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VIA E-MAIL: pfine@aqmd.gov

August 23, 2017

Philip Fine, Ph.D
Deputy Executive Officer
Planning and Rules
South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765

Re: **Comments on South Coast Air Quality Management District's August 18, 2017 Presentation for the Proposed Rule 1410 Fifth Working Group Meeting**

Dear Dr. Fine,

Torrance Refining Company LLC ("TORC") is once again very disappointed and concerned with the release of the August 18, 2017 South Coast Air Quality Management District's (the "District") presentation for the fifth Working Group meeting on August 23, 2017 related to Proposed Rule 1410, Hydrogen Fluoride Storage and Use at Petroleum Refineries ("PR 1410"), which only impacts two of the five Southern California refineries – TORC's Torrance Refinery and Valero's Wilmington Refinery. Unfortunately, this presentation repeats the premature conclusion put forth in the District's July 28th presentation, which was originally intended to be presented at the fourth Working Group meeting on August 2nd, by again including a PR 1410 conceptual framework that includes a phase-out of modified Hydrofluoric Acid ("MHF") as an alkylation technology in the South Coast Air Basin.

This is especially disappointing considering that TORC met with District staff on August 17th, the day before the release of the August 18th presentation, and provided District staff with requested additional and supplementing MHF testing and modeling data and analyses that further supports and substantiates the efficacy of MHF[1]. This meeting was part of an ongoing dialogue that has occurred over several months wherein TORC has been meeting and working collaboratively with District staff to provide them, with the consent of the licensor of the technology, UOP, voluminous testing results, technical analyses, and modeling data related to MHF to support the efficacy of the technology -- a technology that has been permitted by the District and used safely for 20 years at the Torrance Refinery without any offsite release.

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[1] Slide 4 of the District's August 18th presentation acknowledges this:

- Subsequent meeting was held on August 17, 2017 to discuss more supplemental information
  - TORC provided rainout model data points used to create the Airborne Reduction Factor ("ARF") correlation, all testing data with associated operating parameters including measured and predicted HF rainout

At the August 17th meeting, District staff for the first time presented an analysis of some of the MHF testing and modeling data received to date[2]. However, staff's analysis was clearly inaccurate as it was based on incorrect Torrance Refinery MHF Alkylation Unit operating conditions, failed to account for testing data being hydrocarbon-free, and most importantly, showed that District staff has yet to fully understand that the higher unit operating pressure relative to the tested data points decreases the propensity for flash atomization. In response, TORC is going to provide the District with further clarifying information to assist District staff in their analysis and correct their inaccurate assumptions[3]. TORC believes that if District staff considers this clarifying information, they will change the outcome of their analysis and validate the efficacy of MHF at the range of operating conditions for the Torrance Refinery MHF Alkylation Unit.

However, before going back and evaluating this additional clarifying information and gaining a complete understanding of the MHF technology, District staff stated at the August 17th meeting that they still intended to "move forward with a phase-out of MHF" as part of its PR 1410 conceptual rulemaking framework. How can the District staff reach a conclusion to phase-out MHF when they have not completed the review of the extensive and voluminous MHF testing, analyses, and modeling data provided by TORC and they have not completed the statutorily required California Environmental Quality Act ("CEQA") and Socioeconomic analysis for the rulemaking? Based on sound science and technology? The answer is -- "the District cannot."

To conclude otherwise at this point in the PR 1410 rulemaking process, would contradict the recommendation of an independent Court-appointed Safety Advisor and the decision of a well-respected and experienced Los Angeles Superior Court Judge who in 1995 under the City of Torrance Consent Decree approved the use of the MHF technology at the Torrance Refinery, finding it as safe as or safer than Sulfuric Acid for a similarly sized alkylation unit. This decision was reached after approximately a two-year review of voluminous MHF testing results, technical analyses, and modeling data.

Additionally, this would contradict the District's previous, publicly-stated position on this technology. For example, in 2003, the District issued a press release announcing an "enforceable agreement" with Valero to replace the Wilmington Refinery's use of HF with MHF by 2006.

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[2] TORC suspects that the District's analysis was done in only a few days based on the supplemental MHF testing and modeling data submitted by TORC to the District on August 11th. This MHF testing and modeling data was requested by the District at a June 28th meeting and before TORC could provide this information the District released its July 28th presentation for the August 2nd PR 1410 fourth Working Group meeting prematurely including a phase-out of MHF. On August 2nd, TORC submitted a letter (dated August 1st) that provided extensive comments regarding the premature nature of the inclusion of a MHF phase-out in the District's PR 1410 conceptual framework, which all have yet to be responded to.

[3] Slide 4 of the District's August 18th presentation acknowledges this by stating that "TORC to provide additional new information that staff will evaluate". In slide 6, the District further indicates that "District staff will continue to evaluate information provided to assist in formulating the rule proposal".

In the press release, the District states:

> "Once this refinery stops using concentrated hydrogen fluoride, we will have virtually eliminated the potential for a catastrophic accidental release of this compound in our region," said Barry Wallerstein, executive officer of the South Coast Air Quality Management District."
>
> "The agreement fulfils one of the 23 Environmental Justice goals adopted by AQMD's Governing Board last fall."
>
> "Switching to modified HF will minimize the possibility of a catastrophic accidental release not only at the refinery, but along Southland transportation corridors, as the additive is added to the chemical before shipping."

See Highly Toxic Chemical to be Phased Out at Valero Refinery: SCAQMD, Feb. 7, 2003.

The District issued permits to the Torrance Refinery in 1997 and Valero Wilmington Refinery in 2004, after performing statutorily required California Environmental Quality Act ("CEQA") analyses for the MHF technology. The MHF technology is the same as when the District originally permitted the Torrance MHF Alkylation Unit 20 years ago.

Neither of the MHF Alkylation technologies employed by TORC at its Torrance Refinery, nor, to TORC's knowledge, those employed by Valero at its Wilmington Refinery, have changed since the District approved these permits. The MHF technology is the same as when it was originally permitted 20 years ago. However, the safety systems, training, and knowledge of the MHF Alkylation process and equipment have improved related to MHF alkylation, which has been the case at the Torrance Refinery.

Therefore, the Torrance Refinery MHF Alkylation Unit is even safer than when the District permitted it 20 years ago. In fact, Torrance used hydrofluoric acid ("HF") in the Alkylation Unit without any HF offsite release since it was commissioned in 1966 through1997. In 1997, the Refinery began using MHF to comply with the City of Torrance Consent Decree, and the MHF Alkylation Unit has been operating since then without any MHF offsite impact.

Accordingly, with these facts and voluminous information in hand and technical analysis yet to be completed, the District's decision to change its position, defies science, technology, and logic, especially when TORC is still in the process of providing clarifying information related to MHF testing and modeling data specific to Torrance Refinery's MHF Alkylation Unit operating conditions.

While the Torrance and Wilmington refineries have operated HF/MHF Alkylation units with District permits for decades combined, there are also many other companies and laboratories that utilize conventional hydrofluoric acid ("HF") for manufacturing and research within the District, and throughout the state of California. In fact, the refining industry's combined use of MHF/HF is reportedly less than 2% of demand globally. While MHF is proven to prevent a "dense vapor cloud"

from forming, other sectors, such as aerospace, agriculture, semiconductors, refrigeration, and universities use HF. Based on the District's current PR 1410 conceptual rulemaking framework as presented in its July 28th and August 18th presentations, the District appears to be phasing out the use of the safer MHF technology with no known safer, commercially proven, or economically viable alternative, singling out just two refineries.

Lastly, the District has included in its August 18th presentation the Torrance Refinery's current Risk Management Program ("RMP") information submitted to U.S. Environmental Protection Agency ("EPA") in August 2016 related to the Worst Case Scenario ("WCS") for the MHF Alkylation Unit. At our August 17th meeting, District staff erroneously pointed to this information as an additional basis for prematurely including a MHF phase-out in the PR 1410 conceptual rulemaking framework.

