State of Louisiana

Department of Environmental Quality

BUDDY ROEMER
Governor

PAUL TEMPLET
Secretary

Mr. William Minish, Plant Manager
Vulcan Chemicals Company
Post Office Box 227
Geismar, Louisiana 70734

Dear Mr. Minish:

RE: Revision of Bubble Permit - Vulcan Chemicals Company, Geismar, Ascension Parish, Louisiana.

This is to inform you that the permit request for the above referenced facility has been approved under LAC 33:III.505. The submittal was approved on the basis of the emissions reported and the approval in no way guarantees the design scheme presented will be capable of controlling the emissions to the types and quantities stated. A revised application must be submitted if the reported emissions are exceeded after operation begins. The synopsis, data sheets and conditions are attached herewith.

It will be considered a violation of the permit if all proposed control measures and/or equipment are not installed and properly operated and maintained as specified in the application.

The permit number cited below should be referenced in future correspondence regarding this facility.

Done this 28th day of JULY, 1989.

Permit Number: 1829T (M-2)

Very truly yours,

Mike D. McDaniel

Mike D. McDaniel, Ph.D.
Assistant Secretary

MMcD/ATT/kdv

cc: Capital Regional Office

DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION
BRIEFING SHEET

VULCAN CHEMICALS COMPANY
GEISMAR, ASCENSION PARISH, LOUISIANA

I. BACKGROUND:

Vulcan Chemicals Company operates a synthetic organic chemical manufacturing facility at Geismar, Ascension Parish, Louisiana. The plant has hydrocarbon emission sources regulated under Sections 22.3, 22.4, 22.5, 22.8 and 22.10 of the Louisiana Air Quality Regulations, for the control of emissions of organic compounds. Ascension parish has been designated as a non-attainment area for ozone by the U.S. Environmental Protection Agency.

II. ORIGIN:

In March, 1981, the Air Quality Division sent hydrocarbon compliance schedule forms to applicable industries in the state. These were for the enhancement of efforts to attain the ozone standards in the state. Vulcan Chemicals submitted the compliance schedule on October 29, 1981.

Vulcan Chemicals Company was issued a permit (No. 1829T) on March 24, 1983 for its SIP revision. After several correspondences with the company and the Environmental Protection Agency, an Evaluation Report for Alternative Emission Control Plan was prepared and submitted to the EPA-Region 6 on October 31, 1983, which was revised and submitted back to EPA-Region 6 on June 27, 1984. The permit was revised and resubmitted in April 1987.

In response to the published notice of proposed approval in the Federal Register, Vol. 54, No. 105, Friday, June 2, 1989, the Air Quality Division has reviewed the permit to address comments therein contained.

III. DESCRIPTION:

Vulcan Chemicals Company has several sources regulated under Sections 22.3, 22.4, 22.5, 22.8 and 22.10 of the Louisiana Air Quality Regulations for the control of emissions of organic compounds. Storage tanks are regulated under Section 22.3 and the waste gas vents are regulated under Section 22.8 of the Louisiana Air Quality Regulations. The company controlled five (5) VOC storage tanks to a level beyond Reasonably Available Control Technology (RACT), in lieu of any controls on one tank (MeOH Storage Tank) and one process vent (HCl Emergency Vent).

According to Section 22.3.1.2 of the Louisiana Air Quality Regulations, the use of secondary seals on a tank with external floating roof is required only if the vapor pressure of the contained liquid is 4 psia or greater at storage conditions. If the tank is a welded tank, the primary seal may be a metallic shoe seal, or a liquid mounted foam seal. Thus, if the vapor pressure

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is less than 4 psia, single seals are allowable. Section 22.3.1.3 allows the use of vapor control systems that limit emissions to the same extent as Section 22.3.1.2. Based on the above mentioned information, Vulcan Chemicals Company is due an emission credit of 163.3 tons per year since the vapor recovery system installed for five (5) tanks reduced VOC emissions more effectively than external floating roofs with primary metallic shoe seals.

