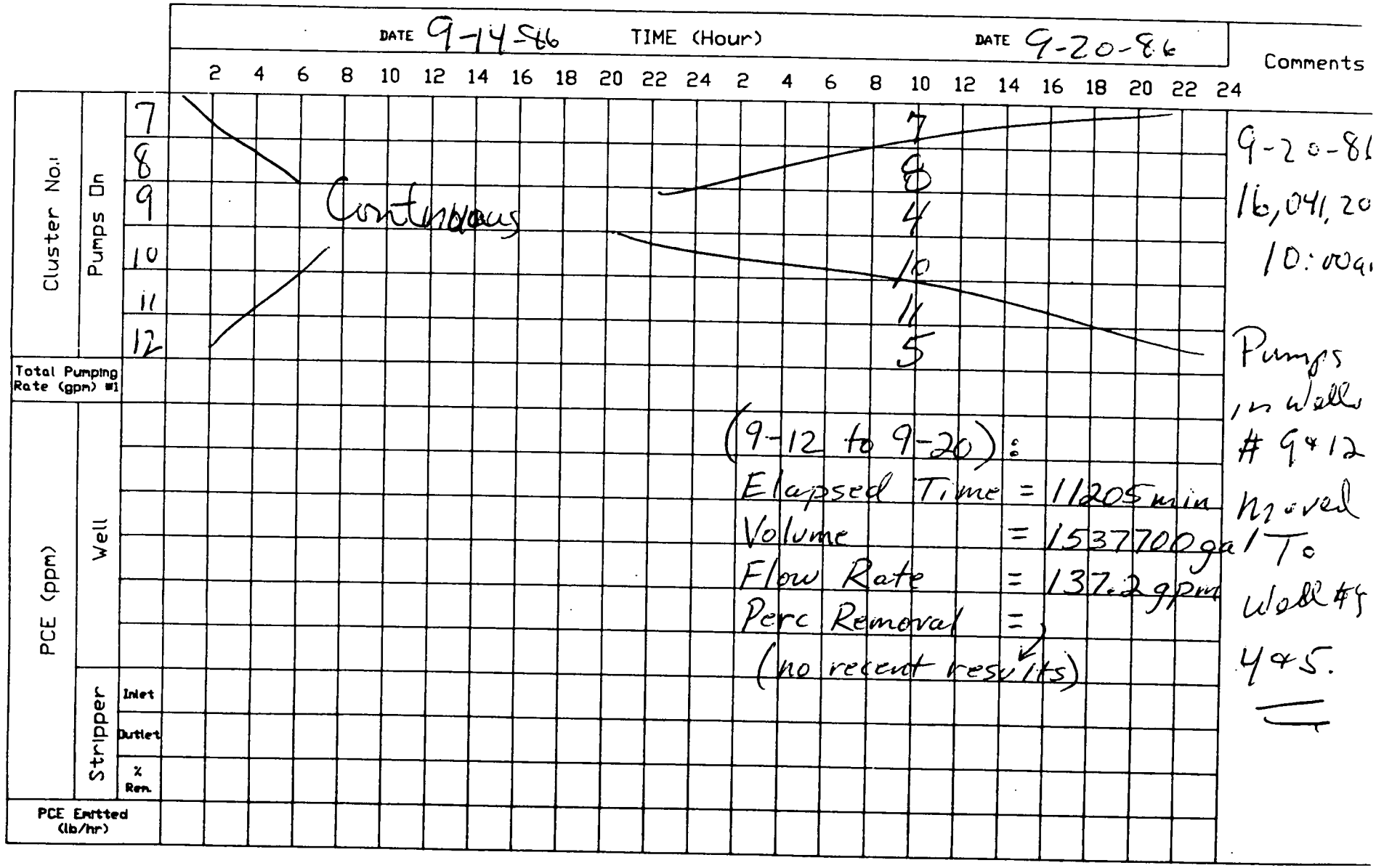
TO: Art F. FROM: MDM

CONVERSATION

ME	OTHER PARTY
Why no data for 9-15 - 9-19?	System ran continuously but we didn't take any readings. Moved two pumps on 9-20. Those 2 pumps were shut off for 1.5 to 2 hrs but everything else ran continuously. Will [illegible] pump house winter

REMARKS/ACTION:

WAUSAU CHEMICAL EXTRACTION PROGRAM



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ZIMPRO INC
ENVIRONMENTAL & ENERGY SYSTEMS

RECEIVED JUN 2 7 1986

June 26, 1986

Wausau Chemical
2001 N. River Drive
Wausau, WI 54401

Attn: Art Flashinski

Re: VOC Analysis

Attachced are the results for samples taken June 24, 1986. EPA Method 601 was used to complete the analysis.

If you have any questions, please call.

Sincerely,

ZIMPRO INC.

Mary C. Christie Heuser

Mary C. Christie Heuser
Instrumentation Chemist

MCCH/ls

cc: J.W. Barr
J.R. Salkowski

MILITARY ROAD
ROTHSCHILD, WISCONSIN 54474

ZIMPRO
ENVIRONMENTAL & ENERGY SYSTEMS

Wausau Chemical
VOC Analysis (ug/l)

	Effluent 6-24-86
Chloroform	<5.
1,1-Dichlorethane	<5.
1,1-Dichloroethylene	<25.
1,2-Dichloroethylene	230.
Ethylbenzene	16.
1,1,1-Trichloroethane	10.
Vinyl Chloride	<100.
Analytical No.	19606

	Influent 6-24-86
Chloroform	<10.
1,1-Dichlorethane	<10.
1,1-Dichloroethylene	<50.
1,2-Dichloroethylene	1,180.
Ethylbenzene	330.
1,1,1-Trichloroethane	90.
Vinyl Chloride	<200.
Analytical No.	19605

Sample	Date	Perc	Analytical No.
Influent	6-27-86	7,700.	19715
Effluent	6-27-86	1,350.	19716
Influent	6-30-86	6,300.	19731
Effluent	6-30-86	1,050.	19732

ZIMPRO
ENVIRONMENTAL & ENERGY SYSTEMS

Wausau Chemical
VOC Analysis (ug/l)

	Influent 6-24-86	Effluent 6-24-86
Perc	9,360.	1,475.
Toluene	3,400.	550.
TCE	1,680.	360.
m-Xylene	450.	77.
o & p-Xylene (as o-Xylene)	560.	136.
Analytical No.	19605	19606

ZIMPRO INC
ENVIRONMENTAL & ENERGY SYSTEMS

RECEIVED JUL 14 1986

July 11, 1986

Wausau Chemical Corp.
2001 N. River Drive
Wausau, WI 54401

Attn: Art Flashinski

Re: VOC Analysis

Attachced are the results for the July 7, 1986 water samples. EPA Method 601 was used to complete the analysis.

	Influent	Effluent
Perc (ug/l)	5,290.	815.
Analytical No.	19830	19831

If you have any questions, please call.

Sincerely,

ZIMPRO INC.

Mary C. Christie Heuser

Mary C. Christie Heuser
Instrumentation Chemist

MCCH/ls

cc: J.W. Barr
J.R. Salkowski

MILITARY ROAD
ROTHSCHILD, WISCONSIN 54474
TELEPHONE (715) 359-7211 TELEX 26-6483

ZIMPRO INC.
ENVIRONMENTAL & ENERGY SYSTEMS

July 18, 1986

Wausau Chemical Corp.
2001 N. River Drive
Wausau, WI 54401

Attn: Art Flashinski

Re: VOC Analysis

Listed below are the results for the July 14, 1986 water samples. EPA Method 601 was used to complete the analysis.

	Influent	Effluent
Perc (ug/l)	5,150.	770.
Analytical No.	19991	19992

If you have any questions, please call.

Sincerely,

ZIMPRO INC.

Mary C. Christie Heuser

Mary C. Christie Heuser
Instrumentation Chemist

MCCH/ls

cc: J.W. Barr
J.R. Salkowski

MILITARY ROAD
ROTHSCHILD, WISCONSIN 54474
TELEPHONE (715) 359-7211 TELEX 26-0495

ZIMPRO
ENVIRONMENTAL & ENERGY SYSTEMS

Wausau Chemical
VOC Analysis (ug/l)

	Detection Limit	Influent 7-21-86
Chloroform	10	30
1,1-Dichlorethane	10	X
1,1-Dichloroethylene	50	X
1,2-Dichloroethylene	30	130
Ethylbenzene	20	X
Tetrachloroethylene	10	3,870
Toluene	10	20
1,1,1-Trichloroethane	10	10
Trichloroethylene	10	490
Vinyl Chloride	200	X
Analytical No.		20159

X = Analyzed but not detected

ZIMPRO INC
ENVIRONMENTAL & ENERGY SYSTEMS

Wausau Chemical
VOC Analysis (ug/l)

	Detection Limit	Effluent 7-21-86
Chloroform	5	15
1,1-Dichlorethane	5	X
1,1-Dichloroethylene	25	X
1,2-Dichloroethylene	15	35
Ethylbenzene	10	X
Tetrachloroethylene	5	605
Toluene	5	X
1,1,1-Trichloroethane	5	X
Trichloroethylene	5	80
Vinyl Chloride	100	X
Analytical No.		20160

X = Analyzed but not detected

ZIMPRO INC.
ENVIRONMENTAL & ENERGY SYSTEMS

August 15, 1986

Wausau Chemical Corp.
2001 N. River Drive
Wausau, WI 54401

Attn: Jim Cherwinka

Re: VOC Analysis

Attached are the results for the July 28 - August 12, 1986 water samples. EPA Method 601 was used for the analysis.

If you have any questions, please call.

Sincerely,

ZIMPRO INC.

Mary C. Christie Heuser

Mary C. Christie Heuser
Instrumentation Chemist

MCCH/ls

cc: J.W. Barr
J.R. Salkowski

MILITARY ROAD
ROTHSCHILD, WISCONSIN 54474

ZIMPRO
ENVIRONMENTAL & ENERGY SYSTEMS

Wausau Chemical
VOC Analysis (ug/l)

Sample	Date	Perc	Analytical No.
Influent	7-28-86	2,840	20366
Effluent	7-28-86	345	20367
Influent	8-4-86	3,240	20580
Effluent	8-4-86	410	20581
Influent	8-12-86	2,810	20758
Effluent	8-12-86	340	20759

ZIMPRO INC.
ENVIRONMENTAL & ENERGY SYSTEMS

September 3, 1986

Wausau Chemical Corp.
2001 N. River Drive
Wausau, WI 54401

Attn: Art Flashinski

Re: VOC Analysis

Attached are the results for August 20, 1986 water samples. The analysis was done according to EPA Method 601.

If you have any questions, please call.

Sincerely,

ZIMPRO INC.

Mary C. Christie Heuser

Mary C. Christie Heuser
Instrumentation Chemist

MCCH/ls

cc: J.W. Barr
J.R. Salkowski

MILITARY ROAD
ROTHSCHILD, WISCONSIN 54474

ZIMPRO INC
ENVIRONMENTAL & ENERGY SYSTEMS

Wausau Chemical
VOC Analysis (ug/l)

	Detection Limit	Effluent 8-20-86	Influent 8-20-86
Chloroform	5	5	10
1,1-Dichlorethane	5	X	X
1,1-Dichloroethylene	25	X	X
1,2-Dichloroethylene	15	20	120
Ethylbenzene	10	X	X
Tetrachloroethylene	5	370	3,140
Toluene	5	X	X
1,1,1-Trichloroethane	5	X	10
Trichloroethylene	5	45	390
Vinyl Chloride	100	X	X
Analytical No.		21050	21049

X = Analyzed but not detected

ZIMPRO INC.
ENVIRONMENTAL & ENERGY SYSTEMS

RECEIVED SEP 8 1986

September 5, 1986

Wausau Chemical Corp.
2001 N. River Drive
Wausau, WI 54401

Attn: Art Flashinski

Re: VOC Analysis

Attached are the results for August 27, 1986 water samples. The analysis was done according to EPA Method 601.

If you have any questions, please call.

Sincerely,

ZIMPRO INC.

Mary C. Christie Heuser

Mary C. Christie Heuser
Instrumentation Chemist

MCCH/ls

cc: J.W. Barr
J.R. Salkowski

MILITARY ROAD
ROTHSCHILD, WISCONSIN 54474

ZIMPRO
ENVIRONMENTAL & ENERGY SYSTEMS

Wausau Chemical
VOC Analysis (ug/l)

	Well #10 8-27-86	Well #11 8-27-86	Well #12 8-27-86
Tetrachloroethylene	1,620	5,740	600
Analytical No.	21368	21369	21370

Wausau Chemical
VOC Analysis (ug/l)

	Detection Limit	Influent 8-27-86	Effluent 8-27-86
Chloroform	10	30	10
1,1-Dichlorethane	10	X	X
1,1-Dichloroethylene	50	X	X
1,2-Dichloroethylene	30	150	27
Ethylbenzene	20	X	X
Tetrachloroethylene	10	2,630	425
Toluene	10	200	X
1,1,1-Trichloroethane	10	20	X
Trichloroethylene	10	380	68
Vinyl Chloride	200	X	X
Analytical No.		21371	21372

X = Analyzed but not detected

ZIMPRO INC.
ENVIRONMENTAL & ENERGY SYSTEMS

RECEIVED SEP 17 1986

September 16, 1986

Wausau Chemical Corp.
2001 N. River Drive
Wausau, WI 54401

Attn: Art Flashinski

Re: VOC Analysis

Attached are the results for August 29, 1986 water samples. The analysis was done according to EPA Method 601.

If you have any questions, please call.

Sincerely,

ZIMPRO INC.

Mary C. Christie Heuser

Mary C. Christie Heuser
Instrumentation Chemist

MCCH/ls

cc: J.W. Barr
J.R. Salkowski

MILITARY ROAD
ROTHSCHILD, WISCONSIN 54474

ZIMPRO INC
ENVIRONMENTAL & ENERGY SYSTEMS

Wausau Chemical
VOC Analysis (ug/l)

	Well #10 8-29-86	Well #11 8-29-86	Well #12 8-29-86
Perc	2,210	5,820	797
Analytical No.	21437	21438	21439

ZIMPRO INC
ENVIRONMENTAL & ENERGY SYSTEMS

Wausau Chemical
VOC Analysis (ug/l)

	Detection Limit	Influent 8-29-86
Chloroform	10	X
1,1-Dichlorethane	10	X
1,1-Dichloroethylene	50	X
1,2-Dichloroethylene	30	160
Ethylbenzene	20	X
Tetrachloroethylene	10	2,840
Toluene	10	X
1,1,1-Trichloroethane	10	10
Trichloroethylene	10	400
Vinyl Chloride	200	X
Analytical No.		21435

X = Analyzed but not detected

ZIMPRO INC
ENVIRONMENTAL & ENERGY SYSTEMS

Wausau Chemical
VOC Analysis (ug/l)

	Detection Limit	Effluent 8-29-86
Chloroform	5	X
1,1-Dichlorethane	5	X
1,1-Dichloroethylene	25	X
1,2-Dichloroethylene	15	27
Ethylbenzene	10	X
Tetrachloroethylene	5	337
Toluene	5	X
1,1,1-Trichloroethane	5	X
Trichloroethylene	5	50
Vinyl Chloride	100	X
Analytical No.		21436

X = Analyzed but not detected

WAUSAU CHEMICAL EXTRACTION PROGRAM
WATER LEVEL SUMMARY

Date: 6-4-86
Technician: Art Flashinski

		Time:				Time:				Time:				Time:				Comments
		W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	
Pumping Wells	1	15' 11"			OFF													
	2	16' 2"			|													
	3	16' 2"			|													
	4	15' 9"			|													
	5	20' 0"			|													
	6	16' 4"			|													
Other Wells	7	18' 11"	17'	22' 8"	|													
	8	18' 8"	17'	20' 4"	|													
	9	15' 9"	14'	18' 4"	|		Test Wells											
	10	19' 10"	17'	22' 9"	|													
	11	20' 2"	17'	24'	|	1	13' 5"											
	12	16' 2"	14'	20' 9"	|	2	14' 7"											
	13	15' 10"				3	14' 10"											
	14	15' 8"				5	12' 10"											
	15	15' 6"				6	15' 8"											

T.F.C.: Top float control set at

B.F.C.: Botton float control set at

W.L.: Water level

WAUSAU CHEMICAL EXTRACTION PROGRAM
WATER LEVEL SUMMARY

Pumps all lowered to bottom of wells on 6-13-86 – about one (1) foot in every case

Date: 6-24-86
Technician: AF & RF

		Time: 11:00 a.m.				Time:				Time: 11:00 a.m.				Time: 6-25-86				Comments
		W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	
Pumping Wells	7	17' 8"	21'	24' 8"	OFF					21' 7"			ON					
	8	17' 5"	21'	23' 0"						20' 9"								
	9	14' 11"	19'	21' 4"						17' 5"								
	10	15' 2"	21'	24' 9"						23' 0"								
	11	19' 0"	21'	22' 6"						20' 4"								
	12	15' 2"	19'	21' 9"	↓					18' 4"			↓					
Other Wells	1	15' 0"					Test Wells			15' 3"					Test Wells			
	2	15' 2"								15' 7"								
	3	15' 7"								16' 0"								
	4	17' 6"								18' 5"								
	5	18' 9"				1	12' 6"			19' 8"				1	12' 6"			
	6	15' 7"				2	13' 9"			16' 1"				2	14' 0"			T.F.C.: Top float control set at
	13	14' 10"				3	14' 0"			15' 7"				3	13' 8"			B.F.C.: Botton float control set at
	14	14' 9"				5	12' 0"			15' 2"				5	11' 9"			W.L.: Water level
	15	14' 8"				6	15' 0"			15' 1"				6	14' 10"			

WAUSAU CHEMICAL EXTRACTION PROGRAM
WATER LEVEL SUMMARY

Date: 6-27-86
Technician: RS

		Time: 8:30 am				Time:				Time:				Time:				Comments
		W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	
Pumping Wells	7	22' 0"	Same		ON													
	8	21' 6"	as															
	9	17' 10"	Last															
	10	23' 5"																
	11	22' 9"																
	12	18' 3"																
Other Wells	1	15' 6"																
	2	16' 0"																
	3	16' 2"																
	4	18' 6"																
	5	20' 0"																
	6	16' 3"																
	13	15' 3"																
	14	15' 6"																
	15	15' 3"																

T.F.C.: Top float control set at

B.F.C.: Bottom float control set at

W.L.: Water level

WAUSAU CHEMICAL EXTRACTION PROGRAM
WATER LEVEL SUMMARY

Date: 6-?9-86
Technician: RE

		Time:				Time:				Time:				Time:				Comments
		W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	
Pumping Wells	7	21' 10"	Same		ON													
	8	21' 0"	as															
	9	17' 5"																
	10	23' 2"	Last															
	11	22' 3"	↓															
	12	18' 3"	↓		↓													
Other Wells	1	15' 5"																
	2	15' 7"																
	3	16' 1"																
	4	18' 8"																
	5	19' 9"																
	6	16' 4"																
	13	15' 4"																
	14	15' 5"																
	15	15' 1"																

Test Wells

1	12' 11"
2	14' 0"
3	14' 6"
5	13' 10"
6	14' 11"

T.F.C.: Top float control set at

B.F.C.: Botton float control set at

W.L.: Water level

WAUSAU CHEMICAL EXTRACTION PROGRAM
WATER LEVEL SUMMARY

Date: 7-3-86
Technician: [illegible]

		Time: 12:30pm				Time:				Time:				Time:				Comments
		W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	
Pumping Wells	7	21' 4"																
	8	19' 11"																
	9	18' 0"																
	10	22' 0"																
	11	22' 6"																
	12	17' 3"																
Other Wells	1	15' 0"																
	2	15' 3"																
	3	15' 7"																
	4	17' 11"																
	5	19' 8"																
	6	15' 11"																
	13	15' 0"																
	14	15' 1"																
	15	14' 11"																

Test Wells

1	12' 7"
2	13' 7"
3	13' 7"
5	11' 10"
6	15' 04

T.F.C.: Top float control set at

B.F.C.: Botton float control set at

W.L.: Water level

WAUSAU CHEMICAL EXTRACTION PROGRAM
WATER LEVEL SUMMARY

Date: 7-7-86
Technician: RF

		Time: 3:00pm				Time:				Time:				Time:				Comments
		W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	
Pumping Wells	7	21' 5"																
	8	19' 11"																
	9	18' 2"																
	10	21' 1"																
	11	22' 5"																
	12	17' 7"																
Other Wells	1	15' 4"																
	2	15' 6"																
	3	15' 7"																
	4	18' 1"																
	5	19' 6"																
	6	16' 1"																
	13	25' 3"																
	14	15' 0"																
	15	15' 0"																

T.F.C.: Top float control set at

B.F.C.: Bottom float control set at

W.L.: Water level

WAUSAU CHEMICAL EXTRACTION PROGRAM
WATER LEVEL SUMMARY

Date: 7-9-86
Technician: RF

		Time: 11:30 a.m.				Time:				Time:				Time: 7-9-86				Comments
		W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	
Pumping Wells	7	21' 8"			OFF													
	8	20' 0"			|													
	9	18' 0"			|													
	10	22' 1"			|													
	11	22' 0"			|													
	12	17' 9"			V													
Other Wells	1	15' 4"																T.F.C.: Top float control set at B.F.C.: Bottom float control set at W.L.: Water level
	2	15' 5"																
	3	15' 9"																
	4	18' 2"																
	5	19' 7"																
	6	16' 2"																
	13	15' 3"																
	14	15' 4"																
	15	15' 2"																

WAUSAU CHEMICAL EXTRACTION PROGRAM
WATER LEVEL SUMMARY

Date: 7-10-86 11:30am
Technician: QT.

		Time:				Time:				Time:				Time:				Comments
		W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	
Pumping Wells	7	16' 1"			OFF													
	8	17' 10"																
	9	15' 0"																
	10	18' 11"																
	11	19' 2"																
	12	15' 5"																
Other Wells	1	15' 3"																
	2	15' 6"																
	3	15' 2"																
	4	17' 11"																
	5	19' 0"																
	6	15' 9"																
	13	15' 2"																
	14	15' 0"																
	15	14' 10"																

T.F.C.: Top float control set at

B.F.C.: Botton float control set at

W.L.: Water level

WAUSAU CHEMICAL EXTRACTION PROGRAM
WATER LEVEL SUMMARY

Date: 7-14-86 9:30 a.m.
Technician: B.F.