However, if the District plans to rely on RMP-related information in the rulemaking process, they must put into context the purpose of the RMP WCS analysis. The WCS is not a predictor of an event or incident, but rather is intended to be used as an emergency response planning tool. EPA has stated that "[l]ocal emergency planning organizations can use RMPs to prepare response plans and allocate resources. *See* p. 9, EPA's Evaluating Chemical Hazards in the Community: Using an RMP's Offsite Consequence Analysis (550-B-99-015 Risk Management, May 1999).

EPA has cautioned that "[c]haracterizing data using only worst-case scenarios can be misleading and unnecessarily alarming." *See* p. 7, *Id.* Moreover, EPA has further cautioned that "[t]hey are *not intended to represent a 'public danger zone'* ". *Id.*, (emphasis added.)

Therefore, including the Torrance Refinery's current RMP WCS information in the August 18th presentation without this context can only lead to misinforming and confusing the public, elected officials, and Governing Board members while causing unwarranted fears and concerns.

TORC offers the following detailed comments and responses to the following specific slides related to the District's August 18th PR 1410 Working Group Meeting #5 presentation, specifically to address the unsupported and premature nature of the inclusion of a MHF phase-out in the District's PR 1410 conceptual framework at this time. These comments along with TORC's August 1st written and August 2nd Working Group meeting verbal comments must be considered and addressed before the District continues with its PR Rule 1410 conceptual rulemaking framework.

* * *

In closing, TORC commends the District for working closely with us and other stakeholders over the past months in what has been to date been an informative and open rulemaking process. However, as discussed above and in detail in Attachment A, TORC believes the District currently lacks a sound scientific or technical basis to conclude there is "insufficient evidence that a dense vapor cloud does not form (assumption in modeling and ARF calculation)".

The record shows District staff's latest conclusion contradicts the District's historic position on the efficacy and environmental benefits of MHF, as outlined in the February 7, 2003 news release that led to Valero investing hundreds of millions of dollars in an MHF Alkylation Unit, for their Wilmington Refinery. The scientific basis for transitioning to MHF at Wilmington is also repeated throughout the supporting documents that led to the replacement of HF with MHF in what the District termed an "enforceable agreement."

With a full analysis of the MHF technology and the MHF Alkylation Unit's safety systems yet to be completed by the District, and a clear history of the District supporting MHF, TORC requests that the District withdraw the premature inclusion of a MHF phase-out in their PR 1410 conceptual rulemaking framework. TORC will be providing supplemental and clarifying information in response to the District's August 17th evaluation of MHF testing results and modeling data. Additionally, TORC is waiting to receive additional information from the MHF technology licensor, which it envisions it will be disclosing to the District.

Moreover, the interests of Southern California, the state, and the California consumer are not served by a MHF phase-out unless there is an inherently safer, environmentally responsible and economically viable, alternative. Currently, such an alternative does not exist.

Proposing a MHF phase-out now when the only known alternative, Sulfuric Acid Alkylation, is **not safer, will actually increase emissions**, and is **cost-prohibitive** makes no sense. The District has prematurely proposed a PR 1410 conceptual rulemaking framework before receiving all the relevant information on the efficacy of MHF at **two** refineries and clearly has not understood to date some of the information already provided by independent industry experts in the field. To be clear, the District, including the current Board chair, hailed the implementation of MHF when the refineries adopted it as a safe and environmentally responsible process.

Accordingly, we urge the District to take the additional time necessary to address TORC's and other stakeholders' comments and withdraw their initial inclusion of a MHF phase-out as part of the PR 1410 conceptual framework at this time.

We look forward to continuing to work collaboratively and openly with the District to arrive at PR 1410 rulemaking that is based on sound science and technology and the current state of Alkylation technologies.

Please note that in submitting this letter, TORC reserves the right to supplement its responses and comments as it deems necessary, especially if additional or different information is made available to the public regarding the PR 1410 rulemaking process.

Sincerely,

Steve Steach
Refinery Manager

cc: Wayne Nastri, via e-mail
Susan Nakamura, via e-mail and hand delivery
Mike Krause, via e-mail and hand delivery
Dr. William A. Burke – Governing Board Chairman, via overnight mail
Ben Benoit – Governing Board Vice-Chairman, via overnight mail
Marion Ashley – Governing Board Member, via overnight mail
Joe Buscaino - Governing Board Member, via overnight mail
Michael A. Cacciotti - Governing Board Member, via overnight mail
Sheila Kuehl – Governing Board Member, via overnight mail
Dr. Joseph K. Lyou - Governing Board Member, via overnight mail
Larry McCallon - Governing Board Member, via overnight mail
Judy Mitchell – Governing Board Member, via overnight mail
Shawn Nelson - Governing Board Member, via overnight mail
Dr. Clark E. Parker, Sr. - Governing Board Member, via overnight mail
Dwight Robinson – Governing Board Member, via overnight mail
Janice Rutherford - Governing Board Member, via overnight mail

Attachment A
TORC's Comments and Responses

TORC offers the following detailed comments and responses to the following specific slides related to the District's August 18th PR 1410 Working Group Meeting #5 presentation to address the unsupported and premature nature of the inclusion of a MHF phase-out in the District's PR 1410 conceptual framework at this time[4]. These comments, along with TORC's August 1st written and August 2nd Working Group meeting verbal comments, must be considered and addressed before the District continues with its PR Rule 1410 conceptual rulemaking framework.

Slide 5 - District staff Assessment of MHF Alkylation Technology –

In slide 5, the District indicates it has "[i]ssues with information provided by TORC", particularly "[e]nsuring experimental data provided based on all current operating conditions including pressure, temperature and weight % HF". The District also states that "[b]ased on information received to date, insufficient evidence that a dense vapor cloud does not form (assumption in modeling and ARF calculation)".

As has been explained to the District, extensive MHF testing was performed on a parametric basis to evaluate MHF efficacy on each operating condition for the Torrance Refinery's Alkylation Unit. Each individual parameter: i.e., temperature, pressure, and concentration, was tested at ranges that include current MHF Alkylation Unit operating conditions. The results of this testing were used to create and validate a "first principles thermodynamic model" that accurately predicts liquid rainout of HF across all the Refinery's MHF Alkylation Unit's operating conditions.

As presented to the District on several occasions, the Additive range of concentrations were tested at equal to or less than 20 percent by weight ("wt%") in 1991, 1992, 1993, and 1994. These tests confirmed the Additive increases ARF even at low concentrations.[5]

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[4] This now the second time the District has released such a presentation knowing that TORC is still answering the District's questions and providing additional information related to MHF. The first time the District did this was on a Friday night, July 28th, days before the fourth Working Group meeting scheduled for August 2nd, to post a presentation entitled "PR 1410 Working Group Meeting #4." This document prematurely concluded "[b]ased on information received to date, insufficient evidence that a dense vapor cloud does not form" from a potential release of MHF" and that a "phase-out of the use of HF is a preemptive measure to prevent an air pollution episode" is alleged to be warranted. This was particularly concerning considering that TORC met with the District on June 28, 2017 to discuss the MHF testing data, Airborne Reduction Factor ("ARF"), and Rainout Model because the District requested additional information regarding testing data specific to Torrance Refinery's MHF Alkylation Unit operating conditions, how the Rainout Model works, and additional Rainout Model runs during that meeting on that same date. As a result, TORC was working towards providing the District with responses to its questions from the meeting. Never in this meeting, or in other meetings, or any conversations did the District give any indication that it would be forging ahead with a PR 1410 conceptual framework prior to giving TORC an opportunity to respond to questions from the District related to MHF testing results, technical analysis, and modeling data. On August 2nd, TORC submitted a letter (dated August 1st) that provided extensive comments regarding the premature nature of the inclusion of a MHF phase-out in the District's PR 1410 conceptual framework, which all have yet to be responded to.

