



OFFICE OF CHEMICAL SAFETY AND POLLUTION PREVENTION

WASHINGTON, D.C. 20460

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MEMORANDUM

SUBJECT: 1,3-Butadiene TRI and NEI Risk Estimate Comparison Analysis

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PURPOSE: EPA acknowledges that general population cancer risk estimates for 1,3-butadiene can be refined using air release input data from the National Emissions Inventory (NEI). In the 2024 *Draft 1,3-Butadiene Risk Evaluation*, risk estimates were screened and modeled using Toxics Release Inventory (TRI) data. This memo describes a refinement of risk analysis for the TRI facilities showing greatest cancer risk to the general population from air exposure to 1,3-butadiene. These refined and facility-specific risk estimates provide important updated estimates for incorporation into the final risk evaluation.

COMPARISON ANALYSIS: The *Draft Risk Evaluation for 1,3-Butadiene* ([U.S. EPA, 2024a](#)) includes risk estimates for the general population via inhalation of 1,3-butadiene in the ambient air. Using the Human Exposure Model (HEM), ambient air concentrations of 1,3-butadiene were modeled based on the 2016 to 2021 Toxic Release Inventory (TRI) release data as the emissions input. In the *Draft General Population Exposure for 1,3-Butadiene* ([U.S. EPA, 2024b](#)), it was noted that National Emissions Inventory (NEI) release data were also assessed in the *Draft Environmental Release and Occupational Exposure Assessment for 1,3-Butadiene* ([U.S. EPA, 2024c](#)) but were not included in modeling ambient air concentrations and subsequent general population exposure and risk estimates. This document serves to provide an initial sensitivity analysis by comparing the risk estimates calculated when TRI release data are used as an input to risk estimates calculated when NEI release data are used as the emissions input. Data are presented for the nine TRI facilities with risk estimates at or above 1 in 100,000. This sensitivity analysis may inform the best/most efficient way to incorporate revised risk estimates based on NEI release data into the final risk evaluation. Overall, the risk estimates based on NEI release data were lower than risk estimates based on TRI release data for all nine facilities (within the same order of magnitude and up to four orders of magnitude lower).

The approach and methodology for HEM modeling are detailed in Section 2 of the *Draft General*

Population Exposure for 1,3-Butadiene ([U.S. EPA, 2024b](#)). Risk estimate results are detailed in Section 5.3.4 of the *Draft Risk Evaluation for 1,3-Butadiene* ([U.S. EPA, 2024a](#)). HEM allows for modeling of ambient air concentrations and resulting inhalation risk estimates at census block centroids surrounding a release facility. Initial HEM modeling using TRI releases as an input resulted in 9 facilities with risk estimates at or above 1 in 100,000 for census blocks within 50 km of those facilities. As described in Section 2.3.3 of the *Draft Environmental Release and Occupational Exposure Assessment for 1,3-Butadiene* ([U.S. EPA, 2024c](#)), NEI release data were assessed for the 2017 and 2020 reporting years. As a sensitivity analysis, EPA used HEM to refine and model risk estimates for the general population using NEI release data with the same approach and methodology that was conducted with TRI release data. NEI release data include facility-specific details (e.g., stack height, stack diameter, fugitive area, etc.), allowing for facility-specific input parameters to be used in HEM modeling along with, if available, emission unit-specific latitude and longitude coordinates, which allows for refined spatial modeling results. The granularity of data available in NEI allowed for refinement of modeled ambient air concentrations and risk estimates. For the full set of user inputs, see supplemental file: *Draft Human Exposure Model (HEM) NEI 2017 and 2020 Preliminary Exposure and Risk Analysis for 1,3-Butadiene* ([U.S. EPA, 2025](#)).

All nine facilities reported to the NEI 2017 and 2020 release years and risk estimate results are provided in Table 1. The highest cancer risk was associated with the Beaumont Chemical Plant (EISD 5653011), a 1,3-butadiene processing facility located in Beaumont, TX. This facility also reported to the TRI under the facility name Goodyear Tire and Rubber Co. (TRI ID 77720THGDYINTER). In efforts to directly compare TRI and NEI risk estimates, NEI risk estimates were compared at the same census blocks that resulted in the highest TRI risk estimates. When comparing NEI risk estimates at the same census block that resulted in the highest TRI risk estimate, the NEI 2017 and 2020 risk estimates were lower at 8.2×10^{-6} , or 8.2 in 1,000,000, and 1.8×10^{-6} , or 1.8 in 1,000,000, respectively. Both NEI risk estimates were lower than the TRI risk estimate of 1.0×10^{-5} , or 1 in 100,000.

