Texas Commission on Environmental Quality (TCEQ) Responses to Public Comments Received on the Proposed Development Support Document for Toluene April 15, 2008

The public comment period for the proposed Development Support Document (DSD) for toluene ended March in March 2008. Total Petrochemicals, the American Chemistry Council, and ExxonMobil Refining & Supply Co. submitted comments. The Toxicology Section of the TCEQ appreciates the effort put forth to provide technical comments on the proposed DSD for toluene. The goal of the Toxicology Section and TCEQ is to protect human health and welfare based on the most scientifically-defensible approaches possible (as documented in the DSD), and evaluation of these comments furthers that goal. A summary of Total Petrochemicals, the American Chemistry Council, and ExxonMobil comments are provided below, followed by TCEQ responses. The full comments of Total Petrochemicals, the American Chemistry Council, and ExxonMobil are in Appendices 1, 2, and 3, respectively. TCEQ responses indicate what changes, if any, were made to the DSD in response to the comment.

Total Petrochemicals
Comments Regarding the TCEQ Development Support Document for Toluene ESL Values

1.0 The proposed odor-based ESL for toluene should be withdrawn and reevaluated because the Commission has not developed a scientifically sound basis for establishing a criterion for toluene's odor properties.

The proposed DSD fails to demonstrate an adverse effect on public health. The lack of correlation between odor and health risks is well understood and has been summarized by the US EPA in its 1992 publication *Reference Guide to Odor Thresholds for Hazardous Air Pollutants Listed in the Clean Air Act Amendments of 1990.*

TCEQ Response: The DSD was not revised based on this comment. Development toluene's proposed odor-based ESL is based on directives from Sections 382.0518 and 382.085 of the Texas Health and Safety Code (THSC) that specifically mandate the Texas Commission on Environmental Quality (TCEQ) to "conduct air permit reviews of all new and modified facilities to ensure that the operation of a proposed facility will not cause or contribute to a condition of air pollution." In addition, Section 382.003 of the THSC defines air pollution as "air contaminants that: (a) are or may tend to be injurious to or adversely affect human health or welfare, animal life, vegetation, or property; or (b) interfere with the normal use and enjoyment of animal life, vegetation, or property." Furthermore, according to Section 382.002 of the THSC, the powers of the Commission, including the issuance of air permits, are used for "controlling or abating air pollution and emissions of air contaminants, consistent with the protection of public health, general welfare, and physical property, including the esthetic enjoyment of air resources by the public and the maintenance of adequate visibility." In response to the THSC mandate, TCEQ has historically considered odor, and its potential to create a condition of odor nuisance, in the development of short-term ESLs (< 1 hour).

Regarding the scientific basis for toluene's odor-based ESL comment: Toluene's proposed odor-based ESL adheres to TCEQ's 2006 regulatory guidance document, *Guidelines to Develop Effects Screening Levels, Reference Values, and Unit Risk Factors* (RG-442), that underwent external scientific peer review and two rounds of public comment. Furthermore, development of toluene's odor-based ESL included a comprehensive literature search, consideration of all available toluene odor studies, and selection of the lowest 50% odor detection threshold among the studies that meet the American Industrial Hygiene Association and USEPA odor evaluation criteria.

Regarding the public health and/or welfare comment: It is important to note that ESLs, including odor-based ESLs, are intended to be guidelines and not strict standards. For example, when applying the odor-based ESL in an air permit application review, consideration of the nature of the odor, the surrounding land use, the frequency of odor-based ESL exceedance, and the odor complaint history at the site, all play a role in allowing off-site concentrations that exceed the odor-based ESL. Toluene is odorous at a concentration much lower than at a concentration which could cause an adverse health effect. Because of this, if the permit applicant's predicted or monitored toluene concentrations are allowable from an odor perspective, they are allowable from a health perspective as well.

Although TCEQ's Toxicology Section recognizes that the body of data and information surrounding available odor threshold values are not very robust for some chemicals, toluene's odor-based ESL is considered a useful tool in the air permit review process, and addresses the Commission's mandate to protect public welfare and public enjoyment of air resources.

2.0 The proposed DSD fails to demonstrate an adverse effect on public welfare.

More than just a detection of odors is required to find an adverse effect on public welfare. Measured odor thresholds for a single substance can vary widely. Odor reactions are highly subjective. Odor perceptions, particularly in communities can be the result of combined exposure to odors. Generally accepted and objective criteria for odor in communities are non-existent.

