

# Texas Commission on Environmental Quality

## INTEROFFICE MEMORANDUM

**To:** Tony Ionescu  
Air Permits Division  
Office of Air

**From:** Darrell McCant, MPH *DM*  
Rio Schondelmeyer, B.S. *RS*  
Toxicology Division  
Office of the Executive Director

**Subject:** Health effects review of emissions from **Valero Refining-Texas, L.P.**, Houston, Harris County, TX (Permit No. 2501A and Tox Control No. 7385)

Date: July 21, 2017

At your request, we conducted a health effects review of air emissions from Valero Refining-Texas, L.P. The project is an amendment to the Houston refining facility to authorize existing emissions of hydrogen cyanide from a fluid-catalytic cracking unit (FCCU), which utilizes a wet gas scrubber as a control device. The goal of the following health effects review is to evaluate the modeled emissions predicted to occur at this facility and whether these emissions would be of concern to human health and welfare (odor and vegetation).

The Valero Refining facility is located in an area surrounded by industry to the west, northwest, east, and southeast and some non-industry receptors (i.e., a church, residences) within 3,000 feet of the site. Site-wide air dispersion modeling (Screen3) was used to predict impacts for hydrogen cyanide emissions. The model identifies that the maximum off-property ground level chemical concentration ( $GLC_{max}$ ) will occur 2,521 feet from the property line in either an industrial area (west, northwest, north, east, and southeast of the property line) or at a church (southwest of the property line). The model also identifies that the maximally affected non-industrial receptor ground level concentration ( $GLC_{ni}$ ) for this constituent will occur 2,521 feet southwest of the property line at a church. The Toxicology Division conservatively review the predicted  $GLC_{max}$  as the maximally affected non-industrial receptor ground level concentration ( $GLC_{ni}$ ). The predicted concentrations were compared to hydrogen cyanide's health-based short- and long-term Effects Screening Levels (ESLs).

The modeled  $GLC_{max}/GLC_{ni}$  for hydrogen cyanide will exceed the short-term, health-based ESL of  $20 \mu\text{g}/\text{m}^3$  by 3 times. According to modeled impacts,  $GLC_{ni}$  for hydrogen cyanide will also exceed the long-term, health-based ESL ( $2 \mu\text{g}/\text{m}^3$ ) by 2.4 times. Given the conservatism of the screen modeling, the conservatism in the ESLs, and the fact that the hydrogen cyanide emissions are existing, the impacts for hydrogen cyanide are allowable.

In conclusion, we do not anticipate any short- or long-term adverse health effects to occur among the general public as a result of exposure to the proposed emissions from this facility. If you have further questions, please contact Darrell McCant at the following phone number 512-239-4477 or e-mail address [darrell.mccant@tceq.texas.gov](mailto:darrell.mccant@tceq.texas.gov).

## Request for Comments – TCEQ Toxicology Division

Date Submitted	June 29, 2017	RUSH?	No
Toxicology Control No.			
Company Name	Valero Refining-Texas, L.P.		
Physical Location	9701 Manchester St		
City	Houston		
Facility Type	Houston Refinery		
Location of ARC Reader Files			
County	Harris		
Customer No. (CN)	CN600127468	Permit No.	2501A
Regulated Entity No. (RN)	RN100219310	Project Number	205855
Account No.	HG-0130-C	Permit Review Type	AMEND
% New Hourly and Annual emissions	100	Permit Reviewer	Tony Ionescu, P.E., Technical Specialist
Air Pollutant Watch List Area	APWL1206 (Delisted in 2017)	Watch List Pollutants Involved	Benzene

**Project Overview – Describe the changes at the facility or process associated with this permit action. This should include whether or not this is a new site, addition of new equipment at an existing site, a change in throughput, a relocation of emission points or a change in the products used in or produced by the equipment or process associated with the project.**

Valero Refining which operates the Houston Refinery has submitted an amendment to permit 2501A to authorize emissions of hydrogen cyanide (HCN) from the FCCU.

**Emission Calculation Approach – Describe the emission calculation approach used (emission factors, material balance etc.) and the level(s) of conservatism in the approach.**

The estimated emissions are based on a limited amount of stack test data available from FCCUs of other similar Valero refineries.

**Emission Controls – Describe the process and/or add-on emission controls used to limit emission rates. Include the sources controlled and capture and control efficiency for add-on emission controls.**

The FCCU at Valero's Houston Refinery utilizes a wet gas scrubber to reduce PM emissions from the flue gas.

**Surrounding Land Use – Describe the surrounding land use and any zoning restrictions and provide an area map.**

See attached map. The approximate location of the FCCU stack is marked by the X at the center of the circle on the attached map. Utilizing aerial photographs of the refinery, the area to the west, northwest, north, east, and southeast appears to be occupied by primarily industrial facilities out to a distance of 3000 feet from the FCCU stack. The arc stretching from south of the FCCU stack to south by southwest appears to be a number of housing developments that are located in an area 1200 to 3000 feet from the FCCU stack.

