



TO Distribution DATE January 24, 1983

FROM M. K. Davis *MD* SUBJECT Sodium Formate Plant Process Improvements

On January 18, 1983, a meeting was held to discuss the status of the Sodium Formate Process Improvements Program. In attendance were C. Ardoin, J. D. Jobe, B. Salter, L. Grubb, K. Komoroski, R. M. Hall, C. Dorsett, M. Wood, C. P. LeBlanc, J. B. Alleman, R. P. Lynch, B. Campbell, and M. K. Davis.

The status of the program established at the January 4, 1983 meeting was reported on by those in attendance.

1. The Lab has completed the grab sample tests of the Sodium Formate unit with and without acid addition. Without acid addition and low bleach excess, sodium formate destruction was poor at the exist of retention tank No. 3. Sodium formate destruction improved with a high bleach excess (12 plus gpl bleach), but performance was fair at best when sampled out of retention tank No. 3. Formate destruction improved appreciably when the effluent from retention tank No. 3 combined with the less basic secondary scrubber-stream. This improved performance was only evident when the pH of the combined streams fell below 12.0.

With acid addition, formate destruction was very effective. In each case, sodium formate levels were negligible at the exist of retention tank No. 1. The following tables summarize the destruction of sodium formate with and without acid. It should be noted that outfall 118 is the combination of the sodium formate effluent from retention tank No. 3 and the secondary scrubber stream.

TABLE I

Date	Rt. Tk. 3 pH	Feed	PPM Rt. Tk. 1	TOC Rt. Tk. 3	Rt. Tk. 3 Bleach Excess
1-6-83	12.7	1587	1289	948	1.16
1-10-83	12.6	2711	1628	1082	7.83
1-11-83	12.4	2534	1377	919	10.3
(1) 1-13-83	8.6	1917	60	112	8.2
(1) 1-14-83	8.5	2133	120	144	6.3

TABLE II

Date	(2) Outfall 118 pH	PPM Sodium Formate Outfall 118	Outfall 118 Bleach Excess
1-6-83	10.0	100	1.42
1-10-83	12.4	800	5.97
1-11-83	10.1	200	11.8
(1) 1-13-83	8.8	N.D.	8.5
(1) 1-14-83	8.8	N.D.	6.2

- (1) Acid addition. Sodium formate levels out of retention tank No. 1 are negligible.
- (2) Outfall 118 is the combination of the sodium formate effluent and the secondary scrubber.

- It was recommended that, for the monitoring of sodium formate performance, bleach killed grab samples should be used. In a 24 hour composite, the reaction continues until the bleach is neutralized; when a sodium formate and TOC analysis is finally performed, the composite reflects the amount of TOC present at that time and not the true performance of the Sodium Formate unit over a 24 hour period. The composite would still be retained for EPA purposes.
- Economic estimates on the two options for the static mixer system were presented. Option one would consist of two static mixers to replace the agitated tanks. Some piping modifications would be necessary to allow the formate stream to feed into the top of retention tanks 1 and 2. The investment would be approximately \$66,683. Option two would consist of installing the static mixers before the oxidation tank (tank 10) and installing a titanium clad lining in tank 10 which would serve as a degasser. No piping modifications would be necessary to flow into the retention tanks. The investment for this option is approximately \$55,893. Based on the economics and other salient features such as a degasser, option two was chosen.

The following program was established by those in attendance.

- Since caustic is the major contributor to high pH in the sodium formate stream, it was suggested that the sources of caustic contribution in the bleach stream and in the chloral treatment stream be examined. If the caustic levels can be controlled in these streams, it may increase the efficiency of the Sodium Formate unit. The Sulfur Chloride unit to recover tail gases will address this problem in part when it comes on stream.
(Process)

Sodium Formate Plant Process Improvements

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2. It was proposed that the Lab set up a test program to determine the optimum pH and bleach excess to operate the Sodium Formate unit more effectively. These tests should be a prelude to establishing a program to operate the Sodium Formate unit more efficiently. (Lab)
3. When running without acid (or at pH levels of better than 12.0), 12.0 plus gpl bleach excess is needed to destroy formate. Economically, high bleach excesses are not acceptable. The question still remains, "Is a high bleach excess acceptable environmentally?". Process Engineering will contact Jim Wyche in the Environmental department for a response. (Process)
4. Work will proceed on getting retention tank No. 1 relined with Semag. (Engineering)

The date and time for the next meeting was not set but will probably occur in two to three weeks.

