

TEXAS ENVIRONMENTAL RESEARCH CONSORTIUM (TERC) PROJECT H7-A:

COMPILATION OF INFORMATION ON COOLING TOWERS, EQUIPMENT FUGITIVE LEAKS, AND FLARES

FINAL REPORT

Executive Summary

Recent studies have shown that industrial emissions of highly reactive volatile organic compounds (HRVOC) are important in the formation of high ozone levels in the Houston – Galveston Area (HGA) and that the levels of HRVOC in ambient air downwind of industrial facilities in the HGA typically are much greater than would be expected based on the emissions that are routinely estimated and reported using conventional regulatory guidance. These findings have caused widespread concern throughout the air quality scientific and regulatory communities in Texas that reductions in HRVOC emissions are needed for HGA to attain the federal ozone standards and that adjustment to previously reported HRVOC emissions inventories may be needed to accurately model ozone formation and control in the HGA for regulatory development.

To gather basic information that would be helpful in addressing HRVOC emissions inventory concerns and control strategy development, the Texas Environmental Research Consortium (TERC) sponsored a survey of HRVOC emissions sources in the HGA. URS Corporation conducted the survey under contract to the Houston Advanced Research Center, the management organization for TERC, and with guidance from the Texas Commission on Environmental Quality (TCEQ). This document reports on the survey methods and results.

Permitted emissions for cooling towers ranges from 0 to 7.26 pounds per hour and from 0 to 5.47 tons per year. The range of estimated emission rates for leak events at two of the cooling water towers in the survey were 3.5 – 5.6 lb/hr and 7.2 – 12.3 lb/hr. These estimated emission rates are comparable to the estimated emissions for these cooling towers derived using the “controlled” emission factors given by AP42, Chapter 5.1 and are approximately one order of magnitude lower than the estimated emissions using the AP42, Chapter 5.1 “uncontrolled” emission factors (see Table 3-5).

The survey responses for the leak events at two other cooling water towers did not include estimated emissions. Based on the El Paso Stripper measurements that were reported for these events, the emission rates of 3200 – 22,000 lbs/hour could have been up to three orders of

magnitude higher than the AP42, Chapter 5.1 “uncontrolled” emissions estimates if the VOC were 100% strippable.

Of the 57 flares surveyed in this report, 45 emit material routinely, 34 are steam assisted and 10 are air assisted. Flare heights for the 22 respondents that provided this information ranged from 35 ft – 300 ft. We obtained data for 11 flaring events that occurred during August 2000 through September 2000. The events ranged in duration from 2 hours to 144 hours. The total estimated VOC emissions released during these events ranged from 1 pound to 31,282 pounds. On an hourly basis, the estimated VOC emissions ranged from 0.5 to 371 pounds per hour. The estimated emissions were below the 5000 pounds reportable quantity that existed for ethylene and propylene at the time.

Information on fugitive emissions sources was provided for four plant sites. General information on each plant’s leak detection and repair (LDAR) program and some information on control devices and component counts is provided in the report. Also, information on delay of repair (DOR) at each plant site is provided. The numbers of components on DOR ranged from 0 to 425. All the plant sites reporting data responded affirmatively to whether the emissions estimates from DOR components are included in the emissions inventory.