		Time:				Time:				Time:				Time:				Comments
		W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	
Pumping Wells	7	21' 10"																
	8	19' 10"																
	9	18' 0"																
	10	22' 0"																
	11	22' 2"																
	12	17' 10"																
Other Wells	1	15' 4"																T.F.C.: Top float control set at B.F.C.: Bottom float control set at W.L.: Water level
	2	15' 5"																
	3	15' 8"																
	4	18' 0"																
	5	14' 8"																
	6	16' 1"																
	13	15' 2"																
	14	15' 2"																
	15	15' 1"																

WAUSAU CHEMICAL EXTRACTION PROGRAM
WATER LEVEL SUMMARY

Date: 7-19-86
Technician: RF

		Time: 8:39 am				Time:				Time:				Time:				Comments
		W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	
Pumping Wells	7	21' 6"																
	8	19' 11"																
	9	17' 10"																
	10	21' 9"																
	11	22' 0"																
	12	17' 5"																
Other Wells	1	15' 2"																
	2	15' 3"																
	3	15' 11"																
	4	18' 0"																
	5	19' 9"																
	6	16' 0"																
	13	13' 0"																
	14	15' 0"																
	15	15' 0"																

T.F.C.: Top float control set at

B.F.C.: Bottom float control set at

W.L.: Water level

WAUSAU CHEMICAL EXTRACTION PROGRAM
WATER LEVEL SUMMARY

Date: 7-24-86
Technician: RZ.

		Time:				Time:				Time:				Time:				Comments
		W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	
Pumping Wells	7	21' 9"																
	8	20' 0"																
	9	17' 2"																
	10	21' 9"																
	11	22' 0"																
	12	17' 8"																
Other Wells	1	15' 3"																
	2	15' 5"																
	3	15' 11"																
	4	16' 2"																
	5	19' 9"																
	6	16' 2"																
	13	15' 2"																
	14	15' 2"																
	15	15' 3"																

T.F.C. Top float control set at

B.F.C. Bottom float control set at

W.L. Water level

WAUSAU CHEMICAL EXTRACTION PROGRAM
WATER LEVEL SUMMARY

Date: 7-28-86
Technician: RF.

		Time:				Time:				Time:				Time:				Comments
		W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	
Pumping Wells	7	20' 2"																
	8	20' 5"																
	9	18' 8"																
	10	22' 2"																
	11	22' 9"																
	12	18' 3"																
Other Wells	1	16' 0"																T.F.C.: Top float control set at B.F.C.: Bottom float control set at W.L.: Water level
	2	16' 1"																
	3	16' 6"																
	4	18' 9"																
	5	20' 0"																
	6	16' 2"																
	13	15' 6"																
	14	15' 2"																
	15	15' 4"																

WAUSAU CHEMICAL EXTRACTION PROGRAM
WATER LEVEL SUMMARY

Date: 8-4-86
Technician:

		Time: 3:00 pm				Time:				Time:				Time:				Comments
		W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	
Pumping Wells	7	91' 8"																
	8	80' 0"																
	9	12' 4"																
	10	82' 0"																
	11	82' 1"																
	12	12' 7"																
Other Wells	1	15' 4"																
	2	151' 5"																
	3	16' 0"																
	4	18' 6"																
	5	19' 2"																
	6	26' 0"																
	13	151' 4"																
	14	15' 3"																
	15	151' 4"																

T.F.C.: Top float control set at

B.F.C.: Bottom float control set at

W.L.: Water level

WAUSAU CHEMICAL EXTRACTION PROGRAM
WATER LEVEL SUMMARY

Date: 8-12-86
Technician: [illegible]

		Time: 7:30 a.m.				Time:				Time:				Time:				Comments
		W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	
Pumping Wells	7	21' 6"																
	8	21' 3"																
	9	17' 6"																
	10	22' 0"																
	11	22' 0"																
	12	17' 5"																
Other Wells	1	15' 3"																
	2	15' 4"																
	3	15' 4"																
	4	15' 4"																
	5	15' 6"																
	6	15' 10"																
	13	15' 3"																
	14	15' 3"																
	15	15' 0"																

T.F.C.: Top float control set at

B.F.C.: Bottom float control set at

W.L.: Water level

WAUSAU CHEMICAL EXTRACTION PROGRAM
WATER LEVEL SUMMARY

Date: 8-15-86
Technician: DJ

		Time: 12:30 p.m.				Time:				Time:				Time:				Comments
		W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	
Pumping Wells	7	21'6"																
	8	20'0"																
	9	16'6"																
	10	21'7"																
	11	22'2"																
	12	17'4"																
Other Wells	1	15'0"																
	2	15'5"																
	3	15'1"																
	4	18'0"																
	5	19'0"																
	6	15'1"																
	13	15'2"																
	14	15'1"																
	15	15'0"																

Monitoring Wells

1	12'9"
2	13'7"
3	14'2"
5	12'0"
6	15'0"

T.F.C. Top float control set at

B.F.C. Botton float control set at

W.L. Water level

WAUSAU CHEMICAL EXTRACTION PROGRAM
WATER LEVEL SUMMARY

Date: 8-19-86
Technician: fw

		Time: 10:30am				Time:				Time:				Time:				Comments
		W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	
Pumping Wells	7	18'0"			O													Wells shut down 7:30am Reset 10:30am Restarted 11:00am Flow rate reduced to create cycling 2:30 Back to full flow after phone discussion w/ Mark Mclupp
	8	17'7"			F													
	9	14'11"			F													
	10	19'1"			I													
	11	19'6"			I													
	12	15'4"			I													
Other Wells	1	15'3"																
	2	15'3"																
	3	15'7"																
	4	17'9"																
	5	19'1"																
	6	15'9"																
	13		14'8"															
	14		14'7"															
	15		14'5"															

							Monitor Wells											
						1	12'8"											
						2	13'10"											
						3	13'11"											
						5	12'1"											
						6	14'11"											

T.F.C.: Top float control set at

B.F.C.: Bottom float control set at

W.L.: Water level

WAUSAU CHEMICAL EXTRACTION PROGRAM
WATER LEVEL SUMMARY

Date: 8-27-86
Technician: R.F.

		Time: 12:30 pm				Time:				Time:				Time:				Comments
		W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	
Pumping Wells	7	21'5"			ON													
	8	20'7"																
	9	17'7"																
	10	22'2"																
	11	18'7"																
	12	17'6"			✓													
Other Wells	1	15'2"																
	2	15'2"																
	3	15'11"																
	4	18'0"																
	5	19'1"																
	6	16'0"																
	13	15'0"																
	14	15'0"																
	15	14'10"																

Monitoring Wells

1	12'5"
2	13'9"
3	13'11"
5	12'0"
6	14'7"

T.F.C.: Top float control set at

B.F.C.: Bottom float control set at

W.L.: Water level

WAUSAU CHEMICAL EXTRACTION PROGRAM
WATER LEVEL SUMMARY

Date: 8-29-86
Technician: RJ.

		Time: 2:30 p m				Time:				Time:				Time:				Comments
		W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	
Pumping Wells	7	21'7"																
	8	20'6"																
	9	17'5"																
	10	21'9"																
	11	22'0"																
	14	17'8"																
Other Wells	1		15'4"															
	2		15'4"															
	3		15'9"				Monitor Wells											
	4		18'4"			1	12'10"											
	5		19'2"			2	13'9"											
	6		16'0"			3	14'0"											
	13		15'3"			5	12'2"											T.F.C.: Top float control set at B.F.C.: Bottom float control set at W.L.: Water level
	14		15'1"			6	14'9"											
	15		15'1"															

WAUSAU CHEMICAL EXTRACTION PROGRAM
WATER LEVEL SUMMARY

Date: 9-6-96
Technician: RJ

		Time: 9:00 am				Time:				Time:				Time:				Comments
		W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	
Pumping Wells	7	21'	6"															
	8	20'	8"															
	9	17'	8"															
	10	21'	5"															
	11	22'	1"															
	12	17'	7"															
Other Wells	1	15'	4"															T.F.C.: Top float control set at B.F.C.: Bottom float control set at W.L.: Water level
	2	15'	7"															
	3	15'	11"															
	4	18'	1"			1	13' 2"											
	5	19'	6"			2	14' 0"											
	6	16'	0"			3	14' 1"											
	13	15'	2"			5	12' 1"											
	14	15'	2"			6	14' 9"											
	15	15'	0"															

Monitoring Wells

WAUSAU CHEMICAL EXTRACTION PROGRAM
WATER LEVEL SUMMARY

Date: 9-13-86
Technician: RF

		Time: 11:30am				Time:				Time:				Time:				Comments
		W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	
Pumping Wells	7	21'0"																
	8	20'1"																
	9	16'5"																
	10	21'4"																
	4	21'6"																
	12	16'10"																
Other Wells	1	14'11"																
	2	15'1"																
	3	15'7"																
	7	17'9"				1												
	5	18'11"				2												
	6	15'6"				3												
	13		14'11"			5												
	14		14'9"			6												
	15		14'9"															

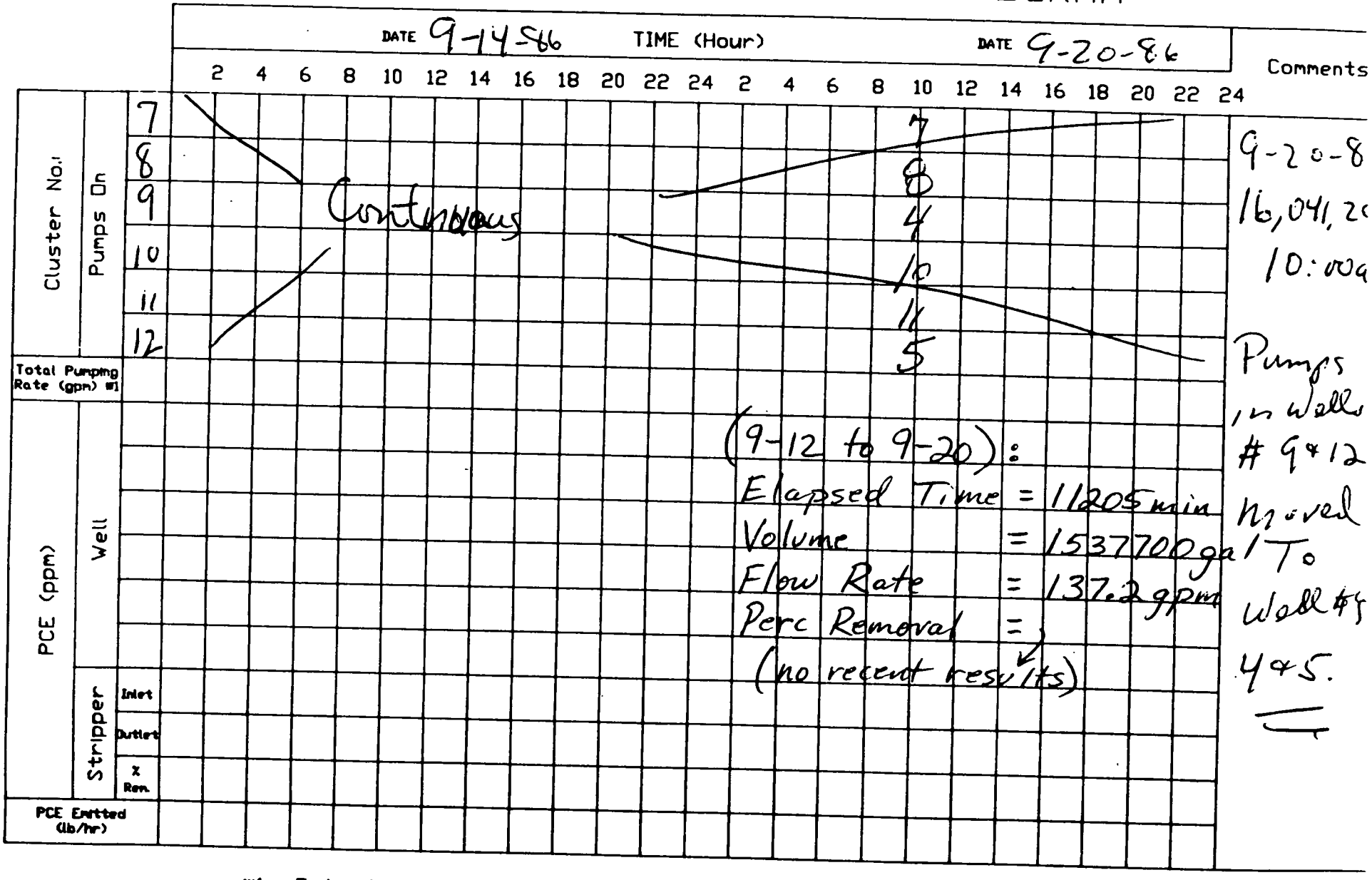
Monitor Not Read

T.F.C.: Top float control set at

B.F.C.: Bottom float control set at

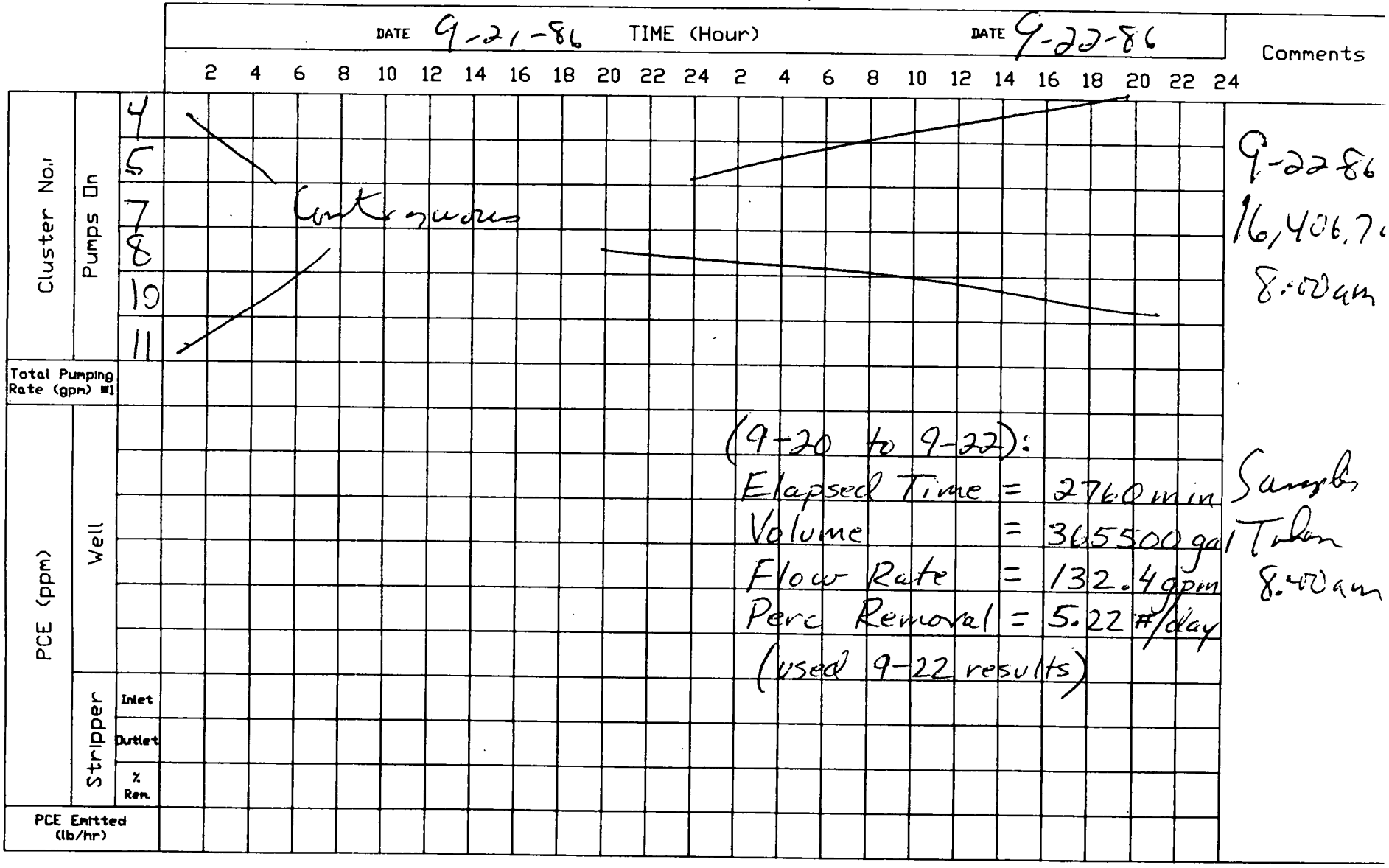
W.L.: Water level

WAUSAU CHEMICAL EXTRACTION PROGRAM



*1 : Estimated pumping rate = 27 gpm/pump
*2 : Limited by max. pumping capacity of 150 gpm
*3 : Using initial concentration
*4 : Using final concentration

WAUSAU CHEMICAL EXTRACTION PROGRAM



*1 : Estimated pumping rate = 27 gpm/pump
*2 : Limited by max. pumping capacity of 150 gpm
*3 : Using initial concentration
*4 : Using final concentration

WAUSAU CHEMICAL EXTRACTION PROGRAM

DATE 9-23-86 TIME (Hour) DATE 9-24-86

2 4 6 8 10 12 14 16 18 20 22 24 2 4 6 8 10 12 14 16 18 20 22 24

Comments

Cluster No.1 — Pumps On: 4, 5, 7, 8, 10, 11

Continuous

Total Pumping Rate (gpm) *1

PCE (ppm) — Well

Stripper — Inlet / Outlet / % Rem.

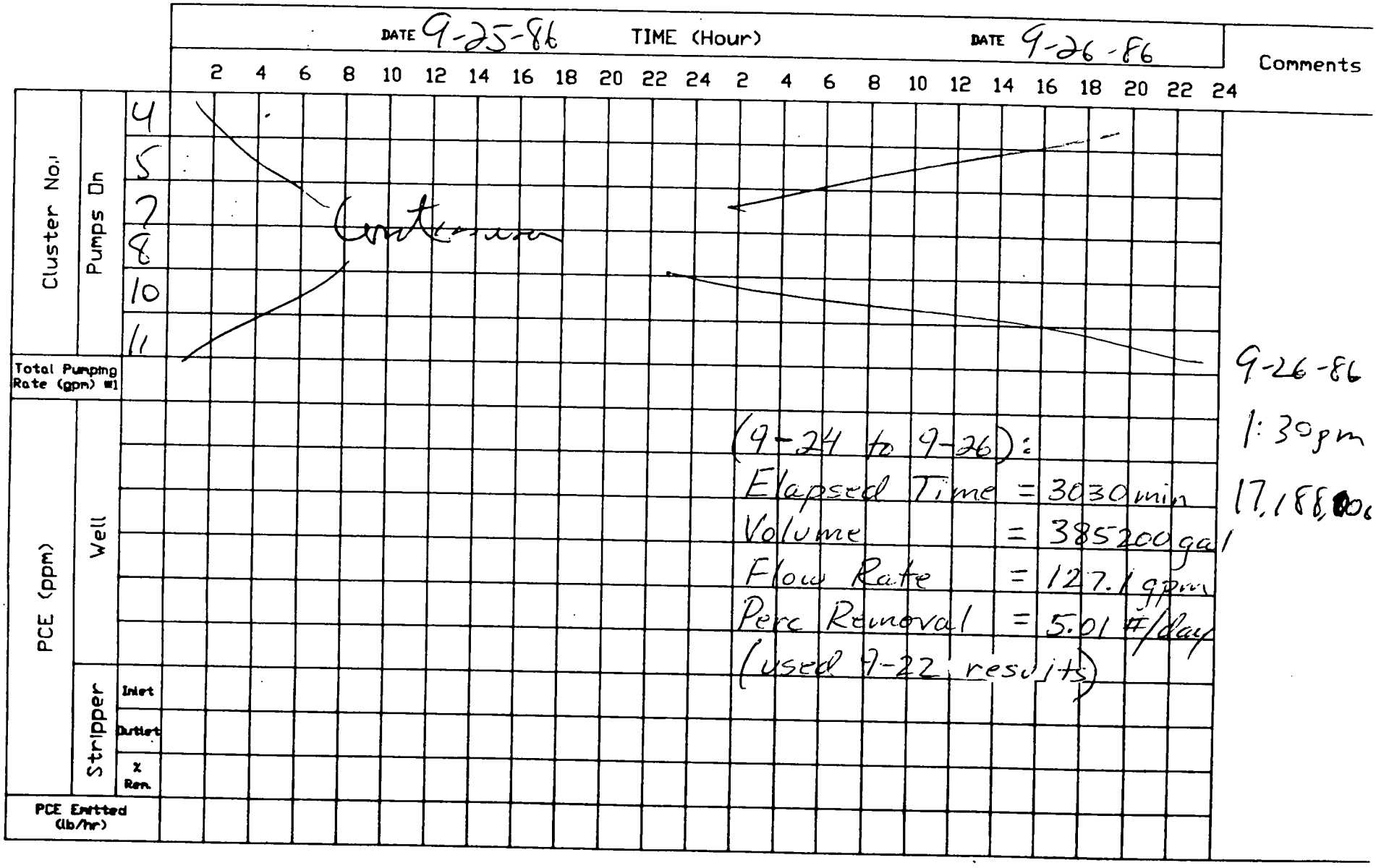
PCE Emitted (lb/hr)

(9-22 to 9-24):
Elapsed Time = 3060 min
Volume = 396100 gal
Flow Rate = 129.4 gpm
Perc Removal = 5.10 #/day
(used 9-22 results)

9-24-86 11:00 am 16,802.80

*1 : Estimated pumping rate = 27 gpm/pump
*2 : Limited by max. pumping capacity of 150 gpm
*3 : Using initial concentration
*4 : Using final concentration