/vem

Distribution:

Those in attendance

B. M. White
R. J. Whitaker
E. J. Tullier
J. A. Hart
J. Wyche
D. Haines
H. J. Hoenes

SL 049584

DATE 5-83 S.F.D.U. DAILY ANALYSIS 66-196

SAMPLE POINT	sample time	Temp(°f)	pH	PPM SODIUM FORMATE	PPM T O C	g/l excess BLEACH	Na ₂ S ₂ O ₃ ml Titer
Feed	2 pm	130	13.0	4600	2350	 	
#1 Ret. TANK	"	110	12.7	460	721	14.5	19.5
#3 Ret. TANK	"	125	12.6	300	71	11.0	14.7
S.S. Eff.	"	98	8.9	 	41	6.5	8.7
O.F. 118	Not sampled	 	 	 	 	 	

Excess Bleach

Sodium thiosulfate $N = 0.1002$

$$\text{g/l NaClO} = \frac{\text{Titer} \times N \times 37.22}{\text{ml sample}}$$

for 5 ml sample, g/l NaClO = titer x 0.746

DATE 5-83 S.F.D.U. DAILY ANALYSIS LB-196

SAMPLE POINT	sample time	Temp(°f)	pH	ppm SODIUM FORMATE	ppm T O C	g/l excess BLEACH	Na ₂ S ₂ O ₃ ml Titer
Feed	2 pm	130	13.0	4600	2350	 	
#1 Ret. TANK	"	110	12.7	460	721	14.5	19.5
#3 Ret. TANK	"	125	12.6	200	71	11.0	14.7
S.S. Eff.	"	98	8.9	 	41	6.5	8.7
O.F. 118	Not sampled	 	 	 	 	 	

Excess Bleach

Sodium Thiosulfate $N = 0.1002$

$$\text{g/l NaClO} = \frac{\text{Titer} \times N \times 37.22}{\text{ml sample}}$$

for 5 ml sample, g/l NaClO = titer x 0.746

DATE 1-6-83 S.F.D.U. DAILY ANALYSIS LB-196

SAMPLE POINT	sample time	Temp(°f)	pH	* ppm SODIUM FORMATE	ppm T O C	g/l excess BLEACH
Feed	7:15 Am	?	12.7	7600	1587	
#1 Ret. TANK	9:09 Am	118	12.3	5850	1289	0.6
#3 Ret. TANK	11:12 Am	122	12.7	5700	948	1.16
S.S. Eff.	11:36 Am	99	9.8	 	 	1.34
O.F. 118	11:42 Am	112	10.0	~100	773	1.42

T.O.C. contained in sodium formate = 17.64 %

Bleach Test
 $N_{Na_2S_2O_3} = .1002$
 Titer $\times 0.746 = g/l NaClO$
 for 5 ml sample

DATE 7/10

S.F.D.U. DAILY ANALYSIS

6-196

SAMPLE POINT	sample time	Temp(°f)	pH	PPM SODIUM FORMATE	PPM TOC	g/l excess BLEACH	Na ₂ S ₂ O ₃ ml Titer
Feed	7 ⁰⁰ AM	140	13.0	6896	2711		
#1 Ret. TANK	9 ⁰⁰ AM	134	12.6	6495	1628	12.12	16.25
#3 Ret. TANK	10 ⁵⁵ AM	136	12.6	2700	1,082	7.83	
S.S. Eff.	11 ¹⁷ AM	112	9.8				
O.F. 118	11 ²² AM	127	12.4	800	945	5.97	

Special #1 R.T. 11⁰⁰ AM

5500 1587 20.2

Excess Bleach

Sodium thiosulfate N = 0.1002

g/l NaClO = $\frac{\text{Titer} \times N \times 37.22}{\text{ml sample}}$ for 5 ml sample, g/l NaClO = $\text{titer} \times 0.746$ 10 min ventron
time in the pipe run
from #3 Rt to O.F. 118

SL 049588

DATE _____ S.F.D.U. DAILY ANALYSIS

LB-196

TOC
ppm unaccounted for
by formate
~~Na₂S₂O₃~~
ml Titer

SAMPLE POINT	sample Time	Temp(°f)	pH	ppm SODIUM FORMATE	ppm T O C	g/l excess BLEACH	
Feed	7:00	137	14.1	2200 131000	2534		334
#1 Ret. TANK	9:30	126	12.5	763 49207	1377	14.5	614
#3 Ret. TANK	12:30	143	12.4	345 1506	919	10.3	574
S.S. Eff.	1:00	124	13.5			10.2	
O.F. 118	12:30	127	10.1	35 1100	509	11.8	474

