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EPA-600/R-94-135
August 1994

FINAL REPORT

EVALUATION OF EMISSIONS FROM PAVING ASPHALTS

Prepared by:

Christopher C. Lutes, Raymond J. Thomas, and Renée Burnette
Acurex Environmental Corporation
4915 Prospectus Drive
P.O. Box 13109
Research Triangle Park, NC 27709

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EPA Project Officer: Bobby E. Daniel

U.S. Environmental Protection Agency
Air and Energy Engineering Research Laboratory
Research Triangle Park, NC 27711

Prepared for:

U.S. Environmental Protection Agency
Office of Research and Development
Washington, D.C. 20460

ABSTRACT

This work provides data from pilot-scale measurements of the emissions of specific air pollutants from paving asphalt both with and without recycled crumb rubber additives. The methods used in this work measured emissions from a static layer of asphalt maintained for a period of several hours near the highest temperature likely to be encountered in a real paving operation (176 °C, 350 °F). Although concentration levels observed for most species were in most cases near the detection limits of the analytical methods applied, statistically significant emissions of a variety of pollutant species were observed. Volatile organic compounds (VOCs) analyses showed significant amounts of benzene emitted from both types of asphalt studied. An analysis targeting 16 polycyclic aromatic hydrocarbons (PAHs) species of primary interest revealed significant emissions of seven of the 16 species when the AC10 asphalt without rubber tests were compared to the facility blank tests. The emissions of five of 16 PAH species were significantly higher in the AC10 thin layer with rubber tests than in the facility blank tests. The concentration observed, though significant, were close to the limit of detection. Statistically significant emissions of both total particulates and PM_{10} were found from both types of asphalt hot-mix material tested.

PREFACE

The Control Technology Center (CTC) was established by the U.S. Environmental Protection Agency's (EPA's) Office of Research and Development (ORD) and Office of Air Quality Planning and Standards (OAQPS) to provide technical assistance to state and local air pollution control agencies. Three levels of assistance can be accessed through the CTC. First, a CTC HOTLINE has been established to provide telephone assistance on matters relating to air pollution control technology. Second, more in-depth engineering assistance can be provided when appropriate. Third, the CTC can provide technical guidance through publication of technical guidance documents, development of personal computer software, and presentation of workshops on control technology matters.

The technical guidance projects, such as this one, focus on topics of national or regional interest that are identified through contact with state and local agencies.

ACKNOWLEDGEMENTS

The authors gratefully acknowledge that this project would not have been successful without the contributions of many individuals. The Project Officer, Bobby Daniel of EPA's Air and Energy Engineering Research Laboratory (AEERL) provided steadfast support and guidance and secured asphalt materials for testing. Gary Foureman of EPA's Environmental Criteria and Assessment Office (ECAO) provided additional technical guidance and helped secure samples for testing. C.W. Lee of EPA/AEERL arranged for the use of a real-time PAH analyzer for this project. Mack Wilkins of EPA's Atmospheric Research and Exposure Assessment Laboratory (AREAL) loaned an SO_2 analyzer for project use.

The assistance of several asphalt companies in providing test materials and data on the composition of test materials is gratefully acknowledged. Samples were provided by Scott Montgomery of Blythe Industries and Roy Hamlin of Asphalt Rubber Systems. Rick Dingus of the C.C. Mangum Corporation generously provided the services of its laboratory as well as a supply of aggregate to prepare a hot-mix from the asphalt provided by Asphalt Rubber Systems.

A large number of Acurex Environmental Corporation employees contributed to this project. Jeff Ryan provided ongoing technical guidance and review. Bryant Harrison, Chris Pressley, and Bill Mitchell had important roles in conducting the pilot-scale tests. Tony Lombardo, Jeff Quinto, Lonnie Phipps, Buck Gormley, and Jeff Johnson were essential in the engineering, design, and construction of the asphalt heating vessel and in customizing the emissions testing facility for use in this project. Lisa Florer, Frank Mack, Terry McKee, and Karen Smith of Acurex Environmental helped produce this document. Ron Harris of Acurex Environmental conducted analyses of PAHs and provided technical advice in mass spectrometry. Mitchell Howell and Roy Gorman conducted the VOC analyses. Mark Bero played a key role in the identification of tentatively identified organic species. Rob Martz provided additional technical review services.

Semivolatile organic analytical services were provided by Air Toxics Ltd. under the direction of Linda Freeman, Bob Freeman, and Alexis Meredith. Lead analyses were provided by IEA Inc. under the direction of Linda Mitchell and Sue Stutts. Elemental analyses were provided by Gailbraith Laboratories under the direction of Gail R. Hutchens.

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SECTION 1

INTRODUCTION

Paving asphalt is a widely used product with incompletely characterized emissions to the atmosphere. Approximately 20 million metric tons of asphalt were sold in 1976.[1] Asphalt is primarily composed of "very high molecular weight hydrocarbons."[1] The vast majority of asphalt used in road paving applications is derived from petroleum refining, although asphalt can also be obtained from natural deposits.[1] Asphalt is most often used in paving applications as a "hot-mix" of petroleum-derived asphalt and aggregate material (crushed stone or gravel).[2]

Typical elemental analyses of asphalt show the following approximate weight percentages: carbon, 80-90 percent; hydrogen, 5-11 percent; sulfur, 0.4-7.3 percent; nitrogen, 0.4-0.9 percent; and oxygen, 0.0-2.0 percent.[1] Among the compounds identified in a soxhlet extract of an asphalt sample were dibenzothiophene, methyldibenzothiophene, phenanthrene, pyrene, and fluoranthene.[3]

A previous study attempted to measure pollutant levels in the emissions, known as "blue smoke," from an asphalt hot-mix facility using a temporary enclosure to aid sampling.[2] Concentrations measured (in ppm, vol) were carbon monoxide (3-6 ppmv), C_2-C_6 hydrocarbons (< 1 ppmv), hydrogen sulfide (< 0.2-1.5 ppmv), methane (2-3 ppmv), nitrogen dioxide (0.05-0.08 ppmv), and sulfur dioxide (< 2 ppmv). Concentrations were also reported for the following organic species ($\mu g/1{,}000\ m^3$): pyrene (44-240), benzo(a)anthracene (5-38), benzo(a)pyrene (3-22), benzo(e)pyrene (non-detectable - 40), perylene (5-16). The particulate matter (PM) was determined to be composed of aromatics (26 percent), cycloparaffins (40 percent), paraffins (28 percent), and sulfur aromatics

(6 percent).[2] Asphalt emissions were also discussed in a recent EPA report to Congress.[4] An evaluation of available literature shows a lack of emissions data for specific pollutants measured in such a way that emissions from asphalt paving could be estimated. Thus, the steering committee of the U.S. Environmental Protection Agency's (EPA's) Control Technology Center (CTC) sponsored a research project examining emissions from paving asphalt. This study was performed under contract to the EPA's Air and Energy Engineering Research Laboratory (AEERL) by Acurex Environmental Corporation. The work was conducted through the guidance of an EPA-approved Quality Assurance (QA) Test Plan (AEERL QA Category III).

SECTION 2

OBJECTIVES

The objective of this work was to provide quantitative data on the emissions of specific pollutants from paving asphalt. In addition, because paving asphalts with recycled crumb rubber additives are now beginning to be used, as required by the Intermodal Surface Transportation Efficiency Act.[5] This project also compared the emissions of asphalt with and without this additive. Crumb rubber is defined as "scrap tire rubber that has been processed to particle sizes usually less than 9.5 mm."[4] The acquired data are intended to provide insight into the possible health effects of human exposure to asphalt emissions as well as to assess the contribution of asphalt emissions to ozone non-attainment. This report will also provide baseline data to which the emissions from other modified asphalt products can be compared.

This work was performed at EPA's Environmental Research Center (ERC) in Research Triangle Park, NC, by Acurex Environmental. Samples of paving asphalts provided were heated in a specially designed vessel, described in Section 3, within the Open Burning Simulation Test Facility. Testing included two types of asphalt—an AC10 grade asphalt hot-mix, and an AC10 grade asphalt hot-mix with a crumb rubber additive. The engineering properties of the asphalt grades are well defined in the literature.[1] Sampling was performed for a wide range of volatile and semivolatile organics, total PM, NO, SO_2, CO, O_2, CO_2, and particulate-phase lead. A list of specific PAH species were specifically targeted due to their demonstrated carcinogenicity in animals.

The concentration data for all analytes were converted to emission rates expressed on a per time and per surface area basis. These rates were calculated from the volumes sampled by each train, the volumes of air flowing into the test facility, the measured mass or concentration of analyte, the surface area of the asphalt heating vessel, and the duration of the sampling period as follows:

$$\text{Emission rate} = (m \times f \times t \times u)/(v \times s \times t)$$

where:

m = mass of analyte

f = flow rate into facility

t = time period of sampling

u = unit conversion factor, as appropriate

v = volume of air sampled

s = surface area of vessel

Alternately,

$$\text{Emission rate} = (c \times f \times t \times u)/(s \times t)$$

where:

c = measured concentration of analyte

f = flow rate into facility

t = time period of sampling

u = unit conversion factor, as appropriate

s = surface area of vessel

SECTION 3

APPROACH

3.1 SUMMARY OF EXPERIMENTAL APPROACH

The project consisted of a replicate study to collect and qualitatively and quantitatively characterize organic and inorganic emissions from a pilot-scale simulation of the asphalt paving processes. Although it was recognized that asphalt experiences a variety of temperature conditions during a paving process, the EPA and Acurex Environmental investigators believed that it was impractical to simulate this temperature profile in an experimental situation. Simulation of the physical agitation undergone by an asphalt hot-mix material during the course of its application by automated road construction equipment was also judged to be well beyond the resources available for this pilot-scale project. Therefore, it was decided that a measurement of emissions from a static layer of asphalt, maintained for a period of several hours near the highest temperature likely to be encountered in a real paving operation, would provide a realistic basis for the estimation of emissions from an asphalt process. A thin layer of asphalt was heated in a stainless steel vessel within a test facility specifically designed to simulate emissions from area sources. Sampling was conducted within the facility through medium volume PM_{10} heads for semivolatile organics and particulate-phase lead. Air samples of volatile organic compounds (VOCs) were removed directly from the facility and collected in Tedlar bags. A portion of the air within the facility was diverted to an adjacent sampling facility via an induced draft duct. A portion of the sample from the induced draft duct was also monitored for CO_2, CO, NO, O_2, SO_2, particulate-bound polycyclic aromatic hydrocarbons (PAHs),

and total hydrocarbons (THCs) by a series of continuous emission monitors (CEMs). The organic constituents were analyzed both qualitatively and quantitatively using a gas chromatograph/mass spectrometer (GC/MS). The lead was quantified using a graphite furnace atomic absorption method (GFAA). Hydrogen sulfide was measured using colorimetric Dräger tube method. Measured concentrations for all analytes were related to dilution air volumes and the surface area of asphalt to derive emission rates. The EPA's Open Burning Simulation Facility used in this study is described more fully below.

3.2 ASPHALT MATERIALS

Asphalt cement and the Hot-mix asphalt were supplied by commercial vendors. Blythe Industries of Haw River, NC, supplied the AC10 Hot-mix material used in the tests of non-rubber containing asphalt. Data obtained from Blythe Industries indicated that this Hot-mix contained 5.6 percent total asphalt by weight, of which, 4.3 percent was new asphalt cement and 1.3 percent was the asphalt cement fraction of the recycled asphalt product (RAP) included in the aggregate. Data obtained from the manufacturer indicated that this asphalt also contained 0.50 percent of a "non-strip additive," supplied by Westavaco of Mulberry FL, known as Indulin AS-1. The asphalt test material was obtained from a standard production run of a full-scale Hot-mix plant by Acurex Environmental personnel acting under EPA direction.

The asphalt Hot-mix used in the rubber containing materials tests was prepared in several steps. Asphalt Rubber Systems Corporation, of Riverside, RI, supplied samples of an AC10 asphalt cement containing crumb rubber in tightly sealed metal containers similar in appearance to paint cans. The manufacturer reported that this material consisted of 79 percent AC10 asphalt, 3 percent extender oil, and a total of 18 percent rubber (of which 15 percent was derived from auto tires and 3 percent was described as "high-nitro tennis ball scrap").[6] Personnel of the C.C. Mangum Corporation of Raleigh, NC, familiar with the formulation of asphalt, prepared bench-scale mixtures of the rubber containing Asphalt Cement, supplied by Asphalt Rubber Systems, with aggregate chosen from C.C.

Mangum's supply so as to duplicate as closely as possible that used at Blythe Industries. This bench-scale Hot-mix was prepared with a total asphalt cement content of 5.3 percent including 4.6 percent new asphalt cement and 0.7 percent from the asphalt fraction of the RAP used in the aggregate. The preparation of this bench-scale Hot-mix was witnessed by EPA and Acurex Environmental personnel. A portion of Table 1 summarizes the composition of the aggregates used in these Hot-mixes.

To minimize off-gassing, all asphalt Hot-mixes were held in tightly sealed stainless steel vessels at room temperature, from the time they were obtained from a production run or were mixed on a bench-scale until the time of testing. Samples of the asphalt materials were submitted to a commercial laboratory for "ultimate" analyses.

3.3 ANALYSIS OF ASPHALT MATERIAL BEFORE TESTING

An ultimate analysis of the asphalts was performed before testing by a subcontracted laboratory using methodologies best summarized by ASTM methods 3176 and 3172.[7] The primary purpose of this analysis was to determine the elemental composition of the asphalt cements used (carbon, nitrogen, oxygen, hydrogen, and sulfur) so that the similarity of the two asphalts could be assessed. The data from this analysis, as presented in a portion of Table 1, indicate that the compositions of the two AC10 asphalts were quite similar, as might be expected.

TABLE 1. COMPOSITION OF ASPHALT MATERIALS

Ultimate Analysis of Asphalts without Aggregate (all data in % as received)			
	Blythe Industries AC-10	Asphalt Rubber Systems AC-10 With Rubber	Asphalt Rubber Systems AC-10 No Rubber Included
Water (Karl Fisher)	0.0091	0.16	0.010
Carbon	84.43	82.94	83.76
Hydrogen	10.33	9.74	10.27
Nitrogen (Kjeldahl)	0.52	0.11	0.42
Total Halogen (as Cl)	<0.004	0.010	0.0044
Sulfur	3.77	4.00	4.74
Ash	0.24	1.78	<0.09
Oxygen (by difference)	0.95	1.50	0.81

(continued)

TABLE 1. COMPOSITION OF ASPHALT MATERIALS (concluded)

Composition of Blythe Industries Aggregate:

Aggregate Type	Recycled Asphalt Product (RAP)	#78M	SCRGS.	Sand
Aggregate Source	Blythe Stockpile	Martin Marietta	Martin Marietta	Blythe-Kelly Pit
Percentage of Total Aggregate Mix	24.1	33	31	11.9
Specific Gravity	2.83	2.65	2.88	2.66
% Passing Sieve 3/4 in (1.9 cm)	100	100	100	100
% Passing Sieve 1/2 in (1.3 cm)	98	100	100	100
% Passing Sieve 3/8 in (0.95 cm)	94	99	100	100
% Passing Sieve #4	72	33	97.2	100
% Passing Sieve #8	55	5.8	71	100
% Passing Sieve #40	31	2.6	25.6	41
% Passing Sieve #80	15	1.2	15.3	8.3
% Passing Sieve #200	7.6	0.4	8.3	2

Composition of C.C. Mangum Aggregate:

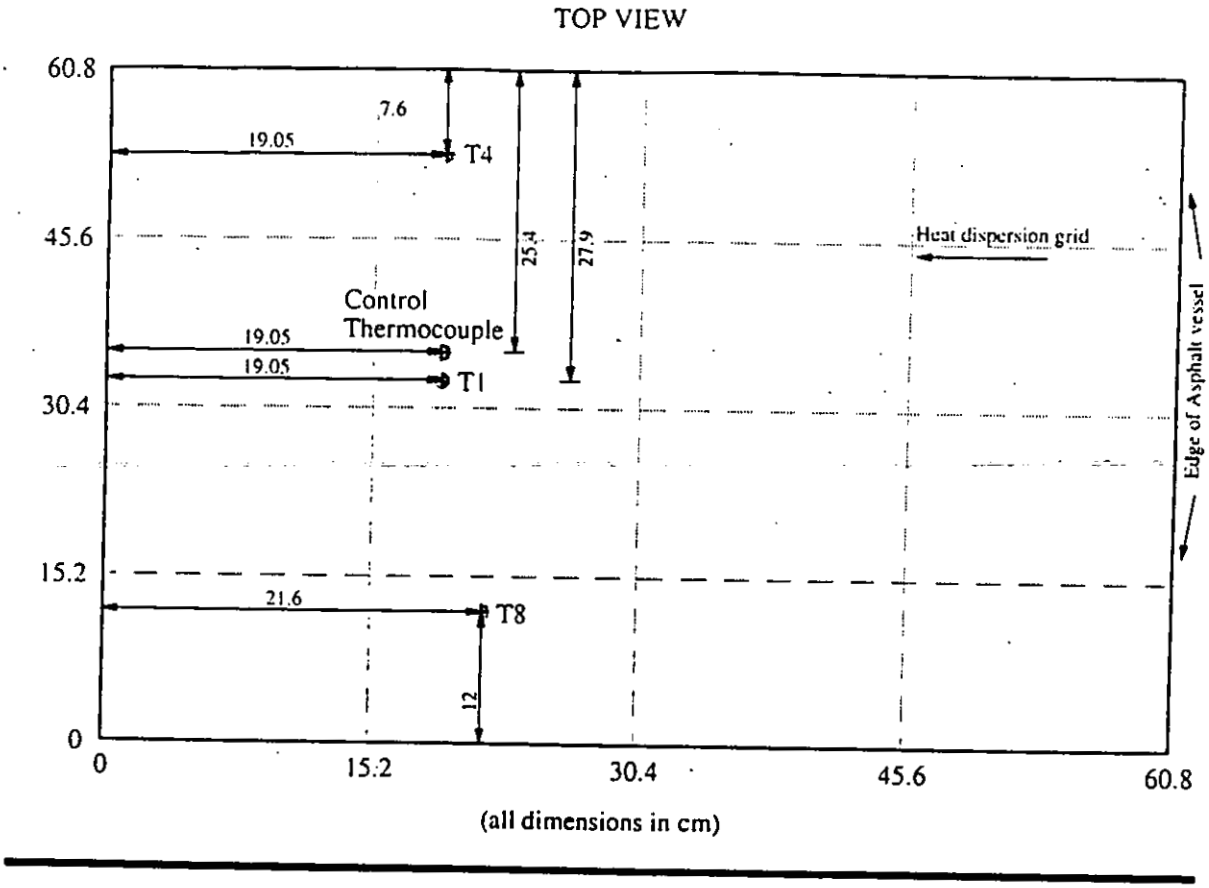
Aggregate Type	RAP	#78M	SCRGS.	Sand
Aggregate Source	C.C. Mangum	Martin Marietta	Martin Marietta	C.C. Mangum
Percentage of Total Aggregate Mix	24.1	31	33	11.9
Specific Gravity	2.701	2.723	2.741	*
% Passing Sieve 3/4 in (1.9 cm)	100	†	†	†
% Passing Sieve 1/2 in (1.3 cm)	96	100	†	†
% Passing Sieve 3/8 in (0.95 cm)	92	95	100	100
% Passing Sieve #4	76	33	99	95
% Passing Sieve #8	60	4	81	89
% Passing Sieve #16	48	2	53	50
% Passing Sieve #40	32	2	31	32
% Passing Sieve #80	29	2	18	4
% Passing Sieve #200	12.1	1.5	8.5	1.5

* Data were not provided.

† Data were not provided since 100% of the material passed a finer sieve.

3.4 ASPHALT HEATING VESSEL

An open-topped, square, asphalt heating vessel was custom designed and built by Acurex Environmental. All portions of the vessel that contacted the asphalt material were constructed of welded stainless steel sheet. Between the inner shell of the stainless steel sheet and the outer steel case, a series of electrical resistance heaters (14 heaters of 240 V each, 500 W, offset terminal type, 3.8 cm wide and 60.3 cm long, part no. SGA1J23NO6, Atlantic Electric Systems Inc., Charlotte, NC) were mounted and insulated with kaolinite wool so as to heat the inner shell as uniformly as possible. The dimensions of the vessel are indicated in Figure 1. The vessel was equipped with a removable grid, constructed from a stainless steel flat bar 0.47 cm thick and 5 cm wide. The grid was included in the vessel after preliminary experiments indicated the need to improve heat distribution throughout the material in the vessel. The vessel was equipped with a temperature controller (proportioning type, range of 0-200 °C (32-392 °F), part no. 49-J-0-200C, Omega Engineering, Stamford, CT) designed to maintain adequate temperature control between 157 and 162 °C (314-323 °F) with an absolute maximum temperature of 177 °C (350 °F). The temperature controller was attached to a Type-J, rod shaped "utility" thermocouple (Omega Engineering, Stamford, CT) that was located near the center of the asphalt mixture during each experiment (see Figure 1). Actual temperatures achieved in various experiments are discussed in Section 4 of this document. Temperature uniformity was monitored by measurements taken periodically during the emissions testing in three different locations within the asphalt layer (see Figure 1) using Type-K, rod shaped "utility" thermocouple probes (Omega Engineering, Stamford, CT). The thermocouples in the asphalt layer shown in Figure 1 were initially located at the following heights above the bottom of the inner surface of the asphalt heating vessel: T1 and control thermocouple, 1.6 cm; T4, 0.5 cm; and T8, 2.5 cm. Before the first thin layer asphalt test was conducted on February 4, 1993, the thermocouple heights were readjusted to the following values: T1 and control thermocouple, 1.1 cm; T4, 0.3 cm; and T8, 1.4 cm. Before the February 18, 1993 experiment, thermocouple T8 was replaced with a Type-K thermocouple weld pad probe that was



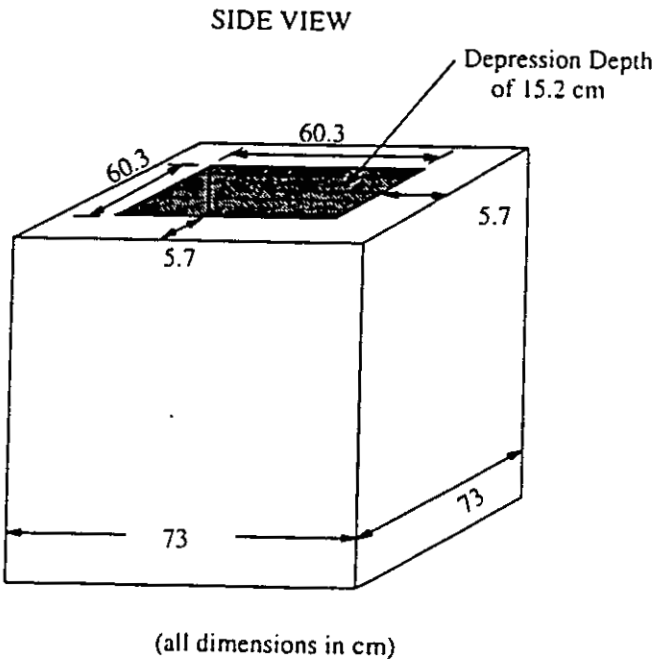


Figure 1. Views of the heating vessel.

placed directly in contact with the surface of the asphalt material for each experiment (Omega Engineering, Stamford, CT).

3.5 TEST METHODOLOGY

For a period of 16 to 24 h before the initiation of each test, the sealed container of asphalt Hot-mix to be used in that test was preheated to just below the design temperature range in an electrical resistance oven. This procedure was necessary because the asphalt Hot-mix has a high heat capacity and therefore could not be brought to its design temperature quickly. This situation is reflective of the field situation where asphalt is held for long periods of time at elevated temperatures (>121 °C, >250 °F).[8] Before the start of each test, the heating control thermocouple of the asphalt heating vessel was located on its heated surface thus allowing the surface of the vessel to be preheated to the design temperature.

Before and after each test, or before and after each change of sample media (if this occurred more frequently), all sampling trains were leak-checked. Before the beginning of each test day, at least 10 min of background data were acquired from the CEMs and thermocouples. The asphalt Hot-mix in the experiment conducted on January 28, 1993 was poured and lightly compacted with hand implements to an approximate depth of 3.8 cm (a depth that is within the range used in actual paving operations). (This experiment is referred to in data tables as "thick.") Because the vertical distribution of temperature in the asphalt material was less uniform than desired, a decision was made to reduce the thickness of the asphalt used in further experiments. In all further experiments, the asphalt Hot-mix was poured and was lightly compacted with hand implements to a depth between 1.3 and 1.9 cm (a depth that is also within the range used in actual paving operations). This process generally required the efforts of two people for a period of 5 to 15 min. After the AC10 Hot-mix material was poured and compacted, all personnel exited the facility. Despite the preheating of the asphalt Hot-mix material and the heating vessel, the pouring process inevitably resulted in a substantial decrease in the temperature of the asphalt material (see Appendix B figures). Sampling activities were

initiated as soon as the asphalt Hot-mix material had achieved a temperature near the design range previously discussed. The temperature was reached between 10 and 70 min after the asphalt pouring was completed.

For facility blank experiments (also referred to as hut blank experiments), the procedures discussed above were modified. Although the asphalt Hot-mix material was preheated as in an actual experiment, no attempt was made to heat the heating vessel. The preheating of the hot-mix material was conducted to evaluate whether the preheating process biased the actual test results. The asphalt heating vessel was not preheated because all traces of asphalt Hot-mix from previous experiments could not be removed despite the rigorous vessel cleaning procedures described in the following paragraph. Warmed air was supplied to the facility as in all experiments. No asphalt Hot-mix was placed in the heating vessel for these experiments. However, personnel did enter and occupy the facility for a period similar to the time required in the facility for pouring and compacting the asphalt in an actual experiment. The onset of sampling was then delayed for a period similar to the delay required in actual experiments to approach design asphalt Hot-mix temperatures.

Between each experiment, the facility was cleaned thoroughly. The asphalt Hot-mix material was warmed and removed with hand tools. The heating vessel was then rinsed with several aliquots cyclohexane to remove residual material. The floor of the facility was then swept with hand tools to remove spilled asphalt Hot-mix material. All personnel entering the facility wore Tyvek boot covers at all times to avoid contaminating the facility.

3.6 TEST FACILITY

The test facility (Figures 2 and 3) is an outbuilding with a 2.7 by 3.4 m (8.9 by 11.1 ft) floor area and a sloping roof with a minimum height of 1.9 m (6.3 ft) and a maximum height of 2.2 m (7.3 ft), which had been previously modified for small-scale, open-combustion simulation experiments. This facility was further modified to adapt it for the low emission levels expected from asphalt.

The building was fitted with a warmed air handling system (based on a 208 V electric utility heater, part no. 3E081, W.W. Grainger) that delivered approximately 4.21 m^3/min (148 ft^3/min) of warmed ambient air to the facility. This flow rate was sufficient to maintain a positive pressure within the facility as indicated by a static pressure gauge in all wind and pressure conditions experienced during testing. Therefore, it could be assumed that the outflow rate from the facility was equal to the inflow rate. At this flow rate, the effective air exchange rate of the test facility is 0.22 air exchanges/min.

A pyramidical aluminum deflector shield was located over the asphalt heating vessel to enhance air mixing. The sample transport duct, 17-cm (6.6-in) OD pipe, was located directly over the rear portion of the deflector shield. This duct transported a representative portion of the test facility environment to the sampling shed located adjacent to the test facility (Figure 2). To minimize heat loss and condensation of organics, the duct was insulated outside the test facility. The inner walls and ceiling of the test facility were covered with 1.6 mm (1/16 in) of aluminum sheeting. To provide a highly clean, inert surface within the test facility for this project, all surfaces within the facility were completely wrapped with Tedlar sheet material (approximately 0.06 mm thick) sealed with aluminum faced tape (part no. 6A062, W.W. Grainger) as shown in Figure 3.

3.7 SAMPLE SHED

The sample shed (Figure 2) contained the majority of the required sampling equipment: dry gas meters, control units and pumps for the PM_{10} particulate sampling trains used for collecting organic PM and lead, three Tedlar bag trains, and the train used to collect organics on XAD-2 resin.

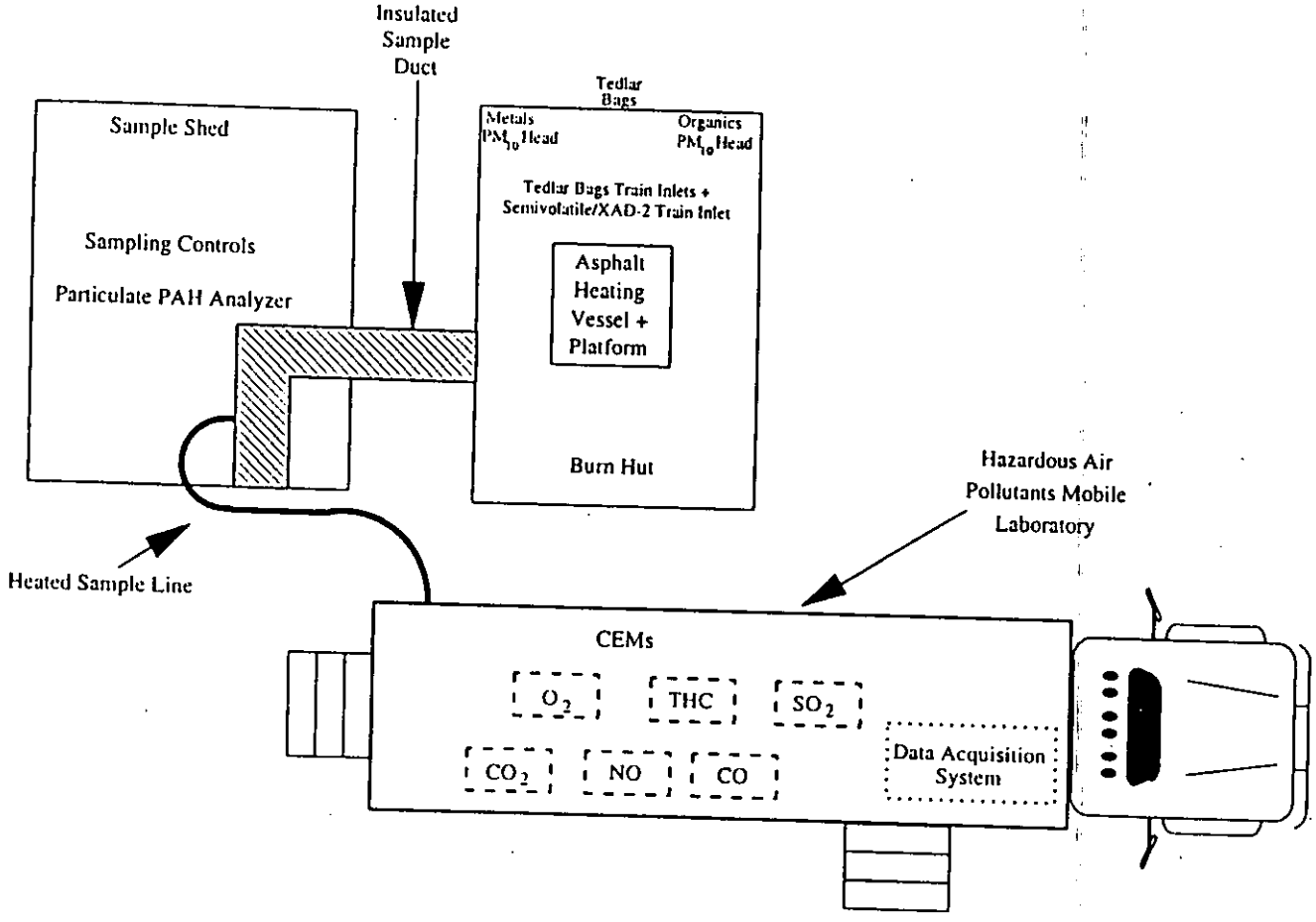


Figure 2. Aerial view of the products of incomplete combustion facility.