WAUSAU CHEMICAL EXTRACTION PROGRAM



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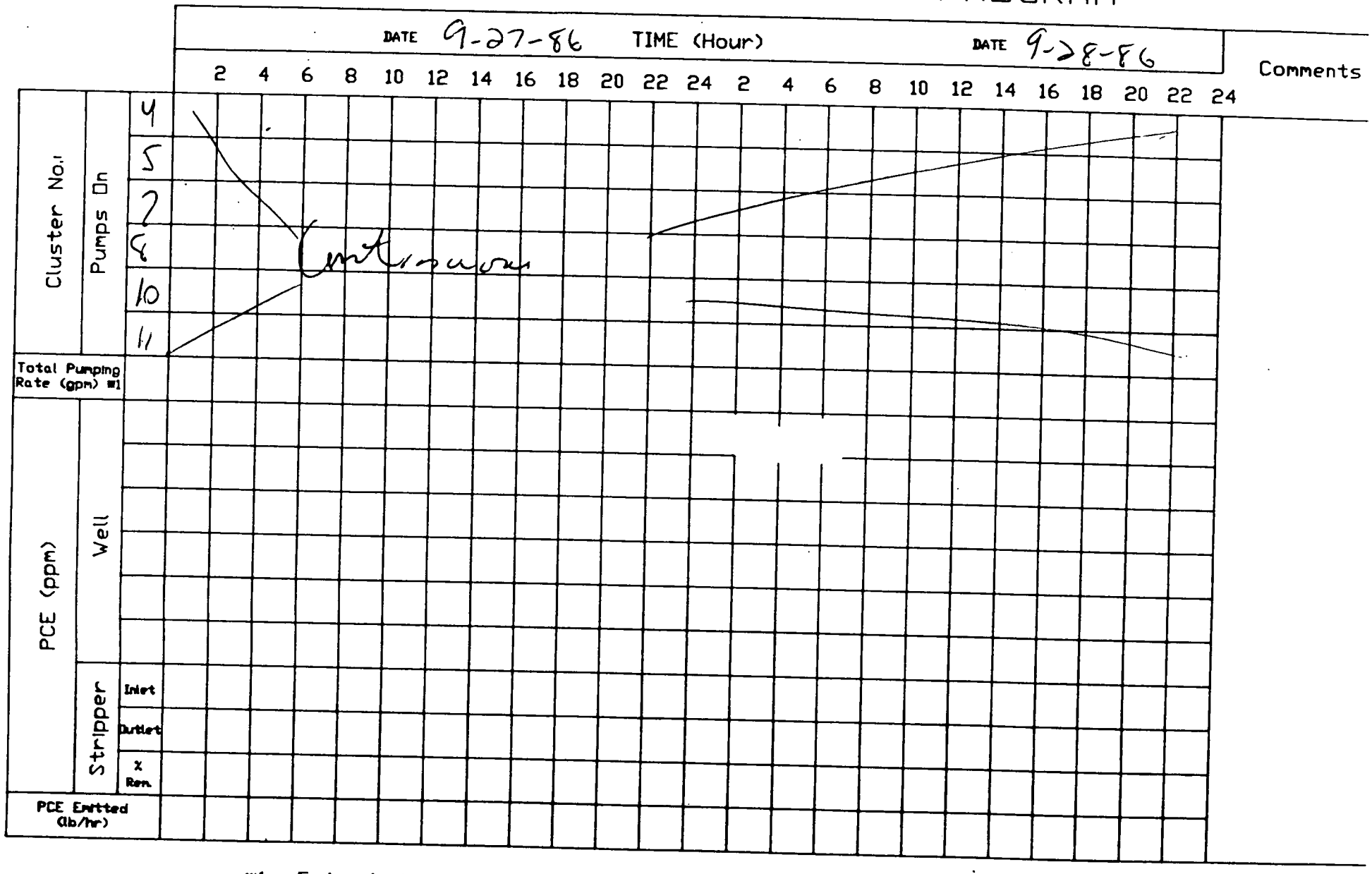
*2 : Limited by max. pumping capacity of 150 gpm
*3 : Using initial concentration
*4 : Using final concentration

WAUSAU CHEMICAL EXTRACTION PROGRAM



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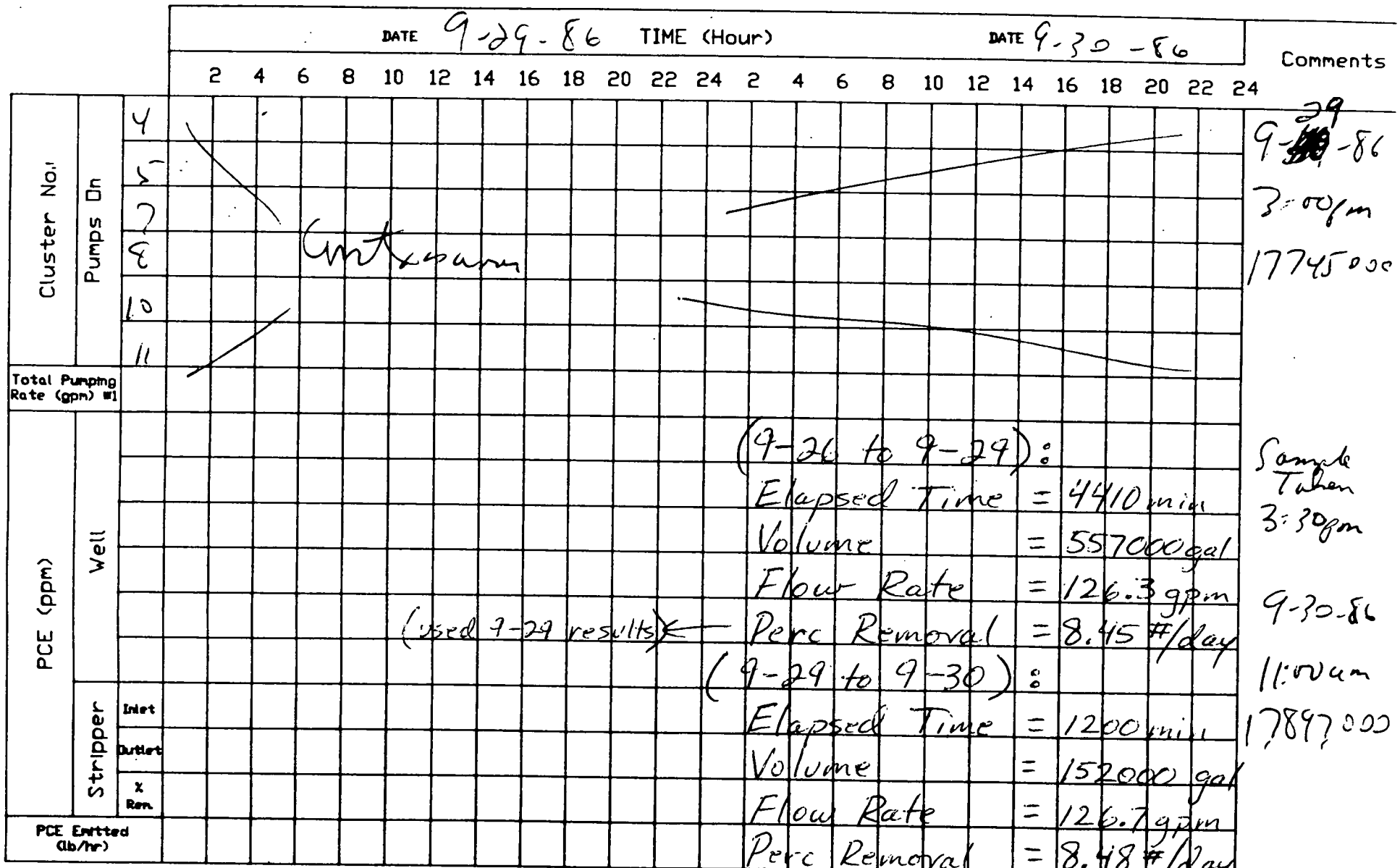
*4 : Using final concentration

WAUSAU CHEMICAL EXTRACTION PROGRAM



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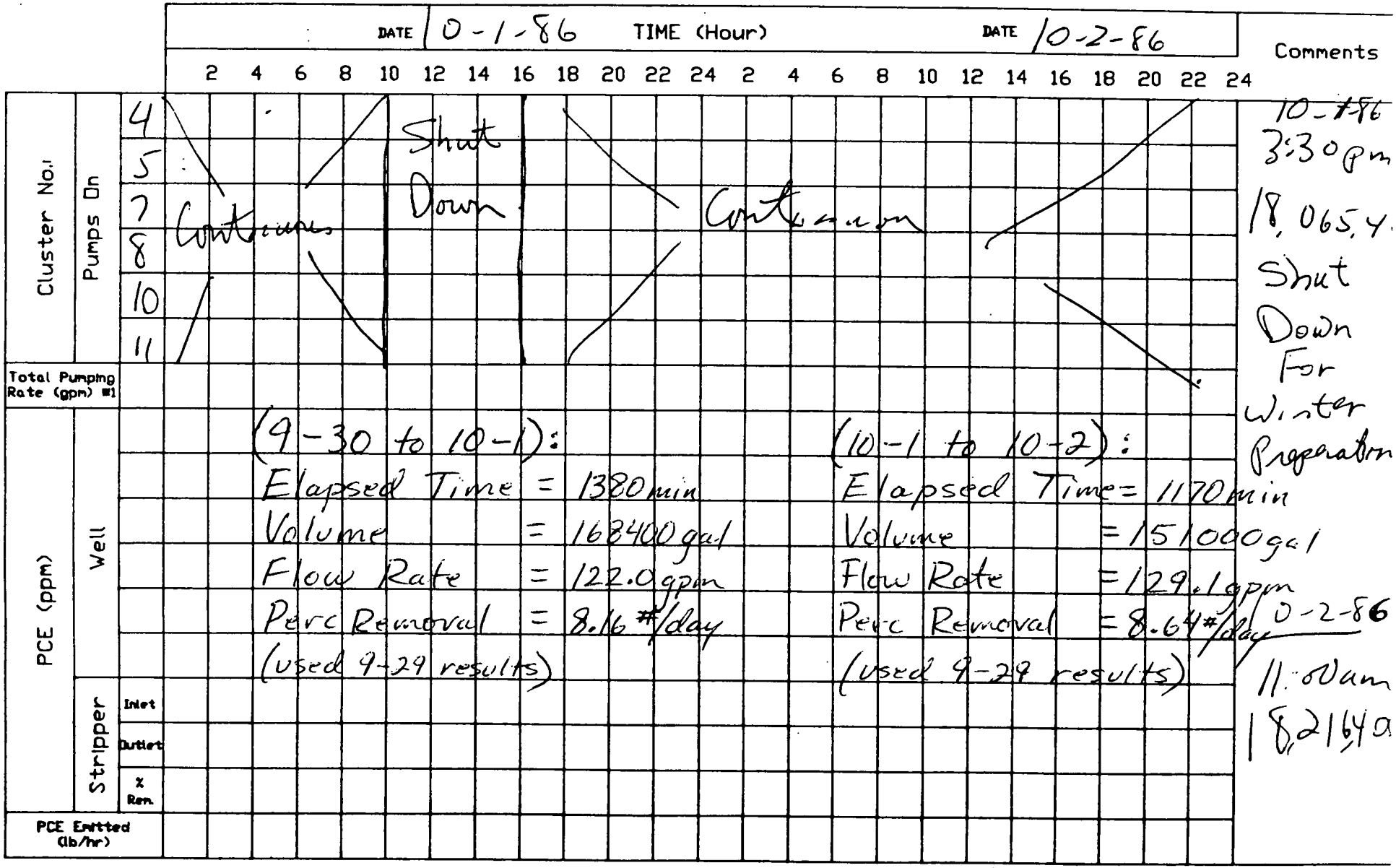
#3 : Using initial concentration
#4 : Using final concentration

WAUSAU CHEMICAL EXTRACTION PROGRAM



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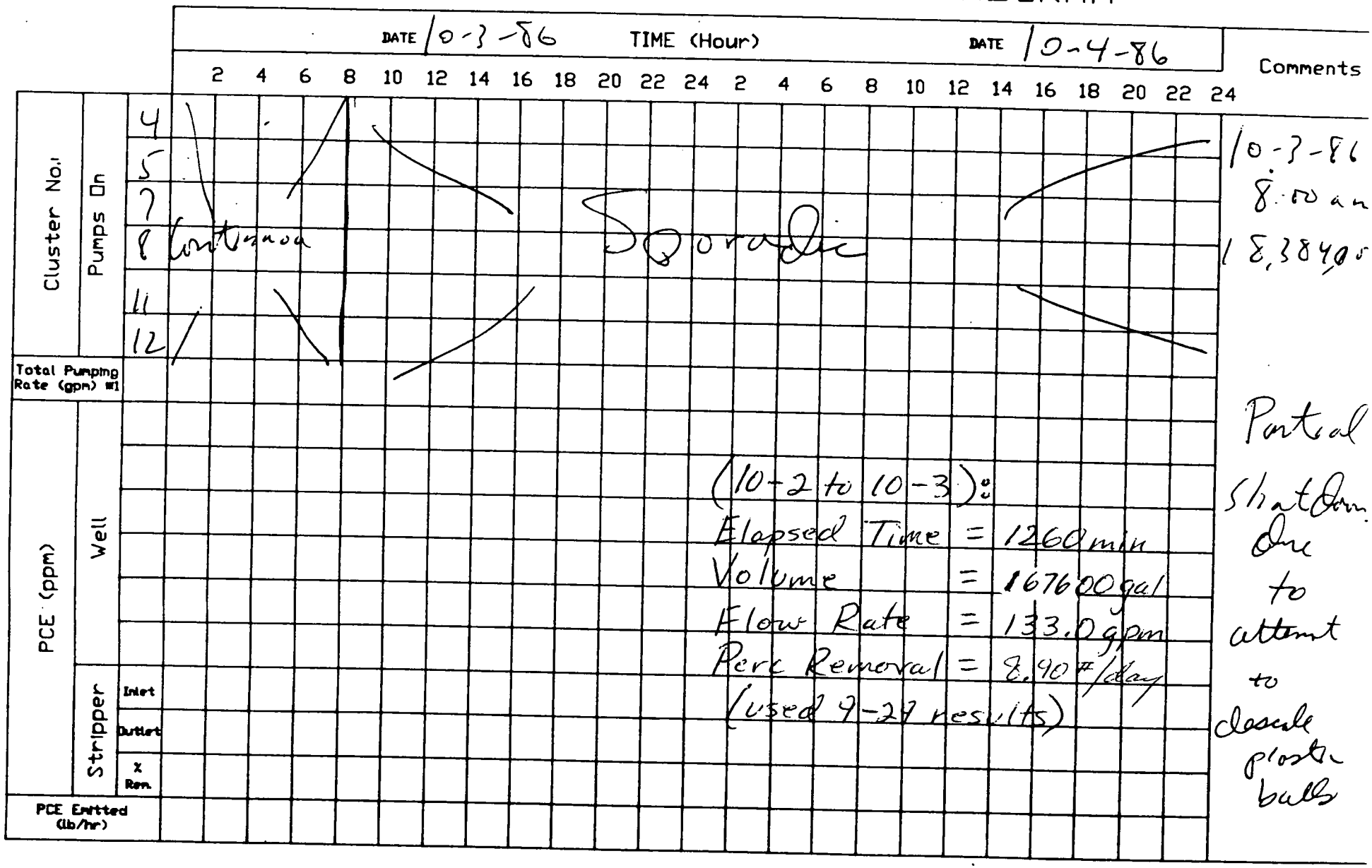
#2 : Limited by max. pumping capacity of 150 gpm
#3 : Using initial concentration
#4 : Using final concentration

WAUSAU CHEMICAL EXTRACTION PROGRAM



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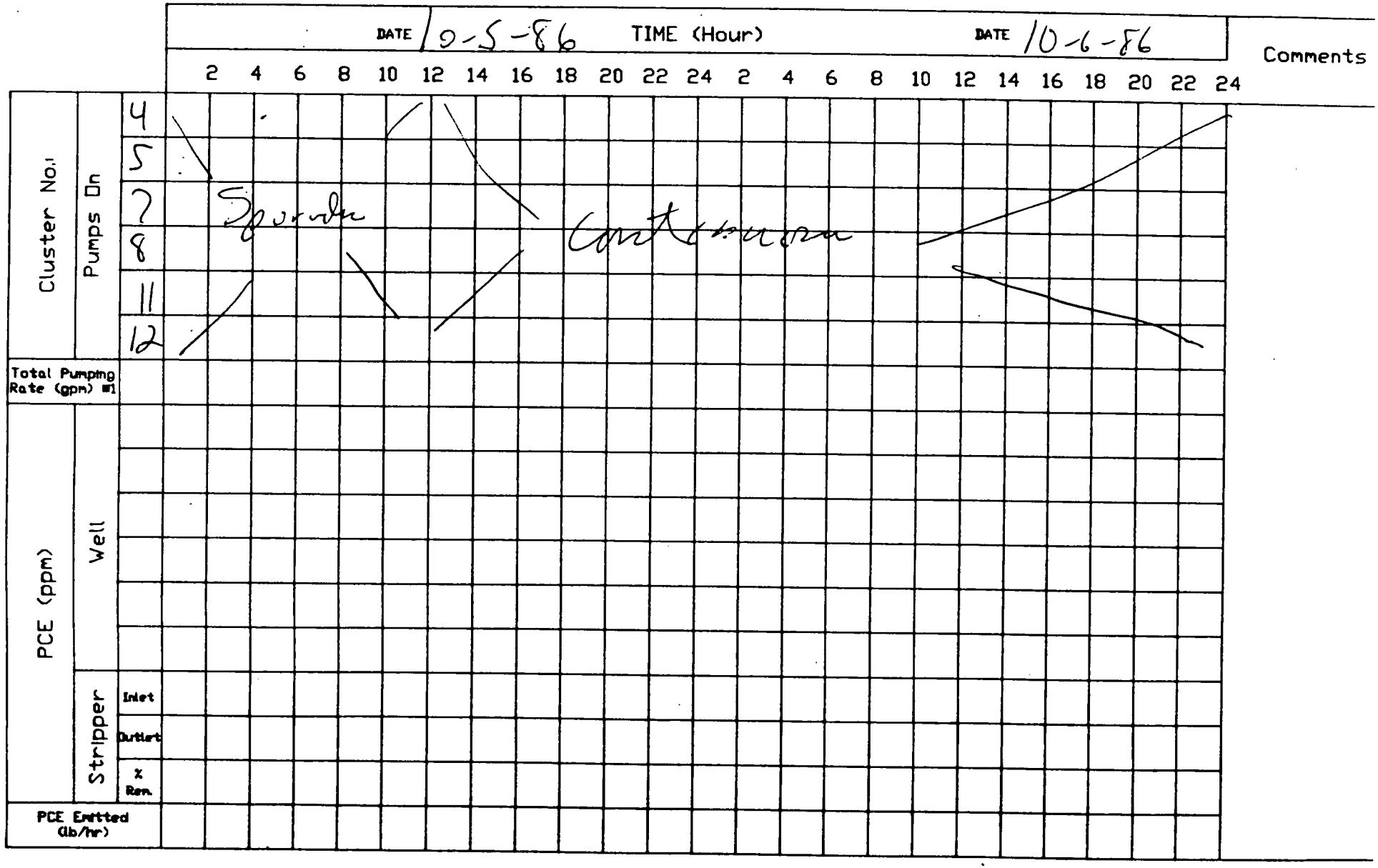
#2 : Limited by max. pumping capacity of 150 gpm
#3 : Using initial concentration
#4 : Using final concentration

WAUSAU CHEMICAL EXTRACTION PROGRAM



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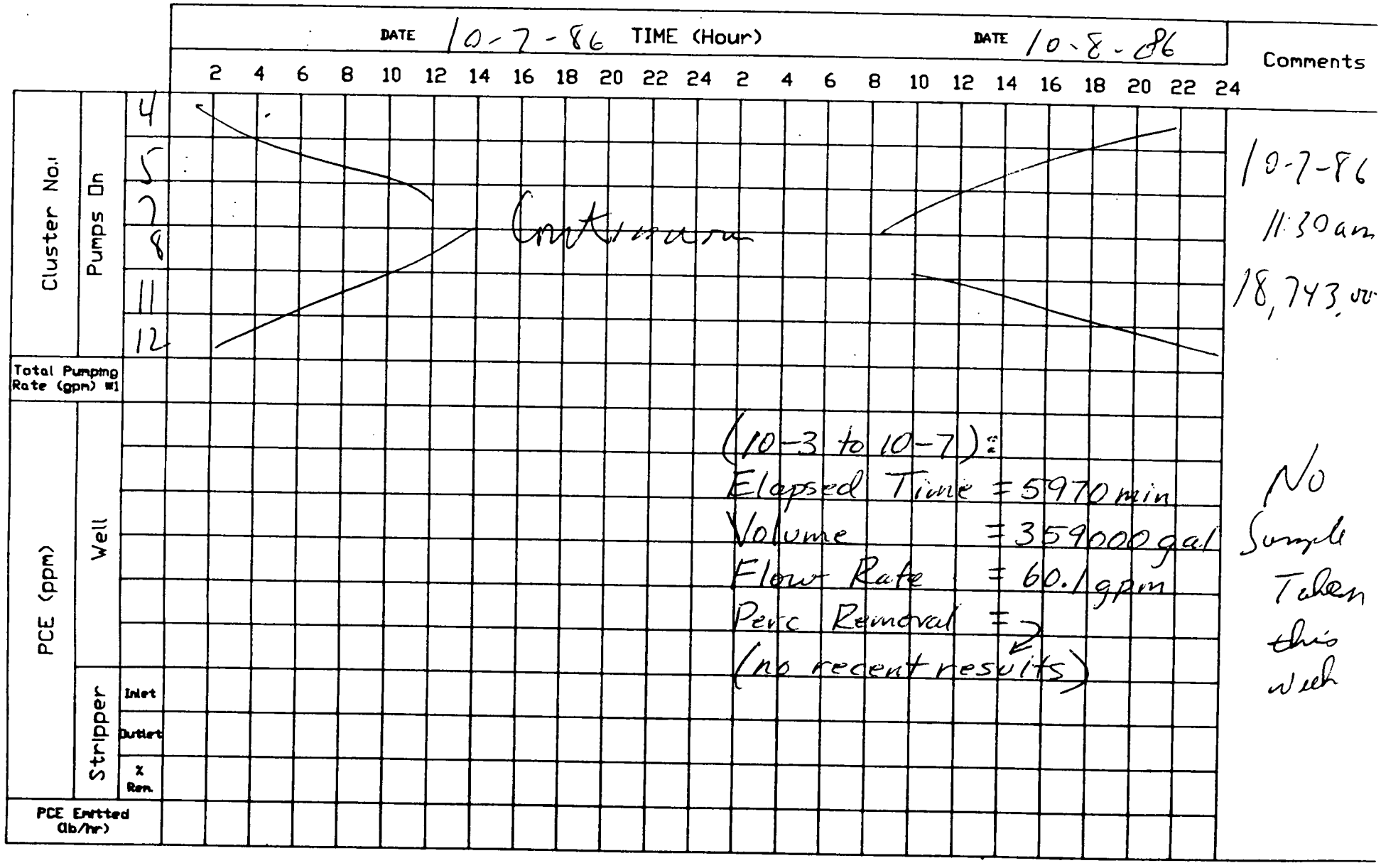
*2 : Limited by max. pumping capacity of 150 gpm
*3 : Using initial concentration
*4 : Using final concentration