Excess BleachSodium thiosulfate $N = 0.1002$

$$\text{g/l NaClO} = \frac{\text{Titer} \times N \times 37.22}{\text{ml sample}}$$

for 5 ml sample, g/l NaClO = $\text{titer} \times 0.746$

DATE 1-13-83 S.F.D.U. DAILY ANALYSIS LB-196

SAMPLE POINT	sample time	Temp(°f)	pH	PPM SODIUM FORMATE	PPM TOC	g/l excess BLEACH	Na ₂ S ₂ O ₃ ml Titer
Feed	7 ¹⁵ AM	130	13.2	12,600	1917		
#1 Ret. TANK	9 ⁰³ AM	131	8.65	* NOT DETECTABLE	60	7.2	
#3 Ret. TANK	11 ⁰⁰ AM	137	8.6	N. D.	112	8.2	
S.S. Eff.	11 ⁰⁸ AM	130	9.2			5.0	
O.F. 118	11 ¹⁶ AM	130	8.8	N. D.	78	8.5	

* less than 50 ppm

Excess Bleach

Sodium Thiosulfate $N = 0.1002$

$$\text{g/l NaClO} = \frac{\text{Titer} \times N \times 37.22}{\text{ml sample}}$$

for 5 ml sample, g/l NaClO = titer x 0.746

Adding Acid since 4 pm 1-12-83

DATE S.F.D.U. DAILY ANALYSIS 4-196

SAMPLE POINT	sample Time	Temp(°f)	pH	ppm SODIUM FORMATE	ppm TOC	g/l excess BLEACH	Na ₂ S ₂ O ₃ ml Titer
Feed	7 ¹⁰ am	132	13.0	11,180	2133		
#1 Ret. TANK	9 ⁴⁰ am	142	8.5	NIL	1200	8.35	
#3 Ret. TANK	11 ⁵² am	140	8.5	NIL	1400	6.3	
S.S. Eff.	12 ⁰⁵ am	127	9.2			4.0	
O.F. 118	12 ¹⁰ pm	130	8.8	NIL	1500	6.2	

Excess Bleach

Sodium thiosulfate $N = 0.1002$

$$\text{g/l NaClO} = \frac{\text{Titer} \times N \times 37.22}{\text{ml sample}}$$

for 5 ml sample, g/l NaClO = titer x 0.746

PPG INDUSTRIES, INC.
CHEMICAL DIVISION-U.S.
LAKE CHARLES, LOUISIANA

Laboratory Department

Date: 1-3-83

Chemist/Analyst: Jobe

Shift: _____

Filing Data: W.T.H.

Analysis of: Sodium formate Destruction Unit effluent & fee

Analyzed by G.C.

EFF.	Sodium formate	0.28%
	pH	12.9
	TOC	1725 PPM
Feed	Sodium formate	0.63 %
	pH	12.7
	TOC	2423 PPM

H.J. Hoene

C.P. Leblanc

CC R.J. Whitaker

J.B. Alleman

R.M. Hall

B. Salter

Ken Komoriski

Mark Wood

Larry Grubb

[Signature]

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(Rev. 1/80)

PPG INDUSTRIES, INC.
CHEMICAL DIVISION-U.S.
LAKE CHARLES, LOUISIANA

Laboratory Department

Date: 1-4-83

Chemist/Analyst: Jobe

Shift: _____

Filing Data: W.T.U.

Analysis of: Sodium formate Destruction Unit Effluent & Feed

Analyzed by G. C.

<u>Effluent</u>	<u>sodium formate</u>	<u>0.073%</u>
	<u>pH</u>	<u>12.9</u>

<u>feed</u>	<u>sodium formate</u>	<u>0.55%</u>
	<u>pH</u>	<u>12.8</u>

SL 049593

PPG INDUSTRIES, INC.
INDUSTRIAL CHEMICAL DIVISION
LAKE CHARLES, LOUISIANA

Laboratory Department

Date: 5/26/82

Analyst: PB

Filing Data: Formate

Analysis of: Plant "B" Waste Treatment Unit Samples
for pH, NaOCl, and Total Organic Carbon

Sample	Grab Time	pH	NaOCl, ppm	TOC, P _i
#1 Retention Tank	10:15 A.M.	8.7	283 ppm	748 ppm
#1 Retention Tank	12:15 P.M.	8.6	730 ppm	567 pp.