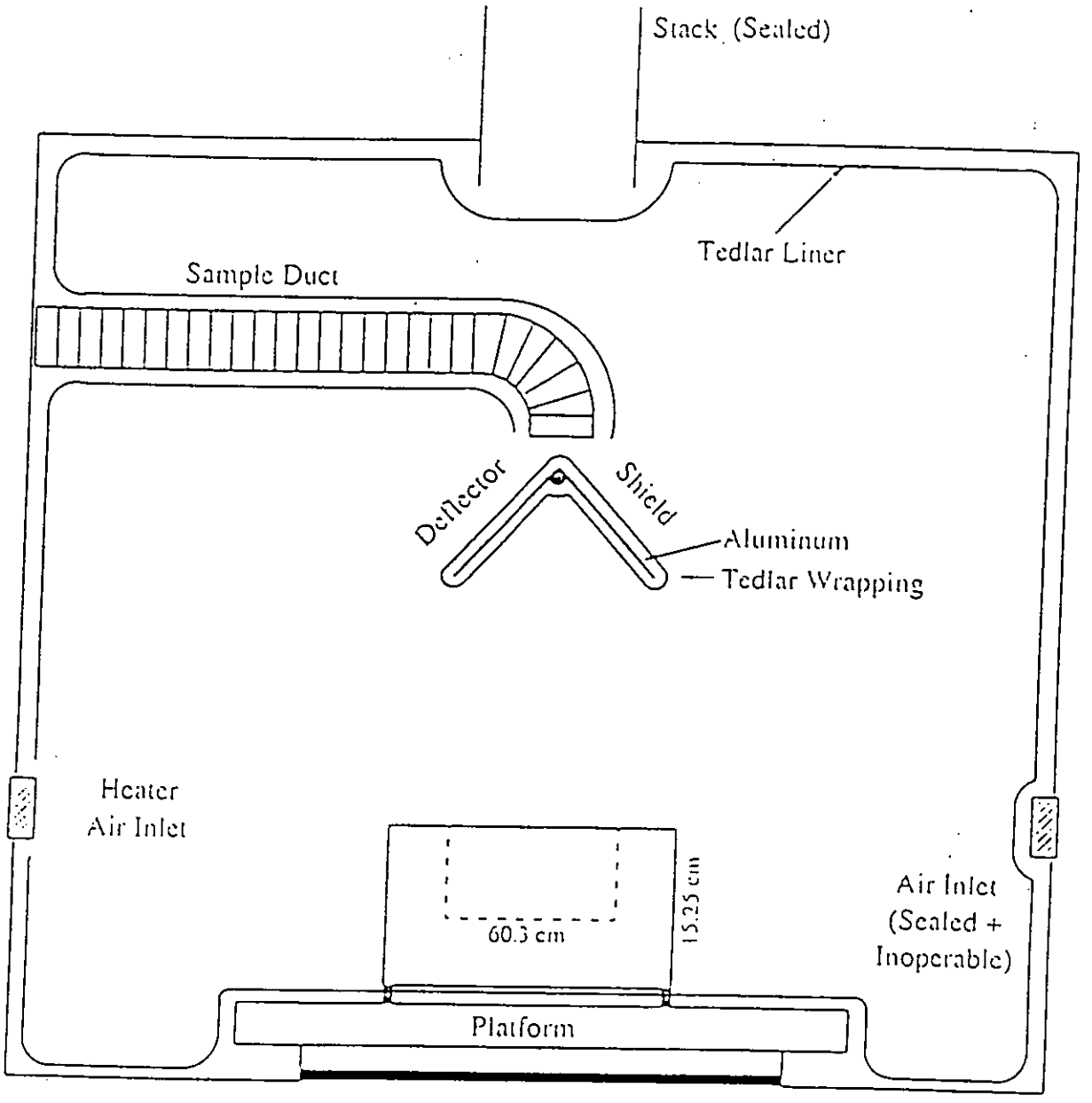


Figure 3. Diagram of the burn hut as configured for the asphalt heating tests; some sampling equipment not shown for clarity.

The sample shed also contained the particulate removal device for the CEMs. A real-time photoelectric analyzer (manufactured by Ecochem Technologies), designed to quantify total PAHs on submicron PM, was also operated using a sample stream withdrawn from the sample transport duct.

Real-time PAH and CEM samples were extracted from a sampling manifold within the duct. The manifold consisted of 9.5-mm (3/8-in) OD stainless steel probes positioned in the sample transport duct so that the probe orifice faced the direction of sample flow and so that all samples were collected at the same axial and radial location. The sample stream was pulled from the test facility into the sample shed by a slight vacuum generated by an induced draft (ID) fan located downstream of the sample manifold.

3.8 HAZARDOUS AIR POLLUTANTS MOBILE LABORATORY (HAPML)

The Hazardous Air Pollutants Mobile Laboratory (HAPML), shown in Figure 2, was used for the continuous monitoring of the fixed combustion gases. A heated (121 °C), particulate-free (conditioned by a low pressure drop heated spun glass filter) gaseous sample was extracted from the sample manifold and routed to individual analyzers for continuous measurement. A portion of the heated sample was routed to the THC analyzer and the SO_2 analyzer. The remaining portion of the sample stream was further conditioned for moisture removal by a refrigeration condenser and silica gel before being routed to the CO, CO_2, and O_2 analyzers. The gas stream for NO was obtained from a location between the refrigeration condenser and desiccant. The analog output of the individual analyzers was recorded using a computerized data acquisition system that recorded all readings at 30-s intervals. This data acquisition system was also used to record temperatures from the series of eight thermocouples located in the asphalt Hot-mix layer, within the test facility, in the air input duct, and in the sample transport duct.

3.9 SAMPLING AND ANALYSIS METHODS

3.9.1 Particulate/Semivolatile Organic Sampling

Because very low concentrations of semivolatile and particulate-bound organics (including PAHs) were anticipated, the following method was adopted for use in sampling these species. The PM_{10} medium volume samplers used (shown in Figure 4) have been described by McFarland.[9] Sampling procedures modeled after those described in Method TO-13 (substituting the medium volume sampler for the high volume sampler described in Method TO-13) were used for particulate-bound organic sampling.[10] This sampler provides a cutpoint at a diameter of 10 μm and at a flow rate of 0.113 m^3/min (4 cfm). The cutpoint is defined as the diameter at which 50 percent of the particulate is removed; smaller particulate will generally pass through the sampler, larger particulate will generally be removed. Each of these two sampling trains included a filter of 142 mm in diameter (a Pallflex Teflon-impregnated glass fiber filter, part no. T60A20 or TX140H120WW) in a Teflon-lined filter holder, followed by a dry gas meter and dual vacuum pumps. Sampling periods of 130 to 165 min were used. The filters were desiccated for at least 24 h and weighed on an analytical balance both before and after sampling in order to determine total PM_{10} particulate. Additional measurements to confirm the completeness of drying were not made in order to rapidly complete analytical work and due to limitations on project resources. After the gravimetric data were obtained, the organic PM_{10} samples were stored under refrigeration until analysis. An acetone and a methylene chloride rinse of the upper portion of the filter holder was collected when the organic particulate sampling train was recovered, stored under refrigeration, and combined with the filter extract for analysis.

A flow rate of 0.113 m^3/min (4 cfm) cannot be maintained through the PM_{10} sampler when it is backed with an XAD-2 resin module because of the large pressure drop caused by the module; therefore, a separate sampling train was used to collect particulate-bound and semivolatile organics. The semivolatile organics were collected in a train that consisted of a 0.95 cm (3/8 in) ID stainless steel inlet followed by a Teflon-coated filter holder containing a Pallflex Teflon-impregnated glass

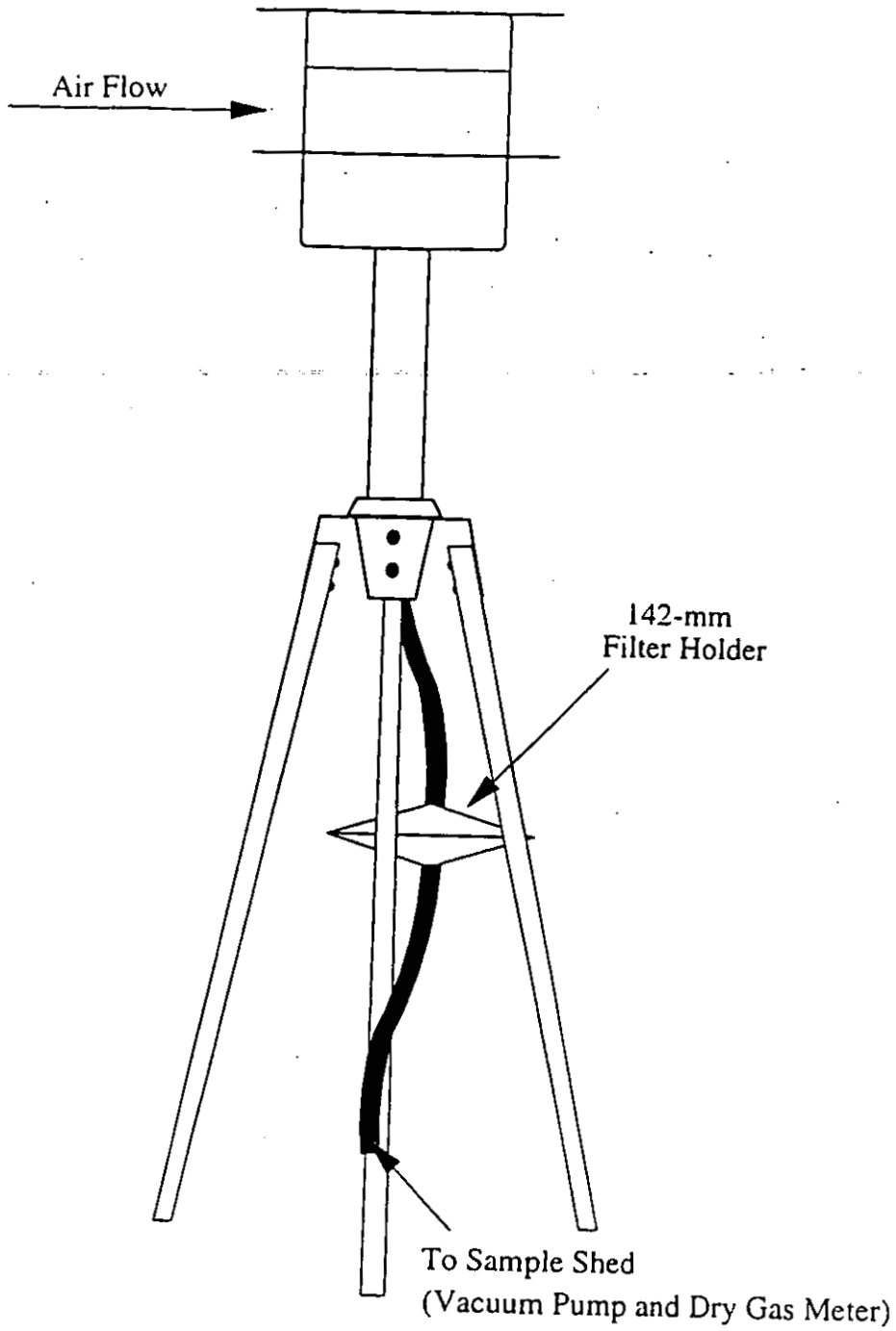


Figure 4. PM_{10} medium volume sampler; particulate metals train shown. (Semivolatile particulate organic train is similar.)

fiber filter (part no. T60A20 or TX140H120WW) and then followed by a water-cooled XAD-2 resin module. This train was operated at approximately 1 cfm for a period of 130 to 165 min. The filter sample collected in the train operated at 0.028314 m^3/min (1 cfm) was not to be analyzed but was used for a gravimetric determination of total particulates (as described above). An acetone and methylene chloride rinse of the portion of the sampling train from the lower half of the filter holder through the entrance to the XAD-2 module was collected when the organic semivolatile sampling train was recovered. The rinse and resin module were kept under refrigeration until analysis. This rinse was combined with the XAD-2 resin extract for analysis.

3.9.2 Particulate and Semivolatile Organic Analysis

The organic PM and XAD-2 samples were analyzed separately by a contracted laboratory. Analysis followed Method 8270 for both semivolatile and particulate-bound organics.[11] Briefly, samples were soxhlet extracted in dichloromethane and concentrated to a known volume. The samples were then analyzed by high resolution gas chromatography/low resolution mass spectrometry (HRGC/LRMS), referred to as (GC/MS) in the full scan mode. Compound identification was based on retention time and the agreement of the mass spectra of the unknown to mass spectra of known standards. A multipoint calibration was performed before analysis for a targeted group of analytes to establish relative response factors (RRFs). Quantification was then based on an internal standard method utilizing these RRFs and the integrated responses of ions specific to each identified compound. Identification of tentatively identified species was based on automated searches of mass spectral libraries confirmed by the judgement of an experienced mass spectroscopist. Approximate quantification of tentatively identified species was based on response factor (RF) assumptions as suggested by the method.

Because some concerns were raised about the chromatographic resolution, possible interferences, and sensitivity obtainable in these analyses, the extracts of these samples were returned under refrigeration to the EPA's ERC where they were reanalyzed by Acurex Environmental

personnel. These analyses were performed on the particulate organic samples only, and targeted a set of PAHs. These analyses were performed by GC/MS using a modified temperature program, derived from that in Method 8270 (injection port = 300 °C, initial oven temperature = 40 °C, held for 4 min then ramped at 10 °C/min to 250 °C, held for 5 min then ramped to 275 °C at 2 °C/min and held for 5 min then ramped to 300 °C at 4 °C/min and held for 8 min) designed to improve chromatographic resolution in the region of interest. These analyses were performed in the selected ion monitoring mode to enhance sensitivity. A multipoint calibration was performed before analysis for a targeted group of analytes to establish RRFs. Quantification was then based on an internal standard method utilizing these RRFs and the integrated responses of ions specific to each identified compound. Identification was based on retention time and the simultaneous detection of the quantification ion and at least two confirming ions for each targeted compound. The results for performance evaluation samples analyzed by Method 8270 and this method are discussed in Appendix A. This method is broadly similar to the HRGC/LRMS analysis of Method TO-13. Our work differed from TO-13 primarily in the areas of column (we used a J&W DB-5MS, 0.25 mm ID, 0.25 μm film thickness, 30 m length), temperature program (see above), MS tuning standard (our work used Perflurotributyl amine (PFTBA) and carrier gas flow (our flow was 35 cm^3/s). We also did not attempt to calculate surrogate recoveries.

3.9.3 Particulate Metals Sampling and Analysis

Particulate-phase lead was a targeted analyte in this study. A PM_{10} medium volume sampler as described by McFarland was used for particulate-bound metals sampling.[9] This sampler provides a cut point at a diameter of 10 μm. The sampling train included a quartz filter in a Teflon-coated filter holder (Pallflex quartz filter, part no. 2500-QATUP), a dry gas meter, and a pump.

Metals were analyzed by a contracted laboratory using the standardized GFAA method.[12] In summary, the filter samples for metals were prepared by digestion and reflux in acid. Lead was then analyzed by the GFAA method, which involves monitoring the adsorption of light at specific

wavelengths in the UV-VIS range by the metal analyte after it is atomized under high temperature conditions.

The metals samples were also used for PM_{10} total particulate analysis. Therefore, they were desiccated and weighed on an analytical balance before and after sampling.

3.9.4 Volatile Organic Compounds Sampling and Analysis

VOCs were collected in Tedlar bags as described in Method 18[13] and analyzed according to Method TO-14[14] (except that the TO-14 target analyte list was not used in its entirety). The Tedlar bags were freshly prepared for each experiment. Multiple Tedlar bag samples were obtained from three locations within the test facility during each experiment through three independent sampling trains. A field blank was prepared during each sampling day by filling a Tedlar bag with zero-grade nitrogen at the sampling site. Trip blanks were occasionally prepared by filling a Tedlar bag with zero-grade nitrogen when the bags were prepared prior to sampling. The instructions of Method TO-14 for capillary column GC/MS in the scan mode were used for this study. Method TO-14 also contains provisions for other analytical methods that will not be used in this study. Compound identification for targeted analytes was based on retention time and the agreement of the mass spectra of the unknown to the mass spectra of known standards. A multipoint calibration was performed before analysis for the targeted group of analytes to establish RRFs. Quantification was then based on an internal standard method using these RRFs and the integrated responses for each identified compound. Identification of tentatively identified species was based on automated searches of mass spectral libraries confirmed by the judgement of an experienced mass spectrometrist. Approximate quantification of tentatively identified species was based on response factor assumptions as suggested in the method.

3.9.5 Hydrogen Sulfide Analysis

Hydrogen sulfide was semiquantitatively assayed using colorimetric Dräger tubes operated according to manufacturers' instructions. The sample was collected from a location within the test

facility (near the location of the organics PM_{10} head in Figure 2) over the course of a 120- to 190-min sampling period.

3.9.6 Continuous Emission Monitors

CEMs were used for CO, CO_2, NO, O_2, SO_2, and THC. The sampling system for the CEMs has been described in Section 3.8. At the beginning of each test day, the CEMs were calibrated and their linearity verified. A 10-min period of background data was obtained with these analyzers before the introduction of heated asphalt. This background sample consisted of facility air sampled through the normal CEM sampling system during a period of time when the heating vessel was being preheated. Data were validated by the introduction of at least one gas standard and a zero gas at the end of sampling for each day. Readings from the CEMs were obtained by the computerized data acquisition system at 5-s intervals throughout the tests. Averages of more than 30-s blocks were electronically recorded.

SECTION 4

DATA, RESULTS, AND DISCUSSION

Because of the large data set generated by this project, the figures and tables that were considered of greatest interest to the reader are presented in the main body of the text. Section 4 tables, however, are located at the end of this section. Supporting figures and tables are presented in Appendix B. Also, for Section 4 tables, double lines were used around analytical detectable values in large data sets containing many analytically non-detectable values.

Semivolatile/particulate-bound species are discussed in three ways. These species were analyzed by a contracted laboratory by full scan HRGC/LRMS in the XAD-2 resin extracts and in the Teflon-impregnated filter extracts. The Teflon-impregnated filter extracts were also analyzed by Acurex Environmental by a selected ion monitoring method. Material collected on XAD-2 resin following a filter are generally considered to represent material distributed to the vapor phase in the atmosphere. Material collected on filters is generally considered to be distributed to the particulate-phase in the atmosphere.

Data from samples collected in a facility blank experiment conducted on March 18, 1993 were not reported because clear evidence was found soon after the test that filter sample designations for this test had been confused and because contamination was present in the instrument used for VOC analysis on the day the volatile organic samples from this test day were analyzed.

4.1 MATERIALS COMPOSITION

The composition of the materials tested has been discussed in Sections 3.2 and 3.3 and is also summarized in Table 1.

4.2 ASPHALT HEATING TEMPERATURES

Despite extensive efforts, detailed in Section 3, the asphalt test material could not be uniformly heated. The material was warmest near the bottom of the vessel and coolest near the surface, as would be expected (this is shown in Table 2 and Figures B-11 through B-20). Additionally, the temperature of the material tended to fluctuate over time in a generally periodic manner. This fluctuation was attributable to the natural cycles of the asphalt heating vessel temperature controllers and the temperature controllers for the input air of the test facility as well as the influence of manual changes in temperature controller setpoint made to control fluctuations in the asphalt temperature. The achieved temperatures tended to be slightly higher during the AC10 without rubber tests than during the AC10 with rubber tests. This difference in temperature, though small, may influence emission rates and should be kept in mind when comparing the emission rates between the AC10 and AC10 with rubber tests.

4.3 TARGETED VOLATILE ORGANIC COMPOUNDS

Estimated emissions for targeted VOCs are summarized in Tables 3 through 5. Facility air concentrations for these compounds are summarized in Tables B-1 through B-3. Data were not reported for several targeted volatile compounds because of an inability to consistently prepare Tedlar bags devoid of these compounds. These compounds were hexane, methylene chloride, acetone, phenol, and 2-butanone. The reported data set includes results for 56 compounds measured in approximately 30 samples. Air concentrations and estimated emissions were calculated for non-detectable compounds based on minimum detection limits.

Among all of the samples analyzed, only six of these 56 targeted compounds were ever detected: benzene, ethyl benzene, m,p-xylene, o-xylene, toluene, and vinyl acetate. Similarly, among

all of the blanks analyzed, only five of these 56 targeted compounds were ever detected: benzene, toluene, ethyl benzene, m/p-xylene, and o-xylene.

The results for all of the detected compounds were near the detection limit. Two separate approaches were taken to determine the significance of the data set. In the first approach, the air concentrations measured were compared to field and facility blank concentrations. Footnotes were then used to mark those results that did not exceed three times the applicable blank concentrations (see Tables 3 through 5 and B-1 through B-3). These data are not corrected for blank concentrations. In the second approach, a two-sided t-test of the differences between means of estimated emissions values was performed.[15] This statistical evaluation, based on the mean and variance of each data set, provides a more rigorous means of determining the statistical significance of differences between the AC10 without rubber, AC10 with rubber and facility blank samples. Pair-wise comparisons were made between the facility blanks and AC10 thin layer without rubber samples, between the facility blanks and the AC10 with rubber samples, and between the AC10 thin layer samples with and without rubber. The results of these statistical analyses are presented in Table 6. In Table 6, the value of the calculated t-statistic is presented along with the level of significance, defined as the probability of making a type I error (i.e., falsely rejecting the tested hypothesis; in this case, the tested hypothesis is that the means are equal).[15,16] Levels of significance greater then 0.1 were reported as not significant (NS). A positive t-statistic indicates that the first of the two means being compared is greater. A negative t-statistic indicates that the second of the two means being compared is greater.

Using the first method of analysis, only the vinyl acetate results from one test day of AC10 with rubber and six of nine benzene results from the tests of AC10 with rubber appear to be different from the blanks.

The statistical method of analysis indicates that the benzene emissions in the AC10 without rubber tests and the AC10 with rubber tests are significantly higher than the facility blank emissions. Additionally, the benzene emissions in the AC10 with rubber tests are significantly higher than the

AC10 without rubber emissions. This statistical method also indicates that the emissions of m,p-xylene were significantly higher in the AC10 with rubber tests than in the AC10 without rubber tests. The significance of this result is unclear because neither the AC10 with rubber nor without rubber were significantly different from the facility blanks.

4.4 TENTATIVELY IDENTIFIED VOLATILE ORGANIC COMPOUNDS

Tables B-4 through B-9 in Appendix B present the air concentration and estimated emission results for VOCs tentatively identified from the Tedlar bag samples discussed in Section 4.3. Samples for which data were presented for targeted VOCs only did not contain any tentatively identified volatile compounds at concentrations above the practical quantitation limit. As for the targeted volatiles, the air concentrations measured were compared to field and facility blank concentrations. Footnotes were used to mark those results that did not exceed three times the applicable blank concentrations. Statistical t-tests were not used for the tentatively identified species because of limitations of project scope and because data on tentatively identified compounds has inherent limitations on its quality. In the AC10 without rubber samples, the tentatively identified compounds with concentrations in excess of three times the applicable blank concentrations were in the alkane, cycloalkane/alkene, aldehyde, and ketone compound classes. In the AC10 with rubber samples, the tentatively identified compounds with concentrations in excess of three times the applicable blank concentrations were predominantly in the alkane, aldehyde, ketone, and carboxylic acid compound classes. Because relatively little consistency existed among the tentatively identified VOCs found in groups of replicate samples, these identifications should be viewed as very preliminary.

4.5 TARGETED SEMIVOLATILE ORGANIC COMPOUNDS COLLECTED ON XAD-2

The masses of various semivolatile species collected on XAD-2 resin are summarized in Table B-10 in Appendix B. The facility air concentrations derived from these amounts are summarized in Table B-11. The estimated emission rates for these compounds are presented in Table 7. Air concentrations and estimated emission values were calculated based on the laboratories'

practical quantitation limits when a compound was reported as non-detectable. Contaminants in XAD-2 resin (primarily alkyl substituted aromatics) have been reported by many authors. The comparisons between actual samples and blanks presented below allow judgements to be made about the impact of such problems on the results reported in this work.

The results for all detected compounds were near the detection limit. Two separate approaches were taken to determine the significance of the data set. In the first approach, the amounts and facility air concentrations measured were compared to field and facility blank amounts and facility air concentrations. Footnotes were then used to mark those results that did not exceed three times the applicable blank results (see Tables 7, B-10, and B-11). These data are not corrected for blank and concentration. In the second approach, a two-sided t-test of the differences between means of estimated emissions values was performed.[15] This statistical evaluation, based on the mean and variance of each data set, provides a more rigorous means of determining the significance of differences between the AC10 without rubber, AC10 with rubber, and facility blank samples. Pair-wise comparisons were made between the facility blanks and the AC10 thin layer without rubber samples, between the facility blanks and the AC10 with rubber samples, and between the AC10 thin layer samples with and without rubber. The results of these statistical analyses are presented in Table 8. Table 8 shows the value of the calculated t-statistic along with the level of significance, defined as the probability of making a type I error (i.e., falsely rejecting the tested hypothesis; in this case, the tested hypothesis is that the means are equal).[15,16] Levels of significance greater than 0.1 were reported as not significant (NS). A positive t-statistic indicates that the first of the two means being compared is greater. A negative t-statistic indicates that the second of the two means being compared is greater.

Using the first method of data analysis, phenol was detected at three times the blank concentration in the AC10 without rubber thick layer experiment, in two of three tests of AC10 without rubber in thin layers and in one of three tests of AC10 with rubber. Also, according to this

method of analysis, diethyl phthalate was detected in the AC10 without rubber, thick layer experiment. Butyl benzyl phthalate was detected in one of three tests of AC10 without rubber, thin layer, and one of three of AC10 with rubber in a thin layer.

The second statistical method of data analysis shows that 2-methyl phenol is significantly higher in the AC10 with rubber experiments than in either the AC10 without rubber or the facility blank experiments. This method of data analysis also shows that diethyl phthalate was emitted at significant concentrations by both the AC10 with and without rubber.

The discordant results produced by these two methods of data analysis may, in part, be attributable to an artifact that affects the statistical analysis of the means of estimated emissions when many of the samples are at or near the analytical detection limit. When a given compound in a given sample was not detectable, the estimated emission rate was calculated using the detection limit. Because this detection limit was constant for all samples, but the facility air volumes sampled were not constant, the inverse of the facility air volume sampled strongly influenced the calculated estimated emission value (see Section 1 for more detail on the calculation method). To give some impression of the potential magnitude of this effect, a t-test of the inverse of the volumes sampled is presented in Table 8. In this case, the bias would tend to make the AC10 with rubber estimated emissions higher than those for the AC10 thin. It would also tend to make the facility blank estimated emissions appear higher than those for AC10 without rubber and the facility blank concentrations appear somewhat lower than those for the AC10 with rubber.

4.6 TENTATIVELY IDENTIFIED SEMIVOLATILE ORGANIC COMPOUNDS COLLECTED ON XAD-2

Estimated emissions for tentatively identified semivolatile organic compounds present in the vapor phase are reported in Table 9. The air concentrations and sample masses from which these estimated emissions were derived are reported in Tables B-12 and B-13. The reader is cautioned that

these data represent, in most cases, only the 10 tentatively identified compounds found in highest concentration in the samples (because of the reporting policies of the contracted laboratory).

The masses and air concentrations of the measured targeted semivolatile organics were compared to field and facility blank amounts and concentrations. Footnotes were used to mark those results that did not exceed three times the applicable blank amounts and concentrations. Statistical t-tests were not used for the tentatively identified species. The tentatively identified compounds with concentrations in excess of three times the applicable blank concentrations were in the carboxylic acid ester, alkene/cycloalkane, alkyl substituted benzene, and aldehyde compound classes.

4.7 ORGANIC PARTICULATE-BOUND TARGETED COMPOUNDS—CONTRACTED LABORATORY FULL SCAN MASS SPECTROMETRY ANALYSES

The masses of various particulate-bound species collected on Teflon-impregnated filters are summarized in Table B-14. The facility air concentrations derived from these amounts are summarized in Table B-15. The estimated emission rates for these compounds are presented in Table 10. Air concentrations and estimated emission values were calculated based on the laboratories' practical quantitation limits when a compound was reported as non-detectable.

The results for all of the detected compounds were near the detection limit. Two separate approaches were taken to determine the significance of the data set. In the first approach, the amounts and facility air concentrations measured were compared to field and facility blank amounts and facility blank air concentrations. Footnotes were then used to mark those results that did not exceed three times the applicable blank results (see Tables 10, B-14, and B-15). Data are not corrected for blank concentrations. In the second approach, a two-sided t-test of the differences between means of estimated emissions values was performed.[15] This statistical evaluation, based on the mean and variance of each data set, provides a more rigorous means of determining the significance of differences between the AC10 without rubber, AC10 with rubber, and facility blank samples. Pair-wise comparisons were made between the facility blanks and the AC10 thin layer without rubber

samples, between the facility blanks and the AC10 with rubber samples, and between the AC10 thin samples with and without rubber. The results of these statistical analyses are presented in Table 11. In Table 11, the value of the calculated t-statistic is presented along with the level of significance, defined as the probability of making a type I error (i.e., falsely rejecting the tested hypothesis; in this case, the tested hypothesis is that the means are equal).[15,16] Levels of significance greater then 0.1 were reported as not significant (NS). A positive t-statistic indicates that the first of the two means being compared is greater. A negative t-statistic indicates that the second of the two means being compared is greater.

Using the first method of data analysis, emissions of phenanthrene and bis(2-ethylhexyl)phthalate were found at a significant concentration in one of three AC-10 without rubber, thin layer tests. Fluoranthene and pyrene were found in significant concentration in two of three AC10 with rubber tests. Butylbenzylphthalate was found at significant concentrations in one of three tests without rubber and two of two with rubber. Benzo(a)anthracene was found in significant concentration in one of three tests of each type of thin layer.

Using the second statistical method of data analysis, the only comparison that achieved significance was the comparison of bis(2-ethylhexyl)phthalate emissions from AC10 with rubber to the facility blank emissions. The discordant results produced by these two methods of data analysis are attributable, in part, to an artifact that affects the statistical analysis of the means of estimated emissions when many of the samples are at or near the analytical detection limit. When a given compound in a given sample was not detectable, the estimated emission rate was calculated using the detection limit. Because this detection limit was constant for all samples but the facility air volumes sampled were not constant, the inverse of the facility air volume sampled strongly influenced the calculated estimated emission value (see Section 1 for more detail on the calculation method). To give some impression of the potential magnitude of this effect, a t-test of the inverse of the volumes sampled is presented in Table 11. In this case, the effect of this bias would make the AC10 with

rubber emissions appear slightly higher than the AC10 without rubber emissions. It would also make it appear that the facility blank emissions were higher than either the AC10 with or without rubber.

4.8 TENTATIVELY IDENTIFIED PARTICULATE-BOUND ORGANIC COMPOUNDS—CONTRACTED LABORATORY FULL SCAN MASS SPECTROMETRY ANALYSES

The estimated emissions of particulate-bound semivolatile species are reported in Table 12. The facility air concentrations and sample amounts from which these estimated emissions were derived are presented in Tables B-16 and B-17. The reader is cautioned that this data set represents, in most cases, only the 10 tentatively identified compounds found in highest concentration in the samples (due to the reporting policies of the contracted laboratory). Air concentrations and estimated emission values were calculated based on the laboratories' practical quantitation limits when a compound was reported as non-detectable.