WAUSAU CHEMICAL EXTRACTION PROGRAM



*1 : Estimated pumping rate = 27 gpm/pump
*2 : Limited by max. pumping capacity of 150 gpm
*3 : Using initial concentration
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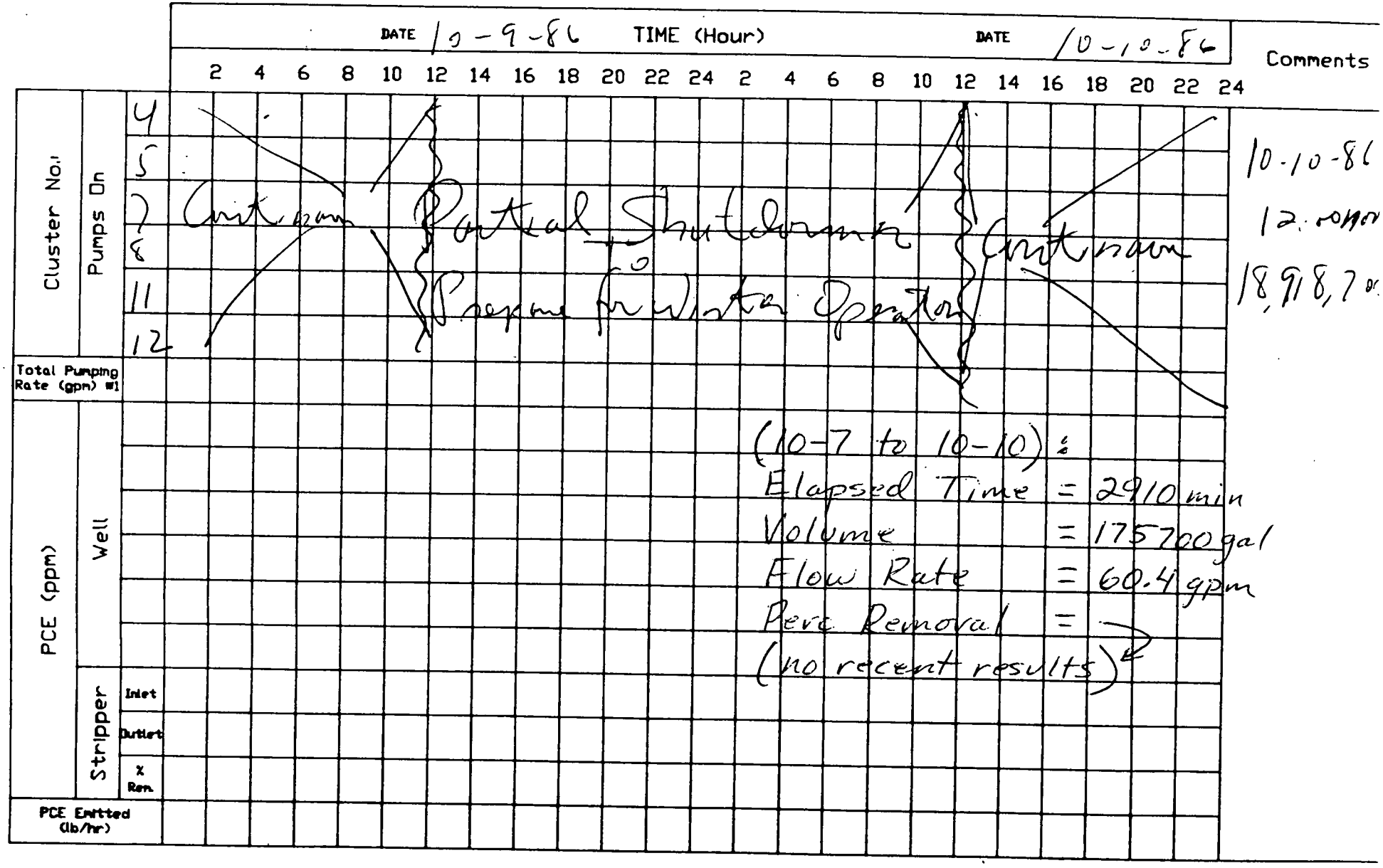
WAUSAU CHEMICAL EXTRACTION PROGRAM



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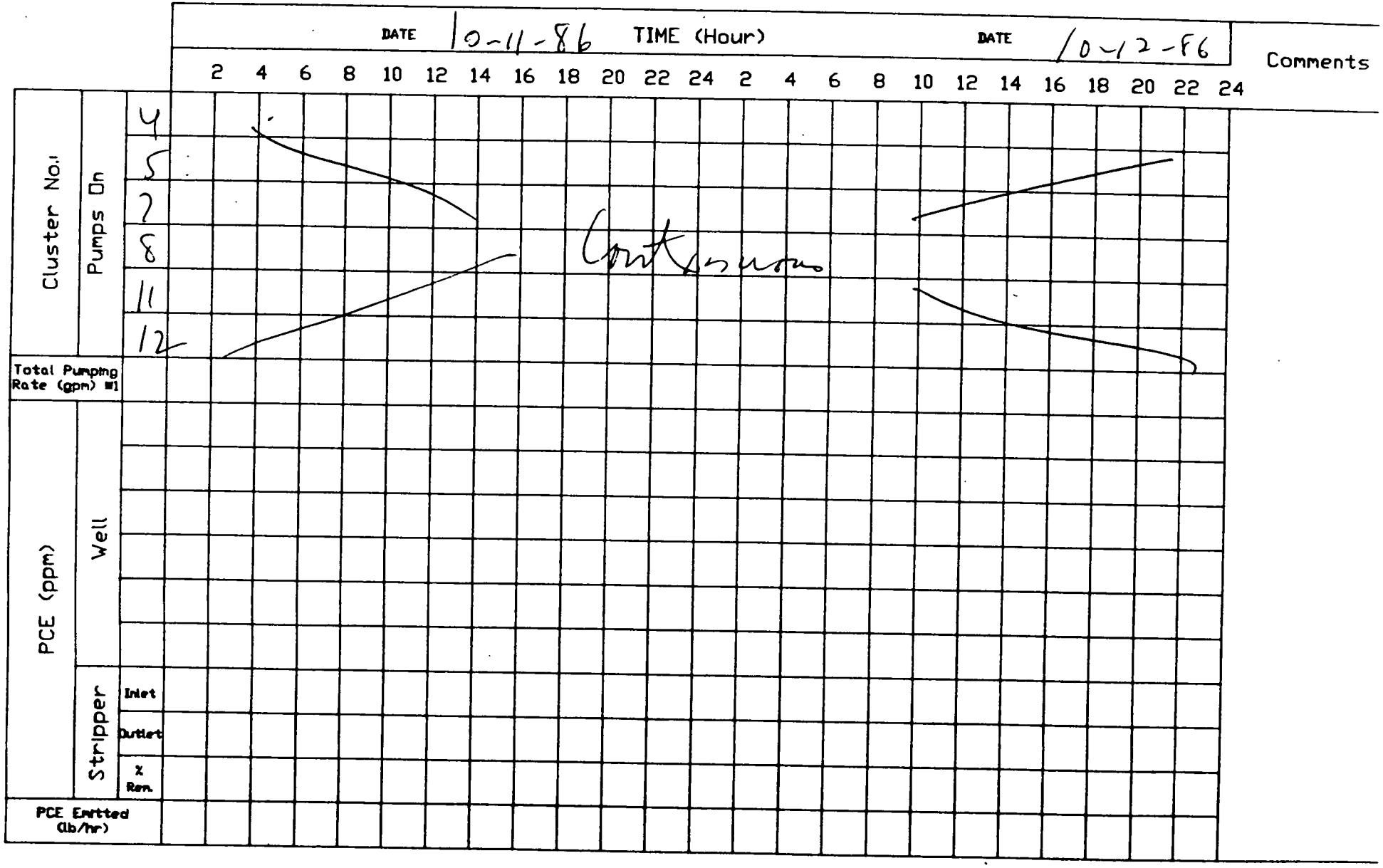
*3 : Using initial concentration
*4 : Using final concentration

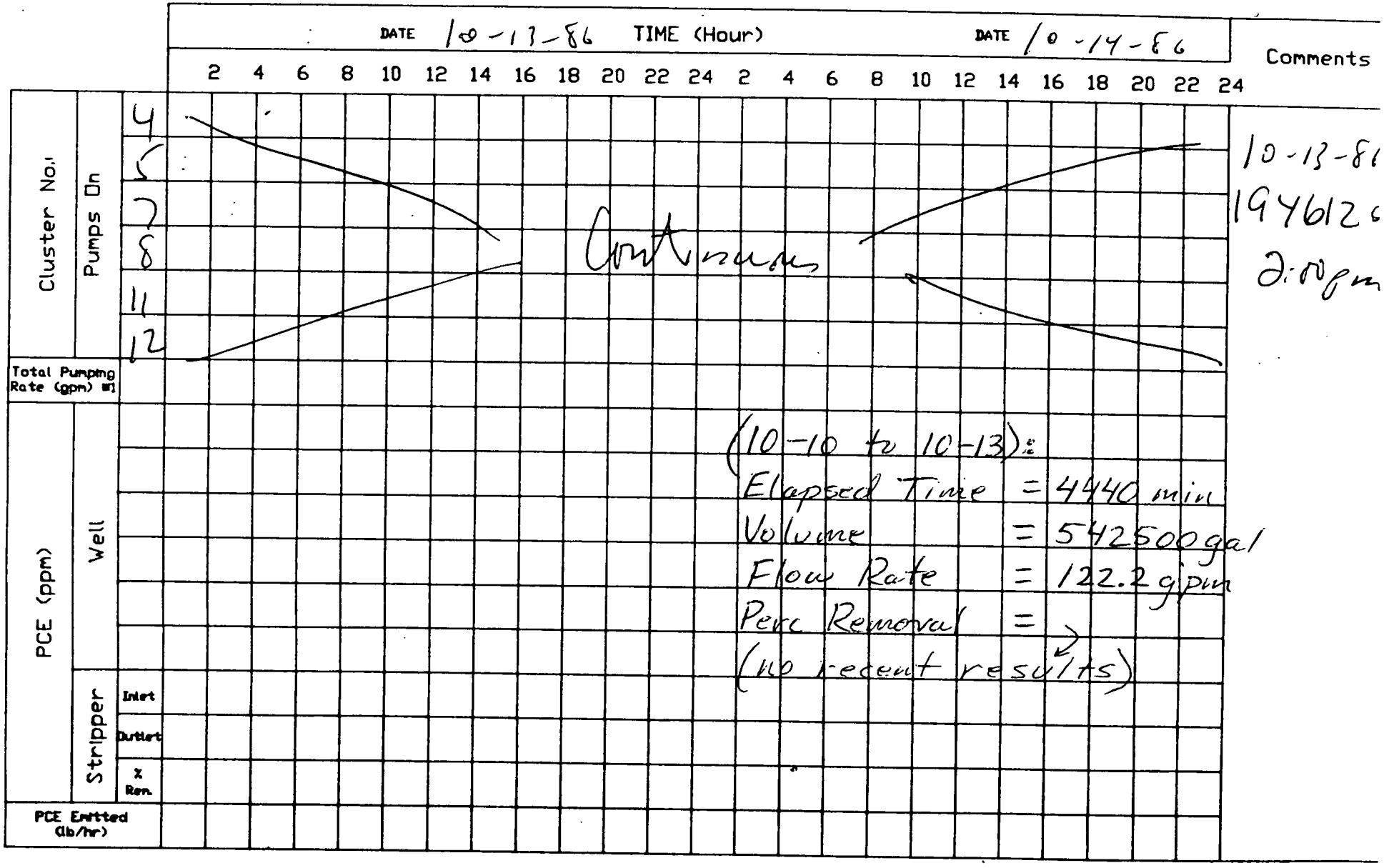
WAUSAU CHEMICAL EXTRACTION PROGRAM



#1 : Estimated pumping rate = 27 gpm/pump
#2 : Limited by max. pumping capacity of 150 gpm
#3 : Using initial concentration
#4 : Using final concentration

STS

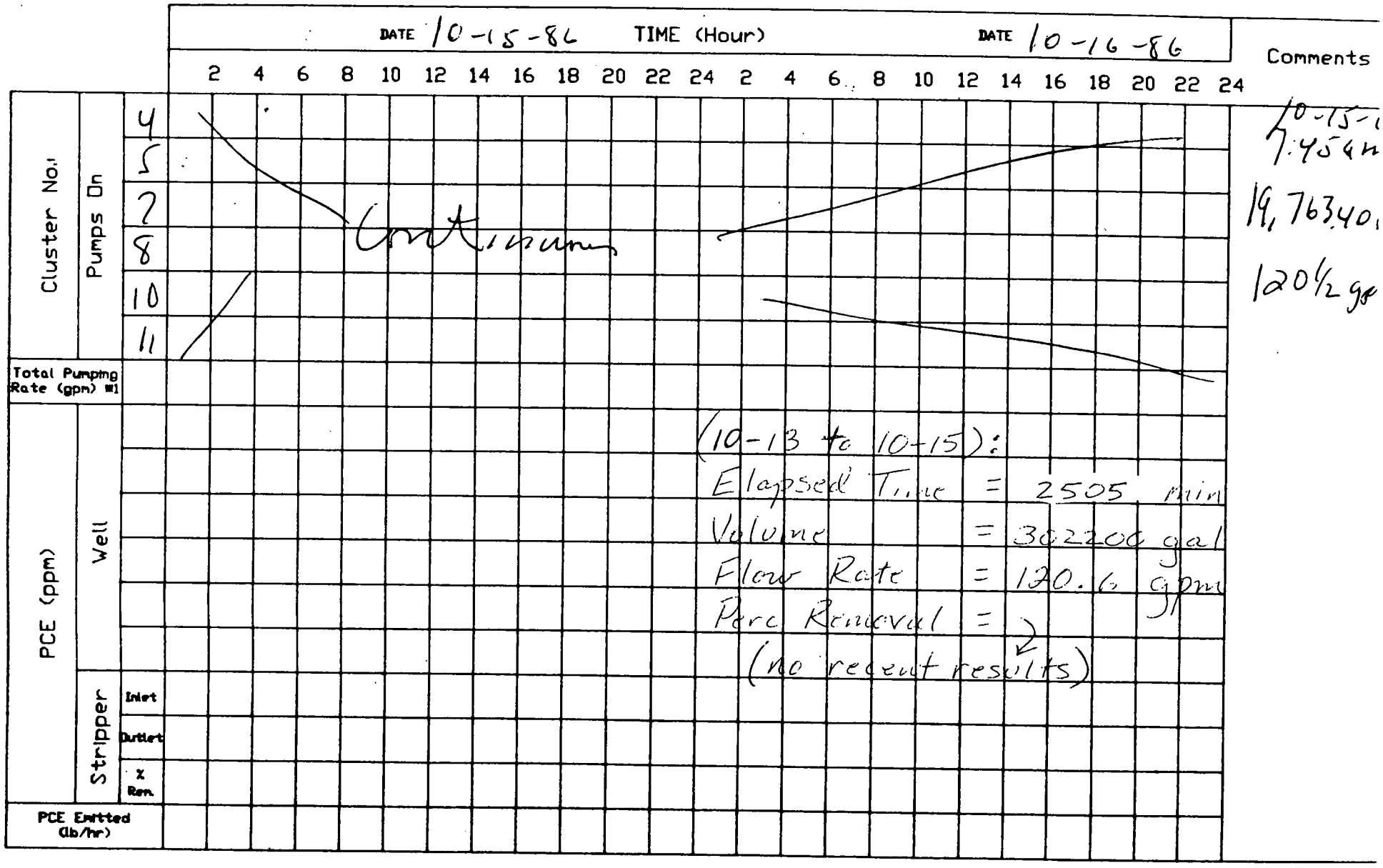
WAUSAU CHEMICAL EXTRACTION PROGRAM



*1 : Estimated pumping rate = 27 gpm/pump
*2 : Limited by max. pumping capacity of 150 gpm
*3 : Using initial concentration
*4 : Using final concentration

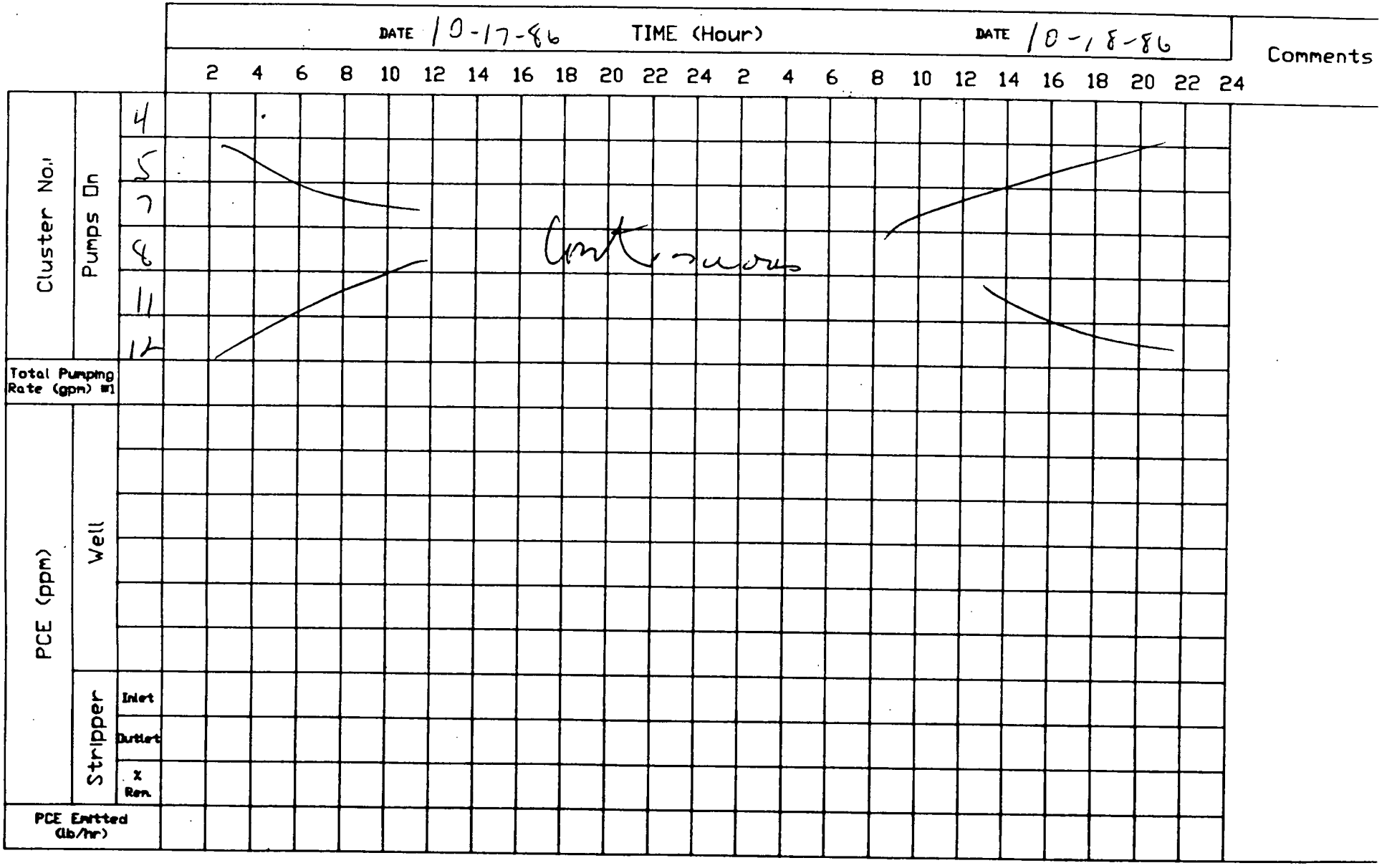
STS

WAUSAU CHEMICAL EXTRACTION PROGRAM



#1 : Estimated pumping rate = 27 gpm/pump
#2 : Limited by max. pumping capacity of 150 gpm
#3 : Using initial concentration
#4 : Using final concentration