[5] Specifically, the extensive testing that was completed by Mobil as presented in DAN 95M-0874 - MHF Airborne HF Reduction Estimates, clearly supports this:

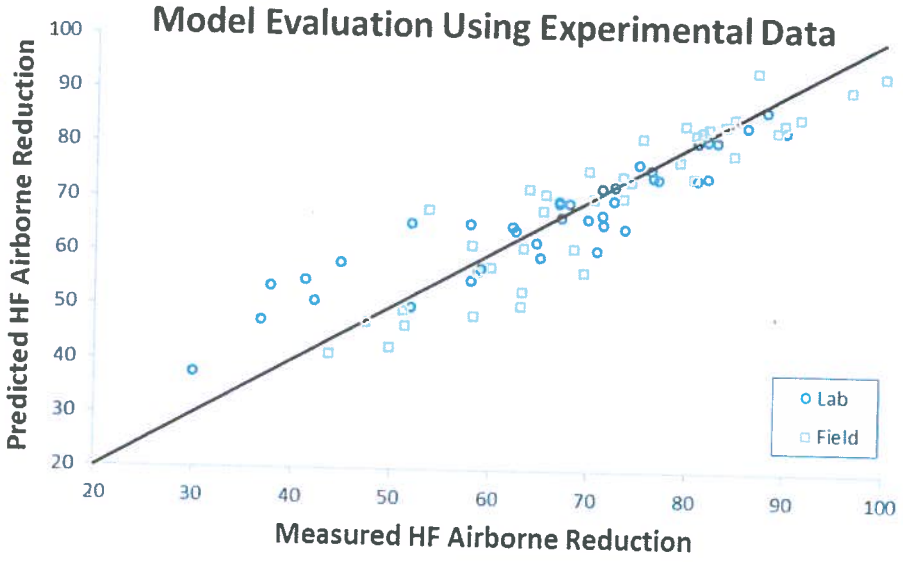
> "Mobil has performed small … and large scale release tests … to understand the effect of storage composition, temperature and pressure and release orifice size on the fraction of released HF that becomes airborne. A key finding of the experiments was that the addition of the additive causes a significant fraction of the released HF to fall on the ground as liquid rainout. The set of experiments … showed that the presence of the additive eliminates flash

As the District has been informed, ARF is calculated as a function of acid strength, Additive, water, and reactor temperature. The Rainout Model results are consistent with ARF test results. Importantly, the supplemental MHF data and information TORC provided to the District on August 11th and discussed with District staff on August 17th validates this consistency and the efficacy of the Rainout Model, and in turn, the efficacy of MHF at current MHF Alkylation Unit current operating conditions.

To further help District staff to understand this, TORC provided at the District's request an Excel spreadsheet containing all testing data, complete with associated operating parameters, measured rainout, and predicted rainout. This data summarizes all 1990's MHF testing documents to which TORC currently has access, showing the wide range of operating parameters parametrically tested. Each relevant case was then run on the Rainout Model - measured versus predicted values are shown. The following graph summarizes the experimental data results and correlates these results to the Rainout Model used as the foundation for the Safety Advisor's and Court's evaluation and approval of the use of MHF. Correlating the experimental data to the Rainout Model's results definitively shows that:

a) Rainout Model calculations are valid.

b) The stated safety improvements offered by MHF are valid.



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atomization of the released jets. More specifically, no flash atomization was observed for compositions containing as much as 85 wt% HF upto 140° F.

Mobil has also developed an aerosol model … to interpret the experimental data and to predict the airborne fraction of HF in releases with conditions outside the range of variables experimentally tested. The model predicts small and large scale release data in the subcooled and superheated regimes of interest."

(Internal references omitted.)

Also, at the District's request, TORC graphed each tested parameter separately to show any testing bias. The graphs showed the delta between measured and predicted rainout separately for each measured operating parameter (i.e., pressures, temperatures, HF %wt concentrations, Additive %wt concentrations, including current MHF Alkylation Unit conditions). The accuracy of the Rainout Model at the full range for each condition, as well as its suitability in validating MHF safety margins, is clearly demonstrated for all key operating parameters.

Additionally, at the District's request, TORC provided a comparison of the rainout at MHF Alkylation Unit operating conditions at 55 psig versus 225 psig as predicted by the Rainout Model.

As has been repeatedly explained to District, the Rainout Model was developed by Mobil from extensive testing and analysis. The Rainout Model is a liquid spray model developed to predict the airborne fraction of MHF in releases with conditions outside the range of variables experimentally tested. The model calculates the evaporation of HF in a two-phase HF/additive jet discharging from an orifice. Given the release conditions (pressure, temperature, and composition) and release geometry (hole size, release orientation, and elevation of the orifice from the ground), the model calculates the HF rainout or capture. HF rainout is defined as the fraction of HF discharged from the orifice that falls on the ground as liquid.

The Rainout Model output at 55 psig versus 225 psig supports that pressure has a relatively small impact on ARF as the release speed is proportional to the square root of pressure. Even at higher pressures tested and small orifice sizes, the projected ARF remains above 50% for Refinery's MHF Alkylation Unit operating conditions. The chart from this comparison illustrates this conclusion, as well as demonstrates that MHF experimental testing results often show a larger ARF than predicted by the Rainout Model, further validating the safety margin provide by MHF.

In summary, the supplemental analysis provided to the District TORC provided to the District on August 11th and discussed with District staff on August 17th unequivocally shows that:

- Rainout Model calculations for current Torrance Refinery MHF Alkylation Unit operating conditions are within the range of model validity for Rainout.
- Experimental data points exist at the Torrance Refinery MHF Alkylation Unit's current operating temperature and composition.
    - The higher unit operating pressure relative to the tested data points ***would only serve to decrease the propensity for flash atomization***, thus the validity of the model is retained
    - Increasing pressure increases the size of the zone in which hydrodynamic shearing occurs as the dominant release mechanism
    - The Rainout Model has been proven to accurately predict release characteristics for all operating conditions within the hydrodynamic regime, hence the model is able to accurately predict rainout across the full range of unit operating pressures

Finally, TORC pointed out and explained to the District that the Rainout Model was derived from extensive release testing. Then, the model was validated after development by additional experiments that proved the model's predictive ability across all MHF Alkylation Unit operating ranges. Validation tests were performed at representative unit operating conditions: i.e., lower Additive concentrations and higher temperatures. Importantly, it was shown that the Rainout Model MHF validation data set is much more extensive than the models that the District uses.

TORC, for example, brought to the attention of District staff that in District's 2004 CEQA document for the Valero ReVAP (MHF) Project that the District used the QUEST CANARY "Momentum Jet Dispersion Model" as part of the Hazards analysis for the project to predict the dispersion of a jet releases into ambient air in comparing HF to MHF. In the supporting Quest documentation for the Hazards analysis, Quest explained that the model was validated using the following data shown on Figure F-1:

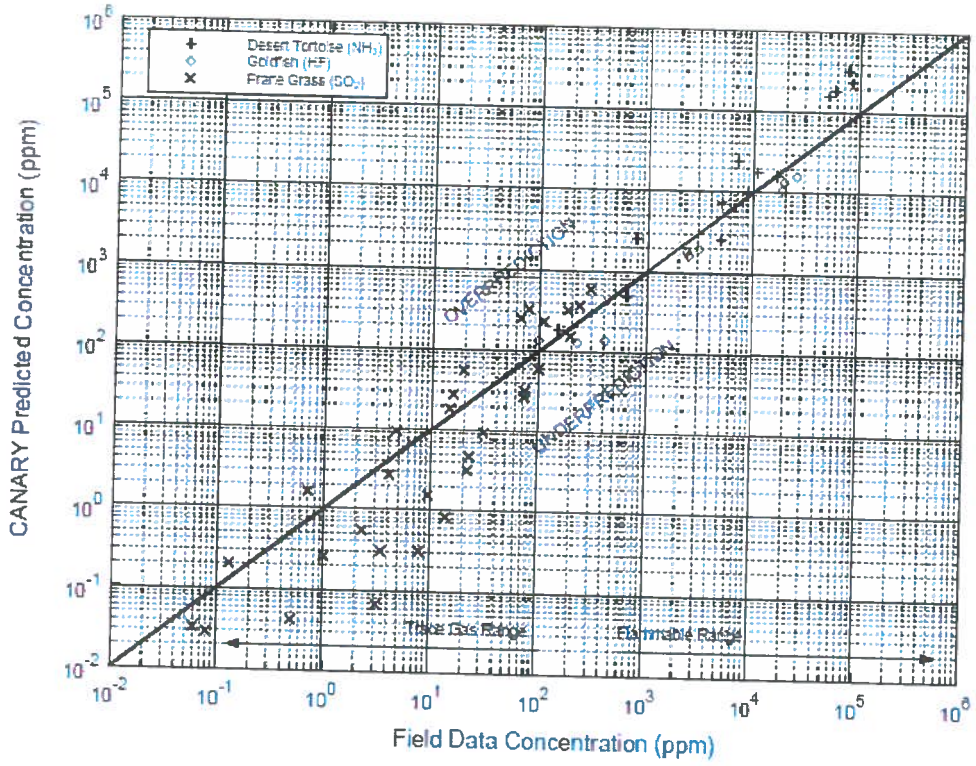

Figure F-1

As can be seen from the chart, this validation data set is much less extensive than the data set used to validate the Rainout Model.