Link to Google map of area: <https://www.google.com/maps/@29.7166126,-95.2601817,690a,35y,39.31t/data=!3m1!1e3>

**Type of Model Used in the Impacts Analysis -**

**SCREEN3**

**Sources Included in the Impacts Analysis – Indicate if this is site wide modeling. If not, indicate which sources emitting the constituent under review were not included.**

The FCCU stack is the only source of HCN that is known to be present at the site. Based on that fact, the modeling performed is considered site wide.

**Modeling Approach - Discuss the modeling approach used and include the characterization of the sources (point, pseudo point, area, volume, flare etc.) and how this affects the level of conservatism of the model. Indicate if refined runs at actual emission rates were used or if ratioing and summation techniques were used.**

The FCCU stack was modeled as an elevated point source on Screen 3.

**Facility Operating Limitations - Limitations to be included in the permit that affect impacts - throughput, hours of operation etc.**

The FCCU is designed to operate continuously or on a 24/7 basis. Over the past few years, FCCUs have been determined to be a source of HCN. At the EPA's direction stack testing and the addition of HCN to permits has been taking place. The purpose of this amendment is to authorize the estimated emissions from the FCCU at Valero's Houston Refinery.

**Location of Maximum Impacts -**

Receptors	Distance from Property line (ft)	Receptor Type
GLC <sub>MAX</sub> 60 µg/m <sup>3</sup>	2,521	Industrial Development
GLC <sub>ni</sub> 60 µg/m <sup>3</sup>	2,521	Church
Other - Specify		

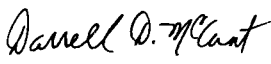

**Additional Comments – Include modifications made to improve off property impacts if necessary.**

The predicted exceedance of the ESL for HCN (20 µg/m<sup>3</sup>) occurs at a distance of 1,476 feet from the property line. The concentration is predicted to increase up to 60 µg/m<sup>3</sup> at 2,500 feet gradually being reduced to less than 20 µg/m<sup>3</sup> at a distance of 22,665 feet. It should be emphasized that these predicted impacts are based on a guess of what the actual emissions are, using data from other FCCU stacks. In any case the actual emissions and impacts at this facility are existing and will continue until testing is performed and additional controls are added as necessary. This amendment will require stack testing of the FCCU stack for HCN, a more detailed modeling analysis, and if necessary additional controls to reduce impacts to acceptable levels.

## IMPACTS SUMMARY

CAS NO.	Constituent	Short Term Impacts Analysis					Annual Impacts Analysis		
		ESL	GLC <sub>MAX</sub>	2* $\lambda$ <sub>MAX</sub>	GLC <sub>ni</sub>	$\lambda$ <sub>ni</sub>	ESL	GLC <sub>MAX</sub>	GLC <sub>ni</sub>
74-90-8	HCN – Hydrogen Cyanide	20	60	N/A*	60	N/A*	2	4.8	4.8
	* Predicted Impacts determined w/Screen3 therefore no frequency analysis is possible								

- If the ESL is not available, contact the Toxicology Division for assistance. Include a CAS No. on the form even if an ESL is not available as of the date of the request for comments.
- The term *nonindustrial* or the letters *ni* are used to identify any receptor on nonindustrial property or land not zoned as industrial. A receptor on the property line is considered to be the same type of receptor as the nearest receptor off property. For example, if the land adjacent to an industrial property line is unzoned, then a receptor on the property line would be identified as nonindustrial.
- ESL - effects screening level in  $\mu\text{g}/\text{m}^3$ .
- GLC<sub>MAX</sub> - Maximum off-property ground-level concentration in  $\mu\text{g}/\text{m}^3$ .
- 2\* $\lambda$ <sub>MAX</sub> - (same value as 2xGLC<sub>MAX</sub> as stated by Air Dispersion Modeling Team) number of hours per year that the GLC<sub>MAX</sub> exceeds two times the ESL at an industrial receptor, other 1\* $\lambda$ <sub>MAX</sub> should apply if GLC<sub>MAX</sub> is at a non-industrial receptor.
- GLC<sub>ni</sub> - ground-level concentration in  $\mu\text{g}/\text{m}^3$  at maximally affected nonindustrial receptor. Supply this information only if the GLC<sub>MAX</sub> is greater than the ESL and is at an industrial receptor.
- $\lambda$ <sub>ni</sub> - (same value as 1xGLC<sub>ni</sub> as stated by Air Dispersion Modeling Team) number of times the ESL is exceeded (hours/year) at GLC<sub>ni</sub>.
- New emissions refers to the fraction of emissions in the modeling that are not currently (prior to the modification) emitted from the site. A new site (greenfield) would have 100 percent while a unit with no modifications would have zero percent.

<b>Toxicology Division Comments:</b>  	<b>Toxicology Division Approval</b> (signature and date required)   July 21, 2017
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