

ESSO CHEMICAL CANADA

P.O. Box 3004, Sarnia, Ontario, Canada N7T 7M5

0950D

April 30, 1985

SARNIA CHEMICAL PLANT
W.D. REID
Manager

File: 1793



Certain-Teed Corporation
Pipe & Plastics Group
P.O. Box 253
Sulphur, Louisiana
70663

Re: Survey Results -
Corrosion in Recovery System

Dear Mr. C. A. Gellner:

Please find attached a copy of the survey results on: Corrosion in the Recovery System.

In Summary:

No. of Respondents: 25

<u>Observations:</u>	<u>YES</u>	<u>NO</u>	<u>N/C</u>
Experienced Pit Corrosion (72%)	18	6	1
In Settling Drum	20	5	-
Stagnation	11	10	4
Acidic Condition	11	11	3
Temperature (>40 °F)	20	-	5
Iron	13	1	11
Chlorides	14	1	10
Corrosion Inhibitor	9	15	1
Filter Solids	8	16	1
Antioxidant	13	11	1
Monitor For Pitting	14	11	-

Cont'd . . . /2



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Other general observations: (1) some of the respondents have had success in thwarting pit corrosion by using coatings (e.g. epoxy), glass-lined vessels and even electropolishing. None had any experience with using Titanium or equivalent materials; (2) I sensed a general confusion as to the difference between pit corrosion and chloride stress corrosion cracking. Therefore, some of the respondents who have indicated experience with pit corrosion may in fact be with C.S.C.C. Possibly the questionnaire itself added to this difficulty, because the answers to a couple of other questions were also misleading. Any future survey questions should take this observation into account to make the results as meaningful as possible.

As a final note, also find attached a blank copy of the survey questions that may help you when reviewing results as well as a copy of my presentation.

Finally, I thank you on behalf of Esso Chemical Canada for your participation, and if you have any further questions or comments, please do not hesitate to contact me (519-339-2061).

Best regards,

ESSO CHEMICAL CANADA



N. Pellarin
P.V.C. Technical
Supervisor

NP/db
Attachments

CTL020307

Company	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	TOTALS	
Questions:																											
1. Experienced Materials	No -	Yes CS/SS	Yes BS/SS	Yes CS	Yes CS	Yes CS	Yes SS	No -	Yes SS	No -	Yes SS	Yes -	Yes SS	Yes SS	Yes CS	Yes SS	Yes CS	No -	Yes SS	Yes CI	Yes V2A (SS)	Yes SS (304)	- -	No -	No -	Y: 18 N: 6 N/C: 1 CS: 5 SS: 9 CS/SS: 2 CI: 1 N/C: 1	
2. Mat'l/Coatings Successful	CS/SS	C-Epoxy	SS/316	C-Al	-	-	Electro.	-	-	-	-	C-Kynar	SS	CS/SS	SS	CS	-	-	C-Epoxy	-	GL	-	Mild Steel	AISI SS	CS	Coatings: 4 CS: 3 SS: 4 GL: 1 Electropolishing: 1 N/C: 10 CS/SS	
3. Settling Drum	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Y: 20 N: 5 N/C: -	
4. Corrosion in Drum	No	Yes	Yes	Yes	Yes	No	-	No	Yes	No	No	Yes	No	No	-	Yes	No	No	Yes	No	No	No	No	No	No	Y: 8 N: 15 N/C: 2	
5. Stagnation Range (hr.)	No (4-12)	Yes (8-24)	No (8)	Yes (8)	Yes (8)	No -	- -	- (8)	- -	- -	Yes (2 wk.)	No (24)	Yes (8)	No -	No -	Yes (8)	- (1)	No (8)	Yes -	No (8)	Yes (4)	Yes (4 Mon.)	Yes (8-12)	- (8)	Yes (2)	Y: 11 N: 10 N/C: 4 Range: 1 hr. to 4 months Typical: 8 - hr.	
6. Conditions																											
pH (acidic?)	7	4	4	8	7 - 8	5 - 6	-	No	4	No	2 - 3	7	7	8	-		10	-	4	7.5	No	3	3 - 4	2	Yes	Acidic: 11 Basic: 11 N/C: 3	
Temp. (°F)	Amb.	50	70	68	68	80	-	50	60	40 - 50	72	-	50	100	-	40-60	-	55	85	100	Amb.	-	50	Amb.	100	Range: Amb. to 100°F	
Chlorides (ppm)	-	-	-	Trace	Yes	Yes	-	-	Yes	-	Yes	Yes	-	-	-	Yes	No	-	-	25	Yes	5	1.5	Yes	Yes	Y: 13 N: 1 N/C: 11	
Iron (ppm)	-	-	-	Trace	5	Yes	-	0.1	Yes	-	Yes	Yes	-	Yes	-	Yes	No	-	-	2	1	Yes	0.3	-	Yes	Y: 14 N: 1 N/C: 10	
7. Resin Carryover	Yes	Yes	No	Trace	Trace	No	-	-	Yes	No	Yes	Yes	No	No	-	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Y: 15 N: 7 N/C: 3	
8. Other Build-Up	No	-	No	Poly.	No	No	-	-	-	Yes	Yes	-	Yes	Yes	-	Yes	Yes	Yes	Yes	No	No	Yes	Yes	No	Yes	Y: 12 N: 7 N/C: 6	
9. Corrosion Inh. U/S	No -	No -	No -	Yes (ISP)	Yes -	No -	Yes -	No -	Yes (C)	No	Yes	Yes (C)	No	Yes	-	No	Yes	No	Yes	No	No	No	No	No	No	Y: 9 N: 15 N/C: 1	
10. Filter Solids U/S	No	Yes	No	Yes	Yes	No	No	No	No	No	No	Yes	No	No	-	No	Yes	Yes	No	No	No	No	Yes	Yes	No	Y: 8 N: 16 N/C: 1	
11. Antioxidants U/S pH Change	Yes Yes	No -	No -	No -	Yes (HG)	Yes -	Yes -	Yes -	Yes -	No -	Yes -	No (P)	No -	Yes -	- -	No -	Yes (C)	Yes -	No -	No -	No -	Yes No	No -	Yes No	Yes No	Y: 13 N: 11 N/C: 1	
12. Titanium Vessel Experience	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Y: - N: 25 N/C: -	
13. Pitting Monitor Method	No -	Yes (US)	Yes (US)	Yes (US)	No -	Yes (US)	Yes -	- -	- -	- -	- -	Yes (US)	- -	- -	- -	Yes (US)	Yes (US)	- -	- -	Yes (US)	- -	- -	Yes R/PL	- -	- -	Y: - N: - N/C: -	

