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Agency / Organization

Oxy Vinyls, LP

Title

Oxy Vinyls Email to NTSB, VCM Vapor Pressure Curve and Polymerization, March 10, 2023

Smith, Steve M. (Mgr Technical LaPorte)

From: Smith, Steve M. (Mgr Technical LaPorte)
Sent: Friday, March 10, 2023 12:44 PM
To: Stancil Paul
Cc: Dougherty Marc
Subject: RE: Sampling activity photos and additional information request (NTSB # RRD23MR005)
Attachments: VCM Vapor Pressure from Yaws.pdf

Paul and Marc,

We are still summarizing the analytical results for the samples taken on the tank cars and are now targeting completion next week. We would like to set up a meeting with you at a mutually convenient time during the week of March 20th, if possible. If so, let me know of times that you may be available.

In response to your questions on runaway Vinyl Chloride polymerization and a temperature/pressure curve:

- Vinyl Chloride (VCM) polymerizes to poly vinyl chloride by a free-radical mechanism. Thermally initiated free radical polymerization will not occur with VCM. In order to start that reaction, a free-radical initiator is needed. Generally, that initiator for industrial purposes is an organic peroxide of some kind. It is for that reason that VCM is stored and shipped in a low-oxygen environment because otherwise peroxides could be formed. These vinyl chloride railcars contained less than 200 ppm oxygen as verified by the certificates of analysis meeting the requirements for shipment as stabilized vinyl chloride. The vinyl chloride railcars were still pressurized when the controlled burn commenced, leaving no apparent mechanism for additional oxygen to be added to the vinyl chloride from the ambient external environment as required to initiate a runaway polymerization reaction.

  Based on OCC's experience and research, vinyl chloride will not undergo runaway polymerization reactions capable of impacting relief devices or damaging vessels in a low oxygen environment at any temperature.

- Attached is a vapor pressure curve and data table for Vinyl Chloride Monomer (VCM), using Yaws' Physical Property data. The vapor pressure equation was obtained from Table 12 of Yaws' Critical Property Data for Chemical Engineers and Chemists (© 2012; 2013; 2014 Knovel).

  In addition to the attached vapor pressure curve, the table below summarizes equilibrium temperatures and pressures of the tank cars according to data collected by SPSI prior to the controlled burn. Of note, based on data collected by SPSI, the shell temperatures for tank car OCPX 080370 were at 135F on February 5, increased 2-3 degrees later that day, then decreased to 130F that evening and remained at 130F as of Monday morning.

Tank Car	Temperature (°F)	Pressure (PSIG)	Relief Device Set Pressure (PSIG)	Comments
TILX 402025	93	60.0	247.5	SPSI provided the car's pressure.
OCPX 080235	60 to 85	28.2 to 50.8	247.5	SPSI provided the range of shell temperatures (60F to 85F) for these cars. The temperatures associated with each car are not known.
OCPX 080179			247.5	
GATX 095098			247.5	
OCPX 080370	130	112.4	247.5	SPSI provided the shell temperatures for this car. On Feb. 5 the temperature increased from 135F by 2-3F, then dropped and remained at 130F as of Monday morning.
	135	121.1		
	138	126.6		

Steve Smith
Technical Manager – La Porte VCM Plant
Office: [redacted]
Mobile: [redacted]

From: Stancil Paul <[redacted]>
Sent: Friday, March 3, 2023 12:36 PM
To: Smith, Steve M. (Mgr Technical LaPorte) <[redacted]>
Cc: Dougherty Marc <[redacted]>
Subject: [EXTERNAL] RE: Sampling activity photos and additional information request (NTSB # RRD23MR005)

Steve,

We appreciate the update on the status of your laboratory work and look forward to reviewing the findings as soon as available.

In the meantime, following up on my earlier request of February 21, please send us a data sheet showing the vinyl chloride temperature/pressure curve, and any data that would indicate what the critical temperature is for VCM runaway polymerization.

Thank you,

Paul L. Stancil, CHMM
Senior Hazardous Materials Accident Investigator

National Transportation Safety Board
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490 L'Enfant Plaza East, SW, Washington DC 20594
Web: www.ntsb.gov
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NTSB

From: Smith, Steve M. (Mgr Technical LaPorte) <[redacted]>
Sent: Friday, March 3, 2023 11:38 AM
To: Stancil Paul <[redacted]>
Cc: Dougherty Marc <[redacted]>
Subject: RE: Sampling activity photos and additional information request (NTSB # RRD23MR005)

Update: We have not completed summarizing the analytical results; so we will not be able to provide them to you today. We are targeting completion by Friday, 3/10. If we complete our work earlier than that, we will promptly share it with you.

Steve Smith
Technical Manager – La Porte VCM Plant
Office: [redacted]
Mobile: [redacted]

From: Stancil Paul <[redacted]>
Sent: Friday, February 24, 2023 3:42 PM

To: Smith, Steve M. (Mgr Technical LaPorte) <[redacted]>
Cc: Dougherty Marc <[redacted]>
Subject: [EXTERNAL] RE: Sampling activity photos and additional information request (NTSB # RRD23MR005)

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Mr. Smith,

Thank you for the update. We are looking forward to reviewing your findings.

Paul L. Stancil, CHMM
Senior Hazardous Materials Accident Investigator

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NTSB

From: Smith, Steve M. (Mgr Technical LaPorte) <[redacted]>
Sent: Friday, February 24, 2023 4:39 PM
To: Stancil Paul <[redacted]>
Cc: Dougherty Marc <[redacted]>
Subject: RE: Sampling activity photos and additional information request (NTSB # RRD23MR005)

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Paul and Marc,
An update on our sample analysis - we hope to be completed with our analysis by the end of next week.

Steve Smith
Technical Manager – La Porte VCM Plant
Office: [redacted]

Mobile: [redacted]

From: Stancil Paul <[redacted]>
Sent: Tuesday, February 21, 2023 8:12 PM
To: Smith, Steve M. (Mgr Technical LaPorte) <[redacted]>
Cc: Dougherty Marc [redacted]>
Subject: [EXTERNAL] Sampling activity photos and additional information request (NTSB # RRD23MR005)

Steve,

Thank you for sending photographs of the 5 VCM car pressure plates that were taken during your February 16-17 sampling activity. Was Mr. Torres able to successfully collect samples from each of the 5 VCM cars? If so, when do you expect to have the analysis completed?

Also, I have another request for information – please send us a data sheet showing the vinyl chloride temperature/pressure curve, and any data that would indicate what the critical temperature of the material would be for runaway polymerization.

Thank you,

Paul L. Stancil, CHMM
Senior Hazardous Materials Accident Investigator

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NTSB

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