TCEQ Response: The DSD was not revised based on this comment. Same response as for Comment 1.0.

American Chemistry Council
Comments Regarding the TCEQ Development Support Document for Toluene ESL Values

1.0 Failure to demonstrate an adverse effect on public health.

The lack of correlation between odor and health risks is well understood and has been well-summarized by EPA (1992, p. 1-22). See 3/17/2008 E-Mail for full comment details.

TCEQ Response: The DSD was not revised based on this comment. Development of toluene's proposed odor-based ESL is based on directives from Sections 382.0518 and 382.085 of the Texas Health and Safety Code (THSC) that specifically mandate the Texas Commission on Environmental Quality (TCEQ) to "conduct air permit reviews of all new and modified facilities to ensure that the operation of a proposed facility will not cause or contribute to a condition of air pollution." In addition, Section 382.003 of the THSC defines air pollution as "air contaminants that: (a) are or may tend to be injurious to or adversely affect human health or welfare, animal life, vegetation, or property; or (b) interfere with the normal use and enjoyment of animal life, vegetation, or property." Furthermore, according to Section 382.002 of the THSC, the powers of the Commission, including the issuance of air permits, are used for "controlling or abating air pollution and emissions of air contaminants, consistent with the protection of public health, general welfare, and physical property, including the esthetic enjoyment of air resources by the public and the maintenance of adequate visibility." In response to the THSC mandate, TCEQ has historically considered odor, and its potential to create a condition of odor nuisance, in the development of short-term ESLs (< 1 hour).

Regarding the scientific basis comment: Toluene's proposed odor-based ESL adheres to TCEQ's 2006 regulatory guidance document, *Guidelines to Develop Effects Screening Levels, Reference Values, and Unit Risk Factors* (RG-442), that underwent external scientific peer review and two rounds of public comment. Furthermore, development of toluene's odor-based ESL included a comprehensive literature search, consideration of all available toluene odor studies, and selection of the lowest 50% odor detection threshold among the studies that meet the American Industrial Hygiene Association and USEPA odor evaluation criteria.

Regarding the public health and/or welfare comment: It is important to note that ESLs, including odor-based ESLs, are intended to be used as guidelines, and not as strict standards. For example, when applying the odor-based ESL in an air permit application review, consideration of the nature of the odor, the surrounding land use, the frequency of odor-based ESL exceedance, and the odor complaint history at the site, all play a role in allowing off-site concentrations that exceed the odor-based ESL. Toluene is odorous at a concentration much lower than at a concentration which could cause an adverse health effect. Because of this, if the permit applicant's predicted or monitored toluene concentrations are allowable from an odor perspective, they are allowable from a health perspective as well.

Although TCEQ's Toxicology Section recognizes that the body of data and information surrounding available odor threshold values are not very robust for some chemicals, toluene's

odor-based ESL is considered a useful tool in the air permit review process, and it addresses the Commission's mandate to protect public welfare and public enjoyment of air resources.

2.0 Failure to demonstrate an adverse effect on public welfare.

The scientific basis for a finding that the odor properties of toluene may adversely affect public welfare has likewise not been adequately documented. See 3/17/2008 E-Mail for full comment details.

TCEQ Response: The DSD was not revised based on this comment. Same response as Comment 1.0.

ExxonMobil Refining & Supply Company
Comment Regarding the TCEQ Development Support Document for Toluene ESL Values

1.0 A specific comment on the proposed odor ESL value for toluene.

The selection of the lowest value of the three studies (i.e., 170 ppb from Hellman, 1974) over more recent values and those chosen as the basis for other chemicals (i.e., 330 ppb from Nagata, 2003) is tenuous, however it is consistent with the RG-442 guidelines to use the lowest value from an appropriate study as you explain in the DSD for toluene.

TCEQ Response: The Toxicology Section appreciates ExxonMobil's acknowledgment that the selection of toluene's odor-based ESL is consistent with the RG-442 guidelines.

