

MEMORANDUM

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

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

Date: 28 November 2023

Subject: Evaluation of Green Valley Products GVP 500 OC NM 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) open-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 500 OC NM 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 500 OC NM formulation was evaluated on July 10-14, 2023. 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. Background samples were collected prior to each test from within the spray room at an air exchange rate of 0.3 and 10 ACH.

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.