Source No. 3-73 (ST-25) is an uncontrolled storage tank with estimated emissions of 4.58 tons per year (TPY) of methanol. Source No. 11 (T-105), HCl Emergency Scrubber, is an uncontrolled vent with emissions of 113.8 TPY of chloromethane and ethylene dichloride (EDC). The HCl Emergency Vent contains a waste process stream that is mainly HCl with a small fraction of organics. The company estimates the cost of control of this vent to be over $250,000 (1983 dollars) and therefore wishes to find an alternative means of compliance. Uncontrolled sources are summarized as follows:

TABLE I

SOURCE	I.D.	EMISSIONS LBS/HR	EMISSIONS TPY
MeOH Storage Tank	3-73	1.05	4.58
HCl Emergency Vent	11	25.98	113.8

Emission credits claimed by the company resulted from the installation of a vapor recovery system on a tank farm in 1978. The present controlled and RACT level emissions as submitted by the Louisiana Air Quality Division to EPA are given in Table II.

TABLE II

SOURCE	I.D.	RACT EMISSIONS LBS/HR	RACT EMISSIONS TPY	CURRENT EMISSIONS LBS/HR	CURRENT EMISSIONS TPY	SURPLUS LBS/HR	SURPLUS TPY
CCl_4 Storage Tank	4C	15.34	67.16	3.09	13.52	12.26	53.64
EDC Storage Tank	3A	7.35	32.22	1.05	4.61	6.30	27.61
EDC Storage Tank	3B	7.58	33.22	1.06	4.64	6.52	28.58
EDC Storage Tank	3C	7.58	33.22	1.06	4.64	6.52	28.58
EDC Storage Tank	3D	8.11	35.48	2.43	10.63	5.68	24.85
	TOTAL	45.96	201.30	8.69	38.04	37.28	163.26

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The entire trade can be summarized as follows:

Sources	Actual	Allowable	Change
CCl_4 Storage Tank	13.52	67.16	-53.64
EDC Storage Tank	4.61	32.22	-27.61
EDC Storage Tank	4.64	33.22	-28.58
EDC Storage Tank	4.64	33.22	-28.58
EDC Storage Tank	10.63	35.48	-24.85
HCl Vent	113.8	0.0	113.8
MeOH Storage Tank	4.58	0.6	3.98
TOTAL	156.42	201.90	-45.48

	TPY
Credits from control of Tanks	163.26
Noncompliance Emissions	-117.78
10% Surcharge	- 11.78
Remaining Offset	33.70 TPY

No credit was given for controlling tank 2A (ST-17) since 1,1,1-trichloroethane is a recognized exempt compound, under Section 22.10. No credit was given for tank 8-73 (ST-22) since the vapor pressure is greater than 4.0 and secondary seals or vapor recovery would be required.

IV. TYPE OF REVIEW:

This permit was reviewed for compliance with State regulations and conformity with EPA Guidelines and Policies.

V. PUBLIC NOTICE:

No additional public notice is required for this revision. Public notice for the original permit (No. 1829) appeared in the Baton Rouge, New Orleans, Shreveport and Monroe newspapers. No public comments were received.

SPECIFIC CONDITIONS

VULCAN CHEMICALS COMPANY
GEISMAR, ASCENSION PARISH, LOUISIANA

1. The permittee shall maintain available on site for two years records of all input variables for the appropriate emission calculations found in EPA publication AP-42, Compilation of Air Pollutaion Emissions Factors, 3rd Edition, to indicate compliance with permitted emission limits. This data shall be maintained for the tanks, sources 3A(ST-4), 3B(ST-15), 3C(ST-16), 3D(ST-29), 4C(ST-18), and 3-73(ST-25); and the calculations shall be provided upon request by the Air Quality Division. Summary reports shall be submitted annually to the Air Quality Division.