Appendix 1

Total Petrochemicals
Public Comment on Proposed Lowering of the ESL for Toluene

TOTAL PETROCHEMICALS

Via e-mail: tox@tceq.state.tx.us

March 17, 2008

Attn: Dr. Michael Honeycutt
Toxicology Section, MC 168
Texas Commission on Environmental Quality
12100 Park 35 Circle, Bldg. F
Austin, Texas 78753

Re: Public Comment on Proposed Lowering of the ESL for Toluene

Dear Dr. Honeycutt:

Thank you for this opportunity to submit public comments on behalf of TOTAL PETROCHEMICALS USA, INC. concerning the Toxicology and Risk Assessment (TARA) group's January 17, 2008 proposal to lower the Effects Screening Level (ESL) for toluene from 1880 ug/m^3 to 640 ug/m^3.

The proposed odor-based ESL for toluene should be withdrawn and reevaluated because the Commission has not developed a scientifically sound basis for establishing a criterion for toluene's odor properties. The proposed DSD fails to demonstrate an adverse effect on public health. The lack of correlation between odor and health risks is well understood and has been summarized by the US EPA in its 1992 publication *Reference Guide to Odor Thresholds for Hazardous Air Pollutants Listed in the Clean Air Act Amendments of 1990.*

The proposed DSD for toluene also fails to demonstrate an adverse effect on public welfare. More that just a detection of odors is required to find an adverse effect on public welfare. Measured odor thresholds for a single substance can vary widely. Odor reactions are highly subjective. Odor perceptions, particularly in communities, can be the result of combined exposure to odors. Generally accepted and objective criteria for odor in communities are non-existent.

For the reasons presented above, TOTAL believes that the proposed odor-based ESL for toluene should be withdrawn and reconsidered on the basis of a more thorough scientific evaluation of the odor-related properties of toluene that are relevant to the potential adverse health and welfare effects on the local community. TOTAL also agrees with the comments submitted by the American Chemistry Council's Toluene & Xylene Panel concerning the proposed lowering of the ESL for toluene. TOTAL respectfully submits these comments for consideration by the TCEQ on the proposed revisions to the ESL for toluene. If you have any questions concerning these comments, please contact me at 713-483-5046.

Sincerely,

Jason Sanders

Jason T. Sanders
Supervisor - Environmental

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Appendix 2

American Chemistry Council
Proposed Acute Welfare-Based Odor ESL for Toluene

SHARON H. KNEISS
VICE PRESIDENT
PRODUCTS DIVISIONS

March 17, 2008

***Via* E-Mail**

Toxicology Section, MC 168
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, TX 78711-3087
<tox@tceq.state.tx.us >

Re: Proposed Acute Welfare-Based Odor ESL for Toluene

The American Chemistry Council's Toluene & Xylene Panel[1] appreciates the opportunity to submit comments on the Texas Commission on Environmental Quality's (TCEQ) January 2008 proposed Development Support Document (DSD) for toluene. This submission addresses only the proposed acute welfare-based effects screening level (ESL) for odor. As developed below, the proposed odor ESL should be withdrawn and reevaluated because the Commission has not developed a scientifically sound basis for establishing a welfare-based criterion for toluene's odor properties.

According to the draft DSD (p. 8), the proposed odor ESL for toluene was developed by selecting the lowest of three studies of toluene odor detection thresholds [Hellman 1974, Nagata 2003, Stalker 1963] that appear on a list of "approved" studies in the Commission's 2006 ESL Guidelines [TCEQ 2006]. Detectability is the sole issue addressed. There is no indication in the DSD that an effort was made to evaluate the other odor properties of toluene or to specifically assess the extent to which such odor properties may cause adverse effects on public health or welfare. Without such an assessment, it is not possible to derive a scientifically sound ESL that achieves the Commission's statutory mission "to protect human health and welfare" [TCEQ 2006, p. 5].

1. Failure to demonstrate an adverse effect on public health: The lack of correlation between odor and health risks is well understood and has been well-summarized by EPA [1992, p. 1-22]:

> Detection of chemical odors may raise health concerns due to the awareness of exposure to chemicals. However, while odor itself is a signal of some type of exposure, it does not necessarily indicate a potential health risk unless the detected chemical is identified, and its toxicity is understood. Without this information,

[1] The Panel members are BP, Chevron Phillips Chemical Company LP, CITGO Petroleum Corporation, ExxonMobil Chemical Company, Flint Hills Resources, LP, Marathon Petroleum LLC, Shell Chemical LP, Sunoco, Inc., and Total Petrochemicals U.S.A.

