

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT ENGINEERING AND COMPLIANCE DIVISION PERMIT APPLICATION EVALUATION AND CALCULATIONS	PAGES 5	PAGE 1
	APPL NO 512830R, 512831R	DATE 1/19/2011
	PROCESSED BY GCR	CHECKED BY

PERMIT TO OPERATE EVALUATION

APPLICANT'S NAME: ORANGE COUNTY SANITATION DISTRICT (OCSD)

MAILING ADDRESS: 10844 ELLIS AVENUE
FOUNTAIN VALLEY, CA 92708-7018
ATTN.: TERRY AHN, REGULATORY SPECIALIST

EQUIPMENT ADDRESS: SAME AS ABOVE (PLANT NO. 1)

FACILITY ID.: 017301

APPLICATION NO.512830:

EQUIPMENT DESCRIPTION:

STORAGE TANK, FIXED ROOF, ID NO. 10ITNK037 (P1 HEADWORKS), HYDROCHLORIC ACID, 12' - 0" DIA. X 10' - 0" H., 8,000-GALLON CAPACITY AND VENTING THROUGH A 55-GALLON DRUM CONTAINING (50% SULPHASORB XL AND 50% SAFETYSORB BLEND OR EQUAL) ACTIVATED CARBON.

APPLICATION NO. 512831:

EQUIPMENT DESCRIPTION:

STORAGE TANK, FIXED ROOF, ID NO. 11ITNK100 (P1 PRIMARY), HYDROCHLORIC ACID, 6' - 0" DIA. X 11' - 0" H., 2,000-GALLON CAPACITY AND VENTING THROUGH A 55-GALLON DRUM CONTAINING (50% SULPHASORB XL AND 50% SAFETYSORB BLEND OR EQUAL) ACTIVATED CARBON.

CONDITIONS: (512830 / 512831)

1. OPERATION OF THIS EQUIPMENT SHALL BE CONDUCTED IN COMPLIANCE WITH ALL DATA AND SPECIFICATIONS SUBMITTED WITH THE APPLICATION UNDER WHICH THIS PERMIT IS ISSUED UNLESS OTHERWISE NOTED BELOW.
[RULE 204]
2. THIS EQUIPMENT SHALL BE PROPERLY MAINTAINED AND KEPT IN GOOD OPERATING CONDITION AT ALL TIMES.
[RULE 204]
3. THIS EQUIPMENT SHALL STORE HYDROCHLORIC ACID WITH CONCENTRATION OF 38 WEIGHT PERCENT OR LESS ONLY.
[RULE 204]
4. THE MAXIMUM AMOUNT OF HYDROCHLORIC ACID FILLED INTO THIS STORAGE TANK SHALL NOT EXCEED 2000 GALLONS PER MONTH.
[RULE 1303 (b) (1) - OFFSET]

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5. THIS EQUIPMENT SHALL NOT BE FILLED UNLESS THE VENT GASES PASS THROUGH A 55-GALLON DRUM CONTAINING ACTIVATED CARBON.
[RULE 1303 (a) (1)-BACT]
6. THE OPERATOR SHALL REPLACE THE CARBON PER MANUFACTURER'S RECOMMENDATION.
[RULE 204]
7. RECORDS REQUIRED BY THIS PERMIT SHALL BE KEPT AND MAINTAINED FOR AT LEAST FIVE YEARS AND MADE AVAILABLE TO AQMD PERSONNEL UPON REQUEST.
[RULE 204]

BACKGROUND:

On 7/22/2010, Orange County Sanitation District (OCSD) submitted above applications for permits to operate the existing HCl-acid storage tanks, at their Plant 1, for the headworks (512830) and primary treatment process (512831). These applications were submitted under the provision of Rule 310 (Amnesty for unpermitted equipment) and, hence, not subject to higher fees for PO no PC.

This is a Title V facility. A/N 514393 is also filed for the TV Revision. Most recent administrative revision to the Title V facility permit was issued August 27, 2010 (Section D, Rev 02).

