



NATIONAL TRANSPORTATION SAFETY BOARD
Investigative Hearing

Norfolk Southern Railway general merchandise freight train 32N
derailment with subsequent hazardous material release and fires,
in East Palestine, Ohio, on February 3, 2023

GROUP	D
EXHIBIT	
19	

Agency / Organization

Oxy Vinyls, LP

Title

**Vinyl Chloride Monomer Vapor Pressure Curve
and Data Table**

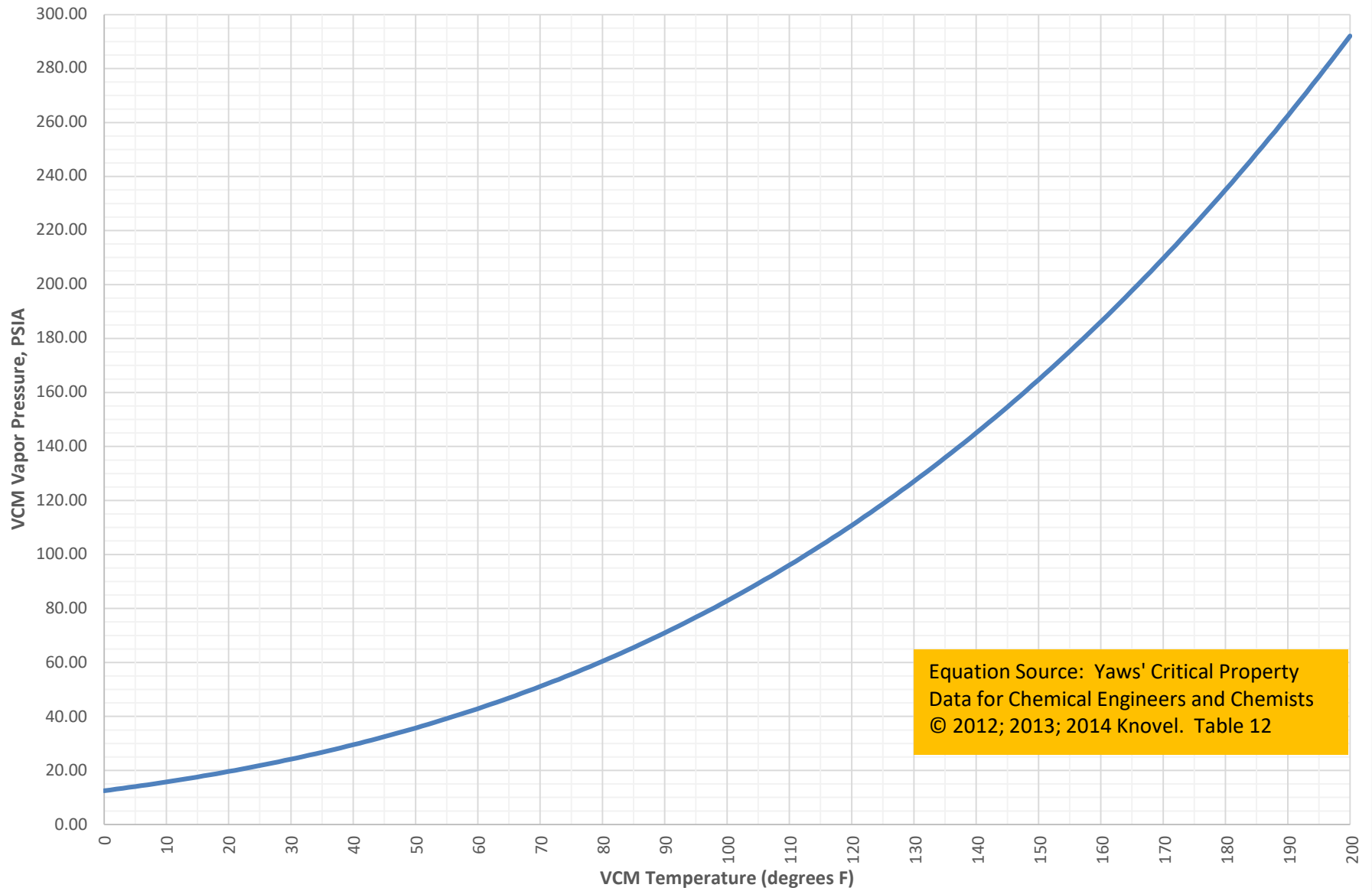
Vinyl Chloride Monomer (VCM) Vapor Pressure

The attached VCM vapor pressure curve and data table are generated from Yaws' Critical Property Data for Chemical Engineers and Chemists © 2012; 2013; 2014 Knovel. The citation as well as the equation and parameters used to generate the vapor pressures are shown below.