2. The permittee shall not store material with vapor pressure more than 4.0 psia in the credited sources (Tanks) namely, 3A(ST-4), 3B(ST-15), 3C(ST-16), 3D(ST-29) and 4C(ST-18).

3. The attached calculation sheets, pages 9 of 17 through 17 of 17, are enforceable components of this permit.

4. The permittee shall demonstrate compliance with emission limits for the HCl scrubber vent by performing a stack test according to the requirements of 40 CFR 60, Appendix A, Method 18 - Measurement of Gaseous Organic Compound Emissions by Gas Chromatography, and Texas Air Control Board Modified Method 5, or other methods approved by the Air Quality Division.

5. The vapor control system is designed for over 88% efficiency when operated within the designed temperature range. The permittee shall maintain a temperature log of the tanks controlled by the system, sources 3A(ST-4), 3B(ST-15), 3C(ST-16), 3D(ST-29), and 4C(ST-18). The permittee shall test the performance of the vapor control system during loading operations according the requirements of 40 CFR 60, Appendix A, Method 18 -Measurement of Gaseous Organic Compound Emissions by Gas Chromatography or other methods approved by the Air Quality Division.

AIR QUALITY DATA SHEET
PAGE 1

VULCAN CHEMICALS COMPANY
GEISMAR, ASCENSION PARISH, LOUISIANA

Location of plant: 16 UTM: 694.4 Km E 3341.3 Km N

Description of location: On Ashland Road approximately 1 1/2 miles Southeast of Geismar, Ascension Parish, Louisiana.

Estimated starting date of construction: - Estimated date operation will begin: -

Type of Dispersion Calculations Used: N/A

EFFECTS ON AMBIENT AIR

Pollutant	Time Period	Calculated Maximum Ground Level Concentration	Louisiana Air Quality Standard

NEW ____ OR MODIFIED ____ EMISSION SOURCES Bubble Permit (Type of Source)

Stack I.D.#	Description	Operating Rate (Maximum)	Operating Schedule Hrs/Day	Days/Wk	Wks/Yr
3A	EDC Storage Tank (ST-4)	12,425,000 Gal/Yr	24	7	52
3B	EDC Storage Tank (ST-15)	12,425,000 Gal/Yr	24	7	52
3C	EDC Storage Tank (ST-16)	12,425,000 Gal/Yr	24	7	52
3D	EDC Storage Tank (ST-29)	33,468,000 Gal/Yr	24	7	52
4C	CCl_4 Storage Tank (ST-18)	25,021,000 Gal/Yr	24	7	52
3-73	MeOH Storage Tank (ST-25)	7,300,000 Gal/Yr	24	7	52
11	HCl Emergency Vent (T-105)	-	24	7	52

AIR QUALITY DATA SHEET - PAGE 2

Vulcan Chemicals Company (Company's Name) | Geismar (Nearest Town) | Ascension (Parish)

MAXIMUM/AVERAGE EMISSIONS ARE LISTED USING THE UNITS LBS/HR

STACK ID	PERMITTED EMISSIONS TSP	SO_2	NO_X	HC	CO	FEET HEIGHT	^oF TEMP.	CFM FLOW RATE
3A(ST-4)	-	-	-	1.05	-	0	Ambient	Variable
3B(ST-15)	-	-	-	1.06	-	0	Ambient	Variable
3C(ST-16)	-	-	-	1.05	-	0	Ambient	Variable
3D(ST-29)	-	-	-	2.43	-	0	Ambient	Variable
4C(ST-18)	-	-	-	3.09	-	0	Ambient	Variable
3-73(ST-25)	-	-	-	1.05	-	0	Ambient	Variable
11(T-29)	-	-	-	25.98	-	0	Ambient	Variable

AIR QUALITY DATA SHEET
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VULCAN CHEMICALS COMPANY
GEISMAR, ASCENSION PARISH, LOUISIANA

