

1. INTRODUCTION

This report presents an overview of the data set collected during the SHARP and TRENF campaigns. Included in the report is the document titled “Aztec Aircraft Data Atlas Final Data Volume H103A”. The data atlas contains graphical products for the science flights flown for both studies. Section 1 of the report includes a program overview, description of the measurement systems, and a brief summary of quality control and quality assurance (QC-QA) procedures. For details, refer to the Quality Assurance Project Plan titled “Airborne Measurements to Investigate Radical Sources in the Houston Area Project H103A.” The last section, Section 3, is a preview of two science flights.

1.1 PROGRAM OVERVIEW

It was proposed to conduct an airborne measurement campaign in and around the Houston area during two campaign periods. The first campaign, SHARP (Study of Houston Atmospheric Radical Processes) began in April and ended at the end of May 2009. The second, TRENF (Traffic Related Emissions of Nitrous acid and Formaldehyde) began in June and continued until the end of November 2009. The research objectives that were addressed included characterization of HCHO (Formaldehyde) emissions from point and area sources and support of surface-based and remote sensing measurement campaigns through measurement of the aloft concentrations of primary and secondary pollutants during intensive field studies. Together, the focal point was to investigate radical sources in the form of HCHO and HONO (Nitrous acid) in the Houston area.

The proposed measurement campaign included fifty flight hours to be divided between the two measurement periods. Ten additional flight hours were flown during the program. Flight plans were developed in concert with researchers from the other concurrent campaigns to best support their measurements and to take advantage of the airborne flexibility in sampling particular source plumes and aloft atmospheric regions. A twin engine Piper Aztec aircraft was utilized which included a base set of chemical and physical sensors to detect ozone (O₃), reactive nitrogen compounds (NO, NO₂, and NO_y), carbon monoxide (CO), alkenes (RAD instrument), formaldehyde (HCHO), particle number density sized from 0.5-10 μm (particle spectrometer),

integrated particle scattering (3- γ nephelometer), up and downward facing $j(\text{NO}_2)$ filter radiometers, VOC canister grab samples, wind speed and direction, temperature, relative humidity, pressure, and GPS location.

The expected benefit of the proposed measurement campaign was to significantly enhance the quality and quantity of data related to the sources and atmospheric chemistry of odd-hydrogen radical sources in the Houston area. By extension, the policy benefits are derived from the greater understanding of these sources and processes that will be available for SIP reference and development.

The experiments and related flights are listed in Table 1-1. A total of fourteen flights were flown. Four flights were focused on the Texas City petro-chemical industrial complex, in support of the stationary DOAS (Differential Optical Absorption Spectroscopy), SOF (Solar Occultation Flux) van, and Aerodyne truck. Similarly, five flights were flown at the Mount Belvieu facilities and the Houston Ship Channel. In addition, two night-into-day flights were flown and three flights in support of the TRENF campaign.

Table 1-1 Summary of flights performed to meet each program objective.

Flight profile	Flight Dates (2009)
Texas City Refinery Complex - (SHARP)	5/07, 5/08, 5/13, 5/14
Mount Belvieu and Houston Ship Channel - (SHARP)	5/18, 5/19, 5/25, 5/28, 5/30
Houston urban area/Night into day - (SHARP)	5/21, 6/05
Galleria and Houston Ship Channel (TRENF)	10/19, 10/28, 11/03