Citation	
Yaws' Critical Property Data for Chemical Engineers and Chemists © 2012; 2013; 2014 Knovel	
Title: Yaws' Critical Property Data for Chemical Engineers and Chemists	
Table: Table 12. Vapor Pressure - Organic Compounds, $\log P = A - B/(T + C)$	
Retrieved from: https://app.knovel.com/hotlink/itble/rcid:kpYCPDCECD/id:kpYCPDCECD/yaws-critical-property/yaws-critical-property	

Table 12. Vapor Pressure - Organic Compounds, $\log P = A - B/(T + C)$												
molecular formula	substance name	synonyms	CAS No.	molecular weight (unitless)	temperature, T_{\min} (°C)	temperature, T_{\max} (°C)	vapor pressure @ T_{\min} (mm Hg)	vapor pressure @ T_{\max} (mm Hg)	code	A	B	C
C ₂ H ₃ Cl	vinyl chloride	view synonyms	1975-01-04	62.498	-139	158.85	0.0075	42525	1,2	6.9142317886886	911.14980036289	239.80015614408

VCM Vapor Pressure (PSIA)



Equation Source: Yaws' Critical Property
Data for Chemical Engineers and Chemists
© 2012; 2013; 2014 Knovel. Table 12

Calculated VCM Vapor Pressure from Yaws' Data Set

Temperature (°F)	Temperature (°C)	VCM Vapor Pressure (mm Hg)	VCM Vapor Pressure (PSIA)	VCM Vapor Pressure (PSIG)
0	-17.78	646.20	12.50	-2.20
1	-17.22	661.62	12.79	-1.90
2	-16.67	677.33	13.10	-1.60
3	-16.11	693.34	13.41	-1.29
4	-15.56	709.64	13.72	-0.97
5	-15.00	726.23	14.04	-0.65
6	-14.44	743.14	14.37	-0.33
7	-13.89	760.35	14.70	0.01
8	-13.33	777.87	15.04	0.35
9	-12.78	795.70	15.39	0.69
10	-12.22	813.86	15.74	1.04
11	-11.67	832.34	16.09	1.40
12	-11.11	851.14	16.46	1.76
13	-10.56	870.28	16.83	2.13
14	-10.00	889.75	17.20	2.51
15	-9.44	909.55	17.59	2.89
16	-8.89	929.70	17.98	3.28
17	-8.33	950.20	18.37	3.68
18	-7.78	971.05	18.78	4.08
19	-7.22	992.25	19.19	4.49
20	-6.67	1013.81	19.60	4.91
21	-6.11	1035.73	20.03	5.33
22	-5.56	1058.02	20.46	5.76
23	-5.00	1080.68	20.90	6.20
24	-4.44	1103.72	21.34	6.65
25	-3.89	1127.13	21.80	7.10
26	-3.33	1150.93	22.26	7.56
27	-2.78	1175.12	22.72	8.03
28	-2.22	1199.69	23.20	8.50
29	-1.67	1224.67	23.68	8.99
30	-1.11	1250.04	24.17	9.48
31	-0.56	1275.81	24.67	9.97
32	0.00	1302.00	25.18	10.48
33	0.56	1328.60	25.69	10.99
34	1.11	1355.61	26.21	11.52
35	1.67	1383.05	26.74	12.05
36	2.22	1410.91	27.28	12.59
37	2.78	1439.20	27.83	13.13
38	3.33	1467.92	28.38	13.69
39	3.89	1497.08	28.95	14.25
40	4.44	1526.69	29.52	14.83
41	5.00	1556.74	30.10	15.41