> odor detection is not useful in risk assessment. This is because the mechanisms that appear to be involved with odor detection have very little to do with the mechanisms involved in chemical-induced toxicity and carcinogenesis.

TCEQ does not appear to take issue with this assessment, although its ESL Guidelines do suggest in passing that "persistent or recurrent exposure to strong odors may cause indirect health effects such as headache and nausea in some individuals" [TCEQ 2006, p. 8]. No references are cited in support of this broad proposition; nor does the limited review of the odor data in the proposed DSD suggest such a relationship in the specific case of toluene. To the contrary, toluene's acute effects have been assessed in what the Commission calls "an abundance of well conducted human inhalation studies," and the lowest levels at which acute effects have been found are over 20 times above the proposed odor ESL [TCEQ 2008, p. 5].

2. Failure to demonstrate an adverse effect on public welfare: The scientific basis for a finding that the odor properties of toluene may adversely affect public welfare has likewise not been adequately documented. The Texas Clean Air Act does not call for the indiscriminate eradication of all odors. Its objective, instead, is the control of facility emissions of odorants if and to the extent that they cause or contribute to adverse effects on welfare. In its ESL Guidelines, the Commission recognizes that more than just detection of odors is required to find an adverse effect on welfare when it observes that welfare-based ESLs are intended to protect against, not any or all odors, but rather "nuisance odor conditions" [TCEQ 2006, p. 2]. Accordingly, the Texas Clean Air Act's public welfare protection mandate calls upon TCEQ to determine not only at what levels odors are detected but also at what levels odors are unacceptable to the well-being of the local community and, hence, are "nuisances."

Odor science points to the same conclusion that mere detection is not a sufficient basis to find unacceptable effects on community well-being. Although our understanding of odors is limited and evolving, there is broad consensus among scientists that detectability is just one of four principal aspects of sensory perception of odorants [EPA 1980, 1992; AIHA 1989]. The other dimensions are intensity, character, and hedonic tone, and all four must be evaluated in concert in order to draw conclusions about the impacts of odorants on the welfare of local communities. There are many reasons why odor detection thresholds identified in specific studies are insufficient by themselves to demonstrate such an impact [EPA 1980, 1992; AIHA 1989; TCEQ 2006]. Several of the most persuasive considerations include:

- Measured odor thresholds for a single substance can vary by up to four orders of magnitude, leaving a very wide range of concentrations that might be found to be unacceptable to local communities.
- Odor reactions are highly subjective and strongly dependent on the context in which the odor is perceived.
- In many community settings, particularly urban areas, odor perceptions are the result of combined exposures to odorants.

- Both the character and the hedonic tone of an odorant can vary at different intensities, frequencies and durations.
- Generally accepted and objective criteria for community acceptability of odors are not available.

The upshot, as EPA has observed, is that "standards tied to 'detection' or 'recognition' thresholds are generally inadequate because they do not necessarily relate to the annoyance property of the odorant within the context of the community setting in which the odor is normally experienced" [EPA 1980, p. 14].

For the reasons presented above, the ACC Toluene & Xylene Panel believes that the proposed odor-based ESL for toluene should be withdrawn and reconsidered on the basis of a need for a more thorough scientific evaluation of all the odor-related properties of toluene that are relevant to an assessment of potential adverse welfare effects on local communities. If further information is needed with respect to these comments, please contact Katherine Schroen, Manager of the ACC Toluene & Xylene Panel at (703) 741-5612 or by email at Katherine_Schroen@americanchemistry.com.

Sincerely,

Sharon H. Kneiss,
Vice President,
Products Divisions

References

AIHA 1989. American Industrial Hygiene Association, Odor Thresholds for Chemicals with Established Occupational Health Standards. Fairfax, VA: AIHA Press 1989.

EPA 1980. US Environmental Protection Agency, Regulatory Options for the Control of Odors. Research Triangle Park, NC: Office of Air Quality Planning and Standards, EPA-450/5-80-003, February 1980. Available from: NTIS, Springfield, VA; PB80-156169.

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Hellman 1974. Hellman TM, Small FH, Characterization for the Odor Properties of 101 Petrochemicals Using Sensory Methods. J. Air Pollut. Control Assoc. 1974; 24:979-982.

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Stalker 1963. Stalker WW, Defining the Odor Problem in a Community. Am. Ind. Hyg. Assoc. J. 1963; 24:600-605.