PROCESS DESCRIPTION:

The existing headworks and primary treatment processes consist of chemical scrubbers where recirculating scrubbing liquid trickles down through the packed bed and contacts the foul air which is passed up through the bed to remove odors. NaOH and NaOCl solutions used for the scrubber and HCl is used for periodic cleaning of the packed bed to remove hardwater deposits and chemical buildup.

EMISSIONS:

A/N 512830: (8000 gal. Tank)

Working loss:

Acid filling rate: 2000 gallon truck delivery, pumped at @ 50 gpm, 3 times a year (40 minutes/event)
Annual throughput = 10,400 gal (permit condition) per OCSD 10/14/2010 E-mail.

$$\begin{aligned}
 L_w &= (F)(1 \text{ cft}/7.48 \text{ gal})(1 \text{ lb-mole}/380 \text{ cf})(M_v)(P/14.7 \text{ psia}) \\
 &= 2.4 \times 10^{-5} \times F \times P \times M_v \\
 &= 2.4 \text{ E-}05 \times 2000 \times 2.90 \times 36.5
 \end{aligned}$$

$$\begin{aligned}
 L_w &= \mathbf{5.08 \text{ lbs HCl /day}} \text{ (with no vapor return line to truck and vapor venting to passive C-drum)} \\
 &= 5.08 \text{ lbs/mo.}
 \end{aligned}$$

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L_w = working loss (lb/day)
 F = filling rate (gal/day), 2000 gal/day (40 min filling time, once every 4-month)
 P = true vapor pressure (psia)
 = 150 mm Hg @ 20 deg C, **max. 37.14% HCl** (23⁰ Be)
 = 2.90 psia
 M_v = molecular weight of vapor (lb/lb-mole) = 36.5

Breathing loss:

$$L_B = (V_o)(\Delta T/T_{avg})(1/v) (P/14.7) (M_v)$$

L_B = breathing loss (lb/day)

V_o = volume of vapor above liquid surface (cf)
 = 50% of max tank vol of 1130 cf = **565 cf**

ΔT = average daily temperature change (deg R or F) = **25 deg R**

T_{avg} = average daily temperature (deg R) = 65 + 460 = **525 deg R**

$(V_o)(\Delta T/T_{avg})$ = Vol of vapor expelled from the tank due to avg. temp. change (cft)

P = true vapor pressure (Psia) = **2.90 psia @ 20 deg C**

$$\begin{aligned}
 V &= 10.73(FT^3 \text{ Psia/ lbmole } ^\circ R) T_{AV} (^\circ R) (1/14.7 \text{ psia}) \\
 &= (10.73) (525)/14.7 \\
 &= 383.21
 \end{aligned}$$

$$(1/v) = 1/383.21 = \mathbf{0.0026}$$

M_v = molecular weight of vapor (lb/lb-mole) = **36.5**

$$\begin{aligned}
 L_B &= (565) (25/525) (0.0026) (2.90/14.7) (36.5) \\
 &= \mathbf{0.50 \text{ lbs/day}} \\
 &= 0.50 \times 30 = 15 \text{ lbs/mo}
 \end{aligned}$$

Total uncontrolled HCl emission = 5.1 + 15.0 = 20.1 lbs/mo = 0.67 lbs/day = 0.028 lbs/hr

At 99% control efficiency* for Carbon per OCSD E-mail information, Oct. 15, 2010),
 = 5.60 x (1.0 - 0.99)

Controlled emission = 0.096 lb/mo = 0.0032 lb/day = 0.0001 lb/hr

No offset required.

A/N 512831: (2000 gal. Tank)

The emissions can be assessed using the following equations:

Working loss:

Acid filling rate: 2000 gallon truck delivery, pumped at @ 50 gpm, 3 times a year (40 minutes/event)
 Annual throughput = 7,800 gal (permit condition) per OCSD 10/14/2010 E-mail.

