

MEMORANDUM

To: Mr. Steve Williams, Technical Director, Green Valley Products, LLC.

From: Robert P. DeMott, Ph.D., DABT, Principal Toxicologist
Michael B. Kaniuga, MSPH, CIH, CSP

Date: 01 July 2024

Subject: Evaluation of Green Valley Products GVP PRO 2.0 HFO Spray Polyurethane Foam (SPF) Emission Concentrations for the Purpose of Establishing Acceptable Risk-Based Re-Entry and Re-Occupancy Times

Introduction and Conclusions

Ramboll has reviewed the results of a recent Spray Polyurethane Foam (SPF) closed-cell emission study conducted by Wood Industrial Health Associates, LLC. for the purpose of evaluating emissions of methylene diphenyl diisocyanate / polymeric methylene diphenyl diisocyanate (MDI/pMDI), amine catalysts, short-chain aldehydes, and flame-retardant emissions following application of Green Valley Products, LLC (Green Valley) GVP PRO 2.0 HFO formulation.

The SPF emission study was conducted at the Evonik Corporation (Evonik) R&D 3 ventilated enclosure located in Trexlertown, PA following requirements described in ASTM Standard D8445 22 "*Standard Practice for Measuring Chemical Emissions from Spray Polyurethane Foam (SPF) Insulation Samples in a Large-Scale Ventilated Enclosure.*" The study involved ambient air monitoring for the presence of MDI/pMDI and tertiary amine catalysts and their reaction products and impurities along with a flame retardant and three short-chain aldehydes (formaldehyde, acetaldehyde and propionaldehyde).

GVP PRO 2.0 HFO formulation was evaluated on March 11-15, 2024. Ambient air samples were collected during application of the SPF and at 15 minutes, 30 minutes, and 1, 2, 3, 6, 24, 48 and 72-hours post application. Sample collection duration varied from 5-minutes (during application) to 15-minutes (within the first hour post application) and 1-hour (after 2-hours post-application).

The spray room was ventilated at an initial air exchange rate of 10 air-changes per hour (ACH) during application of the SPF and for the first hour following application. The ventilation rate was reduced to 0.3 ACH after the first hour of post-application ventilation and remained at 0.3 ACH for the duration of each of the ventilation/monitoring periods. At ambient temperatures, under the conditions of this testing and with respect to potential emissions of MDI/pMDI, amine catalysts and their by-products/impurities, aldehydes and flame retardant, the results support the conclusion that a 1-hour ventilation period at 10 ACH is sufficient to reduce indoor air levels below risk-based guidelines for re-entry of unprotected workers and re-occupancy by the general population, including residents.