Despite this information, at the August 17th meeting, District staff presented its analysis of the supplemental MHF testing and modeling data that was provided to it on August 11th. Staff's analysis was inaccurate as it based was on the wrong Torrance Refinery MHF Alkylation Unit operating conditions, failed to account for the testing data being hydrocarbon-free, and most importantly, have

yet to fully understand that the higher unit operating pressure relative to the tested data points ***only serve to decrease the propensity for flash atomization***. In response, TORC requested that AQMD allow us to provide further clarifying information to assist District staff in their analysis and correct their inaccurate assumptions. TORC believes that if District staff considers this clarifying information, District staff will change the outcome of its analysis and be able to validate the efficacy of MHF at the range of operating conditions for the Torrance Refinery MHF Alkylation Unit.

However, before going back and evaluating this additional clarifying information and having a complete understanding of the MHF technology, District staff stated at the August 17th meeting that they still intended to "move forward with a phase-out of MHF" as part of its PR 1410 conceptual rulemaking framework. How can the District staff reach a conclusion to phase-out MHF when their review of the extensive and voluminous MHF testing, analyses, and modeling data provided by TORC is incomplete; plus they still need to complete the statutorily required CEQA and Socioeconomic analysis for the rulemaking? Based on sound science and technology, the answer is -- "the District cannot."

As explained above, the totality of all the MHF testing, analysis, and modeling data and information provided to the District to date shows that MHF prevents a dense vapor cloud from forming, prevents flash atomization, and promotes rainout of liquid MHF at current Torrance Refinery MHF Alkylation Unit operating conditions. The modeling and testing results support the conclusion that any potential release would be contained onsite by the combination of the passive and active mitigation measures that are employed in the Torrance Refinery's MHF Alkylation Unit safety systems.

This is further demonstrated by the fact that in 1997 the Refinery began using MHF to comply with the City of Torrance Consent Decree. Since then, the MHF Alkylation Unit has been operating without any MHF offsite impact. Importantly, Torrance Refinery used HF in the Alkylation Unit without any HF offsite release from 1966 until 1997, a period that includes the Sylmar and Northridge earthquakes.

Accordingly, the District does not currently have a scientific or technical basis to put forth a PR 1410 conceptual rulemaking framework; while prematurely concluding that "[b]ased on information received to date, insufficient evidence that a dense vapor cloud does not form (assumption in modeling and ARF calculation)". *See* District August 18, 2017 fifth Working Group meeting presentation entitled "PR 1410 Working Group Meeting #5".[6]

Moreover, such a premature conclusion would contradict the recommendation of an independent Court-appointed Safety Advisor and the decision of a well-respected Los Angeles Superior Court Judge that in 1995 under the City of Torrance Consent Decree approved the use of the MHF technology at the Torrance Refinery, finding it as safe as and possibly safer than Sulfuric Acid for a similarly sized alkylation unit. This decision was only reached after approximately a two-year review

[6] *See* District July 28, 2017 fourth Working Group meeting presentation entitled "PR 1410 Working Group Meeting #4", slides 4 and 5, respectively, where it states "[b]ased on information received to date, insufficient evidence that a dense vapor cloud does not form", and as a result, "[a] phase-out of the use of HF is a preemptive measure to prevent an air pollution episode"; *see also* TORC's letter dated August 1, 2017, "Comments on South Coast Air Quality Management District's July 28, 2017 Presentation for the Proposed Rule 1410 Fourth Working Group Meeting".

of voluminous MHF testing results, technical analyses, and modeling data that has been disclosed to the District with the consent of the technology licensor.

Additionally, this would contradict the District previous position on this technology. For example, in 2003, the District issued a press release announcing an "enforceable agreement" with Valero to phase-out the Wilmington Refinery's use of HF with MHF by 2006.

In the press release, the District states:

> "Once this refinery stops using concentrated hydrogen fluoride, we will have virtually eliminated the potential for a catastrophic accidental release of this compound in our region," said Barry Wallerstein, executive officer of the South Coast Air Quality Management District."
>
> "The agreement fulfils one of the 23 Environmental Justice goals adopted by AQMD's Governing Board last fall."
>
> "Switching to modified HF will minimize the possibility of a catastrophic accidental release not only at the refinery, but along Southland transportation corridors, as the additive is added to the chemical before shipping."

See Highly Toxic Chemical to be Phased Out at Valero Refinery: SCAQMD, Feb. 7, 2003.

By endorsing and permitting Valero Wilmington's Reduced Volatility Alkylation Process (ReVAP) project, which was the project that modified the Wilmington Refinery's Alkylation Unit to use MHF under an "enforceable agreement" between Valero and the District, the District further reinforced the efficacy of MHF by stating in its California Environmental Quality Act ("CEQA") Environmental Impact Report ("EIR") for the project the following about the efficacy of MHF:

> "ReVAP incorporates a suppressant in the HF that reduces volatility in the event of an accidental release with a concurrent reduction in safety risks (i.e., distance that the HF could travel and number of persons exposed) in the surrounding area. Use of this modified process meets the SCAQMD's objectives with respect to elimination of concentrated HF."

See District's Ultramar Inc. – Valero, Wilmington Refinery, Alkylation Improvement Project, Statement Of Findings, Statement Of Overriding Considerations, And Mitigation Monitoring Plan, p. 3, (SCH #20030536, December 2004).

> "An accidental release of HF could migrate off the Refinery property and expose individuals in the surrounding community. The proposed (MHF) project will substantially reduce the potential hazard impacts associated with an accidental release of HF."

Id., p. 9.

> "The proprietary additive is a non-volatile, non-odorous, low toxicity material that is completely miscible in the acid phase. It has very limited affinity for other hydrocarbons, including the alkylate product and acid soluble oil (ASO) by-product, similar to the organic polymer produced in the current process. The unique physical properties of the additive

> substantially reduce the volatility of the acid at ambient conditions. This reduction in volatility proportionately reduces the amount of HF that can vaporize and subsequently disperse off-site from a given liquid release quantity. *The modified HF catalyst reduces acid vapor pressure sufficiently to suppress the usual flash atomization process of hydrofluoric acid, causing most of the acid to fall to the ground as an easily controlled liquid and reduces the potential for off-site consequences of an accidental HF release.*"

See Ultramar Inc. – Valero, Wilmington Refinery, Alkylation Improvement Project, Final EIR, Chapter 2, p. 2-7, (SCH #20030536, August 2002) (emphasis added).

This is consistent with what the District had previously concluded regarding the efficacy of MHF in its CEQA Addendum to the Torrance Refinery's MHF Alkylation Unit project. In the Addendum for the project, the District specifically noted:

> "The experimental testing indicated that the addition of the Mobil additive to HF was an effective method for reducing or elimination the amount of aerosol formed during a release. The additive is a water-soluble, thermally stable compound that is solid at ambient conditions. In addition, the health data indicate that the additive has very low toxicity and limited health impacts as compared to HF which has more severe health impacts."

See District's Addendum, Mitigated Negative Declaration, Mobil Modified Hydrogen Fluoride Conversion Project, p. 2, (July 9, 1997).