WAUSAU CHEMICAL EXTRACTION PROGRAM



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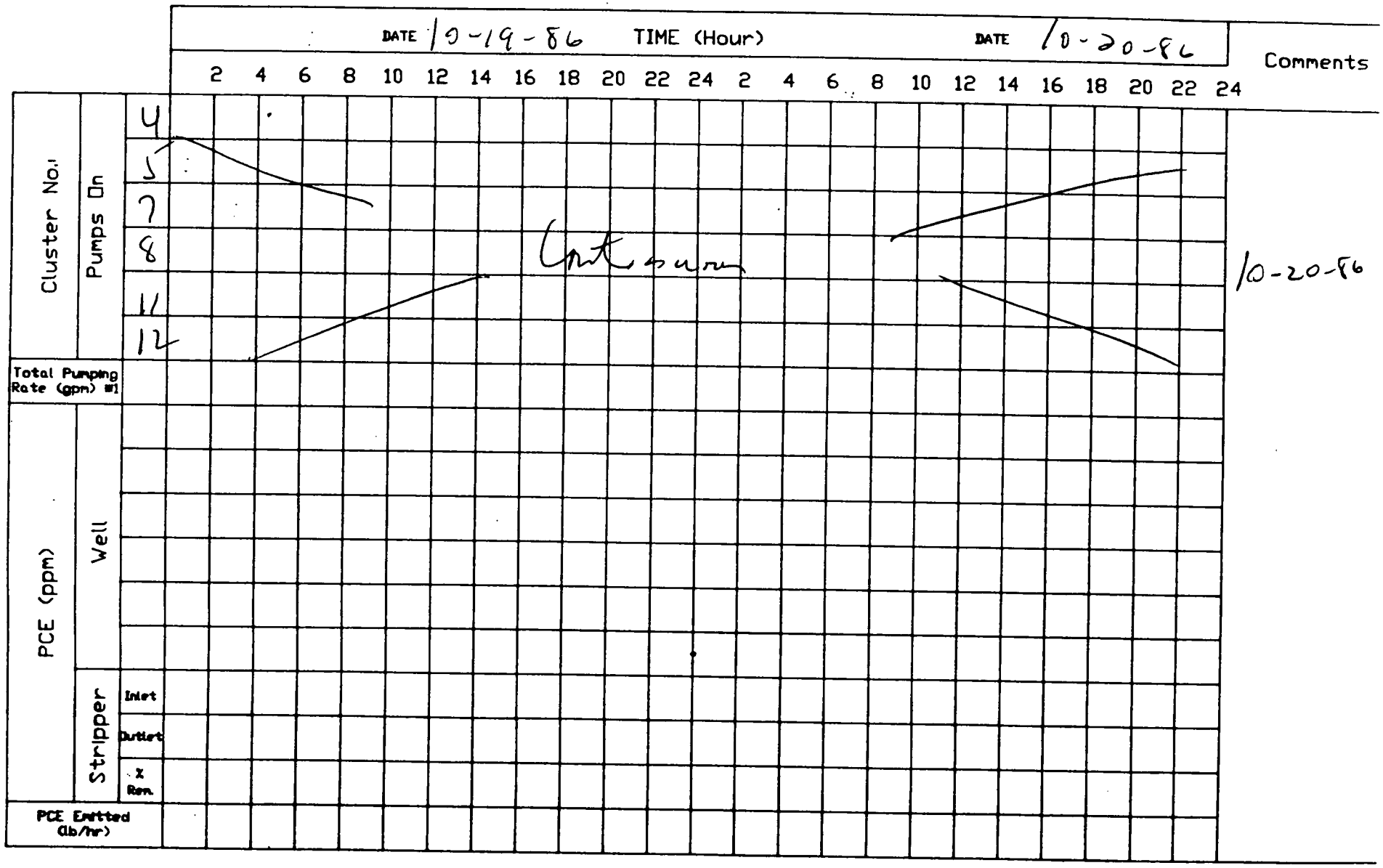
*3 : Using initial concentration
*4 : Using final concentration

WAUSAU CHEMICAL EXTRACTION PROGRAM



#1 : Estimated pumping rate = 27 gpm/pump
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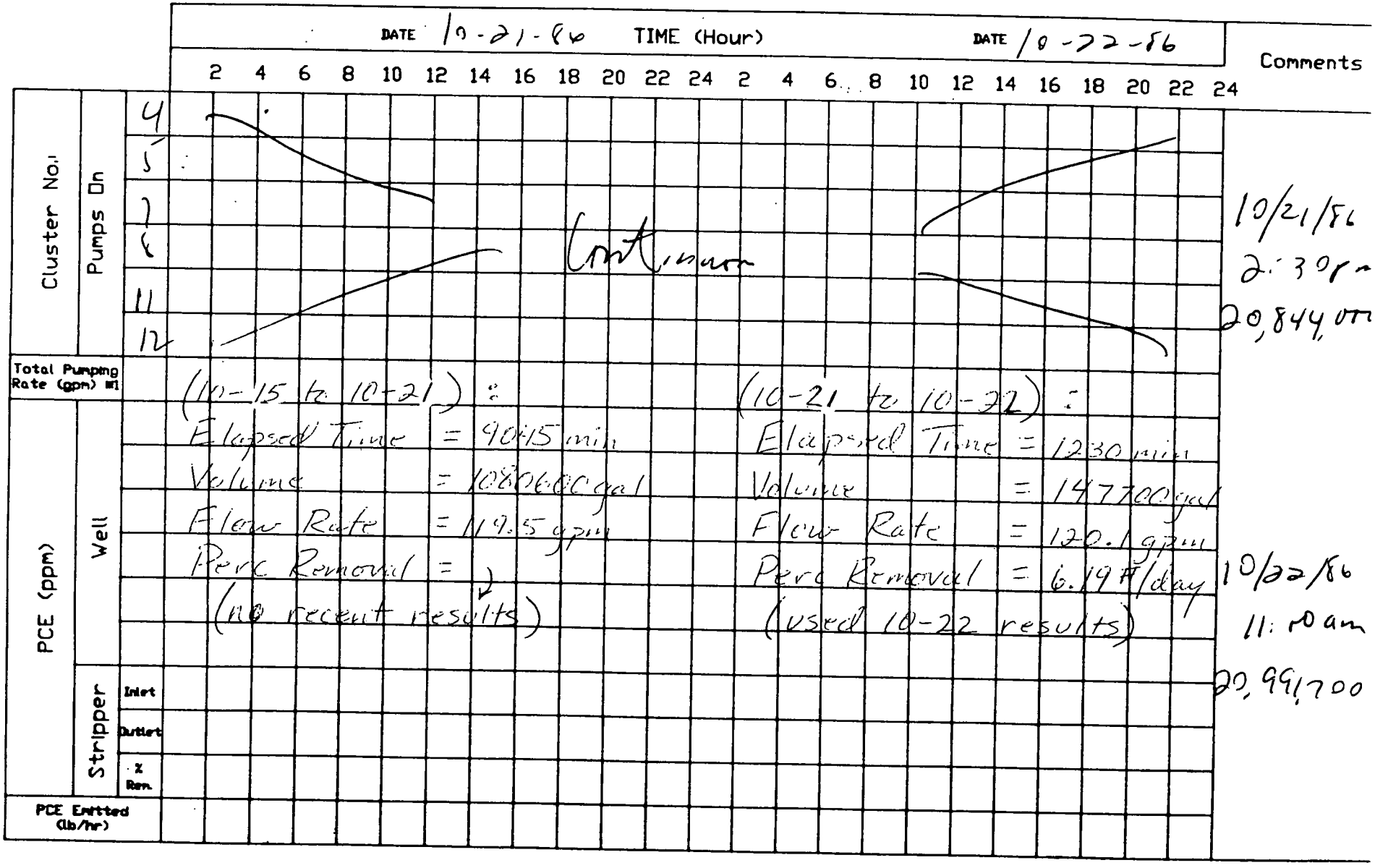
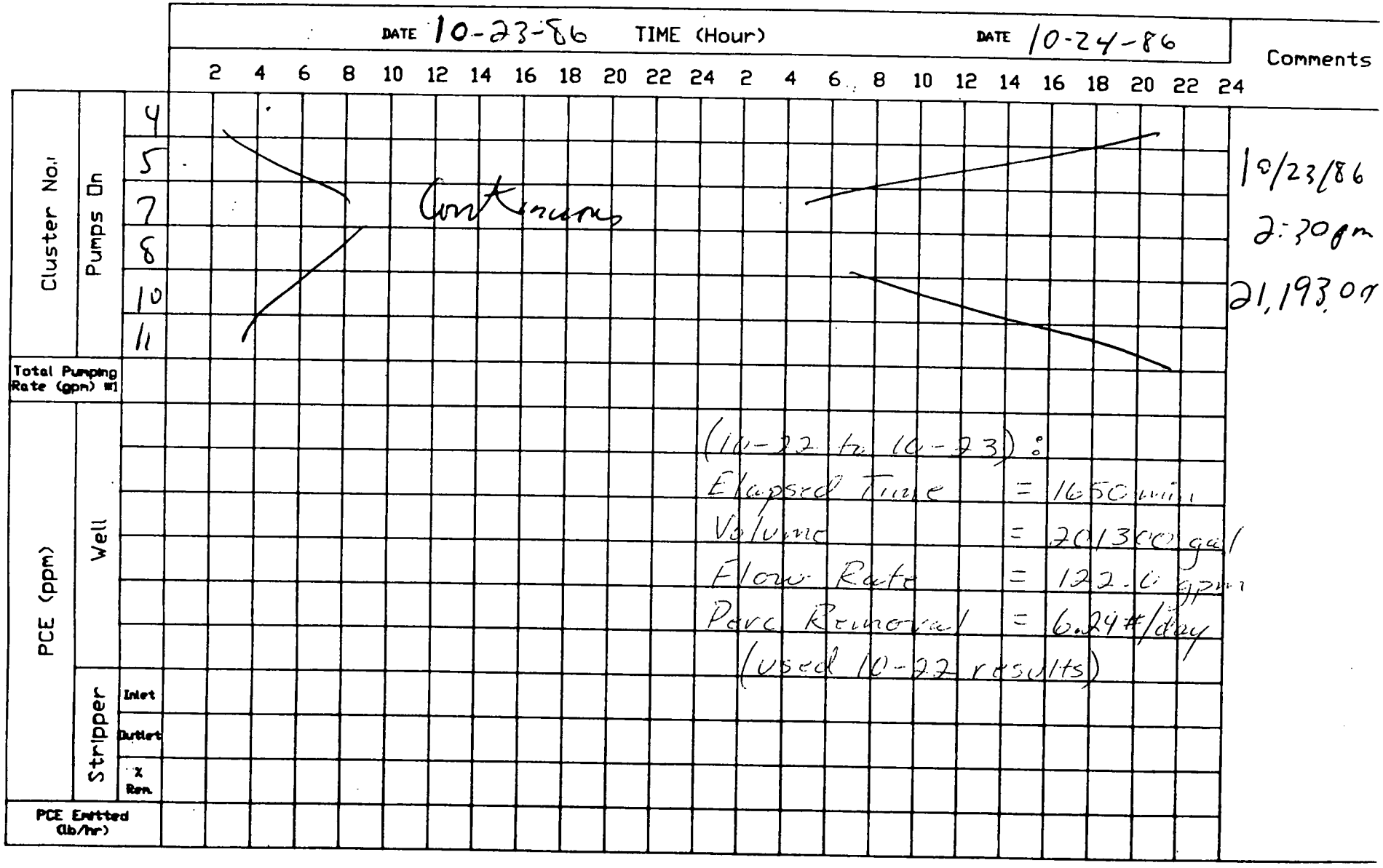
#3 : Using initial concentration
#4 : Using final concentration

WAUSAU CHEMICAL EXTRACTION PROGRAM



#1 : Estimated pumping rate = 27 gpm/pump
#2 : Limited by max. pumping capacity of 150 gpm
#3 : Using initial concentration
#4 : Using final concentration

WAUSAU CHEMICAL EXTRACTION PROGRAM



#1 : Estimated pumping rate = 27 gpm/pump
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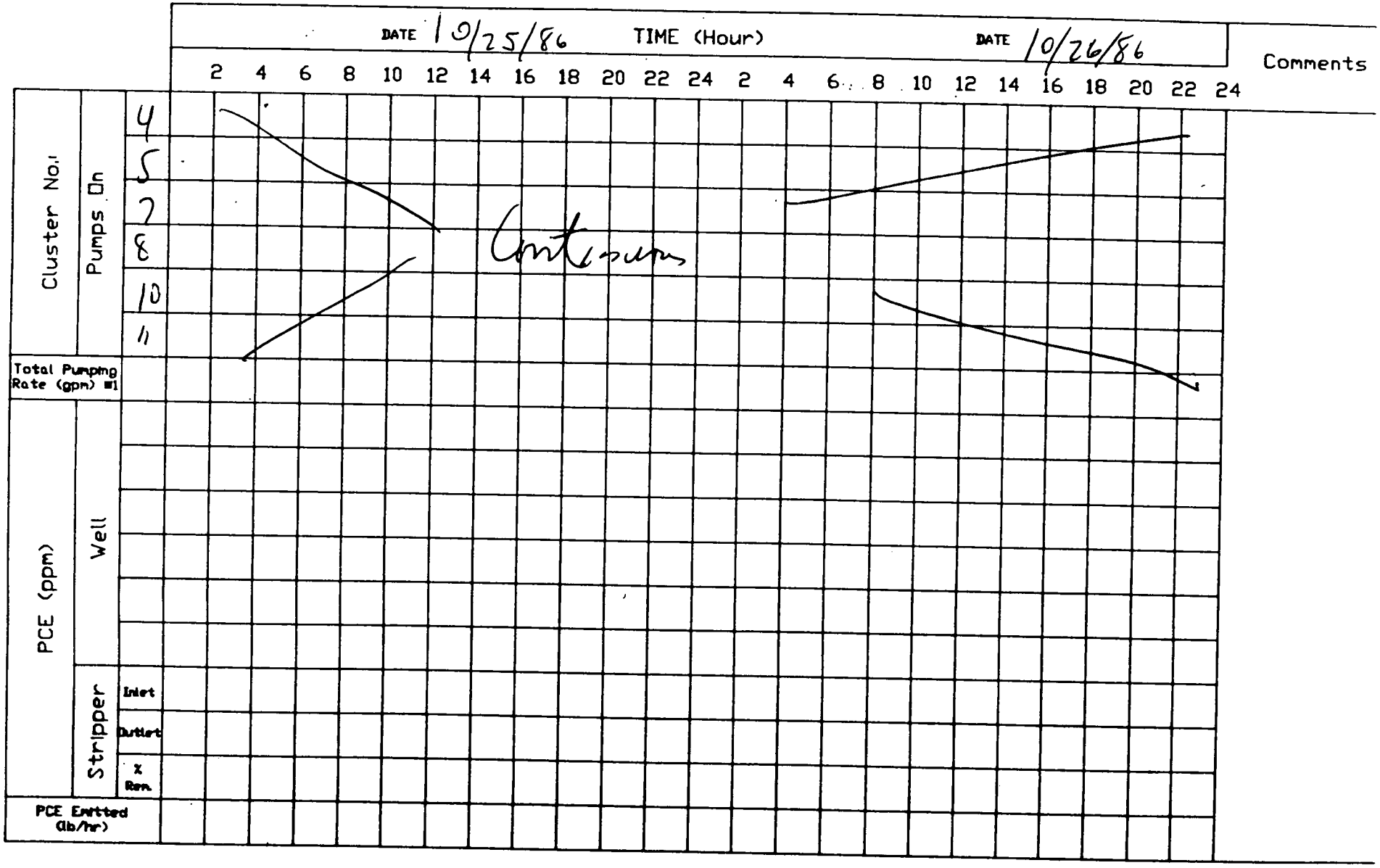
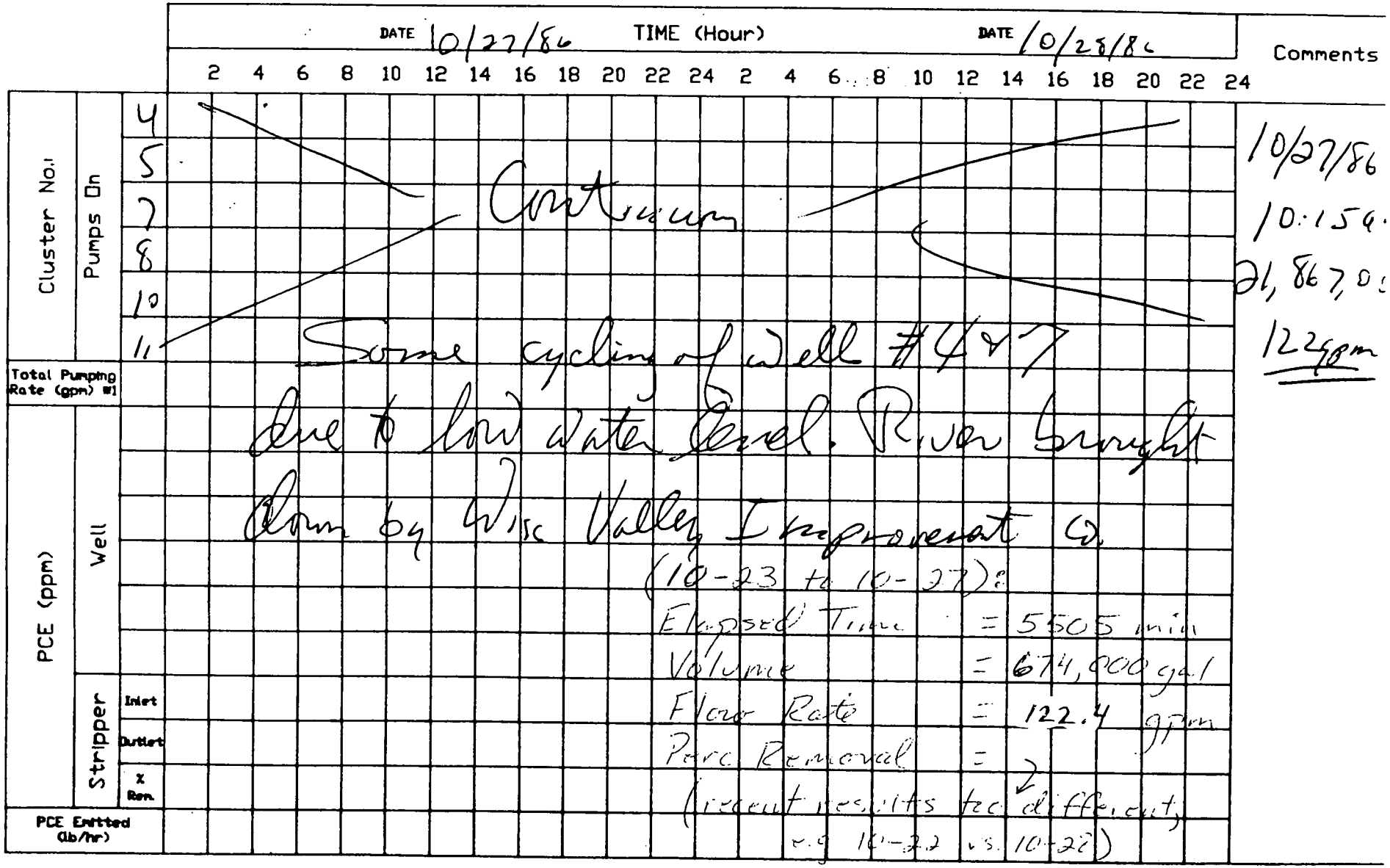
#3 : Using initial concentration
#4 : Using final concentration

WAUSAU CHEMICAL EXTRACTION PROGRAM



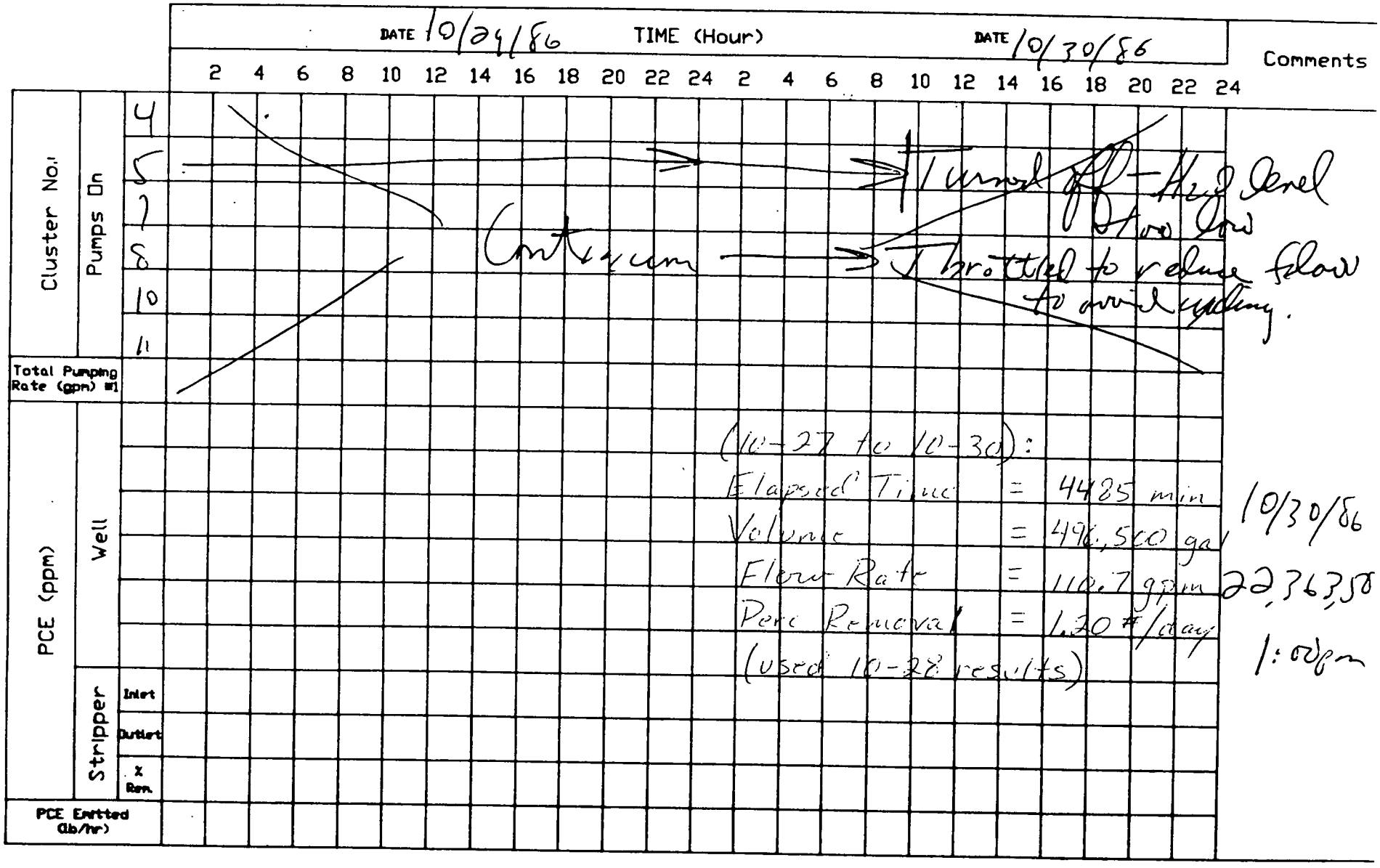
#1 : Estimated pumping rate = 27 gpm/pump
#2 : Limited by max. pumping capacity of 150 gpm
#3 : Using initial concentration
#4 : Using final concentration

