

VCM DISCHARGE CALCULATION

CONFIDENTIAL

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The quantity of VCM discharged to the atmosphere equals the quantity of VCM "charged" to 744 reactor minus the quantity of VCM recovered from 744 reactor and the chem wash return line after the discharge.

VCM "Charged" To 744 Reactor

When the discharge was stopped, a total of 910 gallons had been charged from the fresh VCM receiver. The temperature of the VCM was 95°F.

$$\text{VCM "charged"} = 910 \text{ gals.} \times \frac{7.42 \text{ lb VCM}}{\text{gal}} = 6,752 \text{ lbs VCM}$$

VCM Recovered From 744 Reactor

744 Reactor was recovered to the process after the discharge. The temperature and pressure in 744 reactor were 122°F and 57 psig according to the control panel strip chart recorders, therefore it can be assumed that the reactor contained only VCM vapor. The volume of 744 reactor is 22,000 gallons, however the reactor contained 1,000 gallons of charge water and colloid.

$$\text{lbs VCM in 744 Reactor} = \frac{PVM}{RT}$$

$$P = 57 + 14.7 = 71.7 \text{ psia}$$

$$V = 22,000 \text{ gals} - 1,000 \text{ gals} = 21,000 \text{ gals} \\ = 2,807 \text{ ft}^3$$

$$M = 62.5 \frac{\text{lb VCM}}{\text{lb mole VCM}}$$

$$R = 10.73 \frac{\text{psia} \cdot \text{ft}^3}{^\circ\text{R} \cdot \text{lb mole}}$$

$$T = 122 + 460 = 582 \text{ }^\circ\text{R}$$

$$\begin{aligned} \text{lbs VCM in 744 Reactor} &= \frac{71.7 \times 2,807 \times 62.5}{10.73 \times 582} \\ &= 2,015 \text{ lbs VCM} \end{aligned}$$

VCM Recovered From The Chem Wash Return Line

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The chem wash return line and the 744 reactor charge manifold were recovered to the process after the discharge. These lines would have contained liquid VCM. The chem wash return line has approximately 170 feet of 6 inch piping, and the 744 reactor charge manifold has approximately 15 feet of 8 inch piping.

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$$\begin{aligned}\text{Volume of piping} &= \left(6 \text{ in.} \times \frac{1 \text{ ft.}}{12 \text{ in.}}\right)^2 \times \frac{3.14}{4} \times 170 \text{ ft.} \\ &+ \left(8 \text{ in.} \times \frac{1 \text{ ft.}}{12 \text{ in.}}\right)^2 \times \frac{3.14}{4} \times 15 \text{ ft.} \\ &= 38.6 \text{ ft}^3 \\ &= 289 \text{ gal}\end{aligned}$$

$$\text{VCM Recovered} = 289 \text{ gal} \times \frac{7.42 \text{ lb VCM}}{\text{gal}}$$

$$= 2,145 \text{ lbs VCM}$$

VCM Discharged To The Atmosphere

$$\begin{aligned}\text{VCM Discharged} &= 6,752 \text{ lbs} - 2,015 \text{ lbs} - 2,145 \text{ lbs} \\ &= 2,592 \text{ lbs VCM}\end{aligned}$$

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