> "*In summary, after review of the available test data and performing release/dispersion modeling, under similar release conditions, the addition of the Mobil additive to an HF alkylation unit was determined to result in a reduction of HF hazard zones for equivalent releases*. The amount of reduction will be a function of the additive concentration, and will vary with many parameters which govern the release/dispersion process. *In all cases, addition of the additive to the alkylation unit will reduce the distance traveled by HF in the event of a release. At any concentration of additive, the vapor pressure of the HF will be reduced, thus reducing the potential for public exposure to HF.* Therefore, modification to the HF alkylation unit and the use of MHF at the Mobil Refinery are expected to have a beneficial impact on the environment by reducing the potential impacts associated with an accidental release from the alkylation unit."

Id., p. 4, (emphasis added).

Neither the MHF Alkylation technologies employed by TORC at its Torrance Refinery, nor, to TORC's knowledge, those employed by Valero at its Wilmington Refinery changed since this time. The MHF technology is the same as when it was originally permitted 20 years ago. However, the safety systems, training, and knowledge of the MHF Alkylation process and equipment have improved related to MHF alkylation, which has been the case at the Torrance Refinery. Therefore, the Torrance Refinery MHF Alkylation Unit is even safer than when it was permitted 20 years ago. In fact, Torrance used HF in the Alkylation Unit without any HF offsite release from 1966 until 1997. In 1997, the Refinery began using MHF to comply with the City of Torrance Consent Decree, and the MHF Alkylation Unit has been operating since then without any MHF offsite impact.

Importantly, as noted above, the District has issued permits to the Torrance Refinery in 1997 and Valero Wilmington Refinery in 2004, after performing statutorily required California Environmental Quality Act ("CEQA") analyses for the MHF technology. Moreover, there has never been an offsite release of HF or MHF from Torrance Refinery Alkylation Unit. Accordingly, how is the current District now of the view that the MHF technology may no longer work when the District previously endorsed, permitted, and supported MHF technology?

Accordingly, it defies science, technology, and logic that the District would now change its position, especially since TORC is still in the process of providing the District with clarifying information related to testing data specific to Torrance Refinery's MHF Alkylation Unit operating conditions, how the Rainout Model works, and additional Rainout Model runs.

As noted above and in TORC's August 1, 2017 letter and reiterated here, TORC believes the District currently lacks a scientific or technical basis to reach such an unsupported and premature conclusive. As a result, TORC requests that the District refrain from premature determinations regarding a phase-out of MHF, particularly at the upcoming August 23rd Working Group Meeting #5. We urge the District to heed its own words that "staff will continue to evaluate information provided to assist in formulating the rule proposal" (*see* slide 6), and avoid rushing the PR 1410 rulemaking by taking the additional time necessary to address TORC's and other stakeholders' comments.

Slide 6 - Evaluating Impacts from MHF Technology

Regarding barriers, in slide 6, the District makes several unclear and unsupported statements about the Torrance Refinery's reliance on barriers, specifically that it is concerned "existing mitigations would not provide adequate protection in the unplanned event such as a major accident or earthquake causing equipment failure".[7] The District then claims without any consideration of all the passive and active safety systems that are employed by the Torrance Refinery's MHF Alkylation Unit "[e]ven at 89% ARF, a release of MHF has the potential to cause health risks to a significant number of persons (according to current RMP)".[8]

The basis of the District's concerns and statements related to barriers is unclear. Staff has to date provided no support as to how the many Torrance Refinery MHF Alkylation Unit safety systems, including passive and active mitigation, would fail to function as designed in the event of a major incident or earthquake. As Torrance provided in its August 1st letter and re-emphasized here, TORC has provided the District with the 1990's barrier testing results that proves the effectiveness of the MHF Alkylation Unit barriers. Moreover, the District has seen in person and been provided video evidence of the robustness of the Torrance Refinery MHF Alkylation Unit barriers. As the District has been informed, flange shrouds are tested annually with the Torrance Fire Department ("TFD")

[7] In slide 5, the District further indicates that it has "[i]ssues with information provided by TORC", particularly "[r]eliance on functioning MHF vapor barriers (e.g., flange shrouds, settler pans, pump seals)".

[8] *See* TORC's slide 7 comments below regarding the District's inclusion of the Torrance Refinery's RMP WCS information as an apparent additional basis for inclusion of a MHF phase-out in the PR 1410 conceptual rulemaking framework at this time.

and the solid steel settler pans/pump shrouds are inspected twice per shift by Unit operators to ensure their integrity and functionality.

In regards to the loss of power scenario referred to in the District's slide 6, TORC experienced two Refinery-wide external Southern California Edison power outages in 2016 with no impacts to the Refinery's MHF Alkylation Unit's safety systems. The MHF Alkylation Unit has backup power and uninterruptible power supplies for its safety critical devices and safety systems to ensure that these systems still function during emergencies, including power outages.

The basis for the District's concern in slide 6 regarding the potential lack of water or water pressure to the MHF Alkylation Unit in the event of a major incident scenario is unclear. The Torrance Refinery has an adequate water supply and pressure that meets the National Fire Protection Association's standards. The Refinery's fire water system, which includes the MHF Alkylation Unit, runs on diesel-driven pumps and does not rely on electrical power. Therefore, the MHF Alkylation Unit will always have the required water supply and pressure for its safety system in the event of an emergency or major incident.

On May 16, 2017, District staff participated in a tour of the Refinery's MHF Alkylation Unit, its robust safety systems, and witnessed first-hand the scheduled weekly test of one of the unit's high flow water cannons. Also during the tour, the District was provided a detailed overview by one of the unit's Console Team Leads of how the unit's water system and mitigation works in tandem with the unit's high-resolution remote cameras.

Subsequently, TORC presented at the May 18th Working Group Meeting and re-emphasized in its August 1st letter, the MHF Alkylation Unit's water system and mitigation capabilities, which consists of:

- Nine remotely controlled water cannons;
- Used in tandem with console cameras to target a specific release point;
- Local fire monitors;
- Deluge systems on major pumps; and
- Fire sprays on vessels.

Finally, in the context of an earthquake it should be emphasized, that the Torrance Refinery conducts a seismic assessment every five years pursuant to the CalARP regulations. The regulation is intended to reduce likelihood of release of significant quantities of regulated substances in the event of an earthquake. Moreover, Torrance Refinery used HF in the Alkylation Unit without any HF offsite release from 1966 when the unit was commissioned until 1997 when he unit was modified to use MHF , a period that includes the Sylmar and Northridge earthquakes.

Accordingly, the District has no basis to conclude that the MHF Alkylation Unit's "existing mitigations would not provide adequate protection in the unplanned event such as a major accident or earthquake causing equipment failure."

Attachment A
TORC's Comments and Responses

Slide 7 - Risk Management Plan (RMP) Worst Case Scenario Evaluation by TORC

In slide 7, the District included the following information from Torrance Refinery's current RMP submitted to EPA in August 2016 related to the WCS for the MHF Alkylation Unit:

- EPA's RMP*Comp™ evaluated 5,200 pounds … of MHF release … within a 3.2 miles distance Settler tank …
  - Assumed rainout at 89% (with vapor barriers)

This information is apparently being included as an additional basis for inclusion of a MHF phase-out in the PR 1410 conceptual rulemaking framework.

However, it is important to put into context the purpose of the RMP WCS analysis. The WCS is not a predictor of an event or incident, but rather is intended to be used as an emergency response planning tool. EPA has stated that "[l]ocal emergency planning organizations can use RMPs to prepare response plans and allocate resources. *See* p. 9, EPA's Evaluating Chemical Hazards in the Community: Using an RMP's Offsite Consequence Analysis (550-B-99-015 Risk Management, May 1999).

EPA has cautioned that "[c]haracterizing data using only worst-case scenarios can be misleading and unnecessarily alarming." *See* p. 7, *Id.* Moreover, EPA has further cautioned that "[t]hey are *not intended to represent a 'public danger zone'* ". *Id.*, (emphasis added.)

Additionally, the RMP WCS is not a risk analysis[9]. As stated above, it is a planning tool. Under the EPA RMP regulations, the WCS uses unrealistic modeling parameters and is an ultra-conservative, unrealistic scenario. For example, in determining the WCS, no active safety measures (i.e., automatic shutdown systems, fire monitors, deluge systems, etc.) or emergency response actions can be considered and weather conditions are purposefully considered unfavorable. The WCS is modeled to a threshold of ERPG 2, which means no irreversible impacts after one hour of exposure, but the RMP regulations require the release to occur over just 10 minutes.