The amounts and air concentrations of the measured targeted semivolatiles were compared to field and facility blank amounts and concentrations. Footnotes were used to mark those results that did not exceed three times the applicable blank amounts and concentrations. Statistical t-tests were not used for the tentatively identified species. The tentatively identified compounds with concentrations in excess of three times the applicable blank concentrations were in the carboxylic acid and acid ester compound classes. It is likely that because of the poor chromatographic separation achieved with these samples, many semivolatile compounds present went unidentified.

4.9 ORGANIC PARTICULATE-BOUND TARGETED COMPOUNDS—ACUREX ENVIRONMENTAL SELECTED ION MONITORING MS ANALYSES

Because the concentrations of the semivolatile species collected were so near the detection limit of the analyses and because there was some concern that analytical interferences could be affecting the results, the semivolatile particulate-bound samples were reanalyzed by a more sensitive selective ion monitoring method for 16 PAH species that were among the 65 targeted semivolatile species (see Section 3.9.2 for a detailed description of the method). The concern over interferences in these analyses arose because of the poor chromatographic resolution evident in the total ion

chromatograms of the particulate-bound organic samples (See Appendix D). The chromatograms are marked with the sample name, date of sampling and an abbreviated type of sample corresponding to those shown in Tables 7 to 13. These total ion chromatograms showed a large region of increased ion abundance with widths equal to nearly half the length of the chromatographic run. When the mass spectra of portions of this large, unresolved region were examined, it appeared to consist primarily of alkanes and alkenes. Because asphalt is produced as a part of the petroleum refining process, and the heating volatilization and extraction processes that took place in this study are generally nonselective, the presence of high concentrations of substituted and normal long chain alkanes and alkenes would not be unexpected.[2] Thus, this region of increased ion abundance is interpreted as the product of incomplete chromatographic resolution of a series of high concentration alkanes and alkenes.

It was conceivable that this unresolved peak could interfere with the full scan mass spectrometry analysis of targeted species of interest in four ways. First, it could alter the retention times of the species of interest causing their signals to not be reported since they could fall outside of the usual retention time "window." However, an examination of the retention times of internal standard compounds suggested these retention times were unaffected. Second, the interfering compounds could contribute ions at masses used as quantitation and/or confirming ions. This could alter the ratio of the quantitation and confirming ions and cause the signal from a compound of interest to not be reported because the expected ratio was not observed. Third, high concentrations of ions from the interfering compounds could reach the detector of the mass spectrometer temporarily increasing the level of detector noise (this is sometimes called "ringing the detector" by mass spectrometrists). Fourth, large concentrations of interfering compounds could "overload" the ion source of the mass spectrometer decreasing the efficiency of ionization.

The use of cleanup or preparative chromatography was judged to be beyond the resources available to the project. It was also felt that the implementation of a selected ion monitoring method would be required to obtain additional sensitivity. Therefore, a selected ion monitoring method was

implemented along with a modified temperature program intended to improve the resolution in the region where the interferences were observed (see section 3.9.2).

An examination of ion chromatograms produced during the course of the selected ion monitoring analysis showed that these alkanes and alkenes did not appear to produce significant interferences at the relatively high masses monitored during the PAH analyses. It would, however, still be possible that this large, unresolved peak could interfere with these analyses indirectly by decreasing the efficiency of ionization in the source of the mass spectrometer.

The results of selected ion monitoring analysis are presented in Tables B-19 (air concentrations), B-18 (amount), and 13 (estimated emissions). Two separate approaches were taken to determine the significance of this data set. In the first approach, the amounts and facility air concentrations measured were compared to field and facility blank amounts and facility air concentrations. Footnotes were then used to mark results that did not exceed three times the applicable blank results (see Tables 13, B-17, and B-18). In the second approach, a two-sided t-test of the differences between means of estimated emissions values was performed.[15] This statistical evaluation, based on the mean and variance of each data set, provides a more rigorous means of determining the significance of differences between the AC10 without rubber, AC10 with rubber, and facility blank samples. Pair-wise comparisons were made between the facility blanks and the AC10 thin layer without rubber samples, between the facility blanks and the AC10 with rubber samples, and between the AC10 thin samples with and without rubber. The results of these statistical analyses are presented in Table 14. Table 14 shows the value of the calculated t-statistic along with the level of significance, defined as the probability of making a type I error (i.e., falsely rejecting the tested hypothesis; in this case, the tested hypothesis is that the means are equal).[15,16] Levels of significance greater then 0.1 were reported as not significant (NS). A positive t-statistic indicates that the first of the two means being compared is greater. A negative t-statistic indicates that the second of the two means being compared is greater.

Using the first method of analysis, significant results were found in at least some of the samples for 13 of the 16 PAH species targeted. Note especially that phenanthrene was found in significant concentration in the AC10 without rubber thick layer test, in three of three AC10 without rubber thin layer tests, and in two of three of AC10 with rubber tests. Pyrene and fluoranthene were found in significant concentrations in all of the particulate samples taken during AC10 with rubber and AC10 without rubber testing. Chrysene was found in a significant concentrations in all of the particulate samples obtained from thin layer tests both with and without rubber additives. Benzo(a)pyrene and benzo(k)fluoranthene were found in significant concentration in three of three AC10 without rubber tests, thin layer and in two of three AC10 with rubber in a thin layer tests.

Using the statistical method of analysis, the estimated emissions of seven of the 16 species was shown to be significantly higher in the AC10 thin layer without rubber tests than in the facility blank tests. It is interesting to note that emissions of two of these seven species, pyrene and benzo(a)pyrene, have been previously reported from an asphalt Hot-mix facility.[2] The estimated emission of five of 16 species was shown to be significantly higher in the AC10 thin layer with rubber tests than in the facility blank tests. The emission of two species was significantly higher in the tests without the rubber additive than in the tests with the additive. None of these species had significantly higher emissions with the rubber additive than without.

Notably, the significant results using both forms of analysis come primarily from a middle group of the PAH species, from fluoranthene to benzo(a)pyrene, when they are listed in order of retention time (retention time for homologous species corresponds roughly to boiling point). This is a quite reasonable and perhaps predictable result for three reasons. First, lighter semivolatile species are known to partition primarily to the vapor phase.[17] Second, asphalt is produced as a part of the petroleum refining process which includes a fractional distillation.[1,18] Third, the temperatures to which the asphalt material was heated in this experiment may not have been hot enough to cause significant volatilization of the heaviest PAH species.

The two methods of data analysis applied are in reasonably good agreement for the selected ion monitoring analyses of the particulate-bound species. This could be expected because there are significantly less results at the detection limit in this data set than in the full scan mass spectrometry data set, because of the lower detection limits achievable using selected ion monitoring.

4.10 CONTINUOUS EMISSION MONITOR RESULTS

Table 15 reports estimated emissions for gaseous species monitored with CEMs. CO, CO_2, NO, and SO_2 monitors did not reveal any evidence that emissions of these compounds had been detected. A careful examination of the data sets obtained by the O_2 monitor did not reveal any evidence of a change in O_2 concentration brought about by the presence of the heated asphalt. The concentrations of all these species remained essentially at background values throughout the experiments. The operation of the real-time PAH analyzer was optimized for sensitivity during the course of these experiments. Thus, the higher PAH levels in the February 4, 1993 experiment shown in Table 15 are an artifact of instrument sensitivity. The analyzer was not used in experiments after April 14, 1993 because of the requirements of other studies. The PAH plots produced did not show any clear and convincing evidence of emission of PAHs from the heated asphalt materials. Thus, plots of the concentrations of these species vs. time were not presented in the interest of brevity.

Plots of THCs vs. time did indicate a trend (see Figures B-11 through B-20). THC concentrations appeared to increase over background levels and increased and decreased in response to the slight variations of asphalt temperature discussed in Section 4.2. This sensitivity of THC emissions to variation in asphalt temperature is further evidenced in Figures B-1 through B-10. Hydrocarbon emissions appear to increase nearly exponentially with increasing temperature beyond a temperature at which little or no emissions are seen.

4.11 LEAD

The results of the particulate-phase lead analyses are reflected in Table 16. As with the organic analyses, two methods of data analysis were applied to this data set. In the first approach, the

amounts and facility air concentrations measured were compared to field and facility blank amounts and facility air concentrations. Footnotes were then used to mark those results that did not exceed three times the applicable blank results (see Table 16). In the second approach, a two-sided t-test of the differences between means of estimated emissions values was performed.[15] This statistical evaluation, based on the mean and variance of each data set, provides a more rigorous means of determining the significance of differences between the AC10 without rubber, AC10 with rubber, and facility blank samples. The results of these statistical analyses are presented in Table 17.

Using the first method of data analysis only one in three of the AC10 with rubber tests showed a lead concentration greater than three times the blank concentrations. No other samples showed significant concentrations. Using the second statistical method of data analysis, the AC10 without rubber, thin layer appeared to be in higher concentration than the facility blank. Since in both analyses the significant results are dominated by the results of one sample, no definitive conclusions should be drawn from these lead emissions results.

4.12 HYDROGEN SULFIDE

The results of hydrogen sulfide analyses are presented in Table 18. No detectable concentrations of hydrogen sulfide were ever observed; therefore, no statistically significant differences in estimated emissions of hydrogen sulfide were observed (Table 17).

4.13 TOTAL PARTICULATES AND PM_{10}

Estimated emissions, air concentration, and amount results for total particulates and PM_{10} derived from three separate sampling trains are presented in Table 19. As in the organic analyses, a statistical analysis of the differences between estimated emission means was conducted and is reported in Table 17. Reasonably good agreement was observed in the PM_{10} measurements made with the particulate organic and particulate metals train. The metals train results tended to be slightly higher. This could indicate that the filters used for metals analysis are slightly more effective in capturing fine particulates or that there are slight variations in particulate concentration in different areas of the

facility. A comparison of the total particulates and PM_{10} results indicates that the vast majority of the PM produced is less then 10 μm in diameter. Particulate emissions were slightly higher in the tests of AC10 without rubber than in the tests of AC10 with rubber. This result, however, was not statistically significant.

Because of operational difficulties, the PM_{10} total particulates measurements made in this study may have a particle size cutpoint somewhat different than the intended 10 μm. The PM_{10} medium volume samplers used in this study were designed to be operated at a flow rate of 0.113 m^3/min (4 cfm).[9] Because the authors have not stated the temperature and pressure conditions under which this design valve was developed, we have assumed it applies to standard temperature and pressure. The flow rates achieved (corrected to prevailing temperature and pressure) at the PM_{10} head are listed in Table 19. The effects of these non-optimal flow rates on particle size cutpoint can be estimated. Discussions with the developer of this sampler indicate that although the sampler's cutpoint has not been investigated in this flow range—flow rate multiplied by the square of the cutpoint size should equal a constant.[19] This statement can be substantiated from the well-known equations describing impaction processes (collection of PM in a PM_{10} sampler is essentially an impaction process).[20] This relationship would suggest that at a flow rate of 0.155 m^3/min (5.5 scfm), the particle size cutpoint would decrease to 8.5 μm. At a flow rate of 0.084 m^3/min (3 scfm), the particle size cutpoint would increase to 11.54 μm. Thus, the alteration in particle size cutpoint caused by this flow rate problem is likely to be small.

TABLE 2. TEST MATRIX WITH AVERAGE, MAXIMUM, AND MINIMUM TEMPERATURES

Test Date	Test Condition**	Temperatures (°C) for thermocouples 1 and 4*					
		Avg T1	Max T1	Min T1	Avg T4	Max T4	Min T4
1/28	AC 10 Thick	162.1	167	151	170.2	179	160
2/4	AC 10 Thin	162.1	172	152	169.2	183	155
2/11	Hut Blank	25.7	29	21	25.1	28	20
2/18	AC 10 Thin	164	175	151	158	169	140
2/25	AC 10 Thin	152.3	164	133	153.6	168	128
4/7	AC 10/Rubber Thin	134.4	152	113	155.4	171	136
4/14	Hut Blank	35.1	45	25	33.9	44	25
4/27	AC 10/Rubber Thin	141.7	155	128	152.6	169	136
5/7	Hut Blank	30.5	34	28	30	33	26
5/24	AC 10/Rubber Thin	147	157	139	167.7	180	156
Average AC 10 Thin tests		159.5	168.7	145	160.6	172	142.7
Average AC 10/Rubber tests		141.0	154.7	126.7	158.6	176.7	142.7

* See text for thermocouple locations.
** See text for an explanation of the terms AC10 Thick, AC10 Thin, and AC10/Rubber Thin.

TABLE 3. VOLATILE ORGANIC COMPOUND RESULTS—AC10 THIN AND THICK ESTIMATED EMISSIONS

Sample ID Sample Type Collection Date Compound[#]	MDL ng/L	TB-10 Thin 02/05/93 µg/(m²•min)	TB-11 Thin 02/05/93 µg/(m²•min)	TB-12 Thin 02/05/93 µg/(m²•min)	TB-20 Thin 02/18/93 µg/(m²•min)	TB-21 Thin 02/18/93 µg/(m²•min)	TB-22 Thin 02/18/93 µg/(m²•min)	TB-25 Thin 02/25/93 µg/(m²•min)	TB-26 Thin 02/25/93 µg/(m²•min)	TB-27 Thin 02/25/93 µg/(m²•min)	TB-5 Thick 01/28/93 µg/(m²•min)	TB-6 Thick 01/28/93 µg/(m²•min)	TB-7 Thick 01/28/93 µg/(m²•min)	AVERAGE Thin µg/(m²•min)
Dichlorodifluoromethane	8.0	<97[DE]	<97[DE]	<97[DE]	<97[DE]	<97[DE]	<97[DE]	<97[DE]	<97[DE]	<97[DE]	<97[DE]	<97[DE]	<97[DE]	<=97
Chloromethane	4.0	<49[DE]	<49[DE]	<49[DE]	<49[DE]	<49[DE]	<49[DE]	<49[DE]	<49[DE]	<49[DE]	<49[DE]	<49[DE]	<49[DE]	<=49
2-Methylpropene	1.0	<12[DE]	<12[DE]	<12[DE]	<12[DE]	<12[DE]	<12[DE]	<12[DE]	<12[DE]	<12[DE]	<12[DE]	<12[DE]	<12[DE]	<=12
Vinyl Chloride	2.0	<24[DE]	<24[DE]	<24[DE]	<24[DE]	<24[DE]	<24[DE]	<24[DE]	<24[DE]	<24[DE]	<24[DE]	<24[DE]	<24[DE]	<=24
Bromomethane	2.3	<28[DE]	<28[DE]	<28[DE]	<28[DE]	<28[DE]	<28[DE]	<28[DE]	<28[DE]	<28[DE]	<28[DE]	<28[DE]	<28[DE]	<=28
Chloroethane	1.9	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<=23
Trichlorofluoromethane	1.1	<13[DE]	<13[DE]	<13[DE]	<13[DE]	<13[DE]	<13[DE]	<13[DE]	<13[DE]	<13[DE]	<13[DE]	<13[DE]	<13[DE]	<=13
1,1-Dichloroethene	1.8	<22[DE]	<22[DE]	<22[DE]	<22[DE]	<22[DE]	<22[DE]	<22[DE]	<22[DE]	<22[DE]	<22[DE]	<22[DE]	<22[DE]	<=22
Carbon Disulfide	1.5	<18[DE]	<18[DE]	<18[DE]	<18[DE]	<18[DE]	<18[DE]	<18[DE]	<18[DE]	<18[DE]	<18[DE]	<18[DE]	<18[DE]	<=18
Iodomethane	1.7	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<=21
Acetonitrile	13.1	<159[DE]	<159[DE]	<159[DE]	<159[DE]	<159[DE]	<159[DE]	<159[DE]	<159[DE]	<159[DE]	<159[DE]	<159[DE]	<159[DE]	<=159
trans-1,2-Dichloroethene	0.8	<10[DE]	<10[DE]	<10[DE]	<10[DE]	<10[DE]	<10[DE]	<10[DE]	<10[DE]	<10[DE]	<10[DE]	<10[DE]	<10[DE]	<=10
2-Methyl-2-Propanol	4.0	<49[DE]	<49[DE]	<49[DE]	<49[DE]	<49[DE]	<49[DE]	<49[DE]	<49[DE]	<49[DE]	<49[DE]	<49[DE]	<49[DE]	<=49
1,1-Dichloroethane	1.9	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<=23
Vinyl Acetate	7.0	<85[DE]	<85[DE]	<85[DE]	<85[DE]	<85[DE]	<85[DE]	<85[DE]	<85[DE]	<85[DE]	<85[DE]	<85[DE]	<85[DE]	<=85
Chloroform	1.6	<19[DE]	<19[DE]	<19[DE]	<19[DE]	<19[DE]	<19[DE]	<19[DE]	<19[DE]	<19[DE]	<19[DE]	<19[DE]	<19[DE]	<=19
1,1,1-Trichloroethane	1.1	<13[DE]	<13[DE]	<13[DE]	<13[DE]	<13[DE]	<13[DE]	<13[DE]	<13[DE]	<13[DE]	<13[DE]	<13[DE]	<13[DE]	<=13
Carbon Tetrachloride	1.5	<18[DE]	<18[DE]	<18[DE]	<18[DE]	<18[DE]	<18[DE]	<18[DE]	<18[DE]	<18[DE]	<18[DE]	<18[DE]	<18[DE]	<=18
Benzene	2.3	78[D]	27[DEG]	51[DE]	63[DE]	67[DE]	39[DEG]	66[E]	72[E]	51[DEG]	71[E]	72[E]	72[E]	<=57
1,2-Dichloroethane	1.7	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<=21
Fluorobenzene	1.9	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<=23
2-Chloro-2-Methylpropane	0.6	<7[DE]	<7[DE]	<7[DE]	<7[DE]	<7[DE]	<7[DE]	<7[DE]	<7[DE]	<7[DE]	<7[DE]	<7[DE]	<7[DE]	<=7

# = Compounds are listed in retention time order
Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
MDL = Method detection limit

D = Air concentration of this compound in this sample is NOT greater than three times (3X) that day's field blank concentration
E = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration or 3X the average field blank concentration, whichever is greater
G = Compound detected at less than a practical quantitation limit of 5 ng/L

(continued)

TABLE 3. VOLATILE ORGANIC COMPOUND RESULTS—AC10 THIN AND THICK ESTIMATED EMISSIONS (continued)

Sample ID Sample Type Collection Date Compound[#]	MDL ng/L	TB-10 Thin 02/05/93 µg/(m²*min)	TB-11 Thin 02/05/93 µg/(m²*min)	TB-12 Thin 02/05/93 µg/(m²*min)	TB-20 Thin 02/18/93 µg/(m²*min)	TB-21 Thin 02/18/93 µg/(m²*min)	TB-22 Thin 02/18/93 µg/(m²*min)	TB-25 Thin 02/25/93 µg/(m²*min)	TB-26 Thin 02/25/93 µg/(m²*min)	TB-27 Thin 02/25/93 µg/(m²*min)	TB-5 Thick 01/28/93 µg/(m²*min)	TB-6 Thick 01/28/93 µg/(m²*min)	TB-7 Thick 01/28/93 µg/(m²*min)	AVERAGE Thin µg/(m²*min)
2,5-Dimethyl-3-Hexene	1.4	<17 DE	<17 DE	<17 DE	<17 DE	<17 DE	<17 DE	<17 DE	<17 DE	<17 DE	<17 DE	<17 DE	<17 DE	<=17
Heptane	1.7	<21 DE	<21 DE	<21 DE	<21 DE	<21 DE	<21 DE	<21 DE	<21 DE	<21 DE	<21 DE	<21 DE	<21 DE	<=21
Trichloroethene	1.9	<23 DE	<23 DE	<23 DE	<23 DE	<23 DE	<23 DE	<23 DE	<23 DE	<23 DE	<23 DE	<23 DE	<23 DE	<=23
1,2-Dichloropropane	2.4	<29 DE	<29 DE	<29 DE	<29 DE	<29 DE	<29 DE	<29 DE	<29 DE	<29 DE	<29 DE	<29 DE	<29 DE	<=29
Dibromomethane	2.7	<33 DE	<33 DE	<33 DE	<33 DE	<33 DE	<33 DE	<33 DE	<33 DE	<33 DE	<33 DE	<33 DE	<33 DE	<=33
1,4-Dioxane	7.8	<95 DE	<95 DE	<95 DE	<95 DE	<95 DE	<95 DE	<95 DE	<95 DE	<95 DE	<95 DE	<95 DE	<95 DE	<=95
Bromodichloromethane	1.7	<21 DE	<21 DE	<21 DE	<21 DE	<21 DE	<21 DE	<21 DE	<21 DE	<21 DE	<21 DE	<21 DE	<21 DE	<=21
cis-1,3-Dichloropropene	1.6	<19 DE	<19 DE	<19 DE	<19 DE	<19 DE	<19 DE	<19 DE	<19 DE	<19 DE	<19 DE	<19 DE	<19 DE	<=19
4-Methyl-2-Pentanone	6.3	<76 DE	<76 DE	<76 DE	<76 DE	<76 DE	<76 DE	<76 DE	<76 DE	<76 DE	<76 DE	<76 DE	<76 DE	<=76
Toluene	4.1	46 DEG	50 DEG	39 DEG	73 DE	65 DE	287 E	73 DE	107 DE	58 DEG	195 E	84 E	84 E	<=89
trans-1,3-Dichloropropene	0.9	<11 DE	<11 DE	<11 DE	<11 DE	<11 DE	<11 DE	<11 DE	<11 DE	<11 DE	<11 DE	<11 DE	<11 DE	<=11
1,1,2-Trichloroethane	2.0	<24 DE	<24 DE	<24 DE	<24 DE	<24 DE	<24 DE	<24 DE	<24 DE	<24 DE	<24 DE	<24 DE	<24 DE	<=24
Tetrachloroethene	2.1	<25 DE	<25 DE	<25 DE	<25 DE	<25 DE	<25 DE	<25 DE	<25 DE	<25 DE	<25 DE	<25 DE	<25 DE	<=25
Bromoacetone	20.0	<243 DE	<243 DE	<243 DE	<243 DE	<243 DE	<243 DE	<243 DE	<243 DE	<243 DE	<243 DE	<243 DE	<243 DE	<=243
2-Hexanone	19.6	<238 DE	<238 DE	<238 DE	<238 DE	<238 DE	<238 DE	<238 DE	<238 DE	<238 DE	<238 DE	<238 DE	<238 DE	<=238
Dibromochloromethane	2.2	<27 DE	<27 DE	<27 DE	<27 DE	<27 DE	<27 DE	<27 DE	<27 DE	<27 DE	<27 DE	<27 DE	<27 DE	<=27
1,2-Dibromoethane	2.7	<33 DE	<33 DE	<33 DE	<33 DE	<33 DE	<33 DE	<33 DE	<33 DE	<33 DE	<33 DE	<33 DE	<33 DE	<=33
Chlorobenzene	3.2	<39 DE	<39 DE	<39 DE	<39 DE	<39 DE	<39 DE	<39 DE	<39 DE	<39 DE	<39 DE	<39 DE	<39 DE	<=39
1,1,1,2-Tetrachloroethane	2.0	<24 DE	<24 DE	<24 DE	<24 DE	<24 DE	<24 DE	<24 DE	<24 DE	<24 DE	<24 DE	<24 DE	<24 DE	<=24
Ethyl Benzene	2.9	<35 DE	<35 DE	<35 DE	27 DEG	16 DEG	50 DEG	<35 DE	27 DEG	24 DEG	<35 DE	<35 DE	<35 DE	<=32
m,p-Xylene	7.1	66 DE	47 DEG	59 DEG	97 DE	79 DE	196 DE	23 DEG	23 DEG	21 DEG	18 DEG	13 DEG	13 DEG	<=68
Nonane	11.6	<141 DE	<141 DE	<141 DE	<141 DE	<141 DE	<141 DE	<141 DE	<141 DE	<141 DE	<141 DE	<141 DE	<141 DE	<=141

# = Compounds are listed in retention time order
Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
MDL = Method detection limit

D = Air concentration of this compound in this sample is NOT greater than three times (3X) that day's field blank concentration
E = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration or 3X the average field blank concentration, whichever is greater
G = Compound detected at less than a practical quantitation limit of 5 ng/L

(continued)

TABLE 3. VOLATILE ORGANIC COMPOUND RESULTS—AC10 THIN AND THICK ESTIMATED EMISSIONS (concluded)

Sample ID Sample Type Collection Date Compound#	MDL ng/L	TB-10 Thin 02/05/93 µg/(m²•min)	TB-11 Thin 02/05/93 µg/(m²•min)	TB-12 Thin 02/05/93 µg/(m²•min)	TB-20 Thin 02/18/93 µg/(m²•min)	TB-21 Thin 02/18/93 µg/(m²•min)	TB-22 Thin 02/18/93 µg/(m²•min)	TB-25 Thin 02/25/93 µg/(m²•min)	TB-26 Thin 02/25/93 µg/(m²•min)	TB-27 Thin 02/25/93 µg/(m²•min)	TB-5 Thick 01/28/93 µg/(m²•min)	TB-6 Thick 01/28/93 µg/(m²•min)	TB-7 Thick 01/28/93 µg/(m²•min)	AVERAGE Thin µg/(m²•min)
o-Xylene	3.5	<42 DE	<42 DE	<42 DE	25 DEG	18 DEG	46 DEG	<42 DE	<42 DE	<42 DE	<42 DE	<42 DE	<42 DE	<=38
Styrene	4.1	<50 DE	<50 DE	<50 DE	<50 DE	<50 DE	<50 DE	<50 DE	<50 DE	<50 DE	<50 DE	<50 DE	<50 DE	<=50
Bromoform	2.2	<27 DE	<27 DE	<27 DE	<27 DE	<27 DE	<27 DE	<27 DE	<27 DE	<27 DE	<27 DE	<27 DE	<27 DE	<=27
Cumene	8.1	<98 DE	<98 DE	<98 DE	<98 DE	<98 DE	<98 DE	<98 DE	<98 DE	<98 DE	<98 DE	<98 DE	<98 DE	<=98
1,1,2,2-Tetrachloroethane	6.1	<74 DE	<74 DE	<74 DE	<74 DE	<74 DE	<74 DE	<74 DE	<74 DE	<74 DE	<74 DE	<74 DE	<74 DE	<=74
1,2,3-Trichloropropane	4.0	<49 DE	<49 DE	<49 DE	<49 DE	<49 DE	<49 DE	<49 DE	<49 DE	<49 DE	<49 DE	<49 DE	<49 DE	<=49
1,4-Dichloro-2-Butene	20.0	<243 DE	<243 DE	<243 DE	<243 DE	<243 DE	<243 DE	<243 DE	<243 DE	<243 DE	<243 DE	<243 DE	<243 DE	<=243
Pentachloroethane	5.3	<64 DE	<64 DE	<64 DE	<64 DE	<64 DE	<64 DE	<64 DE	<64 DE	<64 DE	<64 DE	<64 DE	<64 DE	<=64
1,3-Dichlorobenzene	2.6	<32 DE	<32 DE	<32 DE	<32 DE	<32 DE	<32 DE	<32 DE	<32 DE	<32 DE	<32 DE	<32 DE	<32 DE	<=32
1,4-Dichlorobenzene	4.3	<52 DE	<52 DE	<52 DE	<52 DE	<52 DE	<52 DE	<52 DE	<52 DE	<52 DE	<52 DE	<52 DE	<52 DE	<=52
1,2-Dichlorobenzene	3.5	<42 DE	<42 DE	<42 DE	<42 DE	<42 DE	<42 DE	<42 DE	<42 DE	<42 DE	<42 DE	<42 DE	<42 DE	<=42
1,2-Dibromo-3-Chloropropane	7.0	<85 DE	<85 DE	<85 DE	<85 DE	<85 DE	<85 DE	<85 DE	<85 DE	<85 DE	<85 DE	<85 DE	<85 DE	<=85

# = Compounds are listed in retention time order
Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
MDL = Method detection limit

D = Air concentration of this compound in this sample is NOT greater than three times (3X) that day's field blank concentration
E = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration or 3X the average field blank concentration, whichever is greater
G = Compound detected at less than a practical quantitation limit of 5 ng/L

TABLE 4. VOLATILE ORGANIC COMPOUND RESULTS—AC10 WITH RUBBER ESTIMATED EMISSIONS

Sample ID Sample Type Collection Date Compound[#]	MDL ng/L	TB-34 Thin Rub 04/07/93 µg/m²•min)	TB-36 Thin Rub 04/07/93 µg/m²•min)	TB-35 Thin Rub 04/07/93 µg/m²•min)	TB-43 Thin Rub 04/27/93 µg/m²•min)	TB-44 Thin Rub 04/27/93 µg/m²•min)	TB-45 Thin Rub 04/27/93 µg/m²•min)	TB-50 Thin Rub 05/24/93 µg/m²•min)	TB-51 Thin Rub 05/24/93 µg/m²•min)	TB-52 Thin Rub 05/24/93 µg/m²•min)	AVERAGE Thin Rub µg/m²•min)
Dichlorodifluoromethane	8.0	<97[DE]	<97[DE]	<97[DE]	<97[DE]	<97[DE]	<97[DE]	<97[DE]	<97[DE]	<97[DE]	<=97
Chloromethane	4.0	<49[DE]	<49[DE]	<49[DE]	<49[DE]	<49[DE]	<49[DE]	<49[DE]	<49[DE]	<49[DE]	<=49
2-Methylpropene	1.0	<12[DE]	<12[DE]	<12[DE]	<12[DE]	<12[DE]	<12[DE]	<12[DE]	<12[DE]	<12[DE]	<=12
Vinyl Chloride	2.0	<24[DE]	<24[DE]	<24[DE]	<24[DE]	<24[DE]	<24[DE]	<24[DE]	<24[DE]	<24[DE]	<=24
Bromomethane	2.3	<28[DE]	<28[DE]	<28[DE]	<28[DE]	<28[DE]	<28[DE]	<28[DE]	<28[DE]	<28[DE]	<=28
Chloroethane	1.9	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<=23
Trichlorofluoromethane	1.1	<13[DE]	<13[DE]	<13[DE]	<13[DE]	<13[DE]	<13[DE]	<13[DE]	<13[DE]	<13[DE]	<=13
1,1-Dichloroethene	1.8	<22[DE]	<22[DE]	<22[DE]	<22[DE]	<22[DE]	<22[DE]	<22[DE]	<22[DE]	<22[DE]	<=22
Carbon Disulfide	1.5	<18[DE]	<18[DE]	<18[DE]	<18[DE]	<18[DE]	<18[DE]	<18[DE]	<18[DE]	<18[DE]	<=18
Iodomethane	1.7	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<=21
Acetonitrile	13.1	<159[DE]	<159[DE]	<159[DE]	<159[DE]	<159[DE]	<159[DE]	<159[DE]	<159[DE]	<159[DE]	<=159
trans-1,2-Dichloroethene	0.8	<10[DE]	<10[DE]	<10[DE]	<10[DE]	<10[DE]	<10[DE]	<10[DE]	<10[DE]	<10[DE]	<=10
2-Methyl-2-Propanol	4.0	<49[DE]	<49[DE]	<49[DE]	<49[DE]	<49[DE]	<49[DE]	<49[DE]	<49[DE]	<49[DE]	<=49
1,1-Dichloroethane	1.9	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<=23
Vinyl Acetate	7.0	913	3762	2565	<85[DE]	<85[DE]	<85[DE]	<85[DE]	<85[DE]	<85[DE]	<=861
Chloroform	1.6	<19[DE]	<19[DE]	<19[DE]	<19[DE]	<19[DE]	<19[DE]	<19[DE]	<19[DE]	<19[DE]	<=19
1,1,1-Trichloroethane	1.1	<13[DE]	<13[DE]	<13[DE]	<13[DE]	<13[DE]	<13[DE]	<13[DE]	<13[DE]	<13[DE]	<=13
Carbon Tetrachloride	1.5	<18[DE]	<18[DE]	<18[DE]	<18[DE]	<18[DE]	<18[DE]	<18[DE]	<18[DE]	<18[DE]	<=18
Benzene	2.3	105	166	147	120	58[DE]	130	54[E]	147	62[E]	<=110
1,2-Dichloroethane	1.7	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<=21
Fluorobenzene	1.9	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<=23
2-Chloro-2-Methylpropane	0.6	<7[DE]	<7[DE]	<7[DE]	<7[DE]	<7[DE]	<7[DE]	<7[DE]	<7[DE]	<7[DE]	<=7