	TONS PER YEAR					
STACK I.D.	TSP	SO_2	NO_x	HC	CO	OTHER
3A(ST-4)	-	-	-	4.61	-	-
3B(ST-15)	-	-	-	4.64	-	-
3C(ST-16)	-	-	-	4.64	-	-
3D(ST-29)	-	-	-	10.63	-	-
4C(ST-18)	-	-	-	13.52	-	-
3-73(ST-25)	-	-	-	4.58	-	-
11(T-105)	-	-	-	113.8	-	-

Lacc# 3-73

process# ST-25 Methanol Feed Stg. Tank

Calculation Sheet for Fixed Roof Storage Tanks

Breathing Losses:

$$L_B = 2.26 \times 10^{-2} (M) \left(\frac{P}{14.7 - P}\right)^{0.68} (D)^{1.73} (H)^{0.51} (\Delta T)^{0.50} (F_P)(C)(K_c$$

L_B = Fixed Roof Breathing Loss (lbs./yr.)
M = Molecular Wt. of Vapor in Tank (lbs./lb.mole)
P = True Vapor pressure at Liquid Conditions (psia)
D = Tank Diameter (ft.)
H = Avg. Vapor Space Height (ft.)
ΔT = Avg. Ambient Diurnal Temp. Cha
F_P = Paint Factor
C = Adjustment Factor for Small Dia
K_c = Product Factor

$$L_B = (2.26 \times 10^{-2})(32.04) \left(\frac{1.818}{14.7 - 1.818}\right)^{0.68} (33)^{1.73} (12)^{0.51} (22.5)^{0.50} (1.1)(1.0)(1.0)$$

$$= \underline{1.50 \times 10^3 \ \frac{lbs.}{yr.}} = \underline{0.75 \ \frac{tons}{yr.}}$$

Working Losses:

$$L_W = 2.40 \times 10^{-2} (M)(P)(K_N)(K_c)$$

L_W = Fixed Roof Working Loss (lbs. / k gallons of throughput)
M = Mole. Wt. of Vapor in Tank (lbs./lb. mole)
P = True Vapor pressure at Liq. Conditions (psia)
K_N = Turnover Factor
K_c = Product Factor

Volume of Tank = 154 k gals.
Turnovers = 47

$$L_W = (2.40 \times 10^{-2})(32.04)(1.818)(0.77)(1.0)$$

$$= \underline{1.08 \ \frac{lbs.}{k \text{ gals thruput}}}$$

$$\left(\frac{1.08 \ lbs.}{1000 \text{ gals. thruput}}\right) \times (7{,}300{,}000 \text{ gals. thruput}) \times \frac{1 \text{ ton}}{2000 \text{ lbs.}} = 3.93 \text{ T}$$

Total Losses (T_L) = $L_B + L_W$ = $\underline{0.75 + 3.93 = 4.68 \ \frac{tons}{yr.}}$

LACC #: 11

PROCESS #: T-105 Acid Scrubber

Normal Operations

During normal Chloromethanes operation approximately 850 #/hr. of HCl is sent to T-105. This 850 #/hr. of HCl composes 97-98% of the total stream with the remainder being organics. Therefore a ratio produces

$$\frac{850\ \#/HCl}{x\ \#\ RCl's} = \frac{97.5\%}{2.5\%}$$

$$x = (21.8\ \#/hr.\ RCl's)\left[\frac{(24\ hrs/day)(365\ d}{2000\ \#/ton}\right.$$

$$= 95.5\ \frac{tons}{yr.}$$

Start up / Shut Down

During startup and shut down a flow of 1100 ACFM is sent to T-105. The composition is as follows:

MASS FLOW RATE = $(1100\ \frac{ft^3}{min})(0.579\ \frac{\#}{ft^3}) = 637\ \frac{\#}{min}$

Component	Mole Fraction	x 637 #/min =	Component Mass Flow, #/min
HCl	0.713		453.9
CH_3Cl	0.281		178.8
CH_2Cl_2	0.005		3.1
$CHCl_3$	0.002		1.0

TOTAL ORGANICS = 178.8 + 3.1 + 1.0 = 182.9 #/min

There are 5 startups and shutdowns assumed with a durati- of 20 minutes for each.