WAUSAU CHEMICAL EXTRACTION PROGRAM



#1 : Estimated pumping rate = 27 gpm/pump
#2 : Limited by max. pumping capacity of 150 gpm
#3 : Using initial concentration
#4 : Using final concentration

WAUSAU CHEMICAL EXTRACTION PROGRAM



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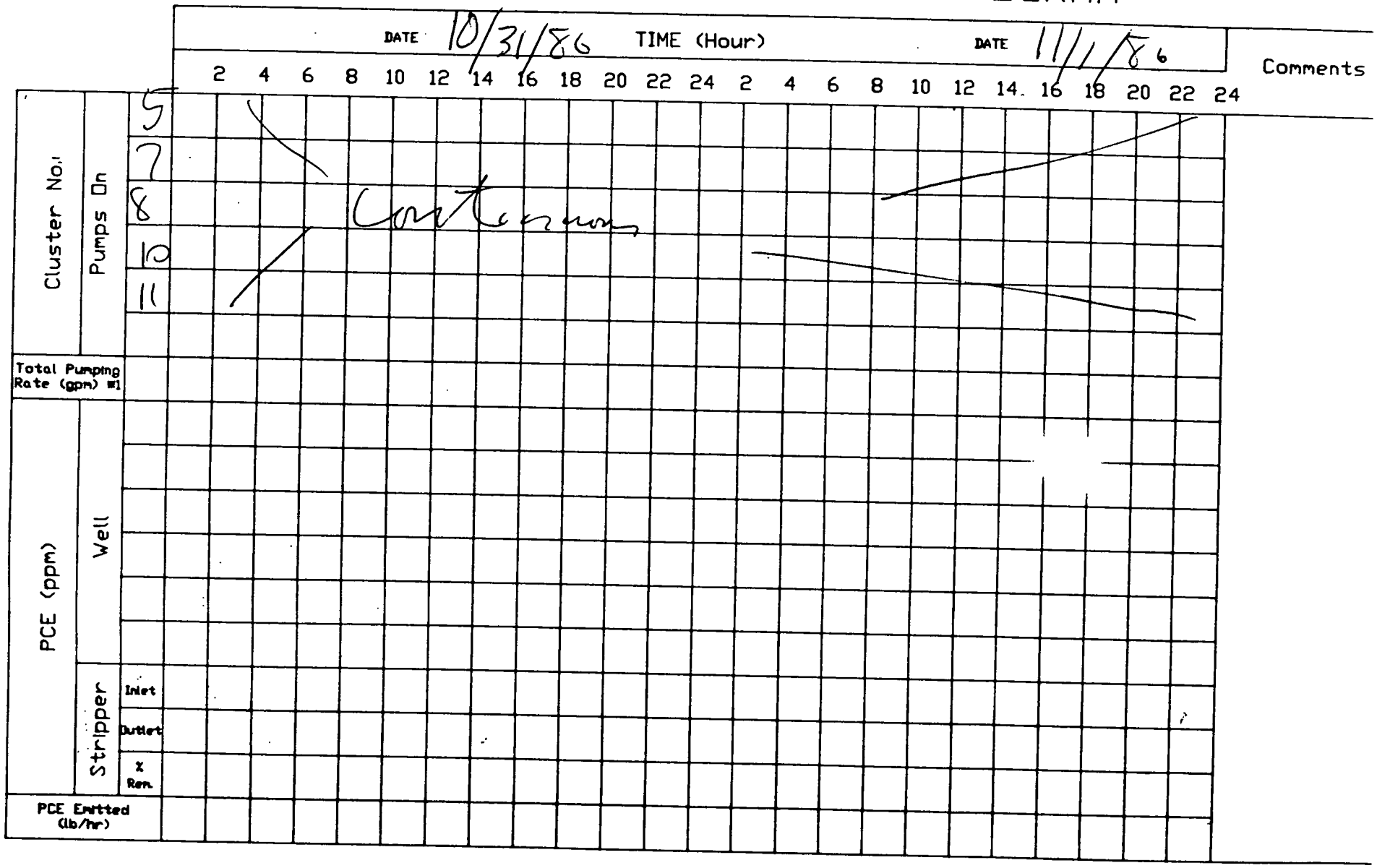
#3 : Using initial concentration
#4 : Using final concentration

WAUSAU CHEMICAL EXTRACTION PROGRAM



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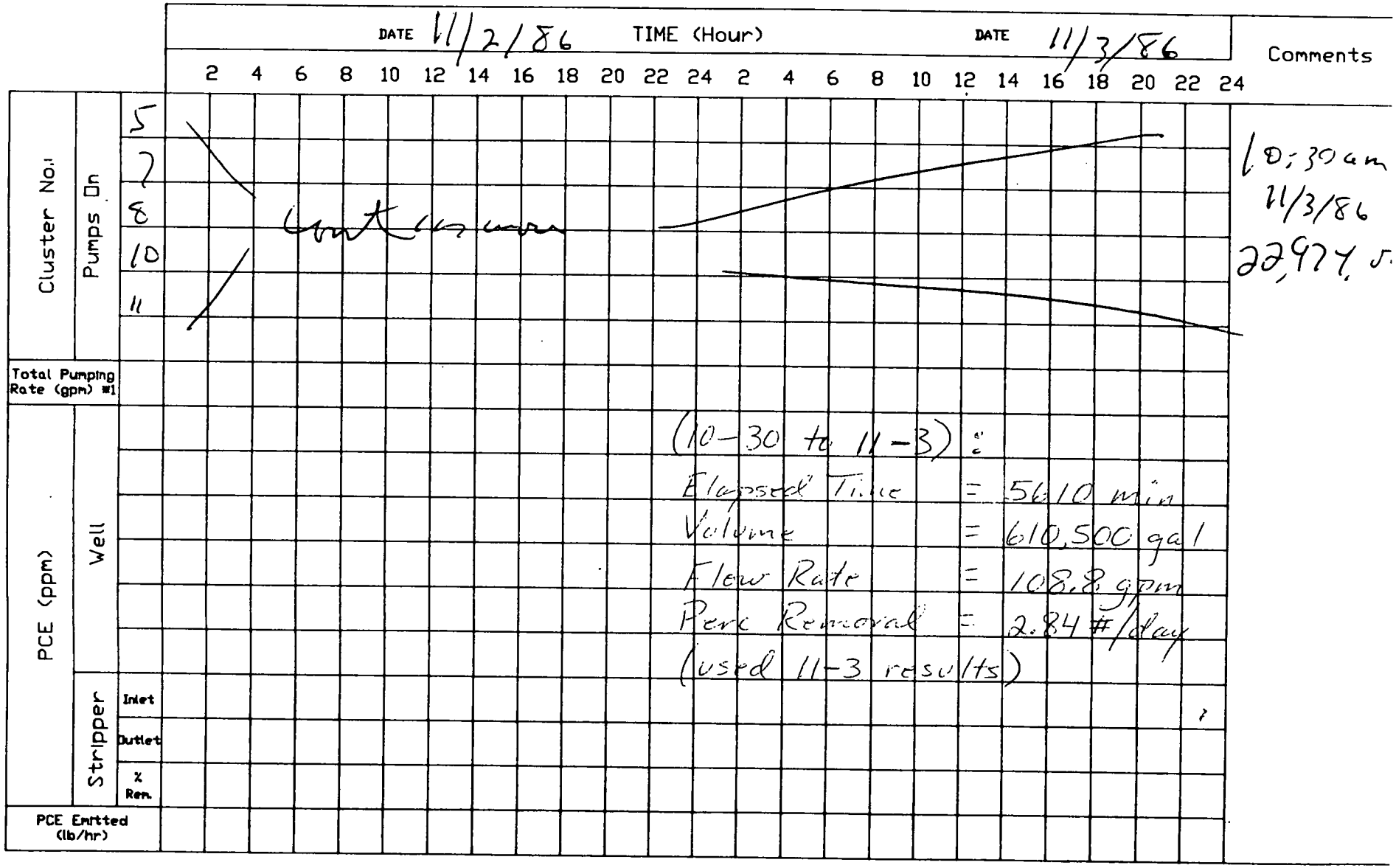
*3 : Using initial concentration
*4 : Using final concentration

WAUSAU CHEMICAL EXTRACTION PROGRAM



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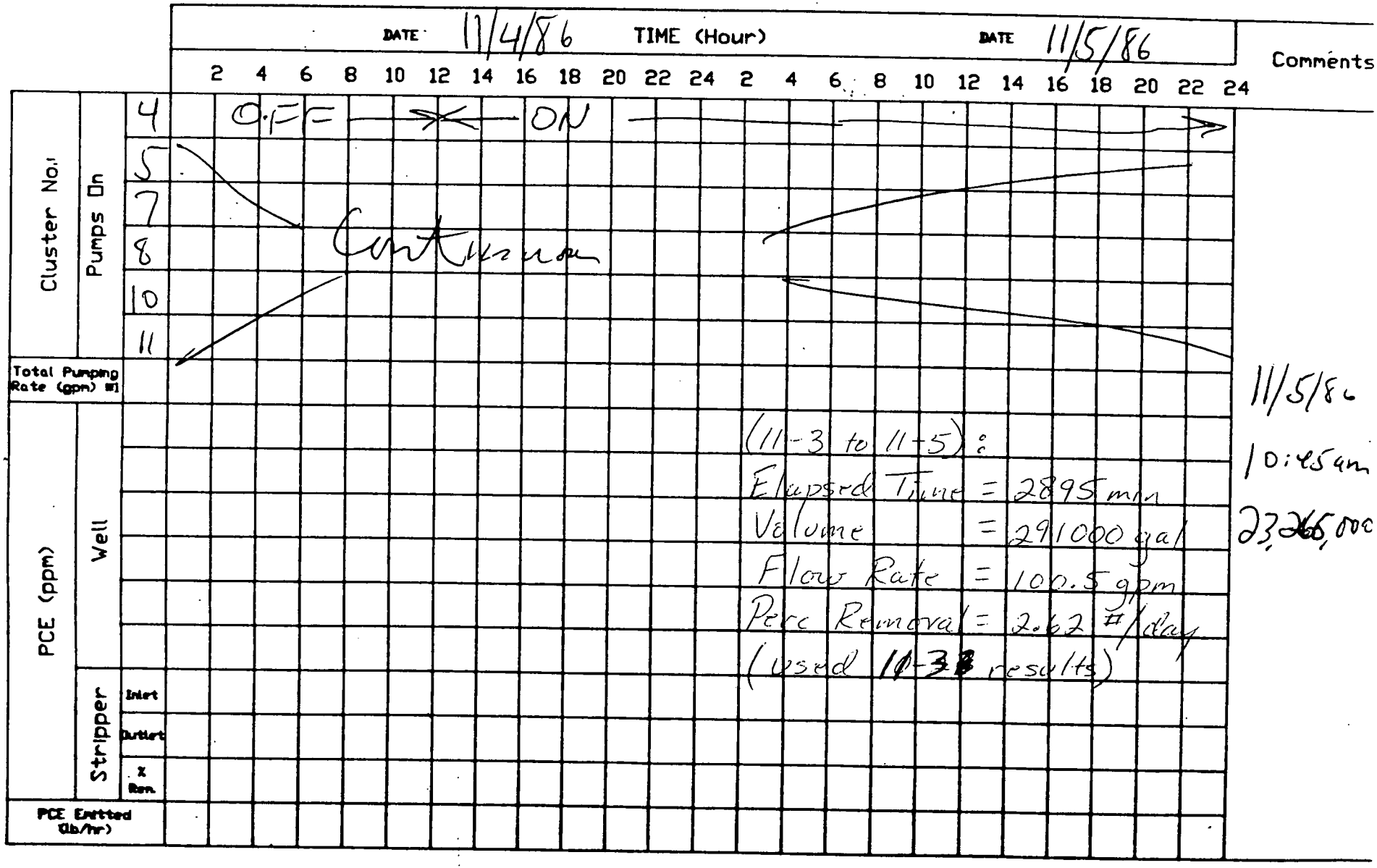
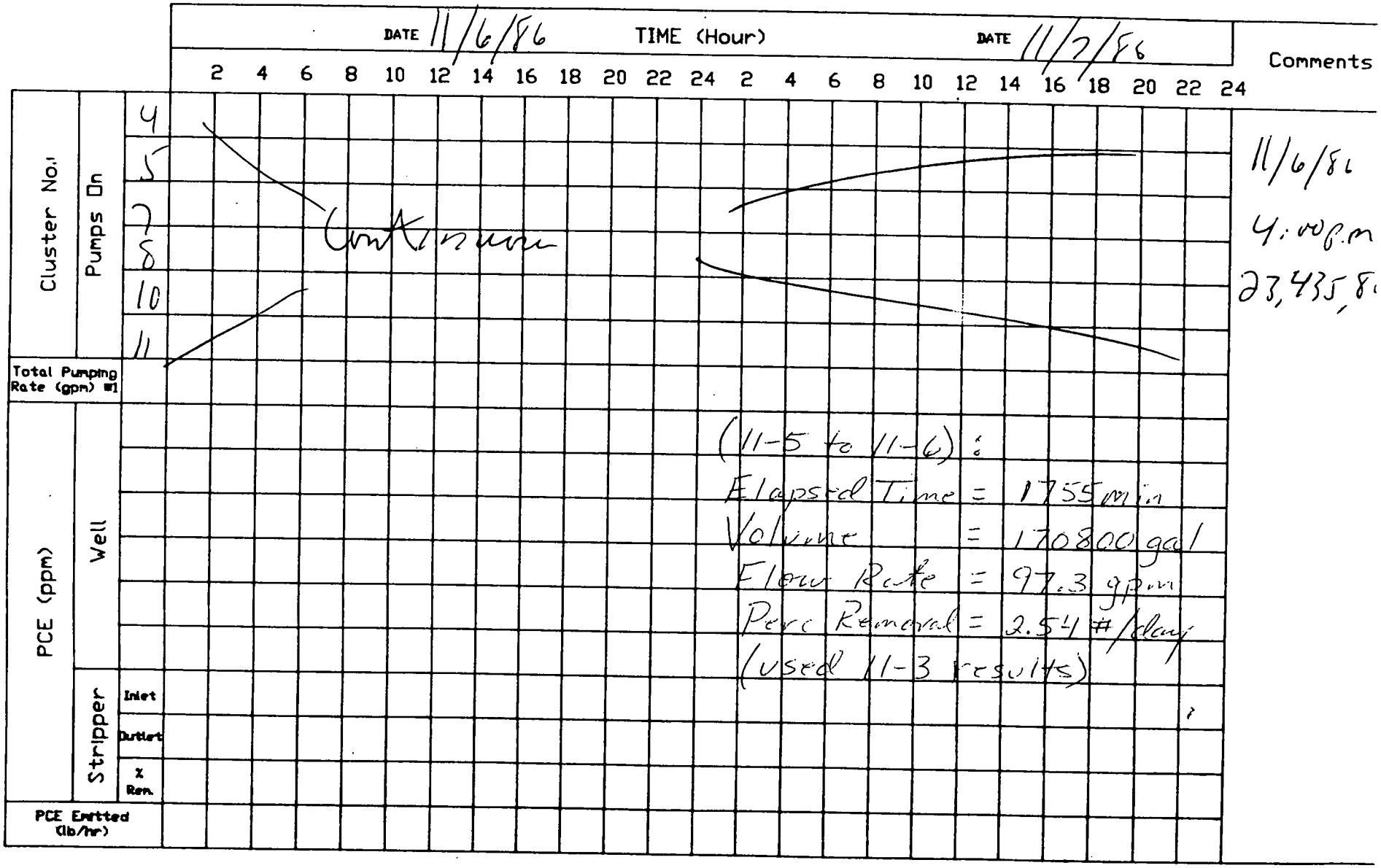
*2 : Limited by max. pumping capacity of 150 gpm
*3 : Using initial concentration
*4 : Using final concentration

WAUSAU CHEMICAL EXTRACTION PROGRAM



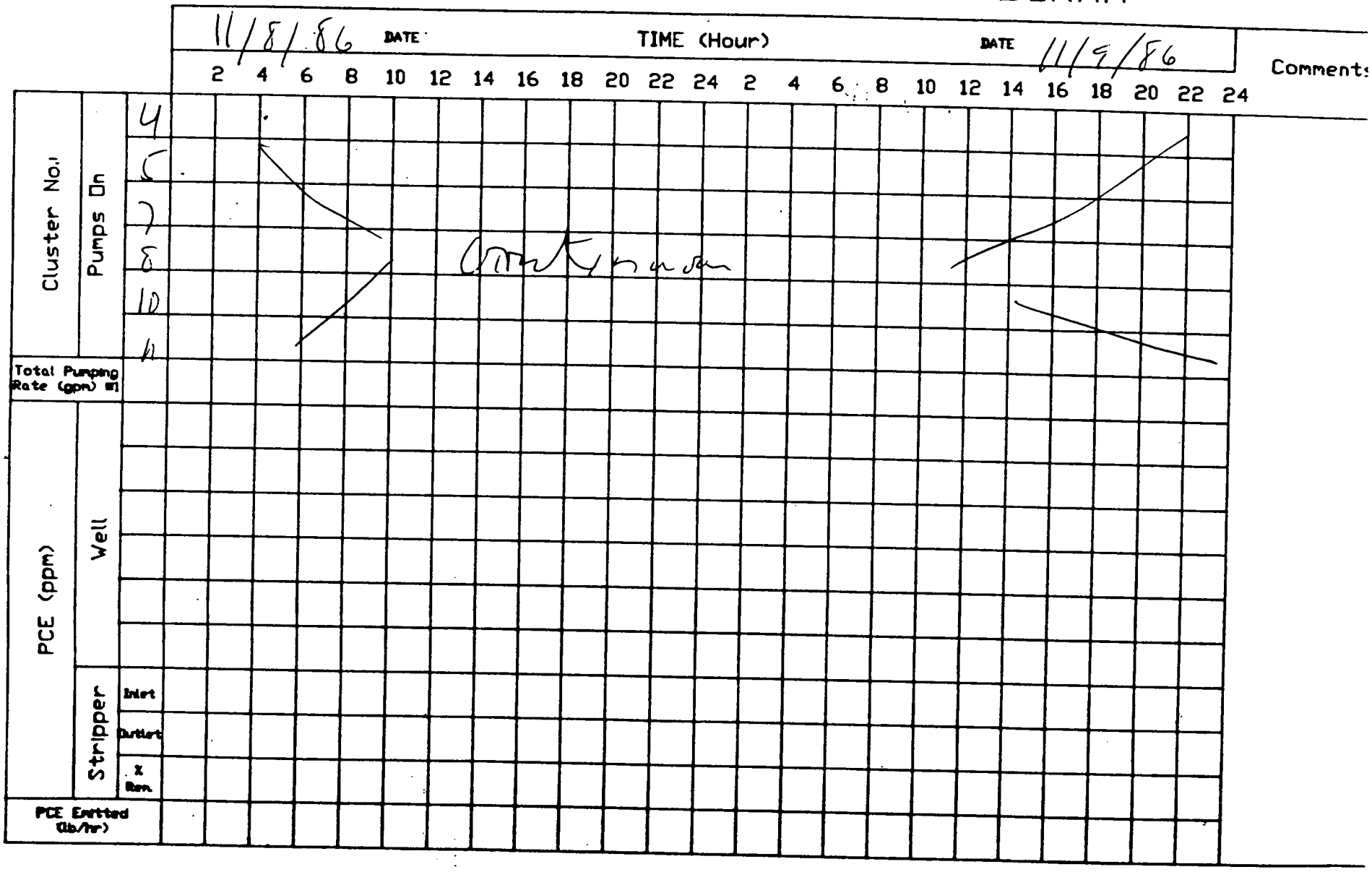
#1 : Estimated pumping rate = 27 gpm/pump
#2 : Limited by max. pumping capacity of 150 gpm
#3 : Using initial concentration
#4 : Using final concentration