= Compounds are listed in retention time order
Thin Rub = AC10 hot-mix with rubber, thin layer
-- = Not detected at a practical quantitation limit of 5.0 ng/L and satisfies the conditions for footnotes D and E

MDL = Method detection limit
D = Air concentration of this compound in this sample is NOT greater than three times (3X) that day's field blank concentration
E = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration or 3X the average field blank concentration, whichever is greater

(continued)

TABLE 4. VOLATILE ORGANIC COMPOUND RESULTS—AC10 WITH RUBBER ESTIMATED EMISSIONS (continued)

Sample ID Sample Type Collection Date Compound#	MDL ng/L	TB-34 Thin Rub 04/07/93 µg/m²•min)	TB-36 Thin Rub 04/07/93 µg/m²•min)	TB-35 Thin Rub 04/07/93 µg/m²•min)	TB-43 Thin Rub 04/27/93 µg/m²•min)	TB-44 Thin Rub 04/27/93 µg/m²•min)	TB-45 Thin Rub 04/27/93 µg/m²•min)	TB-50 Thin Rub 05/24/93 µg/m²•min)	TB-51 Thin Rub 05/24/93 µg/m²•min)	TB-52 Thin Rub 05/24/93 µg/m²•min)	AVERAGE Thin Rub µg/m²•min)
2,5-Dimethyl-3-Hexene	1.4	<17[DE]	<17[DE]	<17[DE]	<17[DE]	<17[DE]	<17[DE]	<17[DE]	<17[DE]	<17[DE]	<=17
Heptane	1.7	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<=21
Trichloroethene	1.9	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<23[DE]	<=23
1,2-Dichloropropane	2.4	<29[DE]	<29[DE]	<29[DE]	<29[DE]	<29[DE]	<29[DE]	<29[DE]	<29[DE]	<29[DE]	<=29
Dibromomethane	2.7	<33[DE]	<33[DE]	<33[DE]	<33[DE]	<33[DE]	<33[DE]	<33[DE]	<33[DE]	<33[DE]	<=33
1,4-Dioxane	7.8	<95[DE]	<95[DE]	<95[DE]	<95[DE]	<95[DE]	<95[DE]	<95[DE]	<95[DE]	<95[DE]	<=95
Bromodichloromethane	1.7	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<21[DE]	<=21
cis-1,3-Dichloropropene	1.6	<19[DE]	<19[DE]	<19[DE]	<19[DE]	<19[DE]	<19[DE]	<19[DE]	<19[DE]	<19[DE]	<=19
4-Methyl-2-Pentanone	6.3	<76[DE]	<76[DE]	<76[DE]	<76[DE]	<76[DE]	<76[DE]	<76[DE]	<76[DE]	<76[DE]	<=76
Toluene	4.1	67[DE]	83[DE]	65[DE]	47[DE]	42[DE]	64[DE]	36[DE]	116[E]	109[E]	<=70
trans-1,3-Dichloropropene	0.9	<11[DE]	<11[DE]	<11[DE]	<11[DE]	<11[DE]	<11[DE]	<11[DE]	<11[DE]	<11[DE]	<=11
1,1,2-Trichloroethane	2.0	<24[DE]	<24[DE]	<24[DE]	<24[DE]	<24[DE]	<24[DE]	<24[DE]	<24[DE]	<24[DE]	<=24
Tetrachloroethene	2.1	<25[DE]	<25[DE]	<25[DE]	<25[DE]	<25[DE]	<25[DE]	<25[DE]	<25[DE]	<25[DE]	<=25
Bromoacetone	20.0	<243[DE]	<243[DE]	<243[DE]	<243[DE]	<243[DE]	<243[DE]	<243[DE]	<243[DE]	<243[DE]	<=243
2-Hexanone	19.6	<238[DE]	<238[DE]	<238[DE]	<238[DE]	<238[DE]	<238[DE]	<238[DE]	<238[DE]	<238[DE]	<=238
Dibromochloromethane	2.2	<27[DE]	<27[DE]	<27[DE]	<27[DE]	<27[DE]	<27[DE]	<27[DE]	<27[DE]	<27[DE]	<=27
1,2-Dibromoethane	2.7	<33[DE]	<33[DE]	<33[DE]	<33[DE]	<33[DE]	<33[DE]	<33[DE]	<33[DE]	<33[DE]	<=33
Chlorobenzene	3.2	<39[DE]	<39[DE]	<39[DE]	<39[DE]	<39[DE]	<39[DE]	<39[DE]	<39[DE]	<39[DE]	<=39
1,1,1,2-Tetrachloroethane	2.0	<24[DE]	<24[DE]	<24[DE]	<24[DE]	<24[DE]	<24[DE]	<24[DE]	<24[DE]	<24[DE]	<=24
Ethyl Benzene	2.9	<35[DE]	<35[DE]	<35[DE]	<35[DE]	<35[DE]	<35[DE]	<35[DE]	26[DE]	25[DE]	<=33
m,p-Xylene	7.1	134[DE]	191[DE]	183[DE]	173[DE]	66[DE]	138[DE]	59[DE]	162[DE]	61[DE]	<=130
Nonane	11.6	<141[DE]	<141[DE]	<141[DE]	<141[DE]	<141[DE]	<141[DE]	<141[DE]	<141[DE]	<141[DE]	<=141

= Compounds are listed in retention time order
Thin Rub = AC10 hot-mix with rubber, thin layer
-- = Not detected at a practical quantitation limit of 5.0 ng/L and satisfies the conditions for footnotes D and E

MDL = Method detection limit
D = Air concentration of this compound in this sample is NOT greater than three times (3X) that day's field blank concentration
E = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration or 3X the average field blank concentration, whichever is greater

(continued)

TABLE 4. VOLATILE ORGANIC COMPOUND RESULTS—AC10 WITH RUBBER ESTIMATED EMISSIONS (concluded)

Sample ID Sample Type Collection Date Compound#	MDL ng/L	TB-34 Thin Rub 04/07/93 µg/m²•min)	TB-36' Thin Rub 04/07/93 µg/m²•min)	TB-35 Thin Rub 04/07/93 µg/m²•min)	TB-43 Thin Rub 04/27/93 µg/m²•min)	TB-44 Thin Rub 04/27/93 µg/m²•min)	TB-45 Thin Rub 04/27/93 µg/m²•min)	TB-50 Thin Rub 05/24/93 µg/m²•min)	TB-51 Thin Rub 05/24/93 µg/m²•min)	TB-52 Thin Rub 05/24/93 µg/m²•min)	AVERAGE Thin Rub µg/m²•min)
o-Xylene	3.5	<42 DE	<42 DE	<42 DE	<42 DE	<42 DE	<42 DE	<42 DE	29 DE	24 DE	<=39
Styrene	4.1	<50 DE	<50 DE	<50 DE	<50 DE	<50 DE	<50 DE	<50 DE	<50 DE	<50 DE	<=50
Bromoform	2.2	<27 DE	<27 DE	<27 DE	<27 DE	<27 DE	<27 DE	<27 DE	<27 DE	<27 DE	<=27
Cumene	8.1	<98 DE	<98 DE	<98 DE	<98 DE	<98 DE	<98 DE	<98 DE	<98 DE	<98 DE	<=98
1,1,2,2-Tetrachloroethane	6.1	<74 DE	<74 DE	<74 DE	<74 DE	<74 DE	<74 DE	<74 DE	<74 DE	<74 DE	<=74
1,2,3-Trichloropropane	4.0	<49 DE	<49 DE	<49 DE	<49 DE	<49 DE	<49 DE	<49 DE	<49 DE	<49 DE	<=49
1,4-Dichloro-2-Butene	20.0	<243 DE	<243 DE	<243 DE	<243 DE	<243 DE	<243 DE	<243 DE	<243 DE	<243 DE	<=243
Pentachloroethane	5.3	<64 DE	<64 DE	<64 DE	<64 DE	<64 DE	<64 DE	<64 DE	<64 DE	<64 DE	<=64
1,3-Dichlorobenzene	2.6	<32 DE	<32 DE	<32 DE	<32 DE	<32 DE	<32 DE	<32 DE	<32 DE	<32 DE	<=32
1,4-Dichlorobenzene	4.3	<52 DE	<52 DE	<52 DE	<52 DE	<52 DE	<52 DE	<52 DE	<52 DE	<52 DE	<=52
1,2-Dichlorobenzene	3.5	<42 DE	<42 DE	<42 DE	<42 DE	<42 DE	<42 DE	<42 DE	<42 DE	<42 DE	<=42
1,2-Dibromo-3-Chloropropane	7.0	<85 DE	<85 DE	<85 DE	<85 DE	<85 DE	<85 DE	<85 DE	<85 DE	<85 DE	<=85

= Compounds are listed in retention time order
Thin Rub = AC10 hot-mix with rubber, thin layer
-- = Not detected at a practical quantitation limit of 5.0 ng/L and satisfies the conditions for footnotes D and E

MDL = Method detection limit
D = Air concentration of this compound in this sample is NOT greater than three times (3X) that day's field blank concentration
E = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration or 3X the average field blank concentration, whichever is greater

TABLE 5. VOLATILE ORGANIC COMPOUND RESULTS—FACILITY BLANKS ESTIMATED EMISSIONS

Sample ID Sample Type Collection Date Compound#	MDL ng/L	TB-9 Facility Blk 02/05/93 µg/(m²•min)	TB-15 Facility Blk 02/11/93 µg/(m²•min)	TB-16 Facility Blk 02/11/93 µg/(m²•min)	TB-39 Facility Blk 04/15/93 µg/(m²•min)	TB-38 Facility Blk 04/15/93 µg/(m²•min)	TB-40 Facility Blk 04/15/93 µg/(m²•min)	TB-48 Facility Blk 05/07/93 µg/(m²•min)	TB-46b Facility Blk 05/07/93 µg/(m²•min)	TB-47 Facility Blk 05/07/93 µg/(m²•min)	AVG Facility Blk µg/(m²•min)
Dichlorodifluoromethane	8.0	<97 DE	<97 DE	<97 DE	<97 DE	<97 DE	<97 DE	<97 DE	<97 DE	<97 DE	<=97
Chloromethane	4.0	<49 DE	<49 DE	<49 DE	<49 DE	<49 DE	<49 DE	<49 DE	<49 DE	<49 DE	<=49
2-Methylpropene	1.0	<12 DE	<12 DE	<12 DE	<12 DE	<12 DE	<12 DE	<12 DE	<12 DE	<12 DE	<=12
Vinyl Chloride	2.0	<24 DE	<24 DE	<24 DE	<24 DE	<24 DE	<24 DE	<24 DE	<24 DE	<24 DE	<=24
Bromomethane	2.3	<28 DE	<28 DE	<28 DE	<28 DE	<28 DE	<28 DE	<28 DE	<28 DE	<28 DE	<=28
Chloroethane	1.9	<23 DE	<23 DE	<23 DE	<23 DE	<23 DE	<23 DE	<23 DE	<23 DE	<23 DE	<=23
Trichlorofluoromethane	1.1	<13 DE	<13 DE	<13 DE	<13 DE	<13 DE	<13 DE	<13 DE	<13 DE	<13 DE	<=13
1,1-Dichloroethene	1.8	<22 DE	<22 DE	<22 DE	<22 DE	<22 DE	<22 DE	<22 DE	<22 DE	<22 DE	<=22
Carbon Disulfide	1.5	<18 DE	<18 DE	<18 DE	<18 DE	<18 DE	<18 DE	<18 DE	<18 DE	<18 DE	<=18
Iodomethane	1.7	<21 DE	<21 DE	<21 DE	<21 DE	<21 DE	<21 DE	<21 DE	<21 DE	<21 DE	<=21
Acetonitrile	13.1	<159 DE	<159 DE	<159 DE	<159 DE	<159 DE	<159 DE	<159 DE	<159 DE	<159 DE	<=159
trans-1,2-Dichloroethene	0.8	<10 DE	<10 DE	<10 DE	<10 DE	<10 DE	<10 DE	<10 DE	<10 DE	<10 DE	<=10
2-Methyl-2-Propanol	4.0	<49 DE	<49 DE	<49 DE	<49 DE	<49 DE	<49 DE	<49 DE	<49 DE	<49 DE	<=49
1,1-Dichloroethane	1.9	<23 DE	<23 DE	<23 DE	<23 DE	<23 DE	<23 DE	<23 DE	<23 DE	<23 DE	<=23
Vinyl Acetate	7.0	<85 DE	<85 DE	<85 DE	<85 DE	<85 DE	<85 DE	<85 DE	<85 DE	<85 DE	<=85
Chloroform	1.6	<19 DE	<19 DE	<19 DE	<19 DE	<19 DE	<19 DE	<19 DE	<19 DE	<19 DE	<=19
1,1,1-Trichloroethane	1.1	<13 DE	<13 DE	<13 DE	<13 DE	<13 DE	<13 DE	<13 DE	<13 DE	<13 DE	<=13
Carbon Tetrachloride	1.5	<18 DE	<18 DE	<18 DE	<18 DE	<18 DE	<18 DE	<18 DE	<18 DE	<18 DE	<=18
Benzene	2.3	<28 DE	21 DEG	16 DEG	27 DE	64 DE	23 DE	20 DE	17 DE	17 DE	<=26
1,2-Dichloroethane	1.7	<21 DE	<21 DE	<21 DE	<21 DE	<21 DE	<21 DE	<21 DE	<21 DE	<21 DE	<=21
Fluorobenzene	1.9	<23 DE	<23 DE	<23 DE	<23 DE	<23 DE	<23 DE	<23 DE	<23 DE	<23 DE	<=23
2-Chloro-2-Methylpropane	0.6	<7 DE	<7 DE	<7 DE	<7 DE	<7 DE	<7 DE	<7 DE	<7 DE	<7 DE	<=7

= Compounds are listed in retention time order
Facility Blk = Facility Blank
MDL = Method detection limit

D = Air concentration of this compound in this sample is NOT greater than three times (3X) that day's field blank concentration
E = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration or 3X the average field blank concentration, whichever is greater
G = Compound detected at less than a practical quantitation limit of 5 ng/L

(continued)

TABLE 5. VOLATILE ORGANIC COMPOUND RESULTS—FACILITY BLANKS ESTIMATED EMISSIONS (continued)

Sample ID Sample Type Collection Date Compound#	MDL ng/L	TB-9 Facility Blk 02/05/93 µg/(m²•min)	TB-19 Facility Blk 02/11/93 µg/(m²•min)	TB-16 Facility Blk 02/11/93 µg/(m²•min)	TB-39 Facility Blk 04/15/93 µg/(m²•min)	TB-38 Facility Blk 04/15/93 µg/(m²•min)	TB-40 Facility Blk 04/15/93 µg/(m²•min)	TB-48 Facility Blk 05/07/93 µg/(m²•min)	TB-46b Facility Blk 05/07/93 µg/(m²•min)	TB-47 Facility Blk 05/07/93 µg/(m²•min)	AVG Facility Blk µg/(m²•min)
2,5-Dimethyl-3-Hexene	1.4	<17 DE	<17 DE	<17 DE	<17 DE	<17 DE	<17 DE	<17 DE	<17 DE	<17 DE	<=17
Heptane	1.7	<21 DE	<21 DE	<21 DE	<21 DE	<21 DE	<21 DE	<21 DE	<21 DE	<21 DE	<=21
Trichloroethene	1.9	<23 DE	<23 DE	<23 DE	<23 DE	<23 DE	<23 DE	<23 DE	<23 DE	<23 DE	<=23
1,2-Dichloropropane	2.4	<29 DE	<29 DE	<29 DE	<29 DE	<29 DE	<29 DE	<29 DE	<29 DE	<29 DE	<=29
Dibromomethane	2.7	<33 DE	<33 DE	<33 DE	<33 DE	<33 DE	<33 DE	<33 DE	<33 DE	<33 DE	<=33
1,4-Dioxane	7.8	<95 DE	<95 DE	<95 DE	<95 DE	<95 DE	<95 DE	<95 DE	<95 DE	<95 DE	<=95
Bromodichloromethane	1.7	<21 DE	<21 DE	<21 DE	<21 DE	<21 DE	<21 DE	<21 DE	<21 DE	<21 DE	<=21
cis-1,3-Dichloropropene	1.6	<19 DE	<19 DE	<19 DE	<19 DE	<19 DE	<19 DE	<19 DE	<19 DE	<19 DE	<=19
4-Methyl-2-Pentanone	6.3	<76 DE	<76 DE	<76 DE	<76 DE	<76 DE	<76 DE	<76 DE	<76 DE	<76 DE	<=76
Toluene	4.1	25 DEG	70 DE	49 DEG	57 DE	742	59 DE	29 DE	24 DE	24 DE	<=120
trans-1,3-Dichloropropene	0.9	<11 DE	<11 DE	<11 DE	<11 DE	<11 DE	<11 DE	<11 DE	<11 DE	<11 DE	<=11
1,1,2-Trichloroethane	2.0	<24 DE	<24 DE	<24 DE	<24 DE	<24 DE	<24 DE	<24 DE	<24 DE	<24 DE	<=24
Tetrachloroethene	2.1	<25 DE	<25 DE	<25 DE	<25 DE	<25 DE	<25 DE	<25 DE	<25 DE	<25 DE	<=25
Bromoacetone	20.0	<243 DE	<243 DE	<243 DE	<243 DE	<243 DE	<243 DE	<243 DE	<243 DE	<243 DE	<=243
2-Hexanone	19.6	<238 DE	<238 DE	<238 DE	<238 DE	<238 DE	<238 DE	<238 DE	<238 DE	<238 DE	<=238
Dibromochloromethane	2.2	<27 DE	<27 DE	<27 DE	<27 DE	<27 DE	<27 DE	<27 DE	<27 DE	<27 DE	<=27
1,2-Dibromoethane	2.7	<33 DE	<33 DE	<33 DE	<33 DE	<33 DE	<33 DE	<33 DE	<33 DE	<33 DE	<=33
Chlorobenzene	3.2	<39 DE	<39 DE	<39 DE	<39 DE	<39 DE	<39 DE	<39 DE	<39 DE	<39 DE	<=39
1,1,1,2-Tetrachloroethane	2.0	<24 DE	<24 DE	<24 DE	<24 DE	<24 DE	<24 DE	<24 DE	<24 DE	<24 DE	<=24
Ethyl Benzene	2.9	<35 DE	<35 DE	<35 DE	<35 DE	86 DE	<35 DE	<35 DE	<35 DE	<35 DE	<=41
m,p-Xylene	7.1	35 DEG	44 DEG	73 DE	33 DE	315	31 DE	<86 DE	<86 DE	<86 DE	<=88
Nonane	11.6	<141 DE	<141 DE	<141 DEG	<141 DE	<141 DE	<141 DE	<141 DE	<141 DE	<141 DE	<=141

= Compounds are listed in retention time order
Facility Blk = Facility Blank
MDL = Method detection limit

D = Air concentration of this compound in this sample is NOT greater than three times (3X) that day's field blank concentration
E = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration or 3X the average field blank concentration, whichever is greater
G = Compound detected at less than a practical quantitation limit of 5 ng/L

(continued)

TABLE 5. VOLATILE ORGANIC COMPOUND RESULTS—FACILITY BLANKS ESTIMATED EMISSIONS (concluded)

Sample ID Sample Type Collection Date Compound#	MDL ng/L	TB-9 Facility Blk 02/05/93 µg/(m²•min)	TB-19 Facility Blk 02/11/93 µg/(m²•min)	TB-16 Facility Blk 02/11/93 µg/(m²•min)	TB-39 Facility Blk 04/15/93 µg/(m²•min)	TB-38 Facility Blk 04/15/93 µg/(m²•min)	TB-40 Facility Blk 04/15/93 µg/(m²•min)	TB-48 Facility Blk 05/07/93 µg/(m²•min)	TB-46b Facility Blk 05/07/93 µg/(m²•min)	TB-47 Facility Blk 05/07/93 µg/(m²•min)	AVG Facility Blk µg/(m²•min)
o-Xylene	3.5	<42 DE	<42 DE	18 DE	<42 DE	107 DE	19 DE	<42 DE	<42 DE	<42 DE	<=44
Styrene	4.1	<50 DE	<50 DE	<50 DE	<50 DE	<50 DE	<50 DE	<50 DE	<50 DE	<50 DE	<=50
Bromoform	2.2	<27 DE	<27 DE	<27 DE	<27 DE	<27 DE	<27 DE	<27 DE	<27 DE	<27 DE	<=27
Cumene	8.1	<98 DE	<98 DE	<98 DE	<98 DE	<98 DE	<98 DE	<98 DE	<98 DE	<98 DE	<=98
1,1,2,2-Tetrachloroethane	6.1	<74 DE	<74 DE	<74 DE	<74 DE	<74 DE	<74 DE	<74 DE	<74 DE	<74 DE	<=74
1,2,3-Trichloropropane	4.0	<49 DE	<49 DE	<49 DE	<49 DE	<49 DE	<49 DE	<49 DE	<49 DE	<49 DE	<=49
1,4-Dichloro-2-Butene	20.0	<243 DE	<243 DE	<243 DE	<243 DE	<243 D,E	<243 DE	<243 DE	<243 DE	<243 DE	<=243
Pentachloroethane	5.3	<64 DE	<64 DE	<64 DE	<64 DE	<64 DE	<64 DE	<64 DE	<64 DE	<64 DE	<=64
1,3-Dichlorobenzene	2.6	<32 DE	<32 DE	<32 DE	<32 DE	<32 DE	<32 DE	<32 DE	<32 DE	<32 DE	<=32
1,4-Dichlorobenzene	4.3	<52 DE	<52 DE	<52 DE	<52 DE	<52 DE	<52 DE	<52 DE	<52 DE	<52 DE	<=52
1,2-Dichlorobenzene	3.5	<42 DE	<42 DE	<42 DE	<42 DE	<42 DE	<42 DE	<42 DE	<42 DE	<42 DE	<=42
1,2-Dibromo-3-Chloropropane	7.0	<85 DE	<85 DE	<85 DE	<85 DE	<85 DE	<85 DE	<85 DE	<85 DE	<85 DE	<=85

= Compounds are listed in retention time order
Facility Blk = Facility Blank
MDL = Method detection limit

D = Air concentration of this compound in this sample is NOT greater than three times (3X) that day's field blank concentration
E = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration or 3X the average field blank concentration, whichever is greater

TABLE 6. VOLATILE ORGANIC COMPOUND T-TEST STATISTICS*

VOCs	Thin/Thin Rubber		Thin/Facility Blank		Thin Rubber/Facility Blank	
	16 degrees of freedom		16 degrees of freedom		16 degrees of freedom	
	t-Stat	Level of Significance	t-Stat	Level of Significance	t-Stat	Level of Significance
Vinyl Acetate	-1.70408	NS	0	NS	1.704085	NS
Benzene	-3.47471	0.01	4.196496	0.002	5.593274	0.002
Toluene	0.689367	NS	-0.38041	NS	-0.63742	NS
Ethyl Benzene	-0.44144	NS	-1.4302	NS	-1.3304	NS
m,p-Xylene	-2.40363	0.05	-0.56957	NS	1.212698	NS
o-Xylene	-0.17015	NS	-0.6635	NS	-0.60719	NS

* All tests are two-tailed difference of means, unlisted compounds were not statistically significant in any comparison
Thin/Thin Rubber = Comparison between AC10 Thin Asphalt and AC10 Thin Asphalt with Rubber; t statistics greater than zero indicate a higher concentration of the compound in the AC10 Thin Asphalt
Thin/Facility Blank = Comparison between AC10 Thin Asphalt and the Facility Blanks; t statistics greater than zero indicate a higher concentration of the compound in the AC10 Thin Asphalt
Thin Rubber/Facility Blank = Comparison between AC10 Thin Asphalt with Rubber and the Facility Blanks; t statistics greater than zero indicate a higher concentration of the compound in the AC10 Thin Asphalt with Rubber
t-Stat = the student's t statistic to test a difference of means
NS = Not statistically significant

TABLE 7. ORGANIC XAD-2 TRAIN, SEMIVOLATILE TARGETED COMPOUND ESTIMATED EMISSIONS

Sample Name Sample Type Date of Collection Compound	MDL (µg)	XAD-3 Thick 1/28/93 µg/(m²*min)	XAD-6 Thin 2/4/93 µg/(m²*min)	XAD-9 Thin 2/18/93 µg/(m²*min)	XAD-12 Thin 2/25/93 µg/(m²*min)	AVERAGE Thin µg/(m²*min)	XAD-16 Thin Rub 4/7/93 µg/(m²*min)	XAD-27 Thin Rub 4/27/93 µg/(m²*min)	XAD-31 Thin Rub 5/24/93 µg/(m²*min)	XAD-27D Thin Rub 4/27/93 µg/(m²*min)	AVERAGE Thin Rub µg/(m²*min)	XAD-8 Facility Blk 2/11/93 µg/(m²*min)	XAD-18* Facility Blk 4/4/93 µg/(m²*min)	XAD-30 Facility Blk 5/7/93 µg/(m²*min)	AVERAGE Facility Blk µg/(m²*min)
Phenol	1.0	274.576	<2.698^{AB}	142.614	30.828	<=58.713	49.276	9.373^{AB}	16.958^{AB}	10.475^{AB}	<=25.202	<2.342^{AB}	14.957^{AB}	<3.193^{AB}	<=6.831
bis(2-Chloroethyl) Ether	1.0	<2.288^{AB}	<2.698^{AB}	<2.641^{AB}	<2.371^{AB}	<=2.570	<2.899^{AB}	<2.757^{AB}	<3.200^{AB}	<2.757^{AB}	<=2.952	<2.342^{AB}	<3.053^{AB}	<3.193^{AB}	<=2.863
2-Chlorophenol	1.0	<2.288^{AB}	<2.698^{AB}	<2.641^{AB}	<2.371^{AB}	<=2.570	<2.899^{AB}	<2.757^{AB}	<3.200^{AB}	<2.757^{AB}	<=2.952	<2.342^{AB}	<3.053^{AB}	<3.193^{AB}	<=2.863
1,3-Dichlorobenzene	1.0	<2.288^{AB}	<2.698^{AB}	<2.641^{AB}	<2.371^{AB}	<=2.570	<2.899^{AB}	<2.757^{AB}	<3.200^{AB}	<2.757^{AB}	<=2.952	<2.342^{AB}	<3.053^{AB}	<3.193^{AB}	<=2.863
1,4-Dichlorobenzene	1.0	<2.288^{AB}	<2.698^{AB}	<2.641^{AB}	<2.371^{AB}	<=2.570	<2.899^{AB}	<2.757^{AB}	<3.200^{AB}	<2.757^{AB}	<=2.952	<2.342^{AB}	<3.053^{AB}	<3.193^{AB}	<=2.863
1,2-Dichlorobenzene	1.0	<2.288^{AB}	<2.698^{AB}	<2.641^{AB}	<2.371^{AB}	<=2.570	<2.899^{AB}	<2.757^{AB}	<3.200^{AB}	<2.757^{AB}	<=2.952	<2.342^{AB}	<3.053^{AB}	<3.193^{AB}	<=2.863
2-Methylphenol	1.0	<2.288^{AB}	<2.698^{AB}	<2.641^{AB}	16.125^{AB}	<=7.155	26.667^{A}	16.540^{AB}	27.837^{A}	15.989^{AB}	<=23.681	<2.342^{AB}	<3.053^{AB}	14.367^{AB}	<=6.587
bis(2-Chloroisopropyl) Ether	1.0	<2.288^{AB}	<2.698^{AB}	<2.641^{AB}	<2.371^{AB}	<=2.570	<2.899^{AB}	<2.757^{AB}	<3.200^{AB}	<2.757^{AB}	<=2.952	<2.342^{AB}	<3.053^{AB}	<3.193^{AB}	<=2.863
n-Nitroso-di-n-Propylamine	1.0	<2.288^{AB}	<2.698^{AB}	<2.641^{AB}	<2.371^{AB}	<=2.570	<2.899^{AB}	<2.757^{AB}	<3.200^{AB}	<2.757^{AB}	<=2.952	<2.342^{AB}	<3.053^{AB}	<3.193^{AB}	<=2.863
4-Methylphenol	1.0	<2.288^{AB}	<2.698^{AB}	<2.641^{AB}	10.197^{A}	<=5.178	<2.899^{AB}	3.584^{AB}	<3.200^{AB}	3.859^{AB}	<=3.227	<2.342^{AB}	<3.053^{AB}	<3.193^{AB}	<=2.863
Hexachloroethane	1.0	<2.288^{AB}	<2.698^{AB}	<2.641^{AB}	<2.371^{AB}	<=2.570	<2.899^{AB}	<2.757^{AB}	<3.200^{AB}	<2.757^{AB}	<=2.952	<2.342^{AB}	<3.053^{AB}	<3.193^{AB}	<=2.863
Nitrobenzene	1.0	<2.288^{AB}	<2.698^{AB}	<2.641^{AB}	<2.371^{AB}	<=2.570	<2.899^{AB}	<2.757^{AB}	<3.200^{AB}	<2.757^{AB}	<=2.952	<2.342^{AB}	<3.053^{AB}	<3.193^{AB}	<=2.863
Isophorone	1.0	<2.288^{AB}	<2.698^{AB}	<2.641^{AB}	<2.371^{AB}	<=2.570	<2.899^{AB}	<2.757^{AB}	<3.200^{AB}	<2.757^{AB}	<=2.952	<2.342^{AB}	<3.053^{AB}	<3.193^{AB}	<=2.863
2-Nitrophenol	1.0	<2.288^{AB}	<2.698^{AB}	<2.641^{AB}	<2.371^{AB}	<=2.570	<2.899^{AB}	<2.757^{AB}	<3.200^{AB}	<2.757^{AB}	<=2.952	<2.342^{AB}	<3.053^{AB}	<3.193^{AB}	<=2.863
2,4-Dimethylphenol	1.0	<2.288^{AB}	<2.698^{AB}	<2.641^{AB}	<2.371^{AB}	<=2.570	<2.899^{AB}	<2.757^{AB}	<3.200^{AB}	<2.757^{AB}	<=2.952	<2.342^{AB}	<3.053^{AB}	<3.193^{AB}	<=2.863
Benzoic Acid	1.0	<2.288^{AB}	<2.698^{AB}	<2.641^{AB}	<2.371^{AB}	<=2.570	<2.899^{AB}	19.297^{A}	<3.200^{AB}	13.508^{A}	<=8.465	<2.342^{AB}	<3.053^{AB}	<3.193^{AB}	<=2.863
bis(2-Chloroethoxy) Methane	1.0	<2.288^{AB}	<2.698^{AB}	<2.641^{AB}	<2.371^{AB}	<=2.570	<2.899^{AB}	<2.757^{AB}	<3.200^{AB}	<2.757^{AB}	<=2.952	<2.342^{AB}	<3.053^{AB}	<3.193^{AB}	<=2.863
2,4-Dichlorophenol	1.0	<2.288^{AB}	<2.698^{AB}	<2.641^{AB}	<2.371^{AB}	<=2.570	<2.899^{AB}	<2.757^{AB}	<3.200^{AB}	<2.757^{AB}	<=2.952	<2.342^{AB}	<3.053^{AB}	<3.193^{AB}	<=2.863
1,2,4-Trichlorobenzene	1.0	<2.288^{AB}	<2.698^{AB}	<2.641^{AB}	<2.371^{AB}	<=2.570	<2.899^{AB}	<2.757^{AB}	<3.200^{AB}	<2.757^{AB}	<=2.952	<2.342^{AB}	<3.053^{AB}	<3.193^{AB}	<=2.863

Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer
Facility Blk = Facility blank
MDL = Method detection limit

A = Mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages will include detection limits as appropriate)
B = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration
* = Some visible damage to filter edge

(continued)

TABLE 7. ORGANIC XAD-2 TRAIN, SEMIVOLATILE TARGETED COMPOUND ESTIMATED EMISSIONS (continued)

Sample Name Sample Type Date of Collection Compound	MDL (µg)	XAD-3 Thick 1/28/93 µg/(m²*min)	XAD-6 Thin 2/4/93 µg/(m²*min)	XAD-9 Thin 2/18/93 µg/(m²*min)	XAD-12 Thin 2/25/93 µg/(m²*min)	AVERAGE Thin µg/(m²*min)	XAD-16 Thin Rub 4/7/93 µg/(m²*min)	XAD-27 Thin Rub 4/27/93 µg/(m²*min)	XAD-31 Thin Rub 5/24/93 µg/(m²*min)	XAD-27D Thin Rub 4/27/93 µg/(m²*min)	AVERAGE Thin Rub µg/(m²*min)	XAD-8 Facility Blk 2/11/93 µg/(m²*min)	XAD-18* Facility Blk 4/4/93 µg/(m²*min)	XAD-30 Facility Blk 5/7/93 µg/(m²*min)	AVERAGE Facility Blk µg/(m²*min)
Naphthalene	1.0	217.373[C]	245.483[C]	110.922[A C]	61.655[AB]	<=139.353	101.450[A]	27.567[AB]	92.790[AB]	26.740[AB]	<=73.936	9.370[ABC]	16.178[AB]	70.240[AB]	<=31.929
4-Chloroaniline	1.0	<2.288[AB]	<2.698[AB]	<2.641[AB]	<2.371[AB]	<=2.570	<2.899[AB]	<2.757[AB]	<3.200[AB]	<2.757[AB]	<=2.952	<2.342[AB]	<3.053[AB]	<3.193[AB]	<=2.863
Hexachlorobutadiene	1.0	<2.288[AB]	<2.698[AB]	<2.641[AB]	<2.371[AB]	<=2.570	<2.899[AB]	<2.757[AB]	<3.200[AB]	<2.757[AB]	<=2.952	<2.342[AB]	<3.053[AB]	<3.193[AB]	<=2.863
4-Chloro-3-Methylphenol	1.0	<2.288[AB]	<2.698[AB]	<2.641[AB]	<2.371[AB]	<=2.570	<2.899[AB]	<2.757[AB]	<3.200[AB]	<2.757[AB]	<=2.952	<2.342[AB]	<3.053[AB]	<3.193[AB]	<=2.863
2-Methylnaphthalene	1.0	9.381[A]	<2.698[AB]	<2.641[AB]	2.608[AB]	<=2.649	26.377[A]	<2.757[AB]	29.437[A]	<2.757[AB]	<=19.523	<2.342[AB]	<3.053[AB]	<3.193[AB]	<=2.863
Hexachlorocyclopentadiene	1.0	<2.288[AB]	<2.698[AB]	<2.641[AB]	<2.371[AB]	<=2.570	<2.899[AB]	<2.757[AB]	<3.200[AB]	<2.757[AB]	<=2.952	<2.342[AB]	<3.053[AB]	<3.193[AB]	<=2.863
2,4,6-Trichlorophenol	1.0	<2.288[AB]	<2.698[AB]	<2.641[AB]	<2.371[AB]	<=2.570	<2.899[AB]	<2.757[AB]	<3.200[AB]	<2.757[AB]	<=2.952	<2.342[AB]	<3.053[AB]	<3.193[AB]	<=2.863
2,4,5-Trichlorophenol	1.0	<2.288[AB]	<2.698[AB]	<2.641[AB]	<2.371[AB]	<=2.570	<2.899[AB]	<2.757[AB]	<3.200[AB]	<2.757[AB]	<=2.952	<2.342[AB]	<3.053[AB]	<3.193[AB]	<=2.863
2-Chloronaphthalene	1.0	<2.288[AB]	<2.698[AB]	<2.641[AB]	<2.371[AB]	<=2.570	<2.899[AB]	<2.757[AB]	<3.200[AB]	<2.757[AB]	<=2.952	<2.342[AB]	<3.053[AB]	<3.193[AB]	<=2.863
2-Nitroaniline	1.0	<2.288[AB]	<2.698[AB]	<2.641[AB]	<2.371[AB]	<=2.570	<2.899[AB]	<2.757[AB]	<3.200[AB]	<2.757[AB]	<=2.952	<2.342[AB]	<3.053[AB]	<3.193[AB]	<=2.863
Dimethylphthalate	1.0	<2.288[AB]	<2.698[AB]	<2.641[AB]	<2.371[AB]	<=2.570	<2.899[AB]	<2.757[AB]	<3.200[AB]	<2.757[AB]	<=2.952	<2.342[AB]	<3.053[AB]	<3.193[AB]	<=2.863
Acenaphthylene	1.0	<2.288[AB]	<2.698[AB]	<2.641[AB]	<2.371[AB]	<=2.570	<2.899[AB]	<2.757[AB]	<3.200[AB]	<2.757[AB]	<=2.952	<2.342[AB]	<3.053[AB]	<3.193[AB]	<=2.863
2,6-Dinitrotoluene	1.0	<2.288[AB]	<2.698[AB]	<2.641[AB]	<2.371[AB]	<=2.570	<2.899[AB]	<2.757[AB]	<3.200[AB]	<2.757[AB]	<=2.952	<2.342[AB]	<3.053[AB]	<3.193[AB]	<=2.863
3-Nitroaniline	1.0	<2.288[AB]	<2.698[AB]	<2.641[AB]	<2.371[AB]	<=2.570	<2.899[AB]	<2.757[AB]	<3.200[AB]	<2.757[AB]	<=2.952	<2.342[AB]	<3.053[AB]	<3.193[AB]	<=2.863
Acenaphthene	1.0	<2.288[AB]	<2.698[AB]	<2.641[AB]	<2.371[AB]	<=2.570	<2.899[AB]	<2.757[AB]	<3.200[AB]	<2.757[AB]	<=2.952	<2.342[AB]	<3.053[AB]	<3.193[AB]	<=2.863
2,4-Dinitrophenol	1.0	<2.288[AB]	<2.698[AB]	<2.641[AB]	<2.371[AB]	<=2.570	<2.899[AB]	<2.757[AB]	<3.200[AB]	<2.757[AB]	<=2.952	<2.342[AB]	<3.053[AB]	<3.193[AB]	<=2.863
4-Nitrophenol	1.0	<2.288[AB]	<2.698[AB]	<2.641[AB]	<2.371[AB]	<=2.570	<2.899[AB]	<2.757[AB]	<3.200[AB]	<2.757[AB]	<=2.952	<2.342[AB]	<3.053[AB]	<3.193[AB]	<=2.863
2,4-Dinitrotoluene	1.0	<2.288[AB]	<2.698[AB]	<2.641[AB]	<2.371[AB]	<=2.570	<2.899[AB]	<2.757[AB]	<3.200[AB]	<2.757[AB]	<=2.952	<2.342[AB]	<3.053[AB]	<3.193[AB]	<=2.863
Dibenzofuran	1.0	<2.288[AB]	<2.698[AB]	<2.641[AB]	<2.371[AB]	<=2.570	<2.899[AB]	<2.757[AB]	3.520[AB]	<2.757[AB]	<=3.058	<2.342[AB]	<3.053[AB]	<3.193[AB]	<=2.863

Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer
Facility Blk = Facility blank
MDL = Method detection limit

A = Mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages will include detection limits as appropriate)
B = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration
C = Compound present in laboratory blank; background subtraction NOT performed
* = Some visible damage to filter edge

(continued)

TABLE 7. ORGANIC XAD-2 TRAIN, SEMIVOLATILE TARGETED COMPOUND ESTIMATED EMISSIONS (continued)

Sample Name Sample Type Date of Collection Compound	MDL (µg)	XAD-3 Thick 1/28/93 µg/(m²*min)	XAD-6 Thin 2/4/93 µg/(m²*min)	XAD-9 Thin 2/18/93 µg/(m²*min)	XAD-12 Thin 2/25/93 µg/(m²*min)	AVERAGE Thin µg/(m²*min)	XAD-16 Thin Rub 4/7/93 µg/(m²*min)	XAD-27 Thin Rub 4/27/93 µg/(m²*min)	XAD-31 Thin Rub 5/24/93 µg/(m²*min)	XAD-27D Thin Rub 4/27/93 µg/(m²*min)	AVERAGE Thin Rub µg/(m²*min)	XAD-8 Facility Blk 2/11/93 µg/(m²*min)	XAD-18* Facility Blk 4/4/93 µg/(m²*min)	XAD-30 Facility Blk 5/7/93 µg/(m²*min)	AVERAGE Facility Blk µg/(m²*min)
Diethylphthalate	1.0	146.441	32.371^{AB}	39.615^{AB}	26.085^{AB}	<=32.690	40.580^{AB}	20.951^{AB}	41.596^{AB}	21.226^{AB}	<=34.375	8.198^{AB}	21.978^{AB}	19.795^{AB}	<=16.657
Fluorene	1.0	<2.288^{AB}	<2.698^{AB}	<2.641^{AB}	<2.371^{AB}	<=2.570	4.348^{AB}	<2.757^{AB}	<3.200^{AB}	<2.757^{AB}	<=3.435	<2.342^{AB}	<3.053^{AB}	<3.193^{AB}	<=2.863
4-Chlorophenyl-Phenyl Ether	1.0	<2.288^{AB}	<2.698^{AB}	<2.641^{AB}	<2.371^{AB}	<=2.570	<2.899^{AB}	<2.757^{AB}	<3.200^{AB}	<2.757^{AB}	<=2.952	<2.342^{AB}	<3.053^{AB}	<3.193^{AB}	<=2.863
4-Nitroaniline	1.0	<2.288^{AB}	<2.698^{AB}	<2.641^{AB}	<2.371^{AB}	<=2.570	<2.899^{AB}	<2.757^{AB}	<3.200^{AB}	<2.757^{AB}	<=2.952	<2.342^{AB}	<3.053^{AB}	<3.193^{AB}	<=2.863
4,6-Dinitro-2-Methylphenol	1.0	<2.288^{AB}	<2.698^{AB}	<2.641^{AB}	<2.371^{AB}	<=2.570	<2.899^{AB}	<2.757^{AB}	<3.200^{AB}	<2.757^{AB}	<=2.952	<2.342^{AB}	<3.053^{AB}	<3.193^{AB}	<=2.863
n-Nitrosodiphenylamine	1.0	<2.288^{AB}	<2.698^{AB}	<2.641^{AB}	4.268^{AB}	<=3.202	18.551^{A}	<2.757^{AB}	24.637^{A}	<2.757^{AB}	<=15.315	<2.342^{AB}	<3.053^{AB}	<3.193^{AB}	<=2.863
4-Bromophenyl-Phenyl Ether	1.0	<2.288^{AB}	<2.698^{AB}	<2.641^{AB}	<2.371^{AB}	<=2.570	<2.899^{AB}	<2.757^{AB}	<3.200^{AB}	<2.757^{AB}	<=2.952	<2.342^{AB}	<3.053^{AB}	<3.193^{AB}	<=2.863
Hexachlorobenzene	1.0	<2.288^{AB}	<2.698^{AB}	<2.641^{AB}	<2.371^{AB}	<=2.570	<2.899^{AB}	<2.757^{AB}	<3.200^{AB}	<2.757^{AB}	<=2.952	<2.342^{AB}	<3.053^{AB}	<3.193^{AB}	<=2.863
Pentachlorophenol	1.0	<2.288^{AB}	<2.698^{AB}	<2.641^{AB}	<2.371^{AB}	<=2.570	<2.899^{AB}	<2.757^{AB}	<3.200^{AB}	<2.757^{AB}	<=2.952	<2.342^{AB}	<3.053^{AB}	<3.193^{AB}	<=2.863
Phenanthrene	1.0	2.288^{AB}	11.869^{A}	5.810^{AB}	4.743^{AB}	<=7.474	6.957^{AB}	<2.757^{AB}	<3.200^{AB}	<2.757^{AB}	<=4.304	<2.342^{AB}	<3.053^{AB}	<3.193^{AB}	<=2.863
Anthracene	1.0	<2.288^{AB}	<2.698^{AB}	<2.641^{AB}	<2.371^{AB}	<=2.570	<2.899^{AB}	<2.757^{AB}	<3.200^{AB}	<2.757^{AB}	<=2.952	<2.342^{AB}	<3.053^{AB}	<3.193^{AB}	<=2.863
di-n-Butylphthalate	1.0	215.085$^{A}_{B}$	269.761$^{A}_{B}$	221.843$^{A}_{B}$	75.883^{AB}	<=189.163	139.131$^{A}_{B}$	551.331^{F}	255.973$^{A}_{B}$	551.331^{F}	<=315.478	112.434^{AB}	48.840^{AB}	306.501^{AB}	<=155.925
Fluoranthene	1.0	<2.288^{AB}	<2.698^{AB}	<2.641^{AB}	<2.371^{AB}	<=2.570	<2.899^{AB}	<2.757^{AB}	<3.200^{AB}	<2.757^{AB}	<=2.952	<2.342^{AB}	<3.053^{AB}	<3.193^{AB}	<=2.863
Pyrene	1.0	<2.288^{AB}	<2.698^{AB}	<2.641^{AB}	<2.371^{AB}	<=2.570	<2.899^{AB}	<2.757^{AB}	6.719^{AB}	<2.757^{AB}	<=4.125	<2.342^{AB}	<3.053^{AB}	<3.193^{AB}	<=2.863
Butylbenzylphthalate	1.0	<2.288^{AB}	<2.698^{AB}	11.356	<2.371^{AB}	<=5.475	<2.899^{AB}	3.584^{AB}	18.238	4.135^{AB}	<=8.240	<2.342^{AB}	<3.053^{AB}	4.470^{AB}	<=3.288
3,3'-Dichlorobenzidine	1.0	<2.288^{AB}	<2.698^{AB}	<2.641^{AB}	<2.371^{AB}	<=2.570	<2.899^{AB}	<2.757^{AB}	<3.200^{AB}	<2.757^{AB}	<=2.952	<2.342^{AB}	<3.053^{AB}	<3.193^{AB}	<=2.863
Chrysene	1.0	<2.288^{AB}	<2.698^{AB}	<2.641^{AB}	<2.371^{AB}	<=2.570	<2.899^{AB}	<2.757^{AB}	<3.200^{AB}	<2.757^{AB}	<=2.952	<2.342^{AB}	<3.053^{AB}	<3.193^{AB}	<=2.863
Benzo(a)anthracene	1.0	<2.288^{AB}	<2.698^{AB}	<2.641^{AB}	<2.371^{AB}	<=2.570	<2.899^{AB}	<2.757^{AB}	<3.200^{AB}	<2.757^{AB}	<=2.952	<2.342^{AB}	<3.053^{AB}	<3.193^{AB}	<=2.863

Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer
Facility Blk = Facility blank
MDL = Method detection limit

A = Mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages will include detection limits as appropriate)
B = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration
F = The mass for this compound in this sample exceeds the instrument calibration range but is within linear range
* = Some visible damage to filter edge

(continued)

TABLE 7. ORGANIC XAD-2 TRAIN, SEMIVOLATILE TARGETED COMPOUND ESTIMATED EMISSIONS (concluded)

Sample Name Sample Type Date of Collection Compound	MDL (µg)	XAD-3 Thick 1/28/93 µg/(m²*min)	XAD-6 Thin 2/4/93 µg/(m²*min)	XAD-9 Thin 2/18/93 µg/(m²*min)	XAD-12 Thin 2/25/93 µg/(m²*min)	AVERAGE Thin µg/(m²*min)	XAD-16 Thin Rub 4/7/93 µg/(m²*min)	XAD-27 Thin Rub 4/27/93 µg/(m²*min)	XAD-31 Thin Rub 5/24/93 µg/(m²*min)	XAD-27D Thin Rub 4/27/93 µg/(m²*min)	AVERAGE Thin Rub µg/(m²*min)	XAD-8 Facility Blk 2/11/93 µg/(m²*min)	XAD-18* Facility Blk 4/4/93 µg/(m²*min)	XAD-30 Facility Blk 5/7/93 µg/(m²*min)	AVERAGE Facility Blk µg/(m²*min)
bis(2-Ethylhexyl)phthalate	1.0	13.271[AB]	13.758[AB]	22.977[AB]	7.588[ABC]	<=14.774	15.073[AB] C	14.610[AB]	28.797[AB]	14.886[AB]	<=19.493	8.667[AB]	14.652[ABC]	13.729[AB]	<=12.349
di-n-Octylphthalate	1.0	<2.288[AB]	<2.698[AB]	<2.641[AB]	<2.371[AB]	<=2.570	<2.899[AB]	<2.757[AB]	30.077[AB]	<2.757[AB]	<=11.911	<2.342[AB]	<3.053[AB]	27.138[AB]	<=10.844
Benzo(b)fluoranthene	1.0	<2.288[AB]	<2.698[AB]	<2.641[AB]	<2.371[AB]	<=2.570	<2.899[AB]	<2.757[AB]	<3.200[AB]	<2.757[AB]	<=2.952	<2.342[AB]	<3.053[AB]	<3.193[AB]	<=2.863
Benzo(k)fluoranthene	1.0	<2.288[AB]	<2.698[AB]	<2.641[AB]	<2.371[AB]	<=2.570	<2.899[AB]	<2.757[AB]	<3.200[AB]	<2.757[AB]	<=2.952	<2.342[AB]	<3.053[AB]	<3.193[AB]	<=2.863
Benzo(a)pyrene	1.0	<2.288[AB]	<2.698[AB]	<2.641[AB]	<2.371[AB]	<=2.570	<2.899[AB]	<2.757[AB]	<3.200[AB]	<2.757[AB]	<=2.952	<2.342[AB]	<3.053[AB]	<3.193[AB]	<=2.863
Indeno(1,2,3-cd)pyrene	1.0	<2.288[AB]	<2.698[AB]	<2.641[AB]	<2.371[AB]	<=2.570	<2.899[AB]	<2.757[AB]	<3.200[AB]	<2.757[AB]	<=2.952	<2.342[AB]	<3.053[AB]	<3.193[AB]	<=2.863
Dibenz(a,h)anthracene	1.0	<2.288[AB]	<2.698[AB]	<2.641[AB]	<2.371[AB]	<=2.570	<2.899[AB]	<2.757[AB]	<3.200[AB]	<2.757[AB]	<=2.952	<2.342[AB]	<3.053[AB]	<3.193[AB]	<=2.863
Benzo(g,h,i)perylene	1.0	<2.288[AB]	<2.698[AB]	<2.641[AB]	<2.371[AB]	<=2.570	<2.899[AB]	<2.757[AB]	<3.200[AB]	<2.757[AB]	<=2.952	<2.342[AB]	<3.053[AB]	<3.193[AB]	<=2.863
Benzo(e)pyrene	1.0	<2.288[AB]	<2.698[AB]	<2.641[AB]	<2.371[AB]	<=2.570	<2.899[AB]	<2.757[AB]	<3.200[AB]	<2.757[AB]	<=2.952	<2.342[AB]	<3.053[AB]	<3.193[AB]	<=2.863

Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer
Facility Blk = Facility blank
MDL = Method detection limit

A = Mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages will include detection limits as appropriate)
B = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration
* = Some visible damage to filter edge

TABLE 8. ORGANIC XAD-2 TRAIN, TARGETED COMPOUND T-TEST STATISTICS*

	Thin/Thin Rubber		Thin/Facility Blank		Thin Rubber/Facility Blank	
	t-Stat	Level of Significance	t-Stat	Level of Significance	t-Stat	Level of Significance
Inverse of volumes	-2.314	0.10	-1.038	NS	0.303	NS
Phenol	0.754	NS	1.209	NS	1.425	NS
2-Methylphenol	-2.878	0.05	0.095	NS	3.228	0.05
4-Methylphenol	0.775	NS	0.918	NS	1.107	NS
Benzoic Acid	-1.088	NS	-1.038	NS	1.033	NS
Naphthalene	1.096	NS	1.845	NS	1.389	NS
2-Methylnaphthalene	-2.002	NS	-0.807	NS	1.975	NS
Dibenzofuran	-1.915	NS	-1.038	NS	0.555	NS
Diethylphthalate	-0.217	NS	2.767	0.10	2.225	0.10
Fluorene	-1.784	NS	-1.038	NS	1.055	NS
n-Nitrosodiphenylamine	-1.851	NS	0.571	NS	1.908	NS
Phenanthrene	1.225	NS	2.064	NS	1.062	NS
di-n-Butylphthalate	-0.930	NS	0.343	NS	1.100	NS
Pyrene	-1.194	NS	-1.038	NS	0.953	NS
Butylbenzylphthalate	-0.476	NS	0.727	NS	0.982	NS
bis(2-Ethylhexyl)phthalate	-0.731	NS	0.501	NS	1.425	NS
di-n-Octylphthalate	-1.028	NS	-1.015	NS	0.087	NS

* All tests are two-tailed difference of means with 4 degrees of freedom, compounds not listed have t statistics equal those of the inverse of the volume

Thin/Thin Rubber = Comparison between AC10 Thin Asphalt and AC10 Thin Asphalt with Rubber; t statistics greater than zero indicate a higher concentration of the compound in the AC10 Thin Asphalt

Thin/Facility Blank = Comparison between AC10 Thin Asphalt and the Facility Blanks; t statistics greater than zero indicate a higher concentration of the compound in the AC10 Thin Asphalt

Thin Rubber/Facility Blank = Comparison between AC10 Thin Asphalt with Rubber and the Facility Blanks; t statistics greater than zero indicate a higher concentration of the compound in the AC10 Thin Asphalt with Rubber

t-Stat = the student's t statistic to test a difference of means

NS = Not statistically significant

TABLE 9. VAPOR PHASE, TENTATIVELY IDENTIFIED, SEMIVOLATILE COMPOUNDS - ESTIMATED EMISSIONS

Sample Name Sample Type Date of Collection Compound[#]	XAD-3 Thick 1/28/93 µg/(m²•min)	XAD-6 Thin 2/4/93 µg/(m²•min)	XAD-9 Thin 2/18/93 µg/(m²•min)	XAD-12 Thin 2/25/93 µg/(m²•min)	XAD-16 Thin Rub 4/7/93 µg/(m²•min)	XAD-27 Thin Rub 4/27/93 µg/(m²•min)	XAD-31 Thin Rub 5/24/93 µg/(m²•min)	XAD-8 Facility Blk 2/11/93 µg/(m²•min)	XAD-18 Facility Blk 4/14/93 µg/(m²•min)	XAD-30 Facility Blk 5/7/93 µg/(m²•min)
2,4-Dimethyl-2-pentanol	<46[MN]	<76[MN]	<48[MN]	<78[MN]	<168[MN]	<74[MN]	992[MN]	<23	<46	1086
2,5,8,11,14-Pentaoxapentadecane	<46[MN]	<76[MN]	<48[MN]	<78[MN]	<168[MN]	<74[MN]	<93[MN]	<23	<46	67
2-(2-methoxyethoxy)ethanol	71[MN]	<76[MN]	<48[MN]	<78[MN]	<168[MN]	<74[MN]	<93[MN]	<23	<46	<57
>C15 Alkane	<46[MN]	78[MN]	<48[MN]	88[MN]	<168[MN]	<74[MN]	<93[MN]	<23	<46	<57
>C15 Alkane	<46[MN]	76[MN]	111[MN]	111[MN]	188[M]	<74[MN]	<93[MN]	33	52	<57
>C15 Alkylamide	<46[MN]	<76[MN]	<48[MN]	<78[MN]	<168[MN]	<74[MN]	<93[MN]	<23	<46	<57
>C16 Hexanedioic acid ester	<46[MN]	<76[MN]	<48[MN]	1470	2725	607[M]	1664	<23	235	<57
>C20 Alkene	114[MN]	138[MN]	151[MN]	<78[MN]	<168[MN]	<74[MN]	<93[MN]	82	<46	<57
>C20 Alkene	144[MN]	<76[MN]	<48[MN]	<78[MN]	<168[MN]	<74[MN]	<93[MN]	54	<46	<57
>C8 Acid	<46[MN]	<76[MN]	<48[MN]	78[MN]	<168[MN]	<74[MN]	<93[MN]	<23	55	<57
>C8 Hexanedioic Acid Ester	<46[MN]	<76[MN]	50[MN]	<78[MN]	<168[MN]	<74[MN]	<93[MN]	<23	<46	<57
Acid Ester	<46[MN]	<76[MN]	<48[MN]	<78[MN]	<168[MN]	<74[MN]	<93[MN]	<23	<46	<57
Acid Ester	<46[MN]	<76[MN]	<48[MN]	<78[MN]	<168[MN]	<74[MN]	<93[MN]	<23	<46	<57
Acid Ester	<46[MN]	<76[MN]	<48[MN]	<78[MN]	<168[MN]	<74[MN]	<93[MN]	<23	<46	<57
Alkene or Cycloalkane	<46[MN]	<76[MN]	<48[MN]	<78[MN]	377	<74[MN]	<93[MN]	<23	<46	<57
Alkene or Cycloalkane	<46[MN]	<76[MN]	<48[MN]	<78[MN]	<168[MN]	<74[MN]	<93[MN]	<23	<46	<57
Alkyl Cyclopropane	<46[MN]	<76[MN]	<48[MN]	<78[MN]	<168[MN]	<74[MN]	<93[MN]	<23	<46	<57

Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer
Facility Blk = Facility blank

# = Compounds are listed in retention time order
M = Mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages include minimum TIC amounts as appropriate)
N = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank concentration

(continued)

TABLE 9. VAPOR PHASE, TENTATIVELY IDENTIFIED, SEMIVOLATILE COMPOUNDS - ESTIMATED EMISSIONS (continued)

Sample Name Sample Type Date of Collection Compound#	XAD-3 Thick 1/28/93 µg/(m²•min)	XAD-6 Thin 2/4/93 µg/(m²•min)	XAD-9 Thin 2/18/93 µg/(m²•min)	XAD-12 Thin 2/25/93 µg/(m²•min)	XAD-16 Thin Rub 4/7/93 µg/(m²•min)	XAD-27 Thin Rub 4/27/93 µg/(m²•min)	XAD-31 Thin Rub 5/24/93 µg/(m²•min)	XAD-8 Facility Blk 2/11/93 µg/(m²•min)	XAD-18 Facility Blk 4/14/93 µg/(m²•min)	XAD-30 Facility Blk 5/7/93 µg/(m²•min)
Benzaldehyde	<46 MN	<76 MN	<48 MN	<78 MN	<168 MN	<74 MN	352 M	<23	<46	<57
Benzothiazole	<46 MN	<76 MN	<48 MN	<78 MN	319 M	<74 MN	195 M	<23	<46	<57
C11 Acid Ester	<46 MN	<76 MN	<48 MN	<78 MN	<168 MN	<74 MN	<93 MN	<23	<46	112
C13-C15 Alkane	<46 MN	<76 MN	<48 MN	<78 MN	<168 MN	<74 MN	<93 MN	<23	<46	<57
C13-C15 Alkane	<46 MN	<76 MN	<48 MN	<78 MN	<168 MN	<74 MN	<93 MN	<23	<46	<57
C13-C15 Alkane	<46 MN	<76 MN	<48 MN	<78 MN	<168 MN	<74 MN	<93 MN	23	<46	<57
C2 Benzene	<46 MN	<76 MN	<48 MN	119 MN	229	441	93 MN	<23	<46	<57
C8 Phthalate	<46 MN	<76 MN	<48 MN	<78 MN	<168 MN	<74 MN	<93 MN	<23	<46	<57
Diene or Alcohol	<46 MN	<76 MN	<48 MN	<78 MN	<168 MN	<74 MN	<93 MN	<23	<46	<57
Diethylbenzene Isomer	80 MN	270	108 MN	<78 MN	194 MN	74 MN	170 MN	<23	<46	144
Ethyl Ester-3-Phenyl-2-Propenoic Acid	46 MN	86 MN	114 MN	119 MN	<168 MN	80 MN	<93 MN	101	70	83
Ethyl Ester-3-Phenyl-2-Propenoic Acid	<46 MN	<76 MN	<48 MN	<78 MN	<168 MN	<74 MN	<93 MN	<23	<46	<57
Hexanedioic Acid, Dioctyl Ester	458	1079	<48 MN	<78 MN	<168 MN	<74 MN	<93 MN	138	<46	<57
Heptanal	108 MN	221	119 MN	<78 MN	<168 MN	<74 MN	<93 MN	<23	<46	<57
Nonanal	<46 MN	270	<48 MN	<78 MN	<168 MN	<74 MN	<93 MN	<23	<46	<57
Octanal	80 MN	208 M	<48 MN	<78 MN	168 M	<74 MN	150 M	<23	<46	<57
Possible Alkylcyclohexane	<46 MN	<76 MN	<48 MN	<78 MN	<168 MN	<74 MN	<93 MN	<23	<46	64

Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer
Facility Blk = Facility blank

# = Compounds are listed in retention time order
M = Mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages include minimum TIC amounts as appropriate)
N = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank concentration

(continued)

TABLE 9. VAPOR PHASE, TENTATIVELY IDENTIFIED, SEMIVOLATILE COMPOUNDS - ESTIMATED EMISSIONS (concluded)

Sample Name Sample Type Date of Collection Compound[#]	XAD-3 Thick 1/28/93 µg/(m²•min)	XAD-6 Thin 2/4/93 µg/(m²•min)	XAD-9 Thin 2/18/93 µg/(m²•min)	XAD-12 Thin 2/25/93 µg/(m²•min)	XAD-16 Thin Rub 4/7/93 µg/(m²•min)	XAD-27 Thin Rub 4/27/93 µg/(m²•min)	XAD-31 Thin Rub 5/24/93 µg/(m²•min)	XAD-8 Facility Blk 2/11/93 µg/(m²•min)	XAD-18 Facility Blk 4/14/93 µg/(m²•min)	XAD-30 Facility Blk 5/7/93 µg/(m²•min)
Styrene	458[MN]	<76[MN]	898[MN]	3320	4348	5514	1696[MN]	1359	672	766
Unknown	<46[MN]	<76[MN]	227[MN]	138[MN]	235[MN]	146[MN]	147[MN]	539	104	57
Unknown	<46[MN]	<76[MN]	<48[MN]	90[MN]	275[MN]	138[MN]	<93[MN]	91	46	192
Unknown	<46[MN]	<76[MN]	<48[MN]	116[MN]	<168[MN]	414[MN]	<93[MN]	<23	641	<57
Unknown	<46[MN]	<76[MN]	<48[MN]	<78[MN]	<168[MN]	201[M]	<93[MN]	<23	<46	<57
Unknown w/>4 Oxygens	<46[MN]	<76[MN]	<48[MN]	<78[MN]	<168[MN]	<74[MN]	<93[MN]	<23	<46	<57
Unknown w/>4 Oxygens	<46[MN]	<76[MN]	<48[MN]	<78[MN]	<168[MN]	<74[MN]	<93[MN]	<23	<46	<57
Unknown/Possible Coelution	<46[MN]	<76[MN]	<48[MN]	<78[MN]	<168[MN]	<74[MN]	<93[MN]	<23	<46	<57
n-Methylbenzaldehyde	<46[MN]	<76[MN]	82[MN]	<78[MN]	<168[MN]	<74[MN]	<93[MN]	<23	67	<57
n-Methyl-n-Propenylbenzene	121[MN]	173[M]	114[MN]	<78[MN]	<168[MN]	<74[MN]	<93[MN]	49	<46	<57
C14 Hexanedioic Acid Ester	<46[MN]	<76[MN]	<48[MN]	<78[MN]	<168[MN]	<74[MN]	<93[MN]	<23	<46	<57
C8 Phthalate	<46[MN]	<76[MN]	<48[MN]	<78[MN]	<168[MN]	204[MN]	170[MN]	<23	61	140

Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer
Facility Blk = Facility blank

# = Compounds are listed in retention time order
M = Mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages include minimum TIC amounts as appropriate)
N = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank concentration

TABLE 10. ORGANIC PARTICLE TRAIN, SEMIVOLATILE TARGETED COMPOUNDS ESTIMATED EMISSIONS

Sample Name Sample Type Date of Collection Compound	MDL (µg)	TF-4 Thick 1/28/93 µg/(m²*min)	TF-5 Thin 2/4/93 µg/(m²*min)	TF-10 Thin 2/18/93 µg/(m²*min)	TF-13 Thin 2/25/93 µg/(m²*min)	AVERAGE Thin µg/(m²*min)	TF-17 Thin Rub 4/7/93 µg/(m²*min)	TF-28 Thin Rub 4/27/93 µg/(m²*min)	TF-32 Thin Rub 5/24/93 µg/(m²*min)	TF-28 Dup Thin Rub 4/27/93 µg/(m²*min)	AVERAGE Thin Rub µg/(m²*min)	TF-7 Facility Blk 2/11/93 µg/(m²*min)	TF-26 Facility Blk 4/14/93 µg/(m²*min)	TF-29 Facility Blk 5/7/93 µg/(m²*min)	AVERAGE Facility Blk µg/(m²*min)
Phenol	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
bis(2-Chloroethyl) Ether	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
2-Chlorophenol	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
1,3-Dichlorobenzene	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
1,4-Dichlorobenzene	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
1,2-Dichlorobenzene	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
2-Methylphenol	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
bis(2-Chloroisopropyl) Ether	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
n-Nitroso-di-n-Propylamine	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
4-Methylphenol	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
Hexachloroethane	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
Nitrobenzene	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
Isophorone	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
2-Nitrophenol	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
2,4-Dimethylphenol	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
Benzoic Acid	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
bis(2-Chloroethoxy) Methane	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
2,4-Dichlorophenol	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
1,2,4-Trichlorobenzene	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
Naphthalene	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
4-Chloroaniline	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
Hexachlorobutadiene	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
4-Chloro-3-Methylphenol	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750

Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer
Facility Blk = Facility blank

A = Mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages will include detection limits as appropriate)
B = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration
MDL = Method detection limit

(continued)

TABLE 10. ORGANIC PARTICLE TRAIN, SEMIVOLATILE TARGETED COMPOUNDS ESTIMATED EMISSIONS (continued)

Sample Name Sample Type Date of Collection Compound	MDL (µg)	TF-4 Thick 1/28/93 µg/(m³*min)	TF-5 Thin 2/4/93 µg/(m³*min)	TF-10 Thin 2/18/93 µg/(m³*min)	TF-13 Thin 2/25/93 µg/(m³*min)	AVERAGE Thin µg/(m³*min)	TF-17 Thin Rub 4/7/93 µg/(m³*min)	TF-28 Thin Rub 4/27/93 µg/(m³*min)	TF-32 Thin Rub 5/24/93 µg/(m³*min)	TF-28 Dup Thin Rub 4/27/93 µg/(m³*min)	AVERAGE Thin Rub µg/(m³*min)	TF-7 Facility Blk 2/11/93 µg/(m³*min)	TF-26 Facility Blk 4/14/93 µg/(m³*min)	TF-29 Facility Blk 5/7/93 µg/(m³*min)	AVERAGE Facility Blk µg/(m³*min)
2-Methylnaphthalene	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
Hexachlorocyclopentadiene	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
2,4,6-Trichlorophenol	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
2,4,5-Trichlorophenol	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
2-Chloronaphthalene	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
2-Nitroaniline	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
Dimethylphthalate	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
Acenaphthylene	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
2,6-Dinitrotoluene	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
3-Nitroaniline	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
Acenaphthene	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
2,4-Dinitrophenol	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
4-Nitrophenol	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
2,4-Dinitrotoluene	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
Dibenzofuran	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
Diethylphthalate	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
Fluorene	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
4-Chlorophenyl-Phenyl Ether	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
4-Nitroaniline	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
4,6-Dinitro-2-Methylphenol	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
n-Nitrosodiphenylamine	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
4-Bromophenyl-Phenyl Ether	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
Hexachlorobenzene	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750

Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer
Facility Blk = Facility blank

A = Mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages will include detection limits as appropriate)
B = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration
MDL = Method detection limit

(continued)

TABLE 10. ORGANIC PARTICLE TRAIN, SEMIVOLATILE TARGETED COMPOUNDS ESTIMATED EMISSIONS (concluded)

Sample Name Sample Type Date of Collection Compound	MDL (µg)	TF-4 Thick 1/28/93 µg/(m²•min)	TF-5 Thin 2/4/93 µg/(m²•min)	TF-10 Thin 2/18/93 µg/(m²•min)	TF-13 Thin 2/25/93 µg/(m²•min)	AVERAGE Thin µg/(m²•min)	TF-17 Thin Rub 4/7/93 µg/(m²•min)	TF-28 Thin Rub 4/27/93 µg/(m²•min)	TF-32 Thin Rub 5/24/93 µg/(m²•min)	TF-28 Dup Thin Rub 4/27/93 µg/(m²•min)	AVERAGE Thin Rub µg/(m²•min)	TF-7 Facility Blk 2/11/93 µg/(m²•min)	TF-26 Facility Blk 4/14/93 µg/(m²•min)	TF-29 Facility Blk 5/7/93 µg/(m²•min)	AVERAGE Facility Blk µg/(m²•min)
Pentachlorophenol	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
Phenanthrene	1.0	<0.702[AB]	2.582	<0.695[AB]	0.694[AB]	<=1.324	0.809[AB]	1.406[AB]	<0.756[AB]	1.265[AB]	<=0.990	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
Anthracene	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
di-n-Butylphthalate	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	1.010[AB]	<=0.846	1.177[AB]	0.914[AB]	<0.756[AB]	0.914[AB]	<=0.949	<0.750[AB]	<0.768[AB]	1.100[AB]	<=0.872
Fluoranthene	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	1.578[AB]	<=1.035	2.281	3.374	<0.756[AB]	3.374	<=2.137	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
Pyrene	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	2.336	<=1.288	3.605	4.920	<0.756[AB]	4.639	<=3.094	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
Butylbenzylphthalate	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	3.094	<=1.540	2.648	2.741	<0.756[AB]	2.460	<=2.048	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
3,3'-Dichlorobenzidine	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
Chrysene	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
Benzo(a)anthracene	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	5.619	<=2.382	4.193	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=1.884	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
bis(2-Ethylhexyl)phthalate	1.0	<0.702[AB]	<0.833[AB]	7.643	6.945[C]	<=5.140	6.253[ABC]	6.607[BC]	3.099[ABC]	6.747[C]	<=5.320	1.649[AB]	2.610[AB]	2.419[AB]	<=2.226
di-n-Octylphthalate	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
Benzo(b)fluoranthene	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	0.947[AB]	<=0.825	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
Benzo(k)fluoranthene	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
Benzo(a)pyrene	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	1.452[AB]	<=0.993	0.809[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.756	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
Indeno(1,2,3-cd)pyrene	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
Dibenz(a,h)anthracene	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
Benzo(g,h,i)perylene	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750
Benzo(e)pyrene	1.0	<0.702[AB]	<0.833[AB]	<0.695[AB]	<0.631[AB]	<=0.720	<0.736[AB]	<0.703[AB]	<0.756[AB]	<0.703[AB]	<=0.731	<0.750[AB]	<0.768[AB]	<0.733[AB]	<=0.750

Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer
Facility Blk = Facility blank
MDL = Method detection limit

A = Mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages will include detection limits as appropriate)
B = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration
C = Compound present in laboratory blank; background subtraction NOT performed

TABLE 11. ORGANIC PARTICLE TRAIN T-TEST STATISTICS*

	Thin/Thin Rubber		Thin/Facility Blank		Thin Rubber/Facility Blank	
	t-Stat	Level of Significance	t-Stat	Level of Significance	t-Stat	Level of Significance
Inverse of volumes	-0.192	NS	-0.506	NS	-1.015	NS
Phenanthrene	0.503	NS	0.912	NS	1.151	NS
di-n-Butylphthalate	-0.673	NS	-0.181	NS	0.457	NS
Fluoranthene	-1.364	NS	1.038	NS	1.826	NS
Pyrene	-1.351	NS	1.023	NS	1.907	NS
Butylbenzylphthalate	-0.502	NS	1.016	NS	2.007	NS
Benzo(a)anthracene	0.251	NS	1.008	NS	0.982	NS
bis(2-Ethylhexyl)phthalate	-0.074	NS	1.335	NS	2.683	0.10
Benzo(b)fluoranthene	1.254	NS	1.016	NS	-1.019	NS
Benzo(a)pyrene	1.010	NS	1.043	NS	0.180	NS

*All tests are two-tailed difference of means with 4 degrees of freedom, compounds not listed have t statistics equal those of the inverse of the volume

Thin/Thin Rubber = Comparison between AC10 Thin Asphalt and AC10 Thin Asphalt with Rubber; t statistics greater than zero indicate a higher concentration of the compound in the AC10 Thin Asphalt

Thin/Facility Blank = Comparison between AC10 Thin Asphalt and the Facility Blanks; t statistics greater than zero indicate a higher concentration of the compound in the AC10 Thin Asphalt

Thin Rubber/Facility Blank = Comparison between AC10 Thin Asphalt with Rubber and the Facility Blanks; t statistics greater than zero indicate a higher concentration of the compound in the AC10 Thin Asphalt with Rubber

t-Stat = the student's t statistic to test a difference of means

NS = Not statistically significant

TABLE 12. PARTICULATE-BOUND, TENTATIVELY IDENTIFIED, SEMIVOLATILE COMPOUNDS—ESTIMATED EMISSIONS

Sample Name Sample Type Date of Collection Compound[#]	TF-4 Thick 1/28/93 µg/(m²•min)	TP-5 Thin 2/4/93 µg/(m²•min)	TF-10 Thin 2/18/93 µg/(m²•min)	TF-17 Thin Rub 4/7/93 µg/(m²•min)	TF-28 Thin Rub 4/27/93 µg/(m²•min)	TF-32 Thin Rub 5/24/93 µg/(m²•min)	TF-7 Facility Blk 2/11/93 µg/(m²•min)	TF-26 Facility Blk 4/14/93 µg/(m²•min)	TF-29 Facility Blk 5/7/93 µg/(m²•min)
2,4-Dimethyl-2-pentanol	<26[MN]	<15[MN]	16[MN]	<10	43[MN]	137	19	<5	212
2,5,8,11,14-Pentaoxapentadecane	<26[MN]	15[MN]	14[MN]	22	7[MN]	<6	39	20	24
9,10-Anthracenedione	<26[MN]	<15[MN]	<6[MN]	<10	<4[MN]	<6	<6	<5	<5
>C13 Acid	<26[MN]	<15[MN]	<6[MN]	<10	61	<6	<6	<5	<5
>C13 Alkane	<26[MN]	<15[MN]	<6[MN]	<10	4[MN]	<6	<6	<5	<5
>C13 Alkane	<26[MN]	<15[MN]	<6[MN]	<10	17[M]	<6	<6	<5	<5
>C13 Alkane	<26[MN]	<15[MN]	<6[MN]	<10	13[MN]	<6	<6	<5	<5
>C15 Alkane	<26[MN]	<15[MN]	<6[MN]	10	24[M]	6	<6	<5	<5
>C15 Alkane	<26[MN]	<15[MN]	<6[MN]	<10	<4[MN]	12	<6	<5	<5
>C18 Alkane	<26[MN]	<15[MN]	<6[MN]	<10	<4[MN]	14	<6	<5	<5
>C18 Alkane	<26[MN]	<15[MN]	<6[MN]	<10	<4[MN]	17	<6	<5	<5
>C18 Alkane	<26[MN]	<15[MN]	<6[MN]	<10	<4[MN]	16	<6	<5	<5
>C20 Acid	<26[MN]	<15[MN]	<6[MN]	<10	35	<6	<6	<5	<5
Alkene or Cycloalkane	<26[MN]	<15[MN]	<6[MN]	<10	<4[MN]	<6	<6	<5	<5
Butylcyclo-hexylphthalate	<26[MN]	<15[MN]	<6[MN]	<10	<4[MN]	<6	<6	<5	<5
C4 Alkylcyclo-hexane	<26[MN]	<15[MN]	<6[MN]	<10	<4[MN]	<6	<6	<5	<5

# = Compounds are listed in retention time order
Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer
Facility Blk = Facility blank

Note: Sample TF-13 was excluded from this data set because the data package transmitted by the contracted laboratory for this sample was incomplete as regards the tentatively identified compounds.
M = Mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages include minimum TIC amounts as appropriate)
N = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank concentration

(continued)

TABLE 12. PARTICULATE-BOUND, TENTATIVELY IDENTIFIED, SEMIVOLATILE COMPOUNDS—ESTIMATED EMISSIONS (concluded)

Sample Name Sample Type Date of Collection Compound#	TF-4 Thick 1/28/93 µg/(m²•min)	TF-5 Thin 2/4/93 µg/(m²•min)	TF-10 Thin 2/18/93 µg/(m²•min)	TF-17 Thin Rub 4/7/93 µg/(m²•min)	TF-28 Thin Rub 4/27/93 µg/(m²•min)	TF-32 Thin Rub 5/24/93 µg/(m²•min)	TF-7 Facility Blk 2/11/93 µg/(m²•min)	TF-26 Facility Blk 4/14/93 µg/(m²•min)	TF-29 Facility Blk 5/7/93 µg/(m²•min)
Hexadecanoic Acid	<26 MN	<15 MN	<6 MN	57	<4 MN	<6	<6	<5	<5
Hexanedioic acid, dioctyl ester	85	<15 MN	<6 MN	<10	<4 MN	17	6	5	8
Toluene	<26 MN	<15 MN	6 MN	<10	<4 MN	<6	<6	<5	<5
Unknown	<26 MN	<15 MN	<6 MN	<10	<4 MN	<6	<6	<5	<5
Unknown	<26 MN	<15 MN	<6 MN	<10	<4 MN	<6	<6	<5	<5
Unknown	<26 MN	<15 MN	<6 MN	<10	<4 MN	<6	<6	5	<5
Unknown	<26 MN	<15 MN	<6 MN	<10	24 M	<6	<6	<5	<5
Unknown	<26 MN	<15 MN	<6 MN	<10	17 M	<6	<6	<5	<5
Unknown/Possible Coelution	<26 MN	<15 MN	<6 MN	<10	<4 MN	<6	<6	<5	<5
Unknown/Possible Coelution	<26 MN	<15 MN	<6 MN	<10	<4 MN	<6	<6	<5	<5
Unknown/Possible Coelution	<26 MN	<15 MN	<6 MN	<10	<4 MN	<6	<6	<5	11
Unknown/Possible Coelution	<26 MN	<15 MN	<6 MN	<10	<4 MN	8	<6	<5	13
Unknown/Possible Coelution	<26 MN	<15 MN	<6 MN	<10	<4 MN	<6	<6	<5	5

# = Compounds are listed in retention time order
Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer
Facility Blk = Facility blank

Note: Sample TF-13 was excluded from this data set because the data package transmitted by the contracted laboratory for this sample was incomplete as regards the tentatively identified compounds.
M = Mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages include minimum TIC amounts as appropriate)
N = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank concentration

TABLE 13. ORGANIC PARTICULATE TRAIN, SEMIVOLATILE TARGETED COMPOUND ESTIMATED EMISSIONS—ACUREX ENVIRONMENTAL ANALYSES

Sample Name Sample Type Date of Collection Compound PQL	(µG)	TF-4 Thick 1/28/93 (µG/(m²•min))	TF-5 Thin 2/4/93 (µG/(m²•min))	TF-10 Thin 2/18/93 (µG/(m²•min))	TF-13 Thin 2/25/93 (µG/(m²•min))	AVG Thin (µG/(m²•min))	TF-17 Thin Rub 4/7/93 (µG/(m²•min))	TF-28 Thin Rub 4/27/93 (µG/(m²•min))	TF-32 Thin Rub 5/24/93 (µG/(m²•min))	AVG Thin Rub (µG/(m²•min))	TF-7 Facility Blk 2/11/93 (µG/(m²•min))	TF-26 Facility Blk 4/14/93 (µG/(m²•min))	TF-29 Facility Blk 5/7/93 (µG/(m²•min))	AVG Facility Blk (µG/(m²•min))
Naphthalene	0.05	0.140	0.092[AB]	0.153	0.063[AB]	<=0.103	0.096[AB]	0.049[AB]	0.045[AB]	<=0.063	<0.037[AB]	<0.038[AB]	0.022[AB]	<=0.033
Acenaphthylene	0.05	<0.035[AB]	<0.042[AB]	<0.035[AB]	<0.032[AB]	<=0.036	0.037[AB]	0.021[AB]	<0.038[AB]	<=0.032	<0.037[AB]	<0.038[AB]	<0.037[AB]	<=0.038
Acenaphthene	0.05	<0.035[AB]	<0.042[AB]	<0.035[AB]	<0.032[AB]	<=0.036	0.022[AB]	0.014[AB]	<0.038[AB]	<=0.025	<0.037[AB]	<0.038[AB]	<0.037[AB]	<=0.038
Fluorene	0.05	<0.035[AB]	0.042[AB]	<0.035[AB]	<0.032[AB]	<=0.036	<0.037[AB]	0.028[AB]	<0.038[AB]	<=0.034	<0.037[AB]	<0.038[AB]	<0.037[AB]	<=0.038
Phenanthrene	0.05	0.681	2.440	0.556	0.410	<=1.135	0.463	0.942	0.083[AB]	<=0.496	<0.037[AB]	<0.038[AB]	0.015[AB]	<=0.030
Anthracene	0.05	0.063[AB]	0.300	0.083[A]	0.076[AB]	<=0.153	0.051[AB]	0.190	0.015[AB]	<=0.085	<0.037[AB]	<0.038[AB]	0.007[AB]	<=0.028
Fluoranthene	0.05	0.688	3.081	1.028	0.833	<=1.648	1.295	1.982	0.257	<=1.178	0.045[AB]	0.084[AB]	0.044[AB]	<=0.058
Pyrene	0.05	0.456	2.715	0.910	0.783	<=1.469	1.802	2.657	0.378	<=1.612	0.030[AB]	0.069[AB]	0.044[AB]	<=0.048
Benzo(a)anthracene	0.05	0.049[AB]	1.457	<0.035[AB]	0.865	<=0.786	0.714	1.012	0.234	<=0.653	<0.037[AB]	<0.038[AB]	<0.037[AB]	<=0.038
Chrysene	0.05	0.056[AB]	6.654	3.537	3.068	<=4.420	2.295	2.882	0.695	<=1.957	<0.037[AB]	<0.038[AB]	0.051[AB]	<=0.042
Benzo(b)fluoranthene	0.05	<0.035[AB]	<0.042[AB]	<0.035[AB]	<0.032[AB]	<=0.036	<0.037[AB]	0.998	<0.038[AB]	<=0.358	<0.037[AB]	<0.038[AB]	0.064[AB]	<=0.047
Benzo(k)fluoranthene	0.05	0.063[AB]	1.474	0.917	0.928	<=1.106	0.589	<0.035[AB]	0.295	<=0.306	<0.037[AB]	<0.038[AB]	0.037[AB]	<=0.038
Benzo(a)pyrene	0.05	0.056[AB]	0.625	1.001	0.354	<=0.660	0.221	0.323	0.068[AB]	<=0.204	<0.037[AB]	<0.038[AB]	0.037[AB]	<=0.038
Indeno(1,2,3-c,d)pyrene	0.05	0.014[AB]	0.208	0.083[AB]	0.133	<=0.141	0.059[AB]	0.105[AB]	0.030[AB]	<=0.065	<0.037[AB]	<0.038[AB]	0.044[AB]	<=0.040
Dibenzo(a,h)anthracene	0.05	0.014[AB]	0.266	0.069[AB]	0.107[AB]	<=0.148	0.059[AB]	0.077[AB]	0.030[AB]	<=0.055	<0.037[AB]	<0.038[AB]	0.051[AB]	<=0.042
Benzo(g,h,i)perylene	0.05	0.021[AB]	0.300	0.111[AB]	0.114[B]	<=0.175	0.088[AB]	0.148	0.053[AB]	<=0.096	<0.037[AB]	<0.038[AB]	0.051[AB]	<=0.042

Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer
Facility Blk = Facility blank
AVG = Average

PQL = Practical quantitation limit
A = Mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages will include detection limits as appropriate)
B = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration

TABLE 14. ORGANIC PARTICLE TRAIN T-TEST STATISTICS—ACUREX ENVIRONMENTAL ANALYSES*

	Thin/Thin Rubber		Thin/Facility Blank		Thin Rubber/Facility Blank	
	t-Stat	Level of Significance	t-Stat	Level of Significance	t-Stat	Level of Significance
Inverse of volumes	-0.192	NS	-0.506	NS	-1.015	NS
Naphthalene	1.262	NS	2.589	0.10	1.809	NS
Acenaphthylene	0.664	NS	-0.506	NS	-1.035	NS
Acenaphthene	1.497	NS	-0.506	NS	-1.841	NS
Fluorene	0.410	NS	-0.506	NS	-1.054	NS
Phenanthrene	0.914	NS	1.691	NS	1.875	NS
Anthracene	0.745	NS	1.689	NS	1.066	NS
Fluoranthene	0.536	NS	2.211	0.10	2.233	0.10
Pyrene	-0.157	NS	2.278	0.10	2.354	0.10
Benzo(a)anthracene	0.281	NS	1.813	NS	2.718	0.10
Chrysene	1.892	NS	3.890	0.02	2.931	0.05
Benzo(b)fluoranthene	-1.004	NS	-1.159	NS	0.971	NS
Benzo(k)fluoranthene	3.285	0.05	5.815	0.01	1.681	NS
Benzo(a)pyrene	2.258	0.10	3.316	0.05	2.245	0.10
Indeno(1,2,3-c,d)pyrene	1.805	NS	2.790	0.05	1.131	NS
Dibenzo(a,h)anthracene	1.491	NS	1.741	NS	0.907	NS
Benzo(g,h,i)perylene	1.151	NS	2.115	NS	1.925	NS

*All tests are two-tailed difference of means with 4 degrees of freedom, compounds not listed have t statistics equal those of the inverse of the volume

Thin/Thin Rubber = Comparison between AC10 Thin Asphalt and AC10 Thin Asphalt with Rubber; t statistics greater than zero indicate a higher concentration of the compound in the AC10 Thin Asphalt

Thin/Facility Blank = Comparison between AC10 Thin Asphalt and the Facility Blanks; t statistics greater than zero indicate a higher concentration of the compound in the AC10 Thin Asphalt

Thin Rubber/Facility Blank = Comparison between AC10 Thin Asphalt with Rubber and the Facility Blanks; t statistics greater than zero indicate a higher concentration of the compound in the AC10 Thin Asphalt with Rubber

t-Stat = the student's t statistic to test a difference of means

NS = Not statistically significant

TABLE 15. ESTIMATED EMISSIONS FROM SIMULATED ASPHALT PAVING

Test Date	Test Condition	CO Avg. Conc. (ppm)	CO Estimated Emission (mg CO/ m^2/min)	CO_2 Avg. Conc. (ppm)	CO_2 Estimated Emission (mg CO2/ m^2/min)	NO Avg. Conc. (ppm)	NO Estimated Emission (mg NO/ m^2/min)	THC Avg. Conc. (ppm)	THC Estimated Emission (mg THC/ m^2/min)	SO_2 Avg. Conc. (ppm)	SO_2 Estimated Emission (mg SO_2/ m^2/min)	PAH Avg. Conc. (ng/m^3)	PAH Estimated Emission (µg PAH/ [m^2•min])	PAH Avg. Raw Voltage	PAH Avg. Current pA	PAH Dilution Factor	CO_2 Avg. Conc.
1/28/93	AC10	-1	-16	358	8530	0.3	5.0	6.3	54.8	0.00	0.07	NOP	NOP	NOP	NOP	1	0.0358
2/4/93	AC10 Thin	13	193	444	10574	0.4	6.6	NOP	NOP	0.02	0.55	13425	163	0.0358	3.58	0.1	0.04438
2/11/93	Hut Blank	7	105	352	8387	0.6	9.1	NOP	NOP	0.00	-0.16	852	10	0.01136	0.2272	0.5	0.0352
2/18/93	AC10 Thin	7	103	381	9078	0.1	0.9	9.9	85.9	-0.01	-0.28	835	10	0.01113	0.2226	0.5	0.0381
2/25/93	AC10 Thin	9	137	386	9197	0.5	8.8	11.1	96.4	-0.01	-0.27	908	11	0.0121	0.242	0.5	0.0386
4/7/93	AC10/ Rubber Thin	9	143	424	10103	0.3	5.5	11.4	99.1	0.01	0.22	915	11	0.0122	0.244	0.5	0.0424
4/14/93	Hut Blank	14	213	508	12106	1.4	22.4	13.6	118.0	0.00	0.10	305	4	0.00407	0.0814	0.5	0.05083
4/27/93	AC10/ Rubber Thin	NA	NA	140	3336	0.9	15.4	12.1	104.5	0.00	0.09	NA	NA	NA	NA	NA	0.014
5/7/93	Hut Blank	13	197	229	5456	4.0	64.9	15.5	134.7	0.00	0.09	NA	NA	NA	NA	NA	0.0229
5/24/93	AC10/ Rubber Thin	17	259	450	10722	1.9	30.6	19.5	169.4	0.04	1.25	NA	NA	NA	NA	NA	0.045
	Avg. Hut Blank	11	171	363	8650	2.0	32.1	14.6	126.3	0.00	0.01	579	7	0.007715	NC	NC	0.036303
	Avg. AC10 Thin	10	144	404	9616	0.3	5.4	10.5	91.1	0.00	0.00	5056	61	0.019677	NC	NC	0.04036
	Avg. AC10/ Rubber	13	201	338	8053	1.1	17.2	14.4	124.3	0.02	0.52	915	11	0.0122	NC	NC	0.0338

NOP = Analyzer not operable
NA = Not available
NC = Statistics on these measures were judged to be not relevant and were not calculated.
Note: Data from tests in which an instrument was totally not operable has been excluded from the table and the average values.
Data from days when post tests quality control checks were failed is included for CO_2 and NO (see the Quality Control Evaluation Report)

TABLE 16. LEAD ANALYSIS OF PM_{10} PARTICULATE LEAD SAMPLES

Filter	Test Conditions	Date Collected	Mass mg/sample	Air Concentration ($\mu g/m^3$)	Estimated Emissions $\mu g/(m^2*min)$
QF1	Thick	1/28/93	0.0007^{AB}	0.040^{AB}	0.49^{AB}
QF2	Thin	2/4/93	0.0006^{AB}	0.045^{AB}	0.55^{AB}
QF3	Facility Blank	2/11/93	0.0005^{AB}	0.029^{AB}	0.36^{AB}
QF4	Field Blank	2/18/93	0.0003	0.000	0.00
QF5	Thin	2/18/93	0.0009^{AB}	0.051^{AB}	0.62^{AB}
QF6	Thin	2/25/93	0.0007^{AB}	0.038^{AB}	0.46^{AB}
QF12	Thin Rub	4/7/93	0.0003^{AB}	0.018^{AB}	0.22^{AB}
QF13	Facility Blank	4/14/93	0.0005^{AB}	0.032^{AB}	0.38^{AB}
QF14	Thin Rub	4/27/93	0.0036	0.229	2.78
QF15	Field Blank	4/27/93	0.0017	0.000	0.00
QF16*	Facility Blank	5/7/93	0.0006^{AB}	0.035^{AB}	0.43^{AB}
QF17	Thin Rub	5/24/93	0.0004^{AB}	0.025^{AB}	0.30^{AB}
	Average		0.0007	0.0436	0.5291
	Thin Average		0.0007	0.0447	0.5428
	Thin Rub Average		0.0014	0.0908	1.1011
	Facility Blank Average		0.0005	0.0322	0.3902
	All Blanks Average		0.0007	0.0000	0.0000
	Thin Pop Std Dev		NC	NC	0.0683
	Thin Rub Pop Std Dev		NC	NC	1.1877
	Facility Blank Pop Std Dev		NC	NC	0.0304

Pop Std Dev = Population standard deviation

A = Mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages will include detection limits as appropriate)

B = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration

NC = Statistics on these measures were judged to be not relevant and were not calculated

* Some damage visible to filter edge

TABLE 17. MISCELLANEOUS T-TEST STATISTICS*

	Thin/Thin Rubber		Thin/Facility Blank		Thin Rubber/ Facility Blank	
	t-Stat	Level of Significance	t-Stat	Level of Significance	t-Stat	Level of Significance
Lead	-0.664	NS	2.886	0.05	0.846	NS
Hydrogen Sulfide	1.838	NS	0.597	NS	-2.014	NS
Organic Train Particulate (PM_{10})	1.615	NS	3.444	0.05	3.053	0.05
Organic XAD Train Total Particulate	1.613	NS	3.205	0.05	2.925	0.05
Metals Train Particulate (PM_{10})	1.293	NS	3.164	0.05	2.375	0.10

* All tests are two-tailed difference of means with 4 degrees of freedom
Thin/Thin Rubber = Comparison between AC10 Thin Asphalt and AC10 Thin Asphalt with Rubber; t statistics greater than zero indicate a higher concentration of the compound in the AC10 Thin Asphalt
Thin/Facility Blank = Comparison between AC10 Thin Asphalt and the Facility Blanks; t statistics greater than zero indicate a higher concentration of the compound in the AC10 Thin Asphalt
Thin Rubber/Facility Blank = Comparison between AC10 Thin Asphalt with Rubber and the Facility Blanks; t statistics greater than zero indicate a higher concentration of the compound in the AC10 Thin Asphalt with Rubber
t-Stat = the student's t statistic to test a difference of means
NS = Not statistically significant

TABLE 18. HYDROGEN SULFIDE MEASUREMENTS BY DRÄGER TUBE

Test Material	Test Date	Time Sampled (min)	Volume Sampled (cc)	Average Flow Rate (cc/min)	Visual Observation	Observed Concentration (ppmv H_2S)	Estimated Emissions (mg/ (m^2*min))
AC10 Thick	1/28/93	232	2395	10.3	No Color Change	2.09	<36.6
AC10 Thin	2/4/93	137	1389	10.1	No Color Change	3.60	<63.1
Hut Blank	2/11/93	167	1842	11.0	No Color Change	2.71	<47.6
AC10 Thin	2/18/93	182	2031	11.2	No Color Change	2.46	<43.2
AC10 Thin	2/25/93	164	4182	25.5	No Color Change	1.20	<21.0
AC10/Rubber Thin	4/7/93	151	4530	15.0	No Color Change	1.10	<19.4
Hut Blank	4/14/93	137	3562	26.0	No Color Change	1.40	<24.6
AC10/Rubber Thin	4/27/93	161	4453	27.7	No Color Change	1.12	<19.7
Hut Blank	5/7/93	101	2929	29.0	No Color Change	1.71	<29.9
AC10/Rubber Thin	5/24/93	149	4172	28.0	No Color Change	1.20	<21.0
Field Blank	5/24/93	NA	NA	NA	No Color Change	0.00	NA

NA = Not applicable

TABLE 19. TOTAL AND PM_{10} PARTICULATE MEASUREMENTS

Sample ID	Test Conditions	Date Collected	Net Gain Weight (g)	Corrected Volume Sampled (ft^3)	Corrected Volume Sampled (m^3)	Corrected Flow Rate (ft^3/m)	Corrected Flow Rate (m^3/min)	Ambient Flow Rate at PM_{10} Head (ft^3/min)	Ambient Flow Rate at PM_{10} Head (m^3/min)	Net Weight Gain ($\mu g/ft^3$)	Net Weight Gain ($\mu g/m^3$)	Total Particulate Estimated Emissions ($mg/(min*m^2)$)
ORGANIC PARTICULATE TRAIN (PM_{10})												
TF-4	Thick	1/28/93	0.00235	610.298	17.28	3.94	0.111	3.747	0.1061	3.85	136.0	1.65
TF-5	Thin	2/4/93	0.04967	514.354	14.56	3.90	0.110	3.612	0.1022	96.57	3410.2	41.36
TF-7	Facility Blank	2/11/93	-0.00138	571.279	16.18	3.76	0.106	3.534	0.10006	-2.41	-85.0	-1.03
TF-10	Thin	2/18/93	0.03497	616.44	17.46	3.94	0.111	3.730	0.10561	56.73	2003.4	24.30
TF-11	Field Blank	2/18/93	0.00010	NA	NA	NA	NA	NA	NA	NA	NA	NA
TF-13	Thin	2/25/93	0.02360	678.43	19.21	4.27	0.121	4.019	0.1138	34.79	1228.5	14.90
TF-17	Thin Rub	4/7/93	0.01829	582.242	16.49	3.81	0.108	3.580	0.1013	31.41	1109.3	13.46
TF-26	Facility Blank	4/14/93	0.00041	558.023	15.80	3.88	0.110	3.660	0.1036	0.73	25.9	0.31
TF-28	Thin Rub	4/27/93	0.02759	609.407	17.26	4.04	0.114	3.810	0.1078	45.27	1598.8	19.39
TF-29	Facility Blank	5/7/93	0.00138	584.292	16.55	3.82	0.108	3.605	0.1020	2.36	83.4	1.01
TF-32	Thin Rub	5/24/93	0.00700	566.726	16.05	3.70	0.105	3.528	0.0998	12.35	436.2	5.29
TF-33	Field Blank	5/24/93	0.00033	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Average		0.02765	NC	NC	NC	NC	NC	NC	47.98	1694.5	20.55
	Thin Average		0.03608	NC	NC	NC	NC	NC	NC	62.69	2214.0	26.85
	Thin Rub Average		0.01763	NC	NC	NC	NC	NC	NC	29.68	1048.1	12.71
	Facility Blank Average		0.00014	NC	NC	NC	NC	NC	NC	0.23	8.1	0.10
	All Blanks Average		0.00017	NC	NC	NC	NC	NC	NC	NA	NA	NA
ORGANIC XAD TRAIN (TOTAL PARTICULATE)												
TF-3/XAD-3	Thick	1/28/93	0.00098	187.196	5.30	1.20	0.034	NA	NA	5.24	184.9	2.24
TF-6/XAD-6	Thin	2/4/93	0.01641	158.781	4.50	1.18	0.033	NA	NA	103.35	3649.7	44.27

Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer

NA = Not available
NC = Statistics on these measures were judged to be not relevant and were not calculated.
* Some damage to the filter edge may have influenced the particulate result.