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$$L_W = (F)(1 \text{ cft}/7.48 \text{ gal})(1 \text{ lb-mole}/380 \text{ cf})(M_V)(P/14.7 \text{ psia})$$

$$= 2.4 \times 10^{-5} \times F \times P \times M_V$$

$$= 2.4 \text{ E-}05 \times 2000 \times 2.90 \times 36.5$$

$$L_W = \mathbf{5.08 \text{ lbs HCl/day}}$$
 (with no vapor return line to truck and vapor venting to passive C-drum)
$$= 5.08 \text{ lb/mo.}$$

L_W = working loss (lb/day)

F = filling rate (gal/day), 2000 gal/day (40 min filling time, once every 4-month)

P = true vapor pressure (psia)

$$= 150 \text{ mm Hg @ } 20 \text{ deg C, max. } \mathbf{37.14\% \text{ HCl (23}^0 \text{ Be)}}$$

$$= 2.90 \text{ psia}$$

M_V = molecular weight of vapor (lb/lb-mole) = 36.5

Breathing loss:

$$L_B = (V_O)(\Delta T/T_{avg})(1/v) (P/14.7) (M_V)$$

L_B = breathing loss (lb/day)

V_O = volume of vapor above liquid surface (cf)
= 50% of max tank vol of 311 cf = **155 cf**

ΔT = average daily temperature change (deg R or F) = **25 deg R**

T_{avg} = average daily temperature (deg R) = 65 + 460 = **525 deg R**

$(V_O)(\Delta T/T_{avg})$ = Vol of vapor expelled from the tank due to avg. temp. change (cft)

P = true vapor pressure (Psia) = **2.90 psia @ 20 deg C**

$$V = 10.73 (FT^3 \text{ Psia}/ \text{lbmole } ^\circ R) T_{AV} (^\circ R) (1/14.7 \text{ psia})$$

$$= (10.73) (525)/14.7$$

$$= 383.21$$

$$(1/v) = 1/383.21 = \mathbf{0.0026}$$

M_V = molecular weight of vapor (lb/lb-mole) = **36.5**

$$L_B = (155) (25/525) (0.0026) (2.90/14.7) (36.5)$$

$$= \mathbf{0.14 \text{ lbs/day}}$$

$$= 0.14 \times 30 = 4.2 \text{ lbs/mo.}$$

Total uncontrolled HCl emission = 5.1 + 4.2 = 9.3 lbs/mo = 0.31 lb/day = 0.013 lb/hr

At 99% control efficiency for Carbon (per OCSD E-mail information, Oct. 15, 2010),
= 5.24 x (1.0 - 0.99)

Controlled emission = 0.093 lb/mo = 0.0031 lb/day = 0.0001 lb/hr

No offset required.

RULES EVALUATION:

Rule 212:

There are no schools within 1/4 mile of the emission source.

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HCl is non-carcinogenic- no risk. No public notice required. Compliance is expected.

Rule 401 (Visible Emissions):

With proper operation, maintenance and control of equipment compliance is expected.

Rule 402 (Nuisance):

With proper operation, maintenance and control of equipment compliance is expected.

Regulation XIII:

Whenever tank is filled and breathing, displaced vapors will be venting through the granular carbon media with assumed control efficiency of 99%.

No modeling or offsets is required. Compliance is expected.

Rule 1401:

HCl is not carcinogenic, no health risk.

Controlled HCl emission is less than chronic (298 lbs/yr) and acute (1.05 bs/hr), worst-case at 25 meters receptor, Screening Emission Levels listed under Table-1A. No further HIC/HIA evaluation is required. Compliance is expected.

Rule 1401.1:

Not applicable as this is an existing facility.

REG. XXX:

Compliance is expected. Title V revision A/N 514393 is filed to include these two permits (A/Ns 512830 & 512831).

Recommendations:

A permit to operate is recommended, for each of the above application, with proposed conditions listed on Pgs. 1-2.

Upon approval of these permits, it should be included under TV Revision (03), Section D.