WAUSAU CHEMICAL EXTRACTION PROGRAM



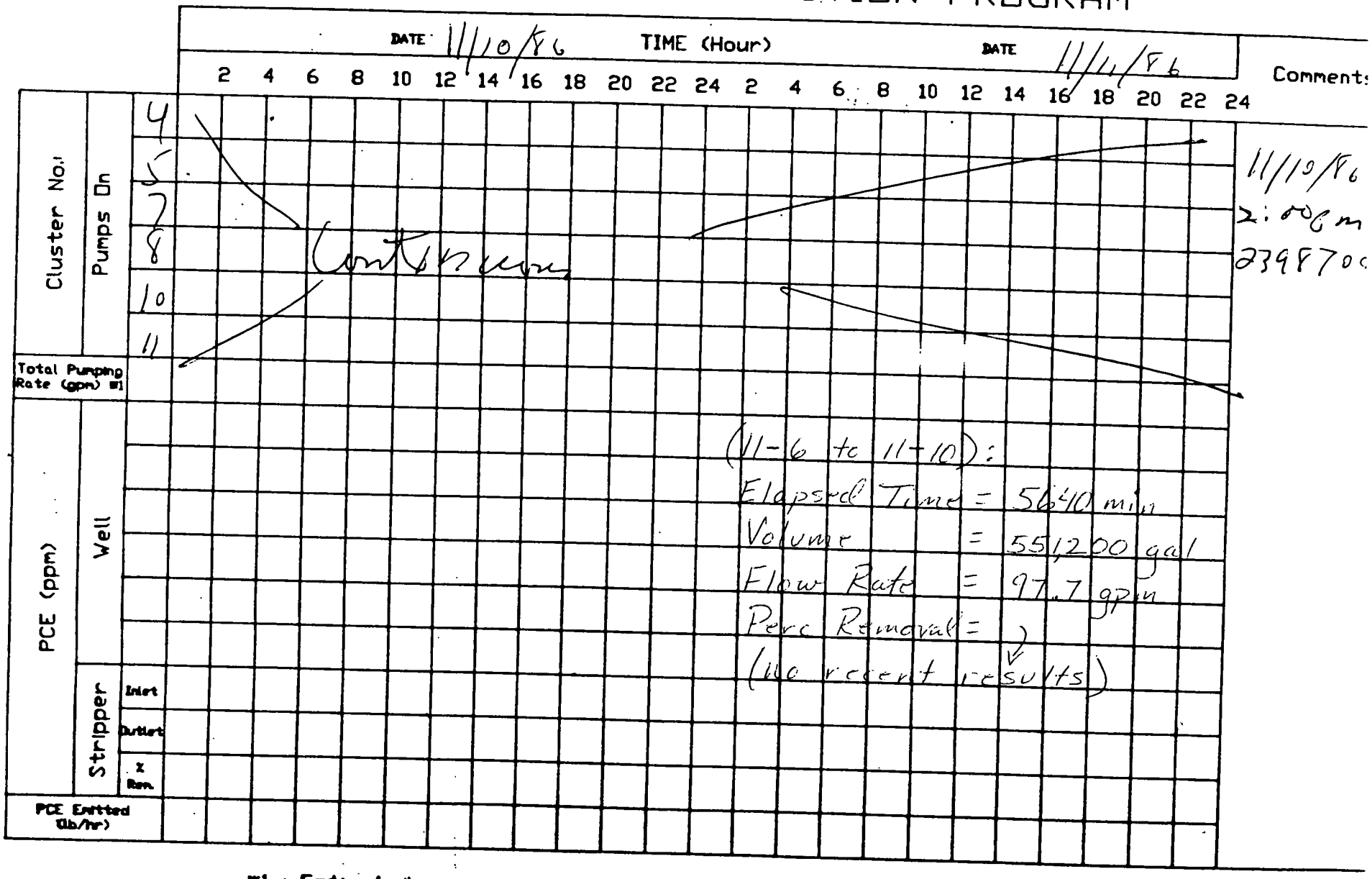
#1 : Estimated pumping rate = 27 gpm/pump
#2 : Limited by max. pumping capacity of 150 gpm
#3 : Using initial concentration
#4 : Using final concentration

WAUSAU CHEMICAL EXTRACTION PROGRAM



#1 : Estimated pumping rate = 27 gpm/pump
#2 : Limited by max. pumping capacity of 150 gpm
#3 : Using initial concentration
#4 : Using final concentration

WAUSAU CHEMICAL EXTRACTION PROGRAM



#1 : Estimated pumping rate = 27 gpm/pump
#2 : Limited by max. pumping capacity of 150 gpm
#3 : Using initial concentration
#4 : Using final concentration

WAUSAU CHEMICAL EXTRACTION PROGRAM

DATE 11/12/86 TIME (Hour) DATE 11/13/86

2 4 6 8 10 12 14 16 18 20 22 24 2 4 6 8 10 12 14 16 18 20 22 24

Comment:

Cluster No.1

Pumps On: 4, 5, 7, 8, 10, 11

Total Pumping Rate (gpm) #1

PCE (ppm)

Well

Stripper: Inlet, Outlet, % Rem.

PCE Emitted (lb/hr)

Continuous

#1 : Estimated pumping rate = 27 gpm/pump
#2 : Limited by max. pumping capacity of 150 gpm
#3 : Using initial concentration
#4 : Using final concentration

WAUSAU CHEMICAL EXTRACTION PROGRAM

DATE 11/14/86 TIME (Hour) DATE 11/15/86

2 4 6 8 10 12 14 16 18 20 22 24 2 4 6 8 10 12 14 16 18 20 22 24

Comments

Cluster No. / Pumps On: 4, 5, 7, 8, 10, 11

Continuous

11/14/86
2:40 pm
74,549.00
/

Total Pumping Rate (gpm) #1

PCE (ppm) — Well

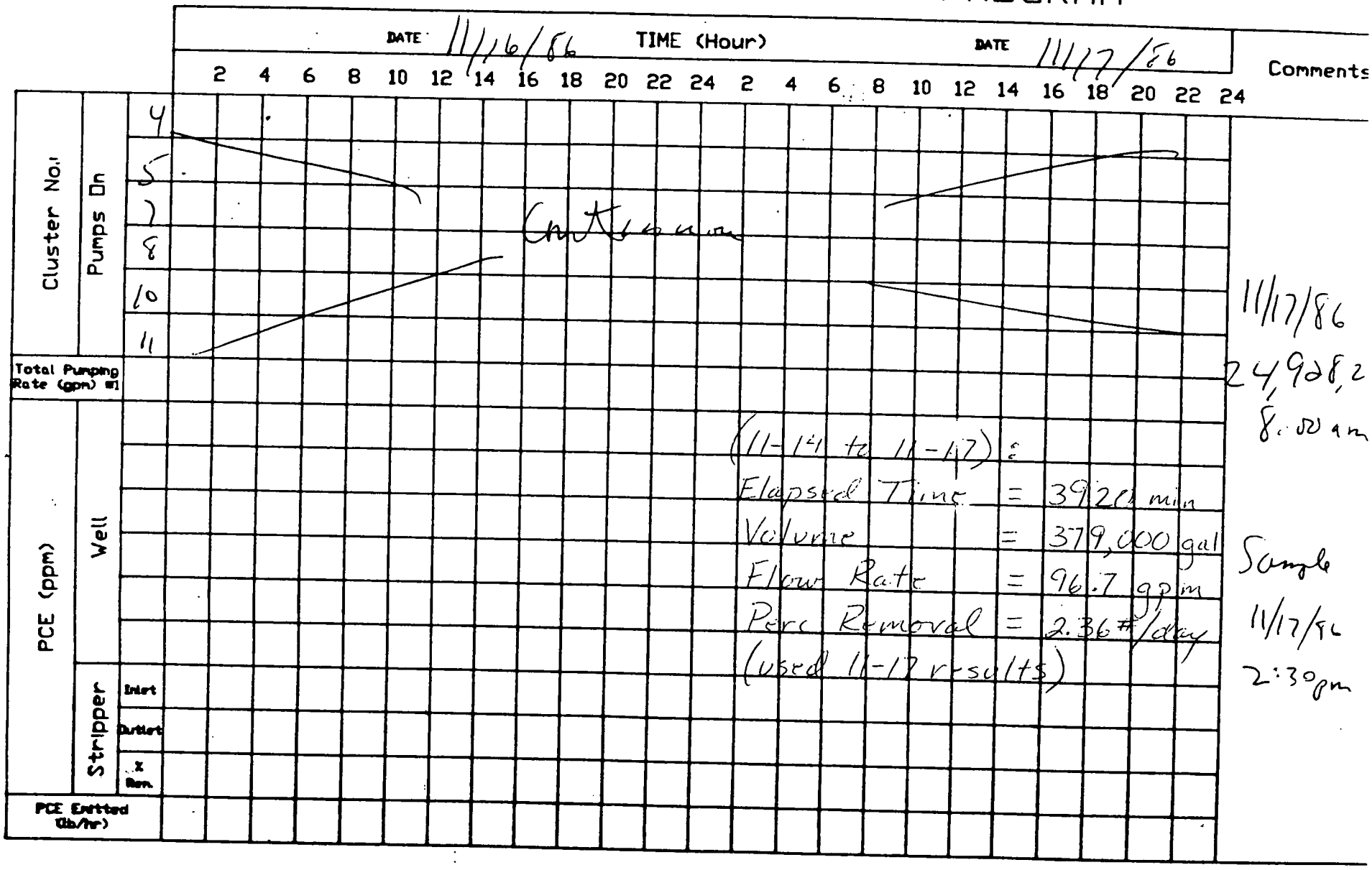
(11-10 to 11-14) 8:1
Elapsed Time = 5800 min
Volume = 562,200 gal
Flow Rate = 96.9 gpm
Perc Removal =
(no recent results)

PCE (ppm) — Stripper: Inlet, Outlet, % Rem.

PCE Emitted (lb/hr)

#1 : Estimated pumping rate = 27 gpm/pump
#2 : Limited by max. pumping capacity of 150 gpm
#3 : Using initial concentration
#4 : Using final concentration

WAUSAU CHEMICAL EXTRACTION PROGRAM



#1 : Estimated pumping rate = 27 gpm/pump
#2 : Limited by max. pumping capacity of 150 gpm
#3 : Using initial concentration
#4 : Using final concentration

WAUSAU CHEMICAL EXTRACTION PROGRAM

DATE 11/18/86 TIME (Hour) DATE 11/24/86

2 4 6 8 10 12 14 16 18 20 22 24 2 4 6 8 10 12 14 16 18 20 22 24

Comment

Cluster No.: 4, 5, 7, 8, 10, 11

Pumps On

Total Pumping Rate (gpm) #1

PCE (ppm) — Well

Stripper — Inlet, Outlet, % Rem.

PCE Emitted (lb/hr)

Continuous

11/24/8

25,897.00

8:00 am

Sample

8:00 am

(11-17 to 11-24):

Elapsed Time = 10,022 min

Volume = 968,800 gal

Flow Rate = 96.1 gpm

Pce Removal = 2.34 #/day

(used 11-17 results)

#1 : Estimated pumping rate = 27 gpm/pump
#2 : Limited by max. pumping capacity of 150 gpm
#3 : Using initial concentration
#4 : Using final concentration

WAUSAU CHEMICAL EXTRACTION PROGRAM

DATE 11/25/86 TIME (Hour) DATE 12/2/86

2 4 6 8 10 12 14 16 18 20 22 24 2 4 6 8 10 12 14 16 18 20 22 24

Comment

Cluster No.: 4 5 7 8 10 11

Pumps On

Total Pumping Rate (gpm) #1

PCE (ppm) — Well

Stripper — Inlet, Outlet, % Rem.

PCE Emitted (lb/hr)

Contractors

(11-24 to 12-2) &

Elapsed Time = 11,520 min

Volume = 971,200 gal

Flow Rate = 84.3 gpm

Per Removal =

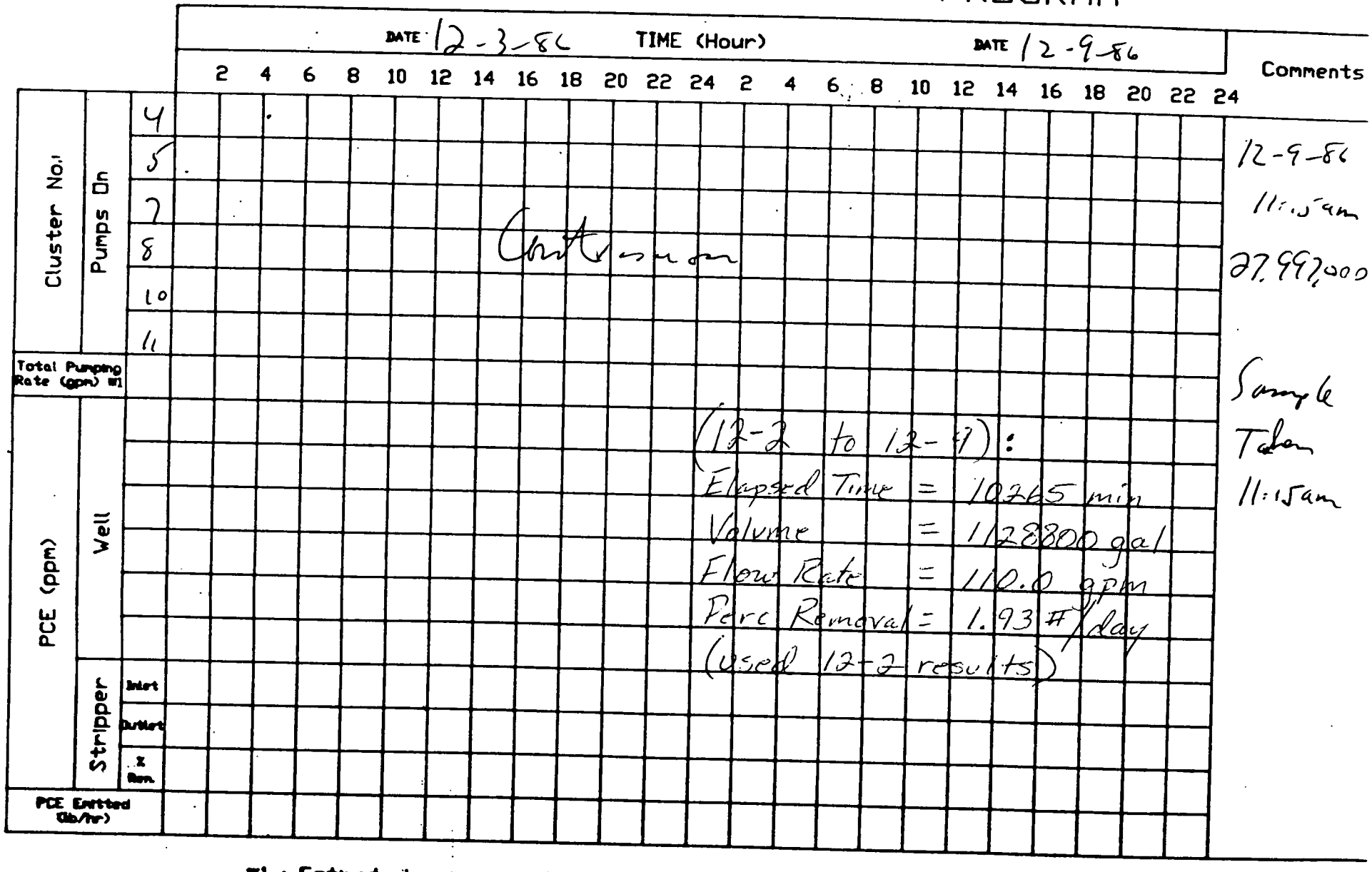
(no recent results)

12/2/86
8:00 am
~~28,884~~
26,868,2

Samples Taken 1:30 p.m. including B-3 well All for VOC Analysis

#1 : Estmated pumping rate = 27 gpm/pump
#2 : Limited by max. pumping capacity of 150 gpm
#3 : Using initial concentration
#4 : Using final concentration

WAUSAU CHEMICAL EXTRACTION PROGRAM



#1 : Estimated pumping rate = 27 gpm/pump
#2 : Limited by max. pumping capacity of 150 gpm
#3 : Using initial concentration
#4 : Using final concentration

WAUSAU CHEMICAL EXTRACTION PROGRAM

DATE 12-10-86 TIME (Hour) DATE 12-15-86

2 4 6 8 10 12 14 16 18 20 22 24 2 4 6 8 10 12 14 16 18 20 22 24

Comments

Cluster No.1 / Pumps On: 4, 5, 7, 8, 10, 4

Total Pumping Rate (gpm) #1

PCE (ppm): Well; Stripper: Inlet, Outlet, % Rem.

PCE Emitted (lb/hr)

Continuous

(12-4 to 12-15):

Elapsed Time = 8475 min

Volume = 817800 gal

Flow Rate = 96.5 gpm

Perc Removal = 2.18 #/day

(used 12-9 results)

12-15-86
8:30 am.
28,814,80

Sample Taken
8:30 am
12-15-86

#1 : Estimated pumping rate = 27 gpm/pump
#2 : Limited by max. pumping capacity of 150 gpm
#3 : Using initial concentration
#4 : Using final concentration

WAUSAU CHEMICAL EXTRACTION PROGRAM

DATE 12-16-86 TIME (Hour) DATE 12-27-86

Cluster No.	Pumps On		2	4	6	8	10	12	14	16	18	20	22	24	2	4	6	8	10	12	14	16	18	20	22	24	Comments
		4																									12-27-86
		5																									9:40 am
		7																									29,925 gal
		8																									
		10																									
		11																									
Total Pumping Rate (gpm) #1																											
PCE (ppm)	Well																										
	Stripper	Inlet																									
		Outlet																									
		% Rem.																									
PCE Emitted (lb/hr)																											

Continuous

(12-15 to 12-23):

Elapsed Time = 11590 min

Volume = 1110900 gal

Flow Rate = 95.8 gpm

Pce Removal = 2.13 #/day

(used 12-15 results)

No Sample

#1 : Estimated pumping rate = 27 gpm/pump
#2 : Limited by max. pumping capacity of 150 gpm
#3 : Using initial concentration
#4 : Using final concentration

WAUSAU CHEMICAL EXTRACTION PROGRAM

DATE 12-24-86 TIME (Hour) DATE 12-25-86

2 4 6 8 10 12 14 16 18 20 22 24 2 4 6 8 10 12 14 16 18 20 22 24

Comments

Cluster No. / Pumps On: 4, 5, 7, 8, 10, 11

Continuous

Total Pumping Rate (gpm) #1

PCE (ppm) — Well

PCE (ppm) — Stripper: Inlet, Outlet, % Rem.

PCE Emitted (lb/hr)

12-29-86
8:00 am
30,744,500

Samples Taken

(12-23 to 12-29):
Elapsed Time = 8540 min
Volume = 818800 gal
Flow Rate = 95.9 gpm
Perc Removal = 1.73 #/day
(used 12-29 results)

#1 : Estimated pumping rate = 27 gpm/pump
#2 : Limited by max. pumping capacity of 150 gpm
#3 : Using initial concentration
#4 : Using final concentration

ZIMPRO INC.
ENVIRONMENTAL & ENERGY SYSTEMS

October 3, 1986

Wausau Chemical Corp.
2001 N. River Drive
Wausau, WI 54401

Attn: Art Flashinski

Re: VOC Analysis

Attached are the results for September 22, 1986 water samples. EPA Method 601 was used to complete the analysis.

If you have any questions, please call.

Sincerely,

ZIMPRO INC.

Mary C. Christie Heuser

Mary C. Christie Heuser
Instrumentation Chemist

MCCH/ls

SENT TO STS
10-6-86
10AM
JPR

MILITARY ROAD
ROTHSCHILD, WISCONSIN 54474

ZIMPRO
ENVIRONMENTAL & ENERGY SYSTEMS

Wausau Chemical
VOC Analysis (ug/l)

	Detection Limit	Well 4 9-22-86	Well 5 9-22-86
Chloroform	20	X	X
1,1-Dichloroethane	20	X	X
1,1-Dichloroethylene	100	X	X
1,2-Dichloroethylene	60	240	120
Ethylbenzene	40	340	160
Tetrachloroethylene	20	1,420	4,460
Toluene	20	X	280
1,1,1-Trichloroethane	20	X	X
Trichloroethylene	20	160	220
Vinyl chloride	400	X	X
Analytical No.		22019	22020

X = Analyzed but not detected

Wausau Chemical
VOC Analysis (ug/l)

	Influent	Effluent
Perc (ug/l)	3,540	255
Analytical No.	22017	22018

92.8%

ZIMPRO INC.
ENVIRONMENTAL & ENERGY SYSTEMS

RECEIVED OCT 9 1986

October 8, 1986

Wausau Chemical Corp.
2001 N. River Drive
Wausau, WI 54401

Attn: Art Flashinski

Re: VOC Analysis

Listed below are the results for the September 29, 1986 water samples. EPA Method 601 was used to complete the analysis.

	Influent	Effluent
Perc (ug/l)	6,220.	640.
Analytical No.	22273	22274

If you have any questions, please call.

Sincerely,

ZIMPRO INC.

Mary C. Christie Heuser

Mary C. Christie Heuser
Instrumentation Chemist

MCCH/ls

SENT TO MILLSOP 10-9-86

MILITARY ROAD
ROTHSCHILD, WISCONSIN 54474

ZIMPRO INC
ENVIRONMENTAL & ENERGY SYSTEMS

October 28, 1986

Wausau Chemical Corp.
2001 N. River Drive
Wausau, WI 54401

Attn: Art Flashinski

Re: VOC Analysis

Listed below are the results for the October 22, 1986 water samples. EPA Method 601 was used to complete the analysis.

	Influent	Effluent
Perc (ug/l)	4,820.	520.
Analytical No.	22903	22904

89.2%

If you have any questions, please call.

Sincerely,

ZIMPRO INC.

Mary C. Christie Heuser
Instrumentation Chemist

MCCH/ls

Copy SENT TO MARK MILLSOP STS 10/29/86 11:30 AM

ZIMPRO INC
ENVIRONMENTAL & ENERGY SYSTEMS

RECEIVED NOV 4 1986

November 3, 1986

Wausau Chemical Corp.
2001 N. River Drive
Wausau, WI 54401

Attn: Art Flashinski

Re: VOC Analysis

Listed below are the results for the October 28, 1986 water samples. EPA Method 601 was used to complete the analysis.

	Influent	Effluent
Perc (ug/l)	998.	97.
Analytical No.	22300	22301

If you have any questions, please call.

Sincerely,

ZIMPRO INC.

Mary C. Christie Heuser

Mary C. Christie Heuser
Instrumentation Chemist

MCCH/ls

SENT TO SITS 11-4-86

MILITARY ROAD
ROTHSCHILD, WISCONSIN 54474

ZIMPRO

November 6, 1986

Wausau Chemical Corp.
2001 N. River Drive
Wausau, WI 54401

Attn: Art Flashinski

Re: VOC Analysis

Listed below are the results for the November 3, 1986 water samples. EPA Method 601 was used to complete the analysis.

