Vapor Pressure of Heavy Petroleum Liquids for Estimating Emissions

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Introduction

This technical report will provide a methodology to predict the vapor pressure for heavy petroleum liquids (i.e. having vapor pressure below 1 psi) over a range of temperatures by evaluating the results of simulated distillation tests in process simulation software. The term “vapor pressure,” for purposes of this report, refers to the sum of the equilibrium partial pressures exerted by the components of a volatile organic liquid at a given temperature.

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1 Scope

This technical report provides a methodology to predict the vapor pressure for heavy petroleum products over a range of temperatures by evaluating the results of simulated distillation tests in process simulation software.

2 Terms, Definitions, Acronyms, and Abbreviations

2.1 Terms and Definitions

There are no terms and definitions specified for the purposes of this document. Terms of more general use can be found in the API *Manual of Petroleum Measurement Standards (MPMS)* Chapter 1 *Terms and Definitions* online database.

2.2 Acronyms and Abbreviations

API	American Petroleum Institute
ASTM	American Society for Testing and Materials
EPA	US Environmental Protection Agency
GC	gas chromatograph
MPMS	*Manual of Petroleum Measurement Standards*
MW	molecular weight
RVP	Reid vapor pressure
SG	specific gravity
TBP	true boiling point
VOC	volatile organic compound

3 Executive Summary

3.1 Statement of Purpose

Currently, there are limited vapor pressure data available for use in estimating tank emissions for heavy petroleum liquids. The limited data provided in API *MPMS* Chapter 19.4 are likely outdated, as discussed in 4.3. As discussed in Section 4, a method is needed for obtaining more representative vapor pressure data over a range of temperatures to improve emissions estimation from tanks storing these heavy stocks.

This project was initially tasked with collecting and evaluating existing vapor pressure or distillation curve data for heavy (low volatility) petroleum liquids. However, collection of vapor pressure data was not successful because there was not a reliable test method available for determining vapor pressure for heavy stocks. The project then focused on developing a methodology for predicting vapor pressure of heavy stocks from distillation curve data.

This technical report presents methodology for predicting the vapor pressure of heavy stocks over a range of temperatures by evaluating the results of simulated distillation tests in process simulation software. The protocol for the method is provided in Annex A.

3.2 Method for Predicting Vapor Pressure

3.2.1 General

The method presented in this report for predicting vapor pressure of a stock involves the following steps.