Note:

ISP - trisodium phosphate

HG - hydroquinone

US - ultrasonic

C - caustic

P - phenol

R/PH - radiography and penetrating liquids

U/S - upstream

CTL020308

VINYL CHLORIDE SAFETY ASSOCIATION 1984

Vinyl Chloride Recovery System Corrosion Risk Management Survey

1. Have you experienced pit corrosion problems in the recovered monomer system? In what materials of construction.

2. What materials and/or coatings have you had success with? Problems with?

3. Do you use a settling drum system to remove water from recovered monomer? _____
4. Have you experienced pit corrosion in the settling drum? _____
5. Does the water sit stagnant for extended periods of time? _____
How long? _____
6. Is the environment in drum acidic? _____ pH _____?
warm? _____ Ave. Temp. _____?
with Cl⁻ present? _____ ppm _____?
with Fe present? _____ ppm _____?
7. Have you experienced resin carryover to the drum? _____
8. Have you experienced any other form of build-up? _____
9. Do you add corrosion inhibitors in or upstream of the drum? _____
10. Do you filter solids upstream of the drum? _____
11. Do you add antioxidants to the recovered monomer upstream of the water settling drum? _____
Does this affect water pH? _____
12. Do you have experience with the use of titanium in the recovered monomer service? _____
- 12a. Was it satisfactory? _____

Vinyl Chloride Recovery System Corrosion Risk Management Survey
(Continued)

12. Do you monitor equipment for pitting? _____

With what method? (eg. radiography) _____

YOUR RETURN ADDRESS FOR SURVEY REVIEW IF DESIRED.

MAIL RESPONSES TO:

M.L. Marson
Esso Chemical Canada
P.O. Box 3004
SARNIA, Ontario
N7T 7M5
CANADA
Telephone: (519) 339-5944

1746J/jrw

CTL020310



VINYL CHLORIDE
SAFETY ASSOCIATION
MEETING - 1984

SUBJECT: CORROSION IN RECOVERY SYSTEM

SPEAKER: N. (Nino) Pellarin
PVC Technical Supervisor
Esso Chemical Canada

CTL020311



VINYL CHLORIDE
SAFETY ASSOCIATION
MEETING - 1984

CORROSION IN RECOVERY SYSTEM

● BACKGROUND:

- TWO 316 SS INERTS DRUMS IN RECOVERED VCM OPERATION. UPSTREAM PIPING PRIMARILY CS.
- DRUMS ARE EXPERIENCING PIT CORROSION.
- PITTING IS REPAIRED BY LIGHT GRINDING AND WELDING.
- CONCERNS: (1) INTEGRITY OF DRUMS: LEADS TO ENVIRONMENTAL RELEASE.
(2) REPAIR TECHNIQUE: LEADS TO CSCC.