	Influent	Effluent	
Perc (ug/l)	2,340.	164.	93.0%
Analytical No.	23177	23178	

If you have any questions, please call.

Sincerely,

ZIMPRO INC.

Mary C. Christie Heuser
Instrumentation Chemist

MCCH/ls

SENT TO STS - MARK MILLER 11-10 86

ZIMPRO INC
ENVIRONMENTAL & ENERGY SYSTEMS

November 25, 1986

Wausau Chemical Corp.
2001 N. River Drive
Wausau, WI 54401

Attn: Art Flashinski

Re: VOC Analysis

Listed below are the results for the November 17, 1986 water samples. EPA Method 601 was used to complete the analysis.

	Influent	Effluent
Perc (ug/l)	2,115.	82.5
Analytical No.	23563	23564

96.1 %

If you have any questions, please call.

Sincerely,

ZIMPRO INC.

Mary C. Christie Heuser /ls
Mary C. Christie Heuser
Instrumentation Chemist

MCCH/ls

MILITARY ROAD
ROTHSCHILD, WISCONSIN 54474

ZIMPRO INC
ENVIRONMENTAL & ENERGY SYSTEMS

December 23, 1986

Wausau Chemical Corp.
2001 N. River Dr.
Wausau, WI 54401

Attention: Mr. Art Flashinski

Reference: VOC Analysis

Gentlemen:

Attached are the results for samples taken December 2, 9, and 15, 1986. EPA Method 601 with PID (10.2 eV) and Hall detectors in series was used to complete the analysis.

If you have any questions, please call.

Sincerely,

ZIMPRO INC.

Mary C. Christie Heuser

Mary C. Christie Heuser

kfc

Attachment

SENT TO MARK MILLSOP
12-30-86
fkc

MILITARY ROAD
ROTHSCHILD, WISCONSIN 54474
TELEPHONE (715) 359-7211 TELEX 26-0495

WAUSAU CHEMICAL
VOC ANALYSIS (ug/l)

	Detection Limits	Influent 12-2-86
Benzene	5.0	X
Bromoform	12.5	X
Bromomethane	25.0	X
Carbo Tetrachloride	2.5	X
Chlorobenzene	2.5	X
Chloroethane	25.0	X
2-Chloroethylvinyl Ether	50.0	X
Chloroform	2.5	X
Chloromethane	150.	X
Dibromochloromethane	2.5	X
1,2-Dichlorobenzene	7.5	X
1,3-Dichlorobenzene	7.5	X
1,4-Dichlorobenzene	7.5	X
Dichlorobromomethane	2.5	X
1,1-Dichloroethane	2.5	X
1,2-Dichloroethane	7.5	X
1,1-Dichloroethylene	12.5	X
1,2-Dichloroethylene	7.5	90.0
Dichloromethane	5.0	X
1,2-Dichloropropane	12.5	X
cis-1,3-Dichloropropene	7.5	X
trans-1,3-Dichloropropene	25.0	X
Ethylbenzene	5.0	X
1,1,2,2-Tetrachloroethane	2.5	X
Tetrachloroethylene	2.5	1,510
Toluene	2.5	X
1,1,1-Trichloroethane	2.5	5.0
1,1,2-Trichloroethane	2.5	X
Trichloroethylene	2.5	190
Vinyl Chloride	50.0	X
Trichlorofluoromethane	5.0	X
Dichlorodifluoromethane	50.0	X
Analytical No.		23857

X = Analyzed but not detected.

TO
STS
12-30-86

WAUSAU CHEMICAL
VOC ANALYSIS (ug/l)

	Detection Limit	B-3B 12-2-86	Effluent 12-2-86
Benzene	2.0	X	X
Bromoform	5.0	X	X
Bromomethane	10.0	X	X
Carbo Tetrachloride	1.0	X	X
Chlorobenzene	1.0	X	X
Chloroethane	10.0	X	X
2-Chloroethylvinyl Ether	20.0	X	X
Chloroform	1.0	X	X
Chloromethane	60.0	X	X
Dibromochloromethane	1.0	X	X
1,2-Dichlorobenzene	3.0	X	X
1,3-Dichlorobenzene	3.0	X	X
1,4-Dichlorobenzene	3.0	X	X
Dichlorobromomethane	1.0	X	X
1,1-Dichloroethane	1.0	X	X
1,2-Dichloroethane	3.0	X	X
1,1-Dichloroethylene	5.0	X	X
1,2-Dichloroethylene	3.0	3.5	4.0
Dichloromethane	2.0	X	X
1,2-Dichloropropane	5.0	X	X
cis-1,3-Dichloropropene	3.0	X	X
trans-1,3-Dichloropropene	10.0	X	X
Ethylbenzene	2.0	X	X
1,1,2,2-Tetrachloroethane	1.0	X	X
Tetrachloroethylene	1.0	44.2	44.0
Toluene	1.0	X	1.0
1,1,1-Trichloroethane	1.0	X	1.0
1,1,2-Trichloroethane	1.0	X	X
Trichloroethylene	1.0	55.3	4.0
Vinyl Chloride	20.0	X	X
Trichlorofluoromethane	2.0	X	X
Dichlorodifluoromethane	20.0	X	X
Analytical No.		23856	23858

X = Analyzed but not detected.

54 = Total
PCE = 44.1
Tol = 1.0

TO
STS
12-30-86

WAUSAU CHEMICAL
VOC ANALYSIS (ug/l)

Sample	Date	PCE	Analytical No.	
Influent	12-9-86	1,940	24074	97.0%
Effluent	12-9-86	57.5	24075	
Influent	12-15-86	2,295	24155	80.7%
Effluent	12-15-86	443	24156	

TO STS 12-30-86 JJ

STS Consultants Ltd.
Green Bay:
540 Lombeau 54303
(414) 494-6699

RECORD OF PHONE CALL

JOB NO: 12776B

DATE: 1-9-87 START: 3:15 FINISH: 3:18

TO: Mary Heuser
Zimpro

FROM: Mark Millsop

CONVERSATION

ME	OTHER PARTY
Any results for late Dec for Wausau Chem?	→ Dec 29 sampling:
	→ PCE Influent = 1565 ppb
	+ " Effluent = 59 ppb
OK, Thanks	

REMARKS/ACTION

CG 4668

WAUSAU CHEMICAL EXTRACTION PROGRAM
WATER LEVEL SUMMARY

Date: 9-22-86
Technician:

		Time: 7:30 am				Time:				Time:				Time:				Comments
		W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	
Pumping Wells	7	17'11"																
	8	20'3"																
	9	14'11"																
	10	18'4"																
	11	19'0"																
	12	15'5"																
Other Wells	1	15'1"																
	2	15'2"																
	3	15'8"																
	4	19'5"																
	5	21'4"																
	6	15'10"																
	13	14'11"																
	14	14'9"																
	15	14'8"																

Vibration

1	12'5"
2	13'5"
3	13'6"
5	11'10"
6	14'3"

T.F.C.: Top float control set at

B.F.C.: Bottom float control set at

W.L.: Water level

WAUSAU CHEMICAL EXTRACTION PROGRAM
WATER LEVEL SUMMARY

Date: 9-26-86
Technician: RP

		Time: 3:00pm				Time:				Time:				Time:				Comments
		W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	
Pumping Wells	4	19' 9"																
	5	21' 3"																
	7	21' 0"																
	8	20' 0"																
	10	21' 1"																
	11	21' 5"																
Other Wells	1	15' 0"																
	2	15' 2"																
	3	15' 5"																
	6	15' 6"				1	12' 5"											
	9	14' 10"				2	13' 6"											
	12	21' 1"				3	13' 7"											
	13	14' 9"				5	11' 10"											
	14	14' 8"				6	14' 2"											
	15	14' 5"																

Monitoring

T.F.C.: Top float control set at

B.F.C.: Bottom float control set at

W.L.: Water level

WAUSAU CHEMICAL EXTRACTION PROGRAM
WATER LEVEL SUMMARY

Date: 9-29-86
Technician: RT.

		Time:				Time:				Time:				Time:				Comments
		W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	
Pumping Wells	4	17'4"																
	5	19'0"																
	7	19'1"																
	8	18'6"																
	10	19'0"																
	11	19'8"																
Other Wells	1	13'1"																
	2	13'2"																
	3	13'1"																
	6	13'8"				1	11'0"											
	9	12'10"				2	11'7"											
	12	13'3"				3	11'0"											
	13	12'2"																
	14	12'8"				5	9'7"											
	15	12'7"				6	12'4"											

Monitoring

T.F.C.: Top float control set at

B.F.C.: Bottom float control set at

W.L.: Water level

WAUSAU CHEMICAL EXTRACTION PROGRAM
WATER LEVEL SUMMARY

Date: 10-8-86
Technician: BJ.

		Time:				Time:				Time:				Time:				Comments
		W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	
Pumping Wells	4	18'	8"															
	5	20'	6"															
	7	19'	9"															
	8	20'	0"															
	10	20'	7"															
	11	20'	9"															
Other Wells	1	14'	1"															Monitoring Wells
	2	15'	1"															
	3	15'	3"															
	6	15'	4"			1	12' 4"											
	9	14'	9"			2	13' 1"											
	12	13'	0"			3	13' 5"											
	13	14'	8"															
	14	14'	[illegible]			5	11' 4"											
	15	14'	6"			6	13' 11"											

T.F.C.: Top float control set at

B.F.C.: Botton float control set at .

W.L.: Water level

STS

WAUSAU CHEMICAL EXTRACTION PROGRAM
WATER LEVEL SUMMARY

Date: 10-13-86
Technician: RS

		Time:				Time:				Time:				Time:				Comments
		W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	
Pumping Wells	4	16' 7"																
	5	19' 10"																
	7	17' 4"																
	8	17' 9"																
	10	18' 4"																
	11	18' 2"																
Other Wells	1	13' 0"																
	2	13' 3"																
	3	13' 6"																
	6	13' 7"				1	10' 10"											
	9	12' 9"				2	11' 7"											
	12	13' 1"				3	11' 7"											
	13	12' 8"																
	14	12' 6"				5	9' 11"											
	15	12' 4"				6	11' 10"											

Monitoring Wells

T.F.C.: Top float control set at

B.F.C.: Botton float control set at

W.L.: Water level

WAUSAU CHEMICAL EXTRACTION PROGRAM
WATER LEVEL SUMMARY

Date: 10-22-86
Technician: RJ

		Time:				Time:				Time:				Time:				Comments
		W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	
Pumping Wells	4	18'	10"															
	5	20'	8"															
	7	20'	0"															
	8	19'	3"															
	10	20'	3"															
	11	20'	1"															
Other Wells	1		14' 11"															
	2		15' 0"															
	3		15' 2"															
	6		15' 5"			1	12' 7"											
	9		14' 6"			2	13' 5"											
	12		15' 0"			3	13' 5"											
	13		14' 8"			5	11' 6"											
	14		14' 8"			6	14' 0"											
	15		14' 4"															

Monitoring Wells

T.F.C.: Top float control set at

B.F.C.: Bottom float control set at

W.L.: Water level

WAUSAU CHEMICAL EXTRACTION PROGRAM
WATER LEVEL SUMMARY

Date: 10/24/86
Technician: RW

		Time: 11:00 am				Time:				Time:				Time:				Comments
		W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	
Pumping Wells	4	19' 2"																
	5	21' 8"																
	7	19' 9"																
	8	20' 1"																
	10	20' 5"																
	11	21' 4"																
Other Wells	1	15' 1"																T.F.C. Top float control set at B.F.C. Bottom float control set at W.L. Water level
	2	15' 3"																
	3	15' 8"																
	6	15' 6"																
	9	14' 11"																
	12	15' 3"																
	13	14' 11"																
	14	14' 10"																
	15	14' 6"																

WAUSAU CHEMICAL EXTRACTION PROGRAM
WATER LEVEL SUMMARY

Date: 10/20/86
Technician: [illegible]

		Time: 1:30 pm				Time:				Time:				Time:				Comments
		W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	
Pumping Wells	4	22'0"																Water level in river dropped by WI Valley Improvement dam in week
	5	22'2"																
	7	22'1"																
	8	22'6"																
	10	23'10"																
	11	23'8"																
Other Wells	1	17'8"																
	2	17'8"																
	3	18'1"																
	6	18'3"																
	9	17'6"																
	12	18'0"																
	13	17'5"																
	14	17'9"																
	15	17'8"																

Monitor Wells

1	15'6"
2	16'0"
3	16'4"
5	14'6"
6	17'5"

T.F.C. Top float control set at

B.F.C. Botton float control set at

W.L. Water level

WAUSAU CHEMICAL EXTRACTION PROGRAM
WATER LEVEL SUMMARY

Date: 11/3/86
Technician: RF.

		Time: 7:30 am				Time:				Time:				Time:				Comments
		W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	
Pumping Wells	4	17'	3"															River back up to line
	5	17'	6"															
	7	22'	3"															
	8	22'	0"															
	10	23'	0"															
	11	23'	1"															
Other Wells	1	17'	1"															
	2	17'	0"															
	3	17'	5"															
	6	17'	6"															
	9	16'	7"															
	12	17'	0"															
	13	16'	7"															
	14	16'	6"															
	15	16'	9"															

		Monitoring Wells
	1	14' 2"
	2	15' 7"
	3	15' 4"
	4	
	5	13' 10"
	6	15' 11"

T.F.C.: Top float control set at

B.F.C.: Bottom float control set at

W.L.: Water level

WAUSAU CHEMICAL EXTRACTION PROGRAM
WATER LEVEL SUMMARY

Date: 11/17/86
Technician: E.T.

		Time: 8:30 am				Time:				Time:				Time:				Comments
		W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	
Pumping Wells	4	22'	4"															
	5	22'	2"															
	7	19'	9"															
	8	20'	10"															
	10	20'	10"															
	4	22'	0"															
Other Wells	1		15' 11"															
	2		16' 0"															
	7		16' 5"															
	6		16' 4"			1	13' 5"											
	9		15' 7"			2	14' 6"											
	12		16' 2"			3	14' 10"											
	13		15' 6"			5	10' 6"											
	14		15' 6"			6	15' 2"											
	15		15' 4"															

Monitoring Wells

T.F.C.: Top float control set at

B.F.C.: Bottom float control set at

W.L.: Water level

WAUSAU CHEMICAL EXTRACTION PROGRAM
WATER LEVEL SUMMARY

Date: 12/2/86
Technician: RW

		Time: 1:30 pm				Time:				Time:				Time:				Comments
		W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	
Pumping Wells	4	20' 2"																
	5	22' 2"																
	7	20' 0"																
	8	20' 6"																
	10	21' 1"																
	11	22' 4"																
Other Wells	1		16' 0"															
	2		15' 10"															
	3		16' 2"															
	6		16' 3"			1	14' 0"											
	9		15' 10"			2	14' 9"											
	12		16' 3"			3	14' 7"											
	13		15' 9"			5	13' 8"											T.F.C. Top float control set at
	14		15' 8"			6	15' 5"											B.F.C. Botton float control set at
	15		15' 5"															W.L. Water level

WAUSAU CHEMICAL EXTRACTION PROGRAM
WATER LEVEL SUMMARY

Date: 12-29-86
Technician: R.J.

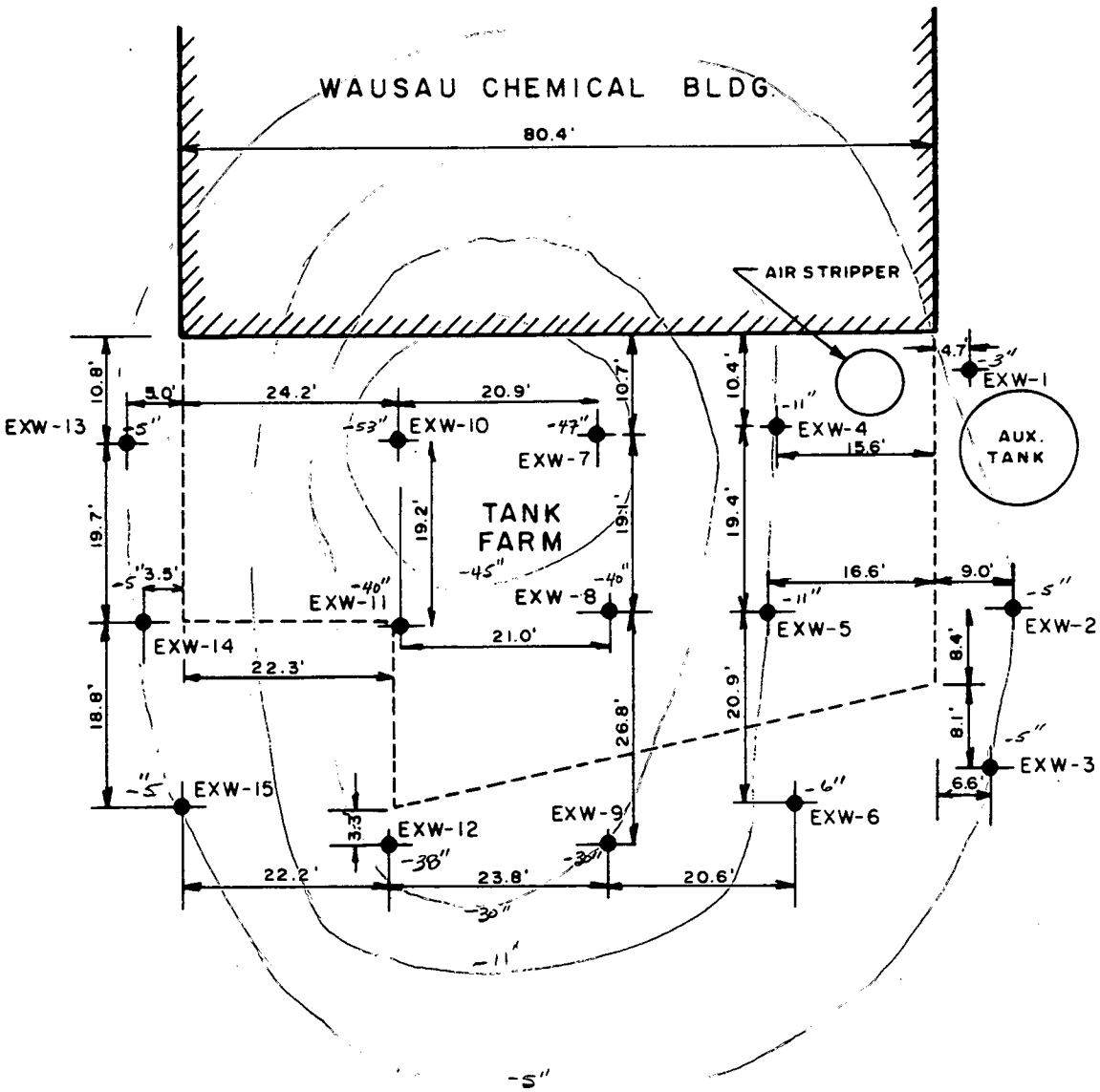
		Time: 8:00 am				Time:				Time:				Time:				Comments
		W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	W.L.	T. F.C.	B. F.C.	ON/ OFF	
Pumping Wells	4	20'4"																
	5	22'8"																
	7	20'0"																
	8	20'9"																
	10	20'11"																
	11	21'11"																
Other Wells	1	15'11"																
	2	16'0"																
	3	16'4"																
	6	16'5"				1	13'5"											
	9	15'6"				2	12'8"											
	12	16'2"				3	14'10"											
	13	15'6"				5	12'5"											
	14	15'6"				6	15'0"											
	15	15'4"																

Monitoring Wells

T.F.C.: Top float control set at

B.F.C.: Bottom float control set at

W.L.: Water level



Drawdown - 6/24/87

EXTRACTION WELL LOCATION DIAGRAM
WAUSAU CHEMICAL FACILITY
FIGURE 1

STS CONSULTANTS LTD.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

J.J.T	1-15-85	No Scale	12776 B

PADMASTER® Made in U.S.A

Water Levels - Wausau Chemical

Well #	System Off								System On	
	11/1/86	11/4/85	11/6/85	11/7/85	11/15/85	6/4/86	6/24/86	8/19/86		6/24/86
Ex. W										
1			13' ?	13' ?	13' 6"	15' 11"	15' 0"	15' 1"		15' 3"
2			13' 3'	13' 8"	13' 0"	16' 2"	15' 2"	15' 3"		15' 7"
3			14' 1'	14' 1"	13' 6"	16' 2"	15' 7"	15' 7"		16' 0"
4			16' 3"	16' 2"	16' 0"	18' 9"	17' 6"	17' 9"		18' 5"
5			17' 5"	17' 4"	17' 0"	20' 0"	18' 9"	19' 1"	Wells	19' 8"
6			14' 2"	14' 1"	14' 0"	16' 4"	15' 7"	15' 9"	Pumped	16' 1"
7			16' 7"	16' 5"	16' 0"	18' 11"	17' 8"	18' 0"	7	21' 7"
8			16' 0"	16' 0"	16' 0"	18' 8"	17' 5"	17' 7"	8	20' 9"
9			13' 4"	13' 4"	12' 6"	15' 9"	14' 11"	14' 11"	9	17' 5"
10	16' 10½"	16' 6"	17' 4"	17' 3"	17' 3"	19' 10"	18' 7"	19' 1"	10	23' 0"
11	17' 4½"	17' 0"	17' 10"	17' 8"	17' 4"	20' 2"	19' 0"	19' 6"	11	22' 4"
12	13' 1"	13' 1½"	13' 11"	13' 9"	13' 4"	16' 2"	15' 2"	15' 4"	12	18' 4"
13	13' 3"	12' 9"	13' 8"	13' 5"	13' 4"	15' 10"	14' 10"	14' 8"		15' 3"
14	13' 0"	12' 7"	13' 6"	13' 4"	13' 0"	15' 8"	14' 9"	14' 7"		15' 2"
15	12' 11"	12' 6"	13' 3"	13' 2"	12' 7"	15' 6"	14' 8"	14' 5"		15' 1"

6/13/86 - lowered all pumps to bottom of wells (approx 1 ft)
Over all WL dropped 2'-3' from fall, 1985 to summer, 1986.