TCEQ 2006. Texas Commission on Environmental Quality, Guidelines to develop effects screening levels, reference values, and unit risk factors. RG-442, 2006. http://www.tceq.state.tx.us/files/rg-442.pdf_4006501.pdf.

TCEQ 2008. Texas Commission on Environmental Quality, Toluene; CAS Registry Number: 108-88-3. Proposed Development Support Document, January 2008.

Appendix 3

ExxonMobil Comments on Proposed DSDs

From: <judy.m.bigon@exxonmobil.com>
To: <tox@tceq.state.tx.us>
Date: Mon, Mar 24, 2008 8:51 AM
Subject: ExxonMobil Comments on Proposed DSDs

ATTN: Dr. Michael Honeycutt and Roberta Grant

ExxonMobil Downstream & Chemical Safety Health and Environmental (SHE) submits comments on the latest list of Development Support Documents (DSD) for Effects Screening Level (ESL) development. The chemicals of interest to ExxonMobil are 1) Butene-1; 2) Butene-2; 3) Ethylene; 4) Isobutene; and 5) Toluene. Our understanding is the DSD is the summary document of available technical health and environmental information and the DSD's were developed according to RG-442 Guidelines to Develop Effects Screening Levels, Reference Values and Unit Risk Factors.

ExxonMobil congratulates the TCEQ on the thorough and complete preparation of these DSD's, and it is clear that the RG-442 guidelines were fully implemented as designed by the TERA group. The RG-442 guidelines appear to be a significant procedure that allows the TCEQ to craft a whole, complete technical dossier on individual chemicals in order to arrive at technically sound and defensible Effects Screening Levels that are protective of public health and welfare. ExxonMobil especially applauds the TCEQ on the open and transparent processes that were used to develop the DSD's, to include the public discussions that TCEQ staff offered for individual DSD review as well as data solicitation early in the process. ExxonMobil provided information and data to the TCEQ staff early in the process, and was engaged as one of the many stakeholders in the ESL development. We want to encourage TCEQ to continue this progressive and open scientific development process, guided by RG-442 and a cooperative spirit.

ExxonMobil's general comment on the 5 DSD documents (list above) pertains to the development and/or application of the odor threshold value as the basis of short-term ESL permit review values. We believe that the TCEQ has essentially done its best with respect to evaluation and implementation of an odor threshold value to describe the short-term ESL permit targets, and those targets are uniformly lower than both Acute and Chronic health values such that the public can and should feel confident that TCEQ ESL values are conservative in a manner to protect against human health effects. As well, the information with respect to odor thresholds used to develop these latest DSD's allowed a general relaxation of earlier (i.e., 2003) acute odor limit values, which had obviously been set using quite conservative values and techniques. ExxonMobil offers that the body of data and information surrounding the very important odor limit values are not very robust, and the primary documents from Katz and Talbert (1930's) with

updates from Nagata (2003) should be investigated with more current and technically precise methods. Since these odor values essentially take precedence over all the very sophisticated acute/chronic ReV's and URF's, the TCEQ should encourage the more complete and accurate development of these values in the future.

A specific comment on the proposed odor ESL value for toluene, the selection of the lowest value of the three studies (i.e., 170 ppb from Hellman, 1974) over more recent values and those chosen as the basis for other chemicals (i.e., 330 ppb from Nagata, 2003) is tenuous, however it is consistent with the RG-442 guidelines to use the lowest value from an appropriate study as you explain in the DSD for toluene. We feel that TCEQ will be challenged in areas such as this, for example with respect to the chronic ESL/ReV values for both 1-butene and 2-butene. TCEQ carefully followed the guidelines laid out by TERA in the 2006 RG-442 document, and properly chose to not establish the chronic ReV as the minimum data sets were not met.

ExxonMobil supports the values developed by TCEQ with respect to Acute and Chronic ESL values for health and welfare for the 5 chemicals listed above. ExxonMobil wants to reiterate the significant effort and collegial approach that TCEQ has employed in this latest set of DSD's. Overall, the current Acute and Chronic ESL proposed values were developed in a documented scientific manner, with clear and transparent methods, and include the maximum amount of actual published data and methods to interpret those data based on the publically reviewed and agreed upon approaches laid out in RG-442. ExxonMobil would very much like to continue to be included in these processes and offer our technical services whenever TCEQ and the public feel they are necessary.

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