(continued)

TABLE 19. TOTAL AND PM_{10} PARTICULATE MEASUREMENTS (continued)

Sample ID	Test Conditions	Date Collected	Net Gain Weight (g)	Corrected Volume Sampled (ft^3)	Corrected Volume Sampled (m^3)	Corrected Flow Rate (ft^3/m)	Corrected Flow Rate (m^3/min)	Ambient Flow Rate at PM_{10} Head (ft^3/min)	Ambient Flow Rate at PM_{10} Head (m^3/min)	Net Weight Gain ($\mu g/ft^3$)	Net Weight Gain ($\mu g/m^3$)	Total Particulate Estimated Emissions ($mg/(min*m^2)$)
ORGANIC XAD TRAIN (TOTAL PARTICULATE) (concluded)												
TF-8/XAD-8	Facility Blank	2/11/93	0.00072	182.861	5.18	1.18	0.034	NA	NA	3.94	139.0	1.69
TF-9/XAD-9	Thin	2/18/93	0.00852	162.185	4.59	1.02	0.029	NA	NA	52.53	1855.2	22.50
TF-12/XAD-12	Thin	2/25/93	0.00689	180.627	5.11	1.20	0.034	NA	NA	38.14	1347.1	16.34
TF-16/XAD-16	Thin Rub	4/7/93	0.00530	147.773	4.18	0.96	0.027	NA	NA	35.87	1266.6	15.36
TF-25/XAD-18*	Facility Blank	4/14/93	-0.00314	140.32	3.97	0.97	0.028	NA	NA	-22.38	-790.2	-9.58
TF-27/XAD-27	Thin Rub	4/27/93	0.00629	155.38	4.40	0.98	0.028	NA	NA	40.48	1429.6	17.34
TF-30/XAD-30	Facility Blank	5/7/93	0.00057	134.158	3.80	0.88	0.025	NA	NA	4.25	150.0	1.82
TF-31/XAD-31	Thin Rub	5/24/93	0.00192	133.867	3.79	0.87	0.025	NA	NA	14.34	506.5	6.14
	Average		0.00820	NC	NC	NC	NC	NA	NA	49.82	1759.2	21.34
	Thin Average		0.01061	NC	NC	NC	NC	NA	NA	64.68	2284.0	27.70
	Thin Rub Average		0.00450	NC	NC	NC	NC	NA	NA	30.23	1067.6	12.95
	Facility Blank Average		-0.00062	NC	NC	NC	NC	NA	NA	-4.73	-167.1	-2.03
	All Blanks Average		0.00000	NC	NC	NC	NC	NA	NA	NA	NA	NA
METALS TRAIN (PM_{10})												
QF1	Thick	1/28/93	0.00915	614.305	17.40	3.96	0.112	3.771	0.1067	14.89	526.0	6.38
QF2	Thin	2/4/93	0.06481	469.048	13.28	3.43	0.097	3.173	0.08984	138.17	4879.5	59.18
QF3	Facility Blank	2/11/93	0.00312	601.157	17.02	3.91	0.111	3.671	0.1039	5.19	183.3	2.22
QF4	Field Blank	2/18/93	0.00444	NA	NA	NA	NA	NA	NA	NA	NA	NA
QF5	Thin	2/18/93	0.04931	618.042	17.50	3.90	0.111	3.716	0.1052	79.78	2817.5	34.17

Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer

NA = Not available
NC = Statistics on these measures were judged to be not relevant and were not calculated.
* Some damage to the filter edge may have influenced the particulate result.

(continued)

TABLE 19. TOTAL AND PM_{10} PARTICULATE MEASUREMENTS (concluded)

Sample ID	Test Conditions	Date Collected	Net Gain Weight (g)	Corrected Volume Sampled (ft^3)	Corrected Volume Sampled (m^3)	Corrected Flow Rate (ft^3/m)	Corrected Flow Rate (m^3/min)	Ambient Flow Rate at PM_{10} Head (ft^3/min)	Ambient Flow Rate at PM_{10} Head (m^3/min)	Net Weight Gain ($\mu g/ft^3$)	Net Weight Gain ($\mu g/m^3$)	Total Particulate Estimated Emissions ($mg/(min*m^2)$)
QF6	Thin	2/25/93	0.03031	656.64	18.59	4.16	0.118	3.915	0.1108	46.16	1630.1	19.77
METALS TRAIN (PM_{10}) (concluded)												
QF12	Thin Rub	4/7/93	0.02337	583.271	16.52	3.81	0.108	3.587	0.1015	40.07	1414.9	17.16
QF13	Facility Blank	4/14/93	0.00384	557.34	15.78	3.87	0.110	3.656	0.1035	6.89	243.3	2.95
QF14	Thin Rub	4/27/93	0.04438	554.656	15.71	3.47	0.098	3.273	0.09267	80.01	2825.6	34.27
QF15	Field Blank	4/27/93	-0.01281	NA	NA	NA	NA	NA	NA	NA	NA	NA
QF16*	Facility Blank	5/7/93	-0.02187	597.614	16.92	3.91	0.111	3.687	0.1044	-36.60	-1292.4	-15.67
QF17	Thin Rub	5/24/93	0.01057	565.739	16.02	3.70	0.105	3.521	0.09970	18.68	659.8	8.00
	Average		0.03840	NC	NC	NC	NC	NC	NC	69.75	2463.3	29.88
	Thin Average		0.04814	NC	NC	NC	NC	NC	NC	88.04	3109.1	37.71
	Thin Rub Average		0.02611	NC	NC	NC	NC	NC	NC	46.25	1633.5	19.81
	Facility Blank Average		-0.00497	NC	NC	NC	NC	NC	NC	-8.17	-288.6	-3.50
	All Blanks Average		-0.00466	NC	NC	NC	NC	NC	NC	NA	NA	NA

Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer

NA = Not available
NC = Statistics on these measures were judged to be not relevant and were not calculated.
* Some damage to the filter edge may have influenced the particulate result.

SECTION 5

SUMMARY AND CONCLUSIONS

These tests successfully obtained measurements of a wide variety of emissions from a simulated asphalt paving process under controlled conditions. Successful replicate tests were conducted both of an AC10 asphalt hot-mix material and an AC10 asphalt hot-mix material with a rubber additive. Though concentration levels were, in most cases, near the detection limits of the analytical methods applied, statistically significant emissions of a variety of pollutant species were observed (summaries are presented in Tables 20 and 21).

VOC analyses showed statistically significant amounts of benzene emitted from both types of asphalt studied. None of the other 55 volatile compounds targeted for quantitative analysis was observed in statistically significant concentrations. A wide variety of volatile compounds, not specifically targeted for quantitative analysis, was also seen in various samples although no consistent set of compounds could be established.

Analysis of vapor phase semivolatile species showed statistically significant concentrations of 2-methylphenol from the AC10 with rubber tests and significant emissions of diethyl phthalate from both hot-mix materials. Observations of phthalate emissions should be treated with extreme caution because phthalates are notorious as analytical artifacts because they are present in a very wide variety of plastic materials. Additional doubt is cast upon the phenol and phthalate results since these compounds were occasionally found as false positives on spiked QA samples (see Appendix C).

TABLE 20. LIST OF COMPOUNDS WITH STATISTICALLY SIGNIFICANT RESULTS

Compounds for which AC10 without rubber emissions were significantly higher than the facility blank emissions:

Benzene
Diethyl Phthalate
Naphthalene
Fluoranthene
Pyrene
Chrysene
Benzo(k)fluoranthene
Benzo(a)pyrene
Indeno(1,2,3-cd)Pyrene
Lead
PM_{10} Particulate (as measured on both trains)
Total Particulate

Compounds for which AC10 with rubber emissions were significantly higher than the facility blank emissions:

Benzene
2-Methyl Phenol
Diethyl Phthalate
bis(2-Ethylhexyl)phthalate
Fluoranthene
Pyrene
Benzo(a)anthracene
Chrysene
Benzo(a)pyrene
PM_{10} Particulate (as measured on both trains)
Total Particulate

Compounds for which AC10 without rubber emissions were significantly higher than AC10 with rubber emissions:

Benzo(k)fluoranthene
Benzo(a)pyrene

Compounds for which AC10 with rubber emissions were significantly higher than AC10 without rubber emissions:

Benzene
m,p-Xylene
2-Methyl Phenol

TABLE 21. SUMMARY OF LEVELS OF SIGNIFICANCE AND ESTIMATED EMISSION VALUES

Compound	AC 10 Without Rubber vs. Facility Blank		AC10 With Rubber vs. Facility Blank	
	Level of Significance*	Estimated Emissions $\mu g/(m^2 \cdot min)$	Level of Significance*	Estimated Emissions $\mu g/(m^2 \cdot min)$
Benzene	0.002	<=57	0.002	<=110
2-Methyl Phenol	NS	<=7.2	0.05	<=23.7
Diethyl Phthalate	0.10	<=32.7	0.10	<=34.37
bis(2-ethylhexyl)phthalate	NS	<=5.1	0.10	<=5.3
Naphthalene	0.10	<=0.103	NS	<=0.063
Fluoranthene	0.10	<=1.648	0.10	<=1.178
Pyrene	0.10	<=1.469	0.10	<=1.612
Benzo(a)anthracene	NS	<=0.786	0.10	<=0.653
Chrysene	0.02	<=4.420	0.05	<=1.957
Benzo(k)fluoranthene	0.01	<=1.106	NS	<=0.306
Benzo(a)pyrene	0.05	<=0.660	0.10	<=0.204
Indeno(1,2,3-c,d)pyrene	0.05	<=0.141	NS	<=0.065
Lead	0.05	<=0.542	NS	<=1.10
PM_{10} Particulate (organic train)	0.05	26,850	0.05	12,710
Total Particulate (organic XAD-2 train)	0.05	27,700	0.05	12,950
PM_{10} Particulate (metals train)	0.05	37,710	0.10	19,810

NS= Not statistically significant at >90% confidence level.
* = Level of significance is defined as the probability of making a type I error (i.e., of falsely rejecting the tested hypothesis, in this case the tested hypothesis is that the means are equal)

None of the other semivolatile species targeted showed statistically significant emissions in the vapor-phase analyses.

Analysis of particulate-phase semivolatile species by full scan mass spectrometry showed statistically significant concentrations of bis(2-ethylhexyl)phthalate. To reiterate, observations of phthalate emissions should be treated with extreme caution because phthalates are notorious as

analytical artifacts and are present in a very wide variety of plastic materials. None of the other semivolatile species targeted showed statistically significant emissions in the PM analyses.

Because some PAH species were observed at concentrations near the detection limit in the full scan mass spectrometry analyses and analytical interferences from hydrocarbon coeluters were suspected, an additional analysis of semivolatile particulate-phase samples was conducted by a more sensitive selected ion monitoring method. This analysis targeted 16 PAH species of primary interest to the project and revealed statistically significant emissions of seven of the 16 species when the AC10 thin without rubber tests were compared to the facility blank tests. The emissions of five of 16 PAH species were significantly higher in the AC10 thin with rubber tests than in the facility blank tests. The emissions of two species were significantly higher in the tests without the rubber additive than in the tests with the additive.

No statistically significant emissions of hydrogen sulfide were found in these tests. A very low level of lead may have been emitted in the AC10 thin without rubber tests. Statistically, significant emissions of both total particulates and PM_{10} were found from both types of asphalt hot-mix material tested.

The estimated emission values measured in this work could be combined with appropriate fate and transport data to model the exposure of populations (either occupational or general) to pollutants generated in the asphalt paving process. To facilitate such a modeling effort, the emissions results have been presented as a function of asphalt surface area so that emissions from the paving of an area of road could be estimated based on the road length and width. Modelers should, however, recall the limitations of this pilot-scale study, especially those discussed in Section 3.1. The facility air concentrations reported in this work **should not** be used directly to evaluate risk to exposed populations because exposure scenarios will vary widely.

Although some statistically significant differences were found between the emissions from the asphalt materials tested with and without rubber, these differences were not, in general, dramatic. In

addition, although the emissions for some pollutants, such as benzene, were significantly higher in the rubber containing asphalt, the emissions of other pollutants, such as benzo(k)fluoranthene, were higher in the non-rubber containing asphalt. Therefore, the data gathered in these experiments indicate that the addition of rubber to asphalt hot-mixes does not have a dramatic impact on the air emissions generated in the paving process.

As we discussed in section 3.1, the results presented in this report were obtained from measurements of emissions from a static layer of asphalt maintained at a constant temperature. We believe that experiments in which asphalt is disturbed, as it is in the road building process, would result in the measurement of higher levels of emissions. The statistically significant emissions of carcinogens, such as benzene, measured in this work are a cause for concern and merit a careful risk assessment to determine if personnel exposed to air emissions during road construction or asphalt manufacturing processes are at risk.

SECTION 6

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APPENDIX A

QUALITY CONTROL EVALUATION REPORT

This task was conducted under the guidance of an EPA-approved QA Test Plan (AEERL Category III) and a Facility Manual for the test facility. This plan was used to establish data quality objectives suitable for this study. The quality control measures employed during this study were used to ensure that the data collected would be suitable to measure air emissions resulting from a simulated paving process.

Table A-1 presents the data quality indicator (DQI) summaries for accuracy, precision, and completeness achieved during testing along with the planned DQI goals for each respective measurement or analysis performed. In general, the intended DQI goals were achieved. In several instances, however, targeted DQI goals were not achieved or could not be measured from the available data.

The accuracy of volatile organic measurements made for this project was intensively investigated by preparing five quality control evaluation samples. These samples were prepared were as dilutions of a gas mixture produced and certified by Scott Specialty Gases. These samples contained five of the targeted volatile organics measured in this project and a sixth non-targeted species. The dilutions were prepared by the Acurex Environmental Task Lead and submitted blind to the volatiles analyst. Because the gas stock was purchased before the project began and because of limitations in the dilution preparation equipment, we were not able to prepare evaluation samples at as low a concentration as was seen in the field samples. However, over the range evaluated, there does not

appear to be a strong relationship between bias and concentration. The results of analyses of these samples are reported in Table A-2. Nineteen of the 25 measurements came within the acceptable range of ±35 percent set in the QA Test Plan. In general, the analytical concentrations observed were lower than the target concentrations. The substantial variation observed in the bias percentages for many of the samples would suggest that the inaccuracies observed do not stem from difficulties in the preparation of the dilutions.

Table A-3 presents data on the recoveries of surrogates spiked into the volatiles samples before analysis. These recoveries are generally excellent regardless of sample type (AC10, AC10 with rubber, or facility blank).

The volatiles analyses were also subject to a QA audit. The auditor's report questions about procedure were fully addressed in an Acurex Environmental response.

The EPA/AEERL QA Officer prepared blind semivolatiles performance evaluation samples which were submitted to the contracted laboratory. The results of this evaluation are contained in data tables in Appendix C and in Table A-4. The results of this evaluation were generally good except for low-boiling semivolatile compounds spiked onto Teflon-impregnated filters. These low-boiling compounds are known to be distributed almost entirely to the particulate phase.[1S] In addition, gravimetric methods requiring filter desiccation were used to determine particulate loadings on these samples (see Section 2). Thus, the assessment of recoveries from filters of low-boiling semivolatiles could be viewed as irrelevant.

Tables A-5 and A-6 present data on the recoveries of surrogates spiked into the vapor phase and particulate-bound semivolatile samples. All of these recoveries meet the compound-specific recovery criteria set by Method 8270 (listed in the first column of Tables A-5 and A-6). A few of the recovery values do not meet the general criteria of 50-150 percent recovery discussed in the QA Test Plan but do, however, meet Method 8270 performance criteria.

Tables A-7 and A-4 present a comparison between results obtained using the (Method 8270) full-scan mass spectrometry method used by the contracted laboratory and the results obtained using the selected ion monitoring method used by Acurex Environmental personnel working in an EPA facility. Table A-7 makes this comparison for the actual field samples for 16 PAH species in 12 samples. The results obtained for the four lowest boiling PAH species (from naphthalene to fluorene) are all non-detects in the contracted analyses. The results for these species obtained by Acurex Environmental were non-detects or results well below the detection limit of the contracted analyses. The medium boiling PAH species (phenanthrene to pyrene) show some agreement in trends, especially for those samples obtained after February 18, 1993. Note also with the series of samples (TF-4, TF-5, TF-10, and TF-13) that although the trends in total particulate per sample (Table 14) are closely paralleled by the results of the selected ion monitoring analyses, they are poorly paralleled by the results of the full-scan analyses. It should be noted also that these samples were submitted to the contracted laboratory in four batches. Senior personnel of the contracted laboratory were made aware of the Acurex Environmental Task Lead's concerns about the chromatographic resolution and accuracy of the first set of these analyses soon after the results of this first set of analyses were reported. Contracted laboratory personnel were also aware that after the analysis of this first set of samples, sample extracts were being returned for further analysis by Acurex Environmental personnel. It is possible that this led to more vigilance in the analysis of later samples. Agreement for the later eluting PAH species [benzo(a)anthracene to benzo(g,h,i)perylene] is relatively poor. This may be attributable to interference with the full-scan mass spectrometry analyses and the fact that many of the analytes were apparently at concentrations below the detection limit of the full-scan analyses.

The author of this report does not intend to imply that the contracted laboratory did not perform up to the expectations of the method. Rather, it should be kept in mind that there are advantages and disadvantages in the use of standardized methods. Method 8270 without modification or the use of

cleanup chromatography is probably not well suited for detecting targeted species obscured by high concentrations of coeluting compounds.

Table A-4 compares the PAH full scan and SIM results for spiked performance evaluation samples. In general, these results are quite similar.

DQIs for the continuous emission monitors (CEMs) are discussed in Tables A-8 and A-1. In general, the O_2, CO_2, and SO_2 analyzers functioned quite well. The CO and THC analyzers functioned quite well in accuracy tests but did not generally meet the strict linearity test discussed in Table A-8. The degree of deviation from linearity is discussed in the footnotes in Table A-8 and, in almost all cases, was less then 5 percent of instrument full scale, though frequently above the stated criteria of 2 percent of instrument full scale. The performance of the NO analyzer was rather poor, especially in later tests. However, when the analyzer was functional, no indication of NO emission could be detected. Thus, the poor performance of the NO analyzer had a minimal impact on project goals.

The EPA/AEERL QA Officer prepared blind performance evaluation samples which were submitted to the contracted laboratory used for lead analyses. The results of these analyses are discussed in Appendix C and Table A-1. Reported concentrations were fairly precise but not very accurate (values reported were approximately 50 percent of spiked concentrations). This result could be attributable to an actual analytical inaccuracy or an artifact of the spiking method. This inaccuracy is of some concern. However, nearly all of the lead results were in excess of the analytical detection limit, so that this poor recovery did not cause unjustified non-detects. In addition, the average lead estimated emissions were relatively low and were quite similar for the AC10 without rubber, AC10 with rubber, and facility blank tests (Table 16), although the AC10 without rubber value did achieve statistical significance.

The accuracy goal of ±25 percent for the flow rates of the PM_{10} was achieved in all cases (see Tables A-1 and 19). The observed variations in flow rate should not have a dramatic impact on data quality (see the discussion of cutpoint and flow rate in Section 4.13).

Facility, field, and/or laboratory blanks were collected routinely for all of the measurements performed during this study. The results of these blank analyses are described in the respective data presentation sections of this report. The test data have not been corrected for blank values. Data have, however, been footnoted in instances where analyte levels in blank samples were sufficient to cause concern about the validity of the values reported. Where feasible, blank levels have been presented along with the actual test data.

Control of asphalt heating temperatures was vital for the success of this study, although no specific DQI goals were set for this parameter. This control was adequately achieved, although not in as narrow a temperature band as initially hoped (See Sections 3.5 and 4.2).

In summary, the QA project objectives set forth have been adequately met in most cases, and the data collected from this study are sufficient to meet project objectives.

TABLE A-1. DATA QUALITY OBJECTIVES FOR CRITICAL MEASUREMENTS

Measurement	Objective Accuracy (% Bias)	Objective Precision (%RSD)	Objective Recovery (%)	Objective Completeness	Achieved Accuracy (% Bias)	Achieved Precision (%RSD)	Achieved Recovery (%)	Achieved Completeness (%)
O_2	15	10	NA	70	1.51	0.96	NA	100
CO_2	15	10	NA	70	3.40	5.92	NA	90
CO	15	10	NA	70	3.18	2.01	NA	100
THC	15	10	NA	70	5.25	7.36	NA	100
NO	15	10	NA	70	17.60	13.43	NA	40
SO_2	20	15	NA	70	3.81	3.43[1]	NA	100
Volatile Organic Analysis	35	25	NM	75	SOT[2]	NM	SOT[3]	100
Semivolatile and Particulate Bound Organic Analysis	35	25	50-150	70	SOT[4]	NM	SOT[5]	100
Hydrogen Sulfide	50	50	NA	70	NM	NM	NM	100
Ultimate Analysis	25	25	NA	70	NM	NM	NM	100
Lead	25	25	NA	70	SOT[6]	SOT[6]	NA	100
Flow Rate - PM_{10} Sampling	25	25	NA	95	9.05	5.2	NA	100

NA = Not applicable
NM = Not measured
SOT = See other table
1 - Average of two span gases
2 - See Table A-2
3 - See Table B-3
4 - See Table A-4
5 - See Tables A-5 and A-6
6 - See Tables in Appendix C

TABLE A-2. ASPHALT PROJECT VOLATILES QUALITY CONTROL CHECKS

Compound:	Benzene	Toluene	Chlorobenzene	m-Dichlorobenzene	o-Xylene
Molecular Weight (daltons)	78.11	92.14	112.56	147.00	106.17
Full Strength Manufacturers Concentration (ppmv)	1.05	1.03	1.06	0.849	1.16
Full Strength Manufacturers Concentration (ng/L)	3661	4237	5327	5572	5498
Sample TB-29					
Dilution Factor	0.3111	0.3111	0.3111	0.3111	0.3111
Target Concentration (ng/L)	1139	1318	1657	1733	1711
Reported Concentration (ng/L)	762	948	1177	1268	1236
% Bias	-33.11	-28.08	-28.97	-26.85	-27.74
Sample TB-54					
Dilution Factor	0.1790	0.1790	0.1790	0.1790	0.1790
Target Concentration (ng/L)	655	758	953	997	984
Reported Concentration (ng/L)	1067	1095.5	1042	698.5	1217
% Bias	62.82	44.47	9.30	-29.95	23.67
Sample TB-55					
Dilution Factor	0.0382	0.0382	0.0382	0.0382	0.0382
Target Concentration (ng/L)	140	162	204	213	210
Reported Concentration (ng/L)	160	174	189	168.5	204.5
% Bias	14.30	7.42	-7.19	-20.90	-2.71
Sample TB-56					
Dilution Factor	0.0309	0.0309	0.0309	0.0309	0.0309
Target Concentration (ng/L)	113	131	164	172	170
Reported Concentration (ng/L)	100	103	120	95	110
% Bias	-11.50	-21.38	-26.97	-44.71	-35.16
Sample TB-57					
Dilution Factor	0.0150	0.0150	0.0150	0.0150	0.0150
Target Concentration (ng/L)	55	63	80	83	82
Reported Concentration (ng/L)	44	47	56	46	52
% Bias	-19.99	-26.67	-30.42	-45.45	-36.70

NA = Not a targeted analyte

TABLE A-3a. VOLATILE ORGANIC COMPOUND AC10 THIN AND THICK SURROGATE RECOVERIES

Surrogate	TB-10 Thin 02/05/93 %	TB-11 Thin 02/05/93 %	TB-12 Thin 02/05/93 %	TB-20 Thin 02/18/93 %	TB-21 Thin 02/18/93 %	TB-22 Thin 02/18/93 %	TB-25 Thin 02/25/93 %	TB-26 Thin 02/25/93 %	TB-27 Thin 02/25/93 %	TB-5 Thick 01/28/93 %	TB-6 Thick 01/28/93 %	TB-7 Thick 01/28/93 %	TB-13 Fld Blk 02/05/93 %	TB-23 Fld Blk 02/18/93 %	TB-28 Fld Blk 02/25/93 %	TB-8 Fld Blk 01/28/93 %
bromochloromethane	130	123	119	70	70	123	101	93	101	101	100	100	116	65	102	100
d5-1,2-dichloroethane	113	107	101	99	95	94	103	111	112	94	96	96	129	94	111	101
d8-toluene	89	89	88	95	96	84	86	91	87	90	90	90	89	92	82	89
4-bromofluorobenzene	95	94	96	101	98	102	101	99	105	86	93	93	93	99	99	84

TABLE A-3b. VOLATILE ORGANIC COMPOUND AC10 WITH RUBBER SURROGATE RECOVERIES

Surrogate	TB-34 Thin Rub 04/07/93 %	TB-36 Thin Rub 04/07/93 %	TB-35 Thin Rub 04/07/93 %	TB-43 Thin Rub 04/27/93 %	TB-44 Thin Rub 04/27/93 %	TB-45 Thin Rub 04/27/93 %	TB-50 Thin Rub 05/24/93 %	TB-51 Thin Rub 05/24/93 %	TB-52 Thin Rub 05/24/93 %	TB-37 Field Blk 04/07/93 %	TB-46a Field Blk 04/27/93 %	TB-53 Field Blk 05/24/93 %
bromochloromethane	83.37	84.91	84.46	92.45	111.89	111.31	NS	103.52	111.25	85.23	119.66	108.49
d5-1,2-dichloroethane	96.93	96.03	91.9	84.5	91.85	92.55	NS	90.99	95.54	93.41	95.98	95.62
d8-toluene	99.15	98.92	100.38	90.58	108.82	102.15	NS	89.65	100.22	98.25	114.24	93.63
4-bromofluorobenzene	110.07	113.38	113.79	94.93	105.51	87.34	NS	90.72	95.79	113.52	114.01	86.56

TABLE A-3c. VOLATILE ORGANIC COMPOUND FACILITY BLANK SURROGATE RECOVERIES

Surrogate	TB-9 Facility Blk 02/05/93 %	TB-15 Facility Blk 02/11/93 %	TB-16 Facility Blk 02/11/93 %	TB-39 Facility Blk 04/15/93 %	TB-38 Facility Blk 04/15/93 %	TB-40 Facility Blk 04/15/93 %	TB-48 Facility Blk 05/07/93 %	TB-46b Facility Blk 05/07/93 %	TB-47 Facility Blk 05/07/93 %
bromochloromethane	114	127	110	80	79	81	111	105	111
d5-1,2-dichloroethane	113	101	102	95	95	98	97	95	96
d8-toluene	92	83	85	102	108	101	103	99	99
4-bromofluorobenzene	84	101	99	93	96	94	92	96	103

Thin = AC10 hot-mix without rubber, thin layer

Thin Rub = AC10 hot-mix with rubber, thin layer

Field Blk = Field blank

Facility Blk = Facility blank

TABLE A-4. COMPARISON OF SPIKED VALUES, FULL SCAN DATA AND SELECTED ION MONITORING DATA FOR PARTICULATE-BOUND SEMIVOLATILES

Sample Name Sample Type Method of Analysis Analytes	TF-20 Spiked Amount (µg)	TF-20 SIM Amount (µg)	TF-20 FS Amount (µg)	TF-20 SIM Recovery (%)	TF-20 FS Recovery (%)	TF-21 Spiked Amount (µg)	TF-21 SIM Amount (µg)	TF-21 FS Amount (µg)	TF-21 SIM Recovery (%)	TF-21 FS Recovery (%)	TF-22 Spiked Amount (µg)	TF-22 SIM Amount (µg)	TF-22 FS Amount (µg)	TF-22 SIM Recovery (%)	TF-22 FS Recovery (%)
Naphthalene	150	0.14	0	0.1	0.0	0	0.07	0	NA	NA	60	0.06	0	0.1	0.0
Acenaphthylene	300	1.1	1.4	0.4	0.5	0	0.04	0	NA	NA	120	0.31	0	0.3	0.0
Acenaphthene	150	0.98	1.5	0.7	1.0	0	ND	0	NA	NA	60	0.24	0	0.4	0.0
Fluorene	30	5.73	7.9	19.1	26.3	0	0.01	0	NA	NA	12	1.71	2.3	14.3	19.2
Phenanthrene	15	10.17	13	67.8	86.7	0	0.01	0	NA	NA	6	3.48	4.2	58.0	70.0
Anthracene	15	9.53	13	63.5	86.7	0	0.02	0	NA	NA	6	2.89	3.9	48.2	65.0
Fluoranthene	30	24.12	31	80.4	103.3	0	0.05	0	NA	NA	12	8.04	10	67.0	83.3
Pyrene	15	11.91	18	79.4	120.0	0	0.03	0	NA	NA	6	3.97	5.9	66.2	98.3
Benzo(a)anthracene	15	11.04	17	73.6	113.3	0	0.12	0	NA	NA	6	3.49	5.3	58.2	88.3
Chrysene	15	12.46	17	83.1	113.3	0	0.03	0	NA	NA	6	3.9	5.2	65.0	86.7
Benzo(b)fluoranthene	30	26	29	86.7	96.7	0	0.12	0	NA	NA	12	7.89	8.4	65.8	70.0
Benzo(k)fluoranthene	15	12.61	16	84.1	106.7	0	0.06	0	NA	NA	6	3.99	4.8	66.5	80.0
Benzo(a)pyrene	15	11.64	15	77.6	100.0	0	0.05	0	NA	NA	6	3.25	4.2	54.2	70.0
Indeno(1,2,3-c,d)pyrene	15	12.16	11	81.1	73.3	0	0.06	0	NA	NA	6	3.26	2.7	54.3	45.0
Dibenz(a,h)anthracene	30	27.34	26	91.1	86.7	0	0.31	0	NA	NA	12	7.86	6.9	65.5	57.5
Benzo(g,h,i)perylene	30	24.24	22	80.8	73.3	0	0.27	0	NA	NA	12	7.01	6.7	58.4	55.8