Finally, the use of a circular impact zone using the endpoint distance as the radius for planning purposes, is ultra-conservative when the actual impact is more of an elliptical impact zone. As a result, the circular impact zone to determine the number of people exposed to an ultra-conservative, unrealistic scenario provides a substantial overestimation of those that could be impacted.

Therefore, including the Torrance Refinery's current RMP WCS information in the August 18th presentation without this context can only lead to misinforming and confusing the public, elected officials, and Governing Board members, purposefully causing unwarranted fears and concerns.

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[9] A quantitative risk analysis ("QRA") following industry best practices was conducted as part of the City of Torrance Consent Decree process. The independent Court-appointed Safety Advisor reviewed, confirmed, and validated the conclusion of the QRA that MHF was as safe or safer than Sulfuric for a similarly sized Alkylation Unit. This finding was included in the Safety Advisor's report to the Court, which approved the use of the MHF technology at the Torrance Refinery. TORC encourages the District to review the QRA, which has been previously provided to the District, and consider and include its findings as part of this rulemaking effort.

Additionally, the inclusion of the Torrance Refinery's current RMP WCS information in the August 18th presentation seems contradictory to the conclusion that the District reached in its own Hazard Impacts analysis as part of its CEQA analysis for the Torrance Refinery MHF project. The Hazards Impacts analysis for this project estimated that the jet dispersion endpoint (EPRG 3) for a potential MHF release could be approximately 3.6 miles, which is farther than the 3.2 mile planning area for the Torrance Refinery's current RMP WCS. Yet, the District concluded under CEQA that with mitigation (i.e., use of MHF), the potential Hazards Impacts would be less than significant.

Accordingly, TORC requests that its current RMP WCS information be removed from the discussion associated with the District's PR 1410 conceptual rulemaking framework or put the information in the appropriate context so the public, elected officials, and Governing Board members are not misled.

Slide 8 - Initial Concept and Framework for Discussion

In slide 8, the District shows a block flow diagram with its PR 1410 conceptual rulemaking structure, including a phase-out of MHF with Sulfuric Acid or Alternative Alkylation Catalysts.

As noted above, it is premature for the District to contemplate a MHF phase-out and there is no scientific or technical justification for it. Since 1997, the Torrance Refinery has been safely using MHF and there have been no offsite impacts. Additionally, the Torrance Refinery used HF in the Alkylation Unit without any HF offsite release from 1966 when it was commissioned until 1997 when the unit was modified to use MHF.

Below TORC addresses the current issues associated with transitioning from a proven and safe Alkylation technology to Sulfuric or so called Alternative Catalysts.

Slide 9 - Implementation Timeframe

In slide 9, the District seeks "input on implementation timeframe for enhanced mitigation measures and phase-out of MHF" as part of its PR 1410 conceptual rulemaking structure.

Specifically regarding the MHF phase-out portion of this slide, the District requests input on:

- "Considerations needed for engineering, design, permitting/CEQA, logistics, removal, construction, delivery, installation, and performance testing
- Maturation of alternative emerging technologies needs to be a consideration"

Again as noted above, it is premature for the District to contemplate a MHF phase-out and there is no scientific or technical justification for including this in the PR 1410 conceptual rulemaking framework. Again, since 1997, the Torrance Refinery has been safely using MHF and there has never been an offsite release. Additionally, the Torrance Refinery used HF in the Alkylation Unit without any HF offsite release from 1966 until 1997.

In addressing any implementation schedule associated with the District's current PR 1410 conceptual rulemaking structure, it is worth emphasizing that the Torrance Refinery's MHF Alkylation unit produces a critical blending component for making all grades of cleaner-burning CARB gasoline for Southern California and the State of California. Alkylate is required to meet stringent state-mandated gasoline specifications. The Torrance Refinery supplies approximately 20% of daily regional demand and approximately 10% statewide. When California refineries are offline, the state relies on imports to supply fuel, which typically results in price spikes.

Accordingly, any PR 1410 rulemaking effort resulting in a phase-out of MHF could have significant impacts to the two refineries targeted by the rule – TORC Torrance and Valero Wilmington – as well as California's petroleum fuels market. As TORC indicated in its August 1st letter, to understand the impact of a potential phase-out of MHF, TORC retained Stillwater Associates ("Stillwater") to conduct an economic study regarding the potential impacts of a MHF ban. Stillwater is a transportation fuels consulting firm specializing in downstream markets that are recognized by industry and government agencies as experts in the supply, demand, distribution, and price of energy related to downstream fuel markets.

Stillwater's economic study entitled "Impact of an HF Ban on Southern California Transportation Fuels Supply" (dated June 23, 2017), which was reviewed with the District on July 26th, concluded:

1. Alkylation is an important refining process. CARBOB cannot be produced by Southern California refineries without alkylate.
2. Should HF be banned, it appears unlikely that impacted refiners would replace current process units, due to the high cost.
3. The impacted refineries are unlikely to be viable without alkylation.
4. Should the impacted refineries cease operations, 25% of regional demand would have to be imported.
5. With only three fuels refiners left in Southern California, the market will have less competition.
6. Offshore refiners will produce the products and ship them half way around the world to the California market.
7. As a result, average spot prices could rise 25 cents per gallon or more, and ultimately the California consumer would pay the price.

See Slide 42[10].

[10] At the June 28th meeting with the District, TORC also presented Capital Matrix's preliminary local and regional economic impacts associated with an MHF phase-out. TORC will shortly be providing to the District Capital Matrix's final report. This information along with Stillwater's economic study must be included and thoroughly considered as part of the District's PR 1410 CEQA and Socioeconomic analyses.

As the District is now well aware, the Stillwater study was reviewed by the California Energy Commission ("CEC") as part of its 2017 Integrated Energy Policy Report ("IEPR") process, which is required every two years and an update every other year by Senate Bill 1389 (SB 1389, Bowen and Sher, Chapter 568, Statutes of 2002)[11].

CEC at its July 6, 2017, 2017 IEPR Commissioner Workshop on Transportation Energy Supply Trends stated the following regarding a potential ban on MHF:

- If an HF ban were compelled it is uncertain if either or both companies would elect to make such changes to their facilities
  - Alkylation process unit projects are extremely expensive
    - A recent project approved for the Valero Houston refinery is estimated to cost $300 million for an alkylation unit with a capacity of 13,000 barrel per calendar day
    - Capacity of the alkylation units at Valero Wilmington and PBF Torrance are 22,000 and 24,200 barrels per day capacity, respectively
    - These alkylation unit capacities are each nearly twice the capacity, meaning the potential costs for such projects at the two California refineries could, at a minimum, easily approach or exceed $500 million *per facility*
  - These estimated costs for such a replacement project could be at or near the value of the refinery when one considers that ExxonMobil sold the entire Torrance refinery to PBF Energy for $537.5 million
    - It would therefore be uncertain as to whether such an expenditure could be justified by either or both companies should an HF alkylation ban ultimately be approved by the SCAQMD

See Slide 11, CEC's "*Transportation Fuel Issues*".

Accordingly, as concluded by the Stillwater study and recognized by the CEC, any phase-out of MHF would have substantial economic impacts to TORC, Valero, and the California's petroleum fuels market, particularly to the California consumers who rely on clean-burning fuels produced by TORC and Valero, which meet the strictest fuel standards in the world, to meet their daily needs.

The District should keep in mind that through the City of Torrance Consent Decree process, the Court determined that "the modified HF catalyst (including mitigation) presents no greater risk than a sulfuric acid alkylation plant producing a comparable amount of alkylate" only after it was proven to

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[11] Senate Bill 1389 requires the CEC to:

> "[C]onduct assessments and forecasts of all aspects of energy industry supply, production, transportation, delivery and distribution, demand, and prices. The Energy Commission shall use these assessments and forecasts to develop energy policies that conserve resources, protect the environment, ensure energy reliability, enhance the state's economy, and protect public health and safety."