The risk estimates based on NEI release data were lower than risk estimates based on TRI release data for all nine facilities: within the same order of magnitude and up to four orders of magnitude lower. Based on the NEI risk estimates, none of the nine facilities resulted in risk estimates at or above 1 in 100,000. There were a total of 825 facilities that reported across the 2017 and 2020 NEI reporting years. A preliminary analysis for all NEI 2017 and 2020 reporting facilities was conducted and, overall, did not result in risk estimates greater than TRI risk estimates. NEI risk estimate results are available in the supplemental file *Draft Human Exposure Model (HEM) NEI 2017 and 2020 Preliminary Exposure and Risk Analysis for 1,3-Butadiene* ([U.S. EPA, 2025](#)). Summary tables for NEI cancer risk estimates are presented in Appendix H of the *Draft Risk Evaluation for 1,3-Butadiene* ([U.S. EPA, 2024a](#)).

Table 1. TRI and NEI Risk Estimate Comparison for TRI Facilities with Risk at or Above 1 in 100,000

Facility Name	TRI ID	NEI EISD	TRI (2016-2021)	NEI 2017 and 2020	NEI 2017	NEI 2020
			Max Census Block Cancer Risk ^a	Max Census Block Cancer Risk ^b	Cancer Risk at TRI Census Block ^c	Cancer Risk at TRI Census Block ^c
TOTALENERGIES PETROCHEMICALS & REFINING USA INC-PORT ARTHUR	77640FNLNDHIGHW	4863111	7.4E-05	3.7E-08	1.8E-08	6.9E-09
LION ELASTOMERS ORANGE LLC	77630FRSTNFARMR	5780411	3.2E-05	1.4E-06	2.6E-08	3.9E-08
TPC GROUP	77651TXSPT212SP	13407911	2.4E-05	1.0E-05	2.6E-07	1.9E-07
SASOL CHEMICALS (USA) LLC-LAKE CHARLES CHEMICAL COMPLEX	70669VSTCHOLDSP	8468011	2.3E-05	2.3E-07	1.2E-07	1.3E-07
FIRESTONE POLYMERS LLC	70602FRSTNLA108	8465911	1.7E-05	1.2E-06	1.2E-06	2.2E-07
SHELL NORCO CHEMICAL PLANT	70079SHLLL1205R	8239511	1.3E-05	2.4E-06	2.3E-06	3.7E-07
DIXIE CHEMICAL CO INC	77507DXCHM10701	4862611	1.1E-05	6.1E-06	6.1E-06	8.8E-07
GOODYEAR TIRE & RUBBER CO	77720THGDYINTER	5653011	1.0E-05	2.6E-05	8.2E-06	1.8E-06
ARLANXEO	77631PLYSRFM100	3961411	9.8E-06	4.1E-06	4.1E-06	3.1E-06
^a Risk estimate from the census block with the highest risk based on TRI releases from 2016 to 2021						
^b Risk estimate from the census block with the highest risk based on NEI releases from 2017 and 2020						
^c Risk estimate based on NEI releases at the census block that resulted in the highest risk estimate based on TRI releases						

REFERENCES

[U.S. EPA](#) (U.S. Environmental Protection Agency). (2024a). Draft Risk Evaluation for 1,3-Butadiene. Washington, DC: Office of Pollution Prevention and Toxics.

[U.S. EPA](#) (U.S. Environmental Protection Agency). (2024b). Draft General Population Exposure for 1,3-Butadiene. Washington, DC: Office of Pollution Prevention and Toxics.

[U.S. EPA](#) (U.S. Environmental Protection Agency). (2024c). Draft Environmental Release and Occupational Exposure Assessment for 1,3-Butadiene. Washington, DC: Office of Pollution Prevention and Toxics.

[U.S. EPA](#) (U.S. Environmental Protection Agency). (2025). Draft Human Exposure Model (HEM) NEI 2017 and 2020 Preliminary Exposure and Risk Analysis for 1,3-Butadiene. Washington, DC: Office of Pollution Prevention and Toxics.