CTL020312



VINYL CHLORIDE
SAFETY ASSOCIATION
MEETING - 1984

CORROSION IN RECOVERY SYSTEM

● MECHANISM:

- CORROSION PROTECTION FOR SS DRUMS PROVIDED BY OXIDE LAYER.
- IRON CHLORIDES CHEMICALLY "BREAKDOWN" THE OXIDE FILM.
- STAGNATION PREVENTS RE-PASSIVATION.
- HYDROCHLORIC ACID ATTACKS THE UNPROTECTED SITE.
- A PIT DEVELOPS.
- PROPAGATION ASSISTED BY THE ELECTROCHEMICAL EFFECT.
- FACTORS THAT ACCELERATE PROCESS:
 - (1) ACIDITY
 - (2) TEMPERATURE

CTL020313

CORROSION IN RECOVERY SYSTEM

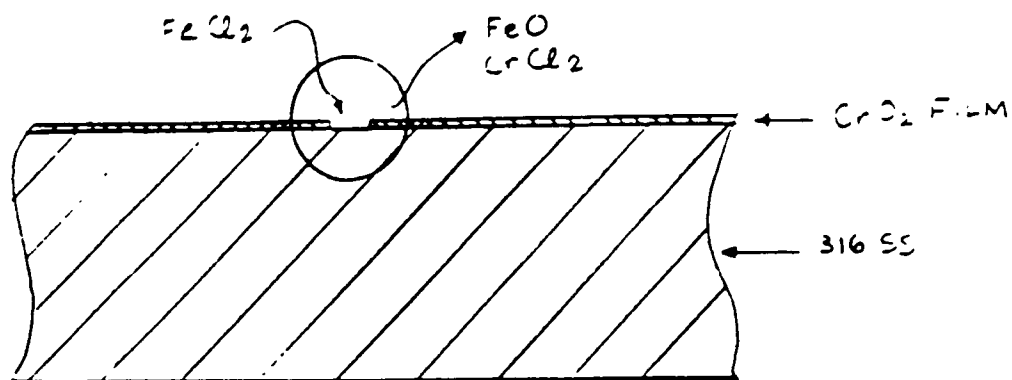


FIG. 1: BREAKDOWN OF OXIDE FILM

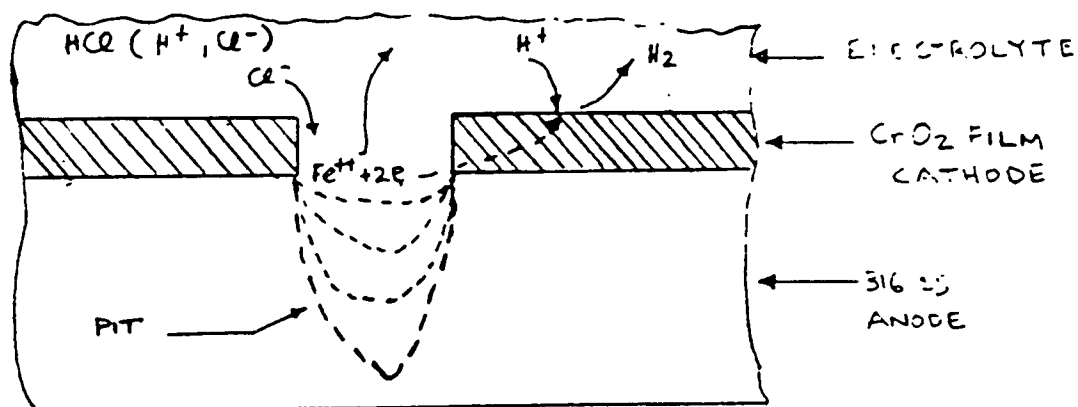


FIG. 2: FORMATION OF PITS

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VINYL CHLORIDE
SAFETY ASSOCIATION
MEETING - 1984

CORROSION IN RECOVERY SYSTEM

● CORRECTIVE ACTIONS:

- SHORT-TERM: ● PURCHASED GL VESSEL TO REPLACE MAIN SS DRUM.
● ONE DRUM OPERATION TO PREVENT STAGNATION.

- LONG-TERM: ● CONSIDERING WAYS OF CONTROLLING OR ELIMINATING FACTORS.

CTL020315



VINYL CHLORIDE
SAFETY ASSOCIATION
MEETING - 1984

CORROSION IN RECOVERY SYSTEM

● SURVEY: 16 RESPONDENTS

- OBSERVATIONS

	<u>YES</u>	<u>NO</u>	<u>N/C</u>
EXPERIENCED PIT CORROSION (80%)	13	3	-
IN SETTLING DRUM	7	7	2
STAGNATION	6	8	2
ACIDIC CONDITION	6	8	2
TEMPERATURE $\geq 40^{\circ}\text{F}$	14	-	2
IRON/CHLORIDES	8	-	8
CORROSION INHIBITOR	7	8	1
FILTER SOLIDS	4	11	1
ANTIOXIDANT	8	7	1
MONITOR FOR PITTING	11	4	1

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