See CA Pub. Res. Code § 25301(a) (emphasis added).

the Court-appointed independent Safety Advisor that "that the catalyst as modified would not form an aerosol or dense vapor cloud upon release". As a result, building a grass roots Sulfuric Acid Alkylation unit would contradict the Consent Decree and does NOT make environmental, process safety, or economic sense. Moreover, after a diligent search TORC has found no record of a conversion from HF/MHF Alkylation Unit to a Sulfuric Acid Alkylation Unit. This was confirmed by CB&I during its presentation at the August 2nd fourth Working Group meeting.

As TORC has commented to the District on several occasions, the use of sulfuric acid as an Alkylation Catalyst presents its own challenges and impacts that run counter to the District's air quality goals, including increased emissions versus MHF, which have been previously documented to the District. *See* TORC letter to Wayne Nastri, entitled: "Norton Engineering Alkylation Technology Study, related to the use of Hydrofluoric Acid in Refinery Alkylation Units" dated December 8, 2016.

As discussed with the District on July 26th and further emphasized in TORC's August 1st letter, the cost of a new grass root Sulfuric Acid Alkylation Unit at the Torrance Refinery would be cost prohibitive. In order to determine the cost, TORC retained Burns & McDonnell ("B&McD") to estimate the total installed cost ("TIC") to build such a unit for the Torrance Refinery. B&McD's Report Brief Alkylation Study & Estimate (July 2017), which was provided to the District on July 26th, concludes that the TIC to build such a unit at the Torrance Refinery would be approximately $600MM.[12]

As the District was informed on July 26th and also noted in TORC's August 1st letter, B&McD's Report Brief did not include the cost of spent sulfuric acid regeneration. However, TORC understands from discussions with an industry consultant that the cost of a new grass roots spent acid regeneration of sufficient capacity to serve a Sulfuric Acid Unit at the Torrance Refinery could cost up to $300MM, making the total cost of approximately $900MM.

Importantly, there is no guarantee that all permits needed to build a new Sulfuric Acid Alkylation Unit can be obtained. Even if they could be obtained, which again there is no guarantee, going through the CEQA process, obtaining right-of-ways for pipelines if required, meeting the District's New Source Rule, Best Available Control Technology, and offset requirements for a District permit, could take many, many years and that would be before any construction could begin.

Regarding Alternative Alkylation Catalysts, as TORC noted in its August 1st letter, PBF has been evaluating Alternative Alkylation Catalyst technologies since it announced the acquisition of the

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[12] The report specifically states:

> "The total installed cost for the new alkylation unit and associated infrastructure (outside the battery limits - OSBL) is estimated at nominally $600 MM, including an owner's cost of $50 MM provided by PBF. This cost is comprised of $56 MM in direct bare equipment cost, $270 MM in additional direct costs associated with labor and materials and $226 MM in indirect costs. Indirect costs include engineering, construction management, escalation, contingency, and contractor fee. The contingency for this estimate was set at $110.6 MM which represents 20% of the total project cost."

This cost information must be included and thoroughly considered as part of the District's PR 1410 CEQA and Socioeconomic analyses.

Torrance Refinery in September 2015. PBF and TORC have met with experts from Honeywell/UOP, Stratco/DuPont, B&McD, KBR, and CB&I, as well as independent Alkylation experts to explore alternatives.

At the August 2nd fourth Working Group meeting, CB&I and Chevron presented on their alkylation technologies.

TORC's take away from CB&I's presentation[13] regarding its CDAlky® and AlkyClean® technologies[14] was the following:

- One small unit in a chemical plant in China - 2,700 barrels per day ("BPD").
- CB&I confirmed that **NO** commercial plant in the U.S.
- CB&I confirmed that AlkyClean technology is the first and only commercialized solid acid alkylation technology in the world[15].
- Operating details, product quality, run length and turnaround interval, catalyst regeneration, and feedstocks are currently unknown.
- CB&I confirmed that all units on CB&I's Commercial Experience List are Sulfuric Acid Alkylation units.
- CB&I conceded that no pilot or demonstration units for an HF/MHF conversion exist.
- CB&I indicated that it may be able to design an HF/MHF conversion.
- CB&I conceded such a conversion would be a little more expensive than a conventional Sulfuric Acid conversion, but definitive cost information currently unknown.
- Testimony at April 1st District Hearing about European refinery converting to Solid Acid Catalyst ("SAC") is inaccurate.
- Based on the foregoing, TORC still believes that there is no commercially viable, cost-effective, or safer SAC technology, including CB&I's technologies, currently available or in the near future.

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[13] CB&I's Presentation - Advanced Alkylation Technologies: CDAlky® and AlkyClean® (August 2, 2017)

[14] Subsequently on August 9, 2017, CB&I announced its intent to sell its alkylation technology business. *See* http://cbi2016ir.q4web.com/news/press-release-details/2017/CBI-Announces-Intent-to-Sell-Technology-Business/default.aspx.

[15] During District "Refinery Committee Investigative Hearing" on April 1, 2017 in Torrance, California, the District's Consultant Mr. Jenkins of Bastleford Engineering and Consultancy claimed that an unnamed UK refinery had successfully converted an existing HF Alkylation Unit to Solid Acid Alkylation Technology. The CB&I presentation irrefutably contradicts this and TORC would like the District to correct the record so that it is clear to the public, elected officials, and the District Governing Board members that this never occurred so they are no longer misinformed on this important issue.

Attachment A
TORC's Comments and Responses

TORC's take away from Chevron's presentation (Isoalky™ Technology: Next Generation Alkylate Gasoline Manufacturing Process Technology (August 2, 2017)) regarding its Isoalky™ technology was the following:

- Chevron stressed that its existing HF Alkylation Unit at its Salt Lake City Refinery it has not had any safety issues, injuries, or offsite impacts with the unit's operation.
- Chevron technology is still only in its demonstration phase.
- Chevron plans to install a small 5,000 BPD unit at its Salt Lake City Refinery in 2020 – "Model No. 1, Serial No. 1".
- Chevron provided limited information regarding its proven capability to scale up to the size of the Torrance Refinery's MHF Alkylation Unit. Referred to the licensor, UOP, for this information.
- Chevron indicated that technology cost would likely be on par with conventional Sulfuric Acid Alkylation.
- Chevron clarified that although it believes that the technology is commercially available, confirming that it is not commercially proven and would not be commercially proven until the 5,000 BPD unit in Salt Lake City was built and operated for some indeterminate period of time. TORC believes that two turnarounds of the technology are needed to determine if the technology is reliable.
- Chevron conceded that a refinery would need additional plot space for technology.
- Chevron indicated that although it believes that its technology is safer than Sulfuric Acid Alkylation it has no plans to convert its two Sulfuric Acid Alkylation units in California with this technology.
- Based on the foregoing, TORC still believes that there is no commercially viable, cost-effective, or safer Ionic Liquid Acid technology, including Chevron's technology, currently available or in the near future.

Although the ability to question CB&I and Chevron at the August 2nd Working Group about their respective emerging technologies was helpful, TORC concurs with Valero that the following information should be provided by CB&I and Chevron as well as other licensors of emerging Alternative Alkylation Catalyst technologies in order for the District and the impacted regulated entities – TORC and Valero – to understand the fundamental viability, status, impacts, and costs of these technologies:

1. Name of Licensor
2. Name of process technology
3. Location of unit

4. Definition of unit (demonstration unit, bench scale, pilot scale, intermediate scale, full scale, etc.)
5. Olefin feed rate to unit
6. When unit was put into operation
7. Regardless of definition, does the location have a parallel alkylation process of equal or greater size
8. Iso-Butane (or other paraffin consumed) feed rate to unit
9. Alkylate product rate from unit
10. Type of acid catalyst used and supplier
11. Specific feed composition (C4= only, specific C4=, C3=, C5=, other limits)
12. Type of feed pre-treatment used
13. If no specific feed treatment is implemented what are the acceptable feed contaminant levels such as (water, sulfur, diolefins, other)
14. Corrosion history of equipment
15. Special materials of construction requirements
16. Alkylate product quality (RON, MON, sulfur, EP, etc.)
17. Special product treatment for any product streams such as propane, butane, alkylate
18. Does the unit include acid regeneration?
    a. If so, how is that performed?
    b. If not, how is the catalyst regenerated?
    c. What is the cost of regeneration?
    d. How often does it need to be replaced?
19. What is the plot space for the unit? What is the estimated plot space for a unit of approximately 30 MBPD of alkylate production, including any regeneration facilities?
20. What are the results of any Process Hazard Analysis (PHA) conducted on the unit?
21. Were environmental impact reviews performed in connection with permitting the unit? If so what were the results of that review?
22. What is the energy consumption associated with the unit (MMBTU/bbl alkylate or similar measure)?
23. What waste streams / material are generated from the unit
24. What has been the run length between required Maintenance and Inspection? Is this consistent with projected Turnaround cycles?
25. What is the estimated cost for a unit of approximately 30 MBPD of alkylate production?