Calculated VCM Vapor Pressure from Yaws' Data Set

Temperature (°F)	Temperature (°C)	VCM Vapor Pressure (mm Hg)	VCM Vapor Pressure (PSIA)	VCM Vapor Pressure (PSIG)
42	5.56	1587.25	30.69	16.00
43	6.11	1618.21	31.29	16.60
44	6.67	1649.63	31.90	17.20
45	7.22	1681.51	32.52	17.82
46	7.78	1713.87	33.14	18.44
47	8.33	1746.70	33.78	19.08
48	8.89	1780.00	34.42	19.72
49	9.44	1813.79	35.07	20.38
50	10.00	1848.06	35.74	21.04
51	10.56	1882.83	36.41	21.71
52	11.11	1918.09	37.09	22.39
53	11.67	1953.85	37.78	23.09
54	12.22	1990.12	38.48	23.79
55	12.78	2026.89	39.19	24.50
56	13.33	2064.18	39.91	25.22
57	13.89	2101.99	40.65	25.95
58	14.44	2140.32	41.39	26.69
59	15.00	2179.18	42.14	27.44
60	15.56	2218.57	42.90	28.20
61	16.11	2258.49	43.67	28.98
62	16.67	2298.96	44.45	29.76
63	17.22	2339.97	45.25	30.55
64	17.78	2381.53	46.05	31.36
65	18.33	2423.65	46.87	32.17
66	18.89	2466.32	47.69	32.99
67	19.44	2509.56	48.53	33.83
68	20.00	2553.37	49.37	34.68
69	20.56	2597.75	50.23	35.54
70	21.11	2642.71	51.10	36.41
71	21.67	2688.25	51.98	37.29
72	22.22	2734.37	52.87	38.18
73	22.78	2781.09	53.78	39.08
74	23.33	2828.40	54.69	40.00
75	23.89	2876.32	55.62	40.92
76	24.44	2924.84	56.56	41.86
77	25.00	2973.96	57.51	42.81
78	25.56	3023.71	58.47	43.77
79	26.11	3074.07	59.44	44.75
80	26.67	3125.05	60.43	45.73
81	27.22	3176.67	61.43	46.73
82	27.78	3228.91	62.44	47.74
83	28.33	3281.80	63.46	48.76

Calculated VCM Vapor Pressure from Yaws' Data Set

Temperature (°F)	Temperature (°C)	VCM Vapor Pressure (mm Hg)	VCM Vapor Pressure (PSIA)	VCM Vapor Pressure (PSIG)
84	28.89	3335.32	64.49	49.80
85	29.44	3389.49	65.54	50.85
86	30.00	3444.32	66.60	51.91
87	30.56	3499.80	67.68	52.98
88	31.11	3555.94	68.76	54.06
89	31.67	3612.74	69.86	55.16
90	32.22	3670.22	70.97	56.27
91	32.78	3728.37	72.09	57.40
92	33.33	3787.20	73.23	58.54
93	33.89	3846.71	74.38	59.69
94	34.44	3906.91	75.55	60.85
95	35.00	3967.80	76.72	62.03
96	35.56	4029.40	77.92	63.22
97	36.11	4091.69	79.12	64.42
98	36.67	4154.69	80.34	65.64
99	37.22	4218.40	81.57	66.87
100	37.78	4282.83	82.82	68.12
101	38.33	4347.98	84.08	69.38
102	38.89	4413.85	85.35	70.65
103	39.44	4480.46	86.64	71.94
104	40.00	4547.80	87.94	73.24
105	40.56	4615.88	89.26	74.56
106	41.11	4684.70	90.59	75.89
107	41.67	4754.27	91.93	77.24
108	42.22	4824.59	93.29	78.60
109	42.78	4895.67	94.67	79.97
110	43.33	4967.51	96.06	81.36
111	43.89	5040.12	97.46	82.76
112	44.44	5113.50	98.88	84.18
113	45.00	5187.66	100.31	85.62
114	45.56	5262.60	101.76	87.07
115	46.11	5338.32	103.23	88.53
116	46.67	5414.83	104.71	90.01
117	47.22	5492.14	106.20	91.50
118	47.78	5570.24	107.71	93.01
119	48.33	5649.15	109.24	94.54
120	48.89	5728.86	110.78	96.08
121	49.44	5809.39	112.34	97.64
122	50.00	5890.73	113.91	99.21
123	50.56	5972.90	115.50	100.80
124	51.11	6055.89	117.10	102.41
125	51.67	6139.71	118.72	104.03