$(182.9\ \#/min)(20\ mins.)(10\ times)\left(\frac{ton}{2000\#}\right) = 18.3\ \frac{tons}{yr.}$

Totals

NORMAL OPERATIONS : 95.5 tons/yr

STARTUP / SHUTDOWN : 18.3 tons/yr.

113.8 tons/yr.

Vulcan Chemicals Bubble
Geismar, Ascension Parish, Louisiana

Tank 3A(ST-4) EDC Storage Tank

$L_B = 2.26 \times 10^{-2} M_V [P/(14.7-P)]^{0.68} D^{1.73} H^{0.51} T^{0.50} F_P C K_C$

$= 2.26 \times 10^{-2} (98.96)[2.02/(14.7-2.02)]^{0.68} (100)^{1.73} (8.5)^{0.51} (22.5)^{0.50} (1.1)(1.0)(1.0)$

$= 0.02 \times 98.96 \times 0.29 \times 2884.03 \times 2.98 \times 4.74 \times 1.1 \times 1.0 \times 1.0$

= 25,720.22 lb/yr

= 12.86 TPY

= 2.94 lb/hr

$L_W = (2.40 \times 10^{-2}) M_V P K_N K_C$

$= 0.02\ (98.96)(2.02)(1.0)(1.0)$

= 4.80 #/1000 gal @ 12,425,000 gal/yr throughput

= (4.80/1000) x (12,425,000/2000)

= 29.80 TPY

= 6.80 lb/hr

L_T = 12.86 + 29.80

= 42.66 TPY

Vapor Recovery System is 89.2% efficient

Actual Losses = 42.66 TPY(100-89.2)/100

= 4.61 TPY

= 1.05 lb/hr

Vulcan Chemicals Bubble
Geismar, Ascension Parish, Louisiana

Tank 3B (ST-15) and 3C(ST-16) EDC Storage Tanks

$L_B = 2.26 \times 10^{-2} M_V [P/(14.7-P)]^{0.68} D^{1.73} H^{0.51} T^{0.50} F_P C K_C$

$= 2.26 \times 10^{-2} (98.96) [2.02/(14.7 - 2.02)]^{0.68} (103)^{1.73} (8)^{0.51} (22.5)^{0.50} (1.1)(1.0)(1.0)$

$= 0.02 \times 98.96 \times 0.29 \times 3035.35 \times 2.89 \times 4.74 \times 1.1 \times 1.0 \times 1.0$

= 26,252.18 lb/yr

= 13.13 TPY

= 3.00 lb/hr.

$L_W = (2.40 \times 10^{-2}) M_V P K_N K_C$

$= 0.02 (98.96) (2.02) (1.0) (1.0)$

= 4.80 #/1000 gal @ 12,425,000 gal/yr. throughput

= (4.80/1000) x (12,425,000/2000)

= 29.80 TPY

= 6.80 lb/hr.

$L_{Total} = 13.13 + 29.80$

= 42.93 TPY

Vapor Recovery System is 89.2% efficient

Actual Losses = 42.93 TPY (100 - 89.2)/100

= 4.64 TPY

= 1.06 lb/hr.