As TORC stated in its August 1st letter and re-emphasized here, before transitioning from MHF Alkylation to a catalyst other than Sulfuric Acid at the Torrance Refinery, the new technology has to be commercially viable in scope and scale to the Torrance Refinery's existing MHF Alkylation Unit and must be inherently safer than MHF Alkylation. At a minimum to be considered commercially viable, the emerging Alternative Alkylation Catalyst technologies need to be constructed at scale and run at California standards through two four-year turnaround cycles to establish baseline operating and reliability data before their commercial viability can be determined.

TORC is confident the Torrance Refinery's MHF Alkylation Unit safety systems protect Refinery employees and the community while reliably producing CARB gasoline. Specifically, since using MHF in the Refinery's Alkylation Unit starting in 1997, there has not been an offsite release of HF at the Torrance Refinery. Additionally, the Torrance Refinery used HF in the Alkylation Unit without any HF offsite impact from 1966 when the unit was commissioned until 1997 when the unit was modified to us MHF.

As TORC has previously public stated, it will continue to evaluate emerging Alternative Alkylation Catalyst technologies.

Slide 10 - Enhanced Interim Control Measures

In slide 10, the District indicates that it is considering enhanced interim control measures as part of the PR 1410 rulemaking conceptual structure.

From this slide and the prior Working Group meetings, it appears that the District is basing its enhanced interim control measures on the American Petroleum Institute's ("API") Recommended Practice 751 ("API-751"). TORC looks forward to working with the District in potentially including in PR 1410 API-751 as the framework for a MHF performance standard. API-751 is a recommended practice for MHF/HF Alkylation Units that provides proven industry practices to support the safe operation of MHF/HF Alkylation Units. The API is recognized by the U.S. government and globally as the standards-setting organization for the petroleum industry.

Slide 11 - Proposed Enhanced Mitigation

In slide 11, the District provides the following list of enhanced interim control measures that it is potentially contemplating as part of the PR 1410 rulemaking conceptual structure.

- Enhance current mitigation efforts
  - HF Detection Systems
  - Water Mitigation Systems
  - Physical Mechanisms
  - Uninterruptible power and water supply
  - Procedures/Training
  - Inventory Control
  - Inspections/Safety Audits
- More automatic activation – *make "active" mitigation more "passive"*
  - Water Mitigation Systems
  - Emergency Block Valves
  - Acid Transfer/Evacuation System

As TORC presented at the May 18th Working Group Meeting and re-emphasized in its August 1st letter, the Torrance Refinery's MHF Alkylation Unit already meets or exceeds all of API-751's

passive and active mitigation measures. The Refinery's MHF Alkylation Unit has robust release prevention, monitoring, and response systems, which include the following:

- **Preventive Safety Systems**
  - Specialized PPE and training required for all personnel entering the unit
  - Robust inspection and audit program
    - Follow API 751 HF Recommended Practices
    - Industry standard practice recognized by OSHA and other agencies
  - Two Operators stationed on unit each shift in contact with Console Supervisor
  - Eight surveillance cameras with video playback
  - Emergency simulation drills
    - Joint TORC and TFD drills
    - TORC and TFD both Hazmat trained
  - MHF
    - >50% Airborne Reduction Factor (ARF) per MHF chemistry
    - Online MHF Analyzer
- **Emergency Response Safety Systems**
  - Redundant response systems allow rapid response and mitigation to any potential loss of containment
  - Barrier technology (89% total unit ARF when combined with MHF chemistry)
    - Flange barriers
    - Settler belly pans
    - Acid circulation pump enclosures
  - Water Mitigation
    - Nine remotely controlled water cannons
    - Used in tandem with console cameras to target a specific release point
    - Local fire monitors
    - Deluge systems on major pumps
    - Fire sprays on vessels
  - 27 Point sensors located throughout unit and on perimeter
    - Detect HF down to 0.1 parts per million (ppm)
    - Alarms internally at 2 ppm
    - Reported directly to AQMD at 6 ppm
    - In the process of completing a similar alarming system to TFD
  - Line of Sight Laser system on unit perimeter
    - Detect HF down to 0.1 ppm per meter (ppm*m)
    - Alarm internally at 50 ppm*m and 75 ppm*m
  - Emergency system that removes all acid from the main unit to a storage drum located behind a blast wall
    - 80% of acid is removed in ~2 min
    - The remaining 20% is transferred within 7 minutes from system activation
  - Automatic valves have battery backups to allow operation in the event of a power disruption

- Painted on all flanges and connections in acid services
  - Extremely sensitive and changes from yellow to red in the presence of HF
  - Will react to HF concentrations in the parts per billion (ppb) level
- Alarmed safety showers

Despite the scope and scale of the Torrance Refinery's MHF Alkylation Unit safety and mitigation systems listed above, TORC is willing to engage with the District along with API to discuss the potential and timing for potential enhancement of safety systems.

Slide 12 - Upcoming SCAQMD Activities and Slide 13 - Schedule

In these two slides, the District provides its currently anticipated schedule related to PR 1410 rulemaking efforts. For example, slide 12 provides:

- Soliciting feedback to generate preliminary draft rule language
- Begin preparing preliminary draft staff report
- Arrange meetings between alternative alkylation technology manufacturers and refineries to discuss commercial feasibility, transition time and costs
- Obtain any other available detailed conversion cost data
- Working on CEQA and Socioeconomic Analysis
- Next working group meeting September 20, 2017

Additionally, slide 13 provides:

PR 1410 Working Group Meeting #6 (Torrance)	September 20, 2017
Release of CEQA Notice of Preparation/Initial Study	September 2017
Public Workshops / CEQA Scoping Meeting	October 2017
Release of CEQA Draft EIR	October/November 2017
SCAQMD Refinery Committee Meeting	November/December 2017
Governing Board consideration of PR 1410	TBD

For all the reasons discussed previously, TORC requests a delay in releasing any proposed rule language by the next Working Group meeting in September 2017. Releasing such language would be premature because TORC will be providing supplemental and clarifying MHF testing and modeling data requested by District staff, which will further substantiate the efficacy of MHF and that a release of MHF would not form a "dense vapor cloud" as alleged by the District. Additionally, the District will need time to review:

- B&McD cost estimate associated with building a new grass roots Sulfuric Acid Alkylation Unit at the Torrance Refinery provided to the District by TORC on July 26th;

- Stillwater study impacts to refineries and the California petroleum markets associated with a phase-out of MHF provided to the District by TORC on July 26th;
- Updated Capital Matrix information regarding the local and regional impacts associated with a phase-out of MHF provided to the District by TORC on July 26th; and
- More licensors' information regarding emerging Alternative Alkylation Catalyst technologies that has been previously presented by CB&I and Chevron and will be presented at the fifth Working Group meeting on August 23rd.

Even if the District releases proposed rule language in September 2017, it is hard to imagine how the District can then draft and release for public review and comment the following statutorily required rulemaking by the current schedule listed above:

- CEQA Notice of Preparation/Initial Study;
- Draft Staff Report;
- Draft EIR;
- Draft Socioeconomic Report; and
- Revised rule language.

Considering the complexity of the type of CEQA EIR and Socioeconomic Report that needs to be done to address the District's current PR 1410 conceptual rulemaking structure, this does not seem feasible.

As a result, TORC urges the District to slow-down the PR 1410 rulemaking process and allow it to progress naturally as science and technology would dictate, particularly in light of the forthcoming information as noted above.