Calculated VCM Vapor Pressure from Yaws' Data Set

Temperature (°F)	Temperature (°C)	VCM Vapor Pressure (mm Hg)	VCM Vapor Pressure (PSIA)	VCM Vapor Pressure (PSIG)
126	52.22	6224.36	120.36	105.66
127	52.78	6309.86	122.01	107.32
128	53.33	6396.19	123.68	108.99
129	53.89	6483.38	125.37	110.67
130	54.44	6571.42	127.07	112.37
131	55.00	6660.31	128.79	114.09
132	55.56	6750.07	130.53	115.83
133	56.11	6840.69	132.28	117.58
134	56.67	6932.18	134.05	119.35
135	57.22	7024.55	135.83	121.14
136	57.78	7117.80	137.64	122.94
137	58.33	7211.92	139.46	124.76
138	58.89	7306.94	141.29	126.60
139	59.44	7402.85	143.15	128.45
140	60.00	7499.65	145.02	130.32
141	60.56	7597.36	146.91	132.21
142	61.11	7695.97	148.82	134.12
143	61.67	7795.49	150.74	136.04
144	62.22	7895.93	152.68	137.99
145	62.78	7997.28	154.64	139.95
146	63.33	8099.55	156.62	141.92
147	63.89	8202.75	158.62	143.92
148	64.44	8306.88	160.63	145.93
149	65.00	8411.95	162.66	147.96
150	65.56	8517.96	164.71	150.01
151	66.11	8624.91	166.78	152.08
152	66.67	8732.80	168.86	154.17
153	67.22	8841.65	170.97	156.27
154	67.78	8951.46	173.09	158.40
155	68.33	9062.22	175.23	160.54
156	68.89	9173.95	177.40	162.70
157	69.44	9286.65	179.57	164.88
158	70.00	9400.33	181.77	167.08
159	70.56	9514.97	183.99	169.29
160	71.11	9630.60	186.23	171.53
161	71.67	9747.22	188.48	173.78
162	72.22	9864.82	190.75	176.06
163	72.78	9983.42	193.05	178.35
164	73.33	10103.02	195.36	180.66
165	73.89	10223.61	197.69	183.00
166	74.44	10345.21	200.04	185.35
167	75.00	10467.83	202.41	187.72

Calculated VCM Vapor Pressure from Yaws' Data Set

Temperature (°F)	Temperature (°C)	VCM Vapor Pressure (mm Hg)	VCM Vapor Pressure (PSIA)	VCM Vapor Pressure (PSIG)
168	75.56	10591.45	204.81	190.11
169	76.11	10716.09	207.22	192.52
170	76.67	10841.76	209.65	194.95
171	77.22	10968.45	212.10	197.40
172	77.78	11096.16	214.56	199.87
173	78.33	11224.92	217.05	202.36
174	78.89	11354.71	219.56	204.87
175	79.44	11485.54	222.09	207.40
176	80.00	11617.41	224.64	209.95
177	80.56	11750.34	227.21	212.52
178	81.11	11884.31	229.81	215.11
179	81.67	12019.35	232.42	217.72
180	82.22	12155.44	235.05	220.35
181	82.78	12292.60	237.70	223.00
182	83.33	12430.82	240.37	225.68
183	83.89	12570.12	243.07	228.37
184	84.44	12710.50	245.78	231.08
185	85.00	12851.95	248.52	233.82
186	85.56	12994.48	251.27	236.58
187	86.11	13138.11	254.05	239.35
188	86.67	13282.82	256.85	242.15
189	87.22	13428.63	259.67	244.97
190	87.78	13575.53	262.51	247.81
191	88.33	13723.54	265.37	250.67
192	88.89	13872.65	268.25	253.56
193	89.44	14022.87	271.16	256.46
194	90.00	14174.21	274.08	259.39
195	90.56	14326.65	277.03	262.34
196	91.11	14480.22	280.00	265.31
197	91.67	14634.91	282.99	268.30
198	92.22	14790.73	286.01	271.31
199	92.78	14947.68	289.04	274.34
200	93.33	15105.76	292.10	277.40