Vulcan Chemicals Bubble
Geisnar, Ascension Parish, Louisiana

Tank 3D(ST-29) EDC Storage Tank

$L_B = 2.26 \times 10^{-2} M_V [P/(14.7-P)]^{0.68} D^{1.73} H^{0.51} T^{0.50} F_P C K_C$

$= 2.26 \times 10^{-2}(98.96)[2.02/(14.7-2.02)]^{0.68}(110)^{1.73}(12)^{0.51}(22.5)^{0.50}(1.1)(1.0)(1.0)$

$= 0.02 \times 98.96 \times 0.29 \times 3401.02 \times 3.55 \times 4.74 \times 1.1 \times 1.0 \times 1.0$

= 36,132.35 lb/yr

= 18.07 TPY

= 4.13 lb/hr

$L_W = (2.40 \times 10^{-2}) M_V P K_N K_C$

$= 0.02(98.96)(2.02)(1.0)(1.0)$

= 4.80 #/1000 gal @ 33,468,000 gal/yr throughput

= (4.80/1000) x (33,468,000/2000)

= 80.32 TPY

= 18.34 lb/hr

L_{Total} = 18.07 + 80.32

= 98.39 TPY

Vapor Recovery System is 89.2% efficient

Actual Losses = 98.39 TPY(100-89.2)/100

= 10.63 TPY

= 2.43 lb/hr

Vulcan Chemicals Bubble
Geisnar, Ascension Parish, Louisiana

Tank 4C(ST-18) CCl_4 Storage Tank

$L_B = 2.26 \times 10^{-2} M_v [P/(14.7-P)]^{0.68} D^{1.73} H^{0.51} T^{0.50} F_P C K_C$

$= 2.26 \times 10^{-2} (152.823) [2.59/(14.7 - 2.59)]^{0.68} (103)^{1.73} (8)^{0.51} (22.5)^{0.50} (1.1)(1.0)(1.0)$

$= 0.02 \times 152.823 \times 0.35 \times 3035.35 \times 2.89 \times 4.74 \times 1.1 \times 1.0 \times 1.0$

= 48,928.78 lb/yr

= 24.46 TPY

= 5.58 lb/hr.

$L_W = (2.40 \times 10^{-2}) M_v P K_N K_C$

$= 0.02 (153.823) (2.59) (1.0) (1.0)$

= 9.56 #/1000 gal @ 25,021,000 gal/yr. throughput

= (9.56/1000) x (25,021,000/2000)

= 119.62 TPY

= 27.31 lb/hr.

$L_{Total} = 24.46 + 119.62$

= 144.08 TPY

Vapor Recovery System is 88.7% efficient

Actual Losses = 119.62 TPY (100 - 88.7)/100

= 13.52 TPY

= 3.09 lb/hr.

RACT ALLOWABLE EMISSIONS FROM FIVE STORAGE TANKS

Vulcan Chemicals Bubble
Geismar, Ascension Parish, Louisiana

Based on RACT as storage in a floating roof tank with metallic shoe primary seal and no secondary seal.

Where:

L_S = Standing storage loss (lb/yr)
K_S = Seal factor (lb-mole/(ft(mi/hr)^{N}yr))
V = Average wind speed (mi/hr)
N = Wind speed exponent (dimensionless)
P^* = Vapor pressure function (dimensionless)
D = Tank diameter (ft)
M_V = Vapor molecular weight (lb/lb-mole)
K_C = Product factor (dimensionless)
E_F = Secondary seal factor (dimensionless)
L_W = Withdrawl loss (lb/yr)
Q = Average throughput (bbl/yr)
C = Shell clingage factor (bbl/1000ft^2)
W_L = Average organic liquid density (lb/gal)

Tank 3A(ST-4) EDC Storage Tank

$L_S = K_S V^N p^* D M_V K_C E_F$

$= (1.2)(6)^{1.5}(0.0369)(100)(98.96)(10.0)(1.0)$

$= 64,401.2$ lb/yr

$= 32.20$ TPY

$L_W = (0.943)(Q)(C)(W_1)/(D)$

$= (0.943)(295,833.3)(0.0015)(10.5)/100$

$= 43.94$ lb/yr $= 0.02$ TPY

$L_{Total} = 32.20 + 0.02 = 32.22$ TPY

Bank = 32.2 - 4.61 = 27.61 TPY