Mark Wood

Distribution:

Larry Drubb

Billy Satter

Bobby Jones

Joe Hutchins

C. P. LeBlanc

SL 049594

PPG INDUSTRIES, INC.
INDUSTRIAL CHEMICAL DIVISION
LAKE CHARLES, LOUISIANA

Laboratory Department

Date: 5/27/82

Analyst: P. BROOKS

Filing Data: Formate

Analysis of: Plant "B" Waste Treatment Unit Samples for
pH, NaOCl, and TOC

Sample	Grab Time	pH	NaOCl, ppm	TOC, mg/l
#1 Retention Tk.	9:30 A.M.	8.6	3,300 ppm	317
Sodium Formate Fed	9:30 A.M.			3,121
#3 Retention TK.	1:30 P.M.	8.6	2,406 ppm	290 pp

Mark Wood

Distribution:

Larry Drubb

Billy Salter

Bobby Jones

Joe Hutchins

C. P. LeBlanc

PPG INDUSTRIES, INC.
INDUSTRIAL CHEMICAL DIVISION
LAKE CHARLES, LOUISIANA

Laboratory Department

Date: 5/25/82

Analyst: P. Brooks

Filing Data: Sodium Formate

Analysis of: Plant "B" Waste Treatment Unit Samples for pH, Hypochloride, and Total Organic Carbon

Sample	Grab Time	pH	Na OCl, ppm	TOC, ppm
Sodium Formate Feed	8:30 A.M.			2948 ppm
#3 Retention TK.	5:30 P.M. 5/24/82	8.6	78 ppm	1535 ppm
#1 Retention TK.	12:15 P.M.	8.7	238 ppm	891 ppm
#1 Retention TK.	2:00 P.M.	8.6	536 ppm	638 ppm

Mark Wood

Distribution:

Larry Drubbs

Billy Salter

Bobby Jones

Joe Hutchins

C. P. LeBlanc

PPG INDUSTRIES, INC.
INDUSTRIAL CHEMICAL DIVISION
LAKE CHARLES, LOUISIANA

Laboratory Department

Date: 5/24/82

Analyst: P. BROOKS

Filing Data: _____

Analysis of: Plant "B" Waste Treatment Unit Samples for
Total Organic Carbon

Sample (5-24-82)	Grab Time	TOC, ppm
Sodium Formate Feed	10:30 A.M.	3,219 ppm
#1 Retention Tank Effluent	1:00 P.M.	1,080 ppm

Mark Wood

Distribution:

Larry Drubb

Billy Salter

Bobby Jones

Joe Hutchins

C. P. LeBlanc

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(Rev. 4/72)

PIG INDUSTRIES, INC.
INDUSTRIAL CHEMICAL DIVISION
LAKE CHARLES, LOUISIANA

Laboratory Department

Date: 5/21/82

Analyst: P. Brooks

Filing Data: _____

Analysis of: Plant "B" Waste Treatment Unit Samples for
Total Organic Carbon

Sample	Draw Time	TOC, ppm
#1 Retention Tk. Effluent	10:15 A.M.	279 ppm
#1 Retention Tk. Effluent	1:00 P.M.	282 ppm

Distribution:

Larry Drubb

Billy Salter

Bobby Jones

Joe Hutchins

C. P. LeBlanc

William Lyndell

SL 049598

PPG INDUSTRIES, INC.
INDUSTRIAL CHEMICAL DIVISION
LAKE CHARLES, LOUISIANA

Laboratory Department

Date: 5/20/82

Analyst: P. Brooks

Filing Data: _____

Analysis of: Plant "B" Waste Treatment Unit Samples for
Total Organic Carbon

Sample	Grab Time ⁽⁵⁻²⁰⁻⁸²⁾	TOC, ppm
TK. 9 Effluent	8:15 A.M.	644 ppm
TK 10 Effluent	8:30 A.M.	599 ppm
Sodium Formate Feed	8:00 A.M.	3,136 ppm
#1 Retention TK. Effluent	10:45 A.M.	441 ppm
#2 Retention TK Effluent	1:15 P.M.	475 ppm

Distribution :

Larry Drubb

Billy Salter

Bobby Jones

Joe Hutchins

C. P. LeBlanc

Mark Wood

PRG INDUSTRIES, INC.
INDUSTRIAL CHEMICAL DIVISION
LAKE CHARLES, LOUISIANA

Laboratory Department

Date: 5/19/82

Analyst: P. Brooks

Filing Date: _____

Analysis of: Plant "B" Waste Treatment Unit Samples for
Total Organic Carbon (5-19-82)

Sample	Grab Time	TOC, ppm
#1 Retention Tk.	10:15 A.M.	215 ppm
Effluent		
#1 Retention Tk.	1:15 P.M.	191 ppm
Effluent		

Distribution:

Larry Grubb

Billy Salter

Bobby Jones

Joe Hutchins

C. P. LeBlanc

Mark Wood