(continued)

FS = Full scan results
SIM = Selected ion monitoring results
NA = Not applicable

TABLE A-4. COMPARISON OF SPIKED VALUES, FULL SCAN DATA AND SELECTED ION MONITORING DATA FOR PARTICULATE-BOUND SEMIVOLATILES (concluded)

Sample Name Sample Type Method of Analysis Analytes	TF-23 Spiked Amount (µg)	TF-23 SIM Amount (µg)	TF-23 FS Amount (µg)	TF-23 SIM Recovery (%)	TF-23 FS Recovery (%)	TF-24 Spiked Amount (µg)	TF-24 SIM Amount (µg)	TF-24 FS Amount (µg)	TF-24 SIM Recovery (%)	TF-24 FS Recovery (%)
Naphthalene	60	0.09	0	0.2	0.0	150	0.32	0	0.1	0.0
Acenaphthylene	120	0.9	1.2	0.8	1.0	300	1.32	1.7	0.4	0.6
Acenaphthene	60	0.72	1.1	1.2	1.8	150	1.2	1.8	0.8	1.2
Fluorene	12	2.77	3.6	23.1	30.0	30	6.29	8.4	20.9	28.0
Phenanthrene	6	4.41	5.2	73.5	86.7	15	10.47	13.0	69.8	86.7
Anthracene	6	4.03	5.3	67.3	88.3	15	9.83	13.0	65.5	86.7
Fluoranthene	12	9.25	12	77.1	100.0	30	25.14	31.0	83.8	103.3
Pyrene	6	4.7	6.8	78.3	113.3	15	12.28	18.0	81.9	120.0
Benzo(a)anthracene	6	4.48	6.3	74.7	105.0	15	11.82	18.0	78.8	120.0
Chrysene	6	4.76	6.5	79.3	108.3	15	12.87	18.0	85.8	120.0
Benzo(b)fluoranthene	12	10.26	11	85.5	91.7	30	30.65	31.0	102.2	103.3
Benzo(k)fluoranthene	6	4.79	7	79.8	116.7	15	14.19	17.0	94.6	113.3
Benzo(a)pyrene	6	4.44	5.5	74.0	91.7	15	12.71	15.0	84.7	100.0
Indeno(1,2,3-c,d)pyrene	6	4.48	3.6	74.7	60.0	15	10.34	12.0	68.9	80.0
Dibenzo(a,h)anthracene	12	9.98	8.8	83.2	73.3	30	23.24	26.0	77.5	86.7
Benzo(g,h,i)perylene	12	8.74	8.5	72.8	70.8	30	20.41	25.0	68.0	83.3

FS = Full scan results
SIM = Selected ion monitoring results
NA = Not applicable

TABLE A-5. ORGANIC XAD-2 TRAIN SEMI-VOLATILE SURROGATE RECOVERIES

Surrogates	Method Limits	XAD-3 Thick 1/28/93 %	XAD-6 Thin 2/4/93 %	XAD-9 Thin 2/18/93 %	XAD-12 Thin 2/25/93 %	XAD-40 Field Blk 2/25/93 %	XAD-16 Thin Rub 4/1/93 %	XAD-27 Thin Rub 4/27/93 %	XAD-31 Thin Rub 5/24/93 %	XAD-27D Thin Rub 4/27/93 %	XAD-41 Field Blk 4/27/93 %	XAD-8 Facility Blk 2/11/93 %	XAD-18 Facility Blk 4/1/93 %	XAD-30 Facility Blk 5/7/93 %
2-Fluorophenol	25-121	65	120	100	30	47	66	50	59	45	50	50	29	66
Phenol-d5	24-113	55	80	80	38	50	67	43	27	48	36	95	41	55
Nitrobenzene-d5	23-120	65	80	60	37	34	55	35	45	36	38	43	27	46
2-Fluorobiphenyl	30-115	42	55	47	45	47	57	45	51	46	40	30	43	58
2,4,6-Tribromophenol	19-122	75	85	75	44	49	61	68	67	68	45	65	60	75
Terphenyl-d14	18-137	30	50	50	63	54	78	79	70	75	51	35	78	75

TABLE A-6. ORGANIC PARTICULATE TRAIN SEMI-VOLATILE SURROGATE RECOVERIES

Surrogates	Method Limits	TF-4 Thick 1/28/93 %	TF-5 Thin 2/4/93 %	TF-10 Thin 2/18/93 %	TF-11 Field Blk 2/18/93 %	TF-13 Thin 2/25/93 %	TF-17 Thin Rub 4/1/93 %	TF-25 Thin Rub 4/27/93 %	TF-32 Thin Rub 5/24/93 %	TF-28 Dup Thin Rub 4/27/93 %	TF-33 Field Blk 5/24/93 %	TF-7 Facility Blk 2/11/93 %	TF-26 Facility Blk 4/14/93 %	TF-29 Facility Blk 5/7/93 %
2-Fluorophenol	25-121	105	65	60	75	50	57	46	54	40	61	70	53	57
Phenol-d5	24-113	85	70	55	70	50	54	30	48	46	56	75	51	46
Nitrobenzene-d5	23-120	85	65	60	70	53	51	43	45	43	48	65	43	47
2-Fluorobiphenyl	30-115	70	65	55	65	73	71	59	59	58	66	60	55	60
2,4,6-Tribromophenol	19-122	75	80	65	60	69	86	70	65	66	59	55	56	64
Terphenyl-d14	18-137	60	60	65	70	81	72	73	80	72	88	70	65	77

Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer
Field Blk = Field blank
Facility Blk = Facility blank

TABLE A-7. COMPARISON OF FULL SCAN AND SELECTED ION MONITORING ANALYSES OF PARTICULATE PHASE SAMPLES

Sample Name Sample Type Method of Analysis Analytes	SIM PQL (µg)	FS PQL (µg)	TF-4 Thick SIM (µg)	TF-4 Thick FS (µg)	TF-5 Thin SIM (µg)	TF-5 Thin FS (µg)	TF-10 Thin SIM (µg)	TF-10 Thin FS (µg)	TF-11 Field Blk SIM (µg)	TF-11 Field Blk FS (µg)	TF-13 Thin SIM (µg)	TF-13 Thin FS (µg)
Naphthalene	0.05	1	0.2	--	0.11	--	0.22	--	--	--	0.1	--
Acenaphthylene	0.05	1	--	--	--	--	--	--	--	--	--	--
Acenaphthene	0.05	1	--	--	--	--	--	--	--	--	--	--
Fluorene	0.05	1	--	--	0.05	--	--	--	--	--	--	--
Phenanthrene	0.05	1	0.97	--	2.93	3.1	0.8	--	--	--	0.65	1.1
Anthracene	0.05	1	0.09	--	0.36	--	0.12	--	--	--	0.12	--
Fluoranthene	0.05	1	0.98	--	3.7	--	1.48	--	--	--	1.32	2.5
Pyrene	0.05	1	0.65	--	3.26	--	1.31	--	--	--	1.24	3.7
Benzo(a)anthracene	0.05	1	0.07	--	1.73	--	--	--	--	--	1.37	8.9
Chrysene	0.05	1	0.08	--	7.99	--	5.09	--	--	--	4.86	--
Benzo(b)fluoranthene	0.05	1	--	--	--	--	--	--	--	--	--	1.5
Benzo(k)fluoranthene	0.05	1	0.09	--	1.77	--	1.32	--	--	--	1.47	--
Benzo(a)pyrene	0.05	1	0.08	--	0.75	--	1.44	--	--	--	0.56	2.3
Indeno(1,2,3-c,d)pyrene	0.05	1	0.02	--	0.25	--	0.12	--	--	--	0.21	--
Dibenzo(a,h)anthracene	0.05	1	0.02	--	0.32	--	0.1	--	--	--	0.17	--
Benzo(g,h,i)perylene	0.05	1	0.03	--	0.36	--	0.16	--	--	--	0.18	--

(continued)

FS = Full scan results
SIM = Selected ion monitoring results
Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer
Field Blk = Field blank
Fclty Blk = Facility blank
-- = Not detected at the PQL

TABLE A-7. COMPARISON OF FULL SCAN AND SELECTED ION MONITORING ANALYSES OF PARTICULATE PHASE SAMPLES (concluded)

Sample Name Sample Type Method of Analysis Analytes	SIM PQL (µg)	FS PQL (µg)	TF-17 Thin Rub SIM (µg)	TF-17 Thin Rub FS (µg)	TF-28 Thin Rub SIM (µg)	TF-28 Thin Rub FS (µg)	TF-32 Thin Rub SIM (µg)	TF-32 Thin Rub FS (µg)	TF-33 Field Blk SIM (µg)	TF-33 Field Blk FS (µg)	TF-7 Felty Blk SIM (µg)	TF-7 Felty Blk FS (µg)	TF-26 Felty Blk SIM (µg)	TF-26 Felty Blk FS (µg)	TF-29 Felty Blk SIM (µg)	TF-29 Felty Blk FS (µg)
Naphthalene	0.05	1	0.13	..	0.07	..	0.06	..	0.05	..	..	..	..	..	0.03	..
Acenaphthylene	0.05	1	0.05	..	0.03	..	..	..	..	..	..	..	..	..	..	..
Acenaphthene	0.05	1	0.03	..	0.02	..	..	..	..	..	..	..	..	..	..	..
Fluorene	0.05	1	..	..	0.04	..	..	..	..	..	..	..	..	..	..	..
Phenanthrene	0.05	1	0.63	1.1	1.34	2	0.11	..	0.01	..	..	..	..	..	..	..
Anthracene	0.05	1	0.07	..	0.27	..	0.02	..	..	..	..	..	..	..	0.02	..
Fluoranthene	0.05	1	1.76	3.1	2.32	4.8	0.34	..	0.01	..	0.06	..	0.11	..	0.06	..
Pyrene	0.05	1	2.45	4.9	3.78	7	0.5	..	0.01	..	0.04	..	0.09	..	0.06	..
Benzo(a)anthracene	0.05	1	0.97	5.7	1.44	..	0.31	..	..	..	..	..	..	..	..	..
Chrysene	0.05	1	3.12	..	4.1	..	0.92	..	0.15	..	..	..	..	..	0.07	..
Benzo(b)fluoranthene	0.05	1	..	..	1.42	..	..	..	..	..	..	..	..	..	0.087	..
Benzo(k)fluoranthene	0.05	1	0.8	..	..	..	0.39	..	..	..	..	..	..	..	0.05	..
Benzo(a)pyrene	0.05	1	0.3	1.1	0.46	..	0.09	..	..	..	..	..	..	..	0.05	..
Indeno(1,2,3-c,d)pyrene	0.05	1	0.05	..	0.15	..	0.04	..	0.01	..	..	..	..	..	0.06	..
Dibenzo(a,h)anthracene	0.05	1	0.05	..	0.11	..	0.01	..	0.02	..	..	..	..	..	0.07	..
Benzo(g,h,i)perylene	0.05	1	0.12	..	0.21	..	0.07	..	0.02	..	..	..	..	..	0.07	..

FS = Full scan results
SIM = Selected ion monitoring results
Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer
Field Blk = Field blank
Felty Blk = Facility blank
.. = Not detected at the PQL

TABLE A-8. CONTINUOUS EMISSION MONITOR CALIBRATIONS

Test Date	Test Conditions	O_2	CO	NO	THC	CO_2	SO_2
1/25/93	AC10	P/P	F/P[1]	F/P[2]	F/P[3]	P/P	P/P
2/4/93	AC10 Thin	P/P	F/P[4]	P/P	N.O.	P/P	P/P
2/11/93	Hut Blank	P/P	F/P[5]	P/P	N.O.	P/P	P/P
2/18/93	AC10 Thin	P/P	F/P[6]	F/P[7]	F/P[8]	P/P[9]	P/P
2/25/93	AC10 Thin	P/P	P/P	F/P[10]	F/P[11]	P/P	P/P
4/7/93	AC10/Rubber Thin	P/P	F/P[12]	F/P[13]	P/P	P/P	P/P
4/14/93	Hut Blank	P/P	P/P	F/P[14]	F/P[15]	P/P	P/P
4/27/93	AC10/Rubber Thin	P/P	P/N.O.[16]	F/P[17]	F/P[18]	P/P	P/P
5/5/93	Hut Blank	F/P[19]	F/P[20]	F/P[21]	F/P[22]	P/P	P/P
5/24/93	AC10/Rubber Thin	F/P[23]	P/P	F/P[24]	F/P[25]	P/P	P/P

P = Pass
F = Fail
N.O. = Instrument not operable

Format:
Before test/after test

Criteria:
Before test, 2% of instrument full scale on midrange gas (linearity check)
After test, 15% of actual concentration value (QC check)

Key to Footnotes:

1. Before test instrument read 2.2% of full scale low on one of midrange gases and 1.6% low on other gas.
2. Before test, instrument read 3.2% of full scale on midrange gas.
3. Before test, instrument read 5.3% of full scale low on one midrange gas and 1.8% low on the other.
4. Before test, instrument read 2.4% of full scale low on one midrange gas and low of full scale low on the other.
5. Before test, instrument read 2.2% of full scale low on both midrange gases.
6. Before test, instrument read 2.2% of full scale low on one midrange gas and 1.4% of full scale low on the other.
7. Before test, instrument read 2.4% of full scale low on midrange gas.
8. Using new instrument for this test. Before test, instrument read 3.3% of full scale high on one midrange gas 0.3% of full scale high on the other.
9. After test, instrument read 16.5% of actual value high for one midrange gas, 14.3% high for the other midrange, and 14.1% high for the upper range gas.
10. Instrument was switched to a narrower operating range prior to calibration. Before test, instrument read 3% of full scale high on midrange gas; following test, instrument read 28% higher than actual concentration for the same gas.
11. Using different instrument for this test. Before test, instrument read 3% of full scale high for one midrange gas and 0.5% high for the other.
12. On pretest linearity check, one midrange span gas read 3.5% of full scale low, while the other midrange gas read 0.6% of full scale low.
13. On pre-test linearity check, midrange gas read 6% of full scale high. During post-test QC check, midrange gas read 46% of actual concentration high, and upper range gas read 19% of actual concentration high.
14. Before test, instrument read 10% of full scale high on midrange gas. After test, instrument read 74% of actual concentration value high for midrange gas and 32% of actual concentration high for upper range gas.
15. Before test, instrument read 3% of full scale low on one midrange gas and 0.7% low on other midrange gas.
16. Instrument became inoperable during test.
17. Before test, instrument read 7% of full scale high on midrange gas. Following test, instrument read 55% of actual concentration high on midrange gas and 23% of actual concentration high for upper range gas.
18. Before test, instrument read 5.3% of full scale high on midrange gas.
19. Before test, instrument read 2.8% of full scale high on one midrange gas, 1.6% high on a second, and exactly equal to the concentration of a third gas.
20. Before test, instrument read 2.4% of full scale high on one midrange gas and 0.4% high on the other.
21. Before test, instrument read 9% of full scale high on midrange gas. After test, instrument read 146% of actual concentration high for midrange gas and 32% of actual concentration high for upper range gas.
22. Before test, instrument read 3% of full scale high on one midrange gas and 5.1% high on other midrange gas.
23. Before test, instrument read 2.8% of full scale high on one midrange gas and 2.4% high on the other.
24. Before test, instrument read 5% high on midrange gas. After test, instrument read 70% of actual concentration high on midrange gas and 30% of actual concentration high on upper range gas.
25. Before test, instrument read 2.0% of full scale high on one midrange gas and 6.5% high on the other.

APPENDIX B

SUPPORTING TABLES AND FIGURES

TABLE B-1. TARGETED VOLATILE ORAGANIC COMPOUND RESULTS--AC10 THIN AND THICK AIR CONCENTRATIONS

Sample ID Sample Type Collection Date Compound#	PQL ng/L	TB-10 Thin 02/05/93 ng/L	TB-11 Thin 02/05/93 ng/L	TB-12 Thin 02/05/93 ng/L	TB-20 Thin 02/18/93 ng/L	TB-21 Thin 02/18/93 ng/L	TB-22 Thin 02/18/93 ng/L	TB-25 Thin 02/25/93 ng/L	TB-26 Thin 02/25/93 ng/L	TB-27 Thin 02/25/93 ng/L	TB-5 Thick 01/28/93 ng/L	TB-6 Thick 01/28/93 ng/L	TB-7 Thick 01/28/93 ng/L	TB-13 Fld Blk 02/05/93 ng/L	TB-23 Fld Blk 02/18/93 ng/L	TB-28 Fld Blk 02/25/93 ng/L	TB-8 Fld Blk 01/28/93 ng/L	AVG Thin ng/L
Dichlorodifluoromethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=8.00
Chloromethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=4.00
2-Methylpropene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=1.00
Vinyl Chloride	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=2.00
Bromomethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=2.30
Chloroethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=1.90
Trichlorofluoromethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=1.10
1,1-Dichloroethene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=1.80
Carbon Disulfide	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=1.50
Iodomethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=1.70
Acetonitrile	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=13.10
trans-1,2-Dichloroethene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=0.80
2-Methyl-2-Propanol	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=4.00
1,1-Dichloroethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=1.90
Vinyl Acetate	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=7.00
Chloroform	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=1.60
1,1,1-Trichloroethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=1.10
Carbon Tetrachloride	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=1.50
Benzene	5.0	6.42[D]	2.20[DEG]	4.20[DE]	5.22[DE]	5.51[DE]	3.20[DEG]	5.41[E]	5.95[E]	4.20[DEG]	5.82[E]	5.91[E]	5.91[E]	--	--	1.60[DEG]	1.30[DEG]	<=4.70
1,2-Dichloroethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=1.70
Fluorobenzene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=1.90
2-Chloro-2-Methylpropane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=0.60

# = Compounds are listed in retention time order
Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Fld Blk = Field blank
PQL = Practical quantitation limit

-- = Not detected at the PQL and satisfies the conditions for footnotes D and E
D = Air concentration of this compound in this sample is NOT greater than three times (3X) that day's field blank concentration
E = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration or 3X the average field blank concentration, whichever is greater
G = Compound detected at less than a practical quantitation limit of 5 ng/L

(continued)

TABLE B-1. TARGETED VOLATILE ORAGANIC COMPOUND RESULTS--AC10 THIN AND THICK AIR CONCENTRATIONS (continued)

Sample ID Sample Type Collection Date Compound#	PQL ng/L	TB-10 Thin 02/05/93 ng/L	TB-11 Thin 02/05/93 ng/L	TB-12 Thin 02/05/93 ng/L	TB-20 Thin 02/18/93 ng/L	TB-21 Thin 02/18/93 ng/L	TB-22 Thin 02/18/93 ng/L	TB-25 Thin 02/25/93 ng/L	TB-26 Thin 02/25/93 ng/L	TB-27 Thin 02/25/93 ng/L	TB-5 Thick 01/28/93 ng/L	TB-6 Thick 01/28/93 ng/L	TB-7 Thick 01/28/93 ng/L	TB-13 Fld Blk 02/05/93 ng/L	TB-23 Fld Blk 02/18/93 ng/L	TB-28 Fld Blk 02/25/93 ng/L	TB-8 Fld Blk 01/28/93 ng/L	AVG Thin ng/L
2,5-Dimethyl-3-Hexene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=1.41
Heptane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=1.70
Trichloroethene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=1.90
1,2-Dichloropropane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=2.40
Dibromomethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=2.70
1,4-Dioxane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=7.80
Bromodichloromethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=1.70
cis-1,3-Dichloropropene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=1.60
4-Methyl-2-Pentanone	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=6.30
Toluene	5.0	3.80[DEG]	4.10[DEG]	3.20[DEG]	6.03[DE]	5.39[DE]	23.66[E]	6.02[DE]	8.86[DE]	4.80[DEG]	16.08[E]	6.95[E]	6.95[E]	--	2.60[DEG]	3.10[DEG]	2.10[DEG]	<=7.32
trans-1,3-Dichloropropene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=0.90
1,1,2-Trichloroethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=2.00
Tetrachloroethene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=2.10
Bromoacetone	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=20.00
2-Hexanone	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=19.60
Dibromochloromethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=2.20
1,2-Dibromoethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=2.70
Chlorobenzene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=3.20
1,1,1,2-Tetrachloroethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=2.00
Ethyl Benzene	5.0	--	--	--	2.20[DEG]	1.30[DEG]	4.10[DEG]	--	2.20[DEG]	2.00[DEG]	--	--	--	--	1.40[DEG]	--	--	<=2.60
m,p-Xylene	5.0	5.48[DE]	3.90[DEG]	4.90[DEG]	7.98[DE]	6.55[DE]	16.12[DE]	1.90[DEG]	1.90[DEG]	1.70[DEG]	1.50[DEG]	1.10[DEG]	1.10[DEG]	--	6.34[DE]	--	--	<=5.60

# = Compounds are listed in retention time order
Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Fld Blk = Field blank
PQL = Practical quantitation limit

-- = Not detected at the PQL and satisfies the conditions for footnotes D and E
D = Air concentration of this compound in this sample is NOT greater than three times (3X) that day's field blank concentration
E = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concenration or 3X the average field blank concentration, whichever is greater
G = Compound detected at less than a practical quantitation limit of 5 ng/L

(continued)

TABLE B-1. TARGETED VOLATILE ORAGANIC COMPOUND RESULTS--AC10 THIN AND THICK AIR CONCENTRATIONS (concluded)

Sample ID Sample Type Collection Date Compound[#]	PQL ng/L	TB-10 Thin 02/05/93 ng/L	TB-11 Thin 02/05/93 ng/L	TB-12 Thin 02/05/93 ng/L	TB-20 Thin 02/18/93 ng/L	TB-21 Thin 02/18/93 ng/L	TB-22 Thin 02/18/93 ng/L	TB-25 Thin 02/25/93 ng/L	TB-26 Thin 02/25/93 ng/L	TB-27 Thin 02/25/93 ng/L	TB-5 Thick 01/28/93 ng/L	TB-6 Thick 01/28/93 ng/L	TB-7 Thick 01/28/93 ng/L	TB-13 Fld Blk 02/05/93 ng/L	TB-23 Fld Blk 02/18/93 ng/L	TB-28 Fld Blk 02/25/93 ng/L	TB-8 Fld Blk 01/28/93 ng/L	AVG Thin ng/L
Nonane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=11.60
o-Xylene	5.0	--	--	--	2.10[DEG]	1.50[DEG]	3.80[DEG]	--	--	--	--	--	--	--	1.30[DEG]	2.40[DEG]	--	<=3.16
Styrene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=4.10
Bromoform	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=2.20
Cumene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=8.10
1,1,2,2-Tetrachloroethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=6.10
1,2,3-Trichloropropane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=4.00
1,4-Dichloro-2-Butene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=20.00
Pentachloroethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=5.30
1,3-Dichlorobenzene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=2.60
1,4-Dichlorobenzene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=4.30
1,2-Dichlorobenzene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=3.50
1,2-Dibromo-3-Chloropropane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<=7.00

# = Compounds are listed in retention time order
Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Fld Blk = Field blank
PQL = Practical quantitation limit

-- = Not detected at the PQL and satisfies the conditions for footnotes D and E
D = Air concentration of this compound in this sample is NOT greater than three times (3X) that day's field blank concentration
E = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration or 3X the average field blank concentration, whichever is greater
G = Compound detected at less than a practical quantitation limit of 5 ng/L

TABLE B-2. TARGETED VOLATILE ORGANIC COMPOUND RESULTS--AC10 WITH RUBBER AIR CONCENTRATIONS

Sample ID Sample Type Collection Date Compound#	PQL ng/L	TB-34 Thin Rub 04/07/93 ng/L	TB-36 Thin Rub 04/07/93 ng/L	TB-35 Thin Rub 04/07/93 ng/L	TB-43 Thin Rub 04/27/93 ng/L	TB-44 Thin Rub 04/27/93 ng/L	TB-45 Thin Rub 04/27/93 ng/L	TB-50 Thin Rub 05/24/93 ng/L	TB-51 Thin Rub 05/24/93 ng/L	TB-52 Thin Rub 05/24/93 ng/L	TB-37 Field Blk 04/07/93 ng/L	TB-46a Field Blk 04/27/93 ng/L	TB-53 Field Blk 05/24/93 ng/L	AVERAGE Thin Rub ng/L
Dichlorodifluoromethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=8.00
Chloromethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=4.00
2-Methylpropene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=1.00
Vinyl Chloride	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=2.00
Bromomethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=2.30
Chloroethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=1.90
Trichlorofluoromethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=1.10
1,1-Dichloroethene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=1.80
Carbon Disulfide	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=1.50
Iodomethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=1.70
Acetonitrile	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=13.10
trans-1,2-Dichloroethene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=0.80
2-Methyl-2-Propanol	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=4.00
1,1-Dichloroethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=1.90
Vinyl Acetate	5.0	75.27	310.14	211.46	--	--	--	--	--	--	10.64[DE]	--	--	<=70.99
Chloroform	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=1.60
1,1,1-Trichloroethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=1.10
Carbon Tetrachloride	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=1.50
Benzene	5.0	8.69	13.71	12.10	9.92	4.82[DE]	10.74	4.43[E]	12.08	5.11[E]	--	--	1.17[DE]	<=9.07
1,2-Dichloroethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=1.70
Fluorobenzene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=1.90
2-Chloro-2-Methylpropane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=0.60

= Compounds are listed in retention time order
Thin Rub = AC10 hot-mix with rubber, thin layer
Field Blk = Field blank
PQL = Practical quantitation limit

-- = Not detected at the PQL and satisfies the conditions for footnotes D and E
D = Air concentration of this compound in this sample is NOT greater than three times (3X) that day's field blank concentration
E = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration or 3X the average field blank concentration, whichever is greater

(continued)

TABLE B-2. TARGETED VOLATILE ORGANIC COMPOUND RESULTS--AC10 WITH RUBBER AIR CONCENTRATIONS (continued)

Sample ID Sample Type Collection Date Compound#	PQL ng/L	TB-34 Thin Rub 04/07/93 ng/L	TB-36 Thin Rub 04/07/93 ng/L	TB-35' Thin Rub 04/07/93 ng/L	TB-43 Thin Rub 04/27/93 ng/L	TB-44 Thin Rub 04/27/93 ng/L	TB-45 Thin Rub 04/27/93 ng/L	TB-50 Thin Rub 05/24/93 ng/L	TB-51 Thin Rub 05/24/93 ng/L	TB-52 Thin Rub 05/24/93 ng/L	TB-37 Field Blk 04/07/93 ng/L	TB-46a Field Blk 04/27/93 ng/L	TB-53 Field Blk 05/24/93 ng/L	AVERAGE Thin Rub ng/L
2,5-Dimethyl-3-Hexene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=1.41
Heptane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=1.70
Trichloroethene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=1.90
1,2-Dichloropropane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=2.40
Dibromomethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=2.70
1,4-Dioxane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=7.80
Bromodichloromethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=1.70
cis-1,3-Dichloropropene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=1.60
4-Methyl-2-Pentanone	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=6.30
Toluene	5.0	5.54^{DE}	6.86^{DE}	5.40^{DE}	3.91^{DE}	3.43^{DE}	5.27^{DE}	2.95^{DE}	9.54^{E}	8.98^{E}	--	--	2.14^{DE}	<=5.76
trans-1,3-Dichloropropene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=0.90
1,1,2-Trichloroethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=2.00
Tetrachloroethene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=2.10
Bromoacetone	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=20.00
2-Hexanone	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=19.60
Dibromochloromethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=2.20
1,2-Dibromoethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=2.70
Chlorobenzene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=3.20
1,1,1,2-Tetrachloroethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=2.00
Ethyl Benzene	5.0	--	--	--	--	--	--	--	2.15^{DE}	2.09^{DE}	--	--	--	<=2.73
m,p-Xylene	5.0	11.07^{DE}	15.74^{DE}	15.06^{DE}	14.26^{DE}	5.43^{DE}	11.38^{DE}	4.88^{DE}	13.37^{DE}	5.00^{DE}	--	--	--	<=10.69
Nonane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=11.60

= Compounds are listed in retention time order
Thin Rub = AC10 hot-mix with rubber, thin layer
Field Blk = Field blank
PQL = Practical quantitation limit

-- = Not detected at the PQL and satisfies the conditions for footnotes D and E
D = Air concentration of this compound in this sample is NOT greater than three times (3X) that day's field blank concentration
E = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration or 3X the average field blank concentration, whichever is greater

(continued)

TABLE B-2. TARGETED VOLATILE ORGANIC COMPOUND RESULTS--AC10 WITH RUBBER AIR CONCENTRATIONS (concluded)

Sample ID Sample Type Collection Date Compound#	PQL ng/L	TB-34 Thin Rub 04/07/93 ng/L	TB-36 Thin Rub 04/07/93 ng/L	TB-35 Thin Rub 04/07/93 ng/L	TB-43 Thin Rub 04/27/93 ng/L	TB-44 Thin Rub 04/27/93 ng/L	TB-45 Thin Rub 04/27/93 ng/L	TB-50 Thin Rub 05/24/93 ng/L	TB-51 Thin Rub 05/24/93 ng/L	TB-52 Thin Rub 05/24/93 ng/L	TB-37 Field Blk 04/07/93 ng/L	TB-46a Field Blk 04/27/93 ng/L	TB-53 Field Blk 05/24/93 ng/L	AVERAGE Thin Rub ng/L
o-Xylene	5.0	--	--	--	--	--	--	--	2.38[DE]	2.02[DE]	--	--	2.22[DE]	<=3.21
Styrene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=4.10
Bromoform	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=2.20
Cumene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=8.10
1,1,2,2-Tetrachloroethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=6.10
1,2,3-Trichloropropane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=4.00
1,4-Dichloro-2-Butene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=20.00
Pentachloroethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=5.30
1,3-Dichlorobenzene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=2.60
1,4-Dichlorobenzene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=4.30
1,2-Dichlorobenzene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=3.50
1,2-Dibromo-3-Chloropropane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	<=7.00

= Compounds are listed in retention time order
Thin Rub = AC10 hot-mix with rubber, thin layer
Field Blk = Field blank
PQL = Practical quantitation limit

-- = Not detected at the PQL and satisfies the conditions for footnotes D and E
D = Air concentration of this compound in this sample is NOT greater than three times (3X) that day's field blank concentration
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TABLE B-3. TARGETED VOLATILE ORGANIC COMPOUND RESULTS--FACILITY BLANKS AIR CONCENTRATIONS

Sample ID Sample Type Collection Date (1993) Compound[a]	PQL ng/L	TB-9 Fcl Blk 02/05 ng/L	TB-15 Fcl Blk 02/11 ng/L	TB-16 Fcl Blk 02/11 ng/L	TB-39 Fcl Blk 04/15 ng/L	TB-38 Fcl Blk 04/15 ng/L	TB-40 Fcl Blk 04/15 ng/L	TB-48 Fcl Blk 05/07 ng/L	TB-46b Fcl Blk 05/07 ng/L	TB-47 Fcl Blk 05/07 ng/L	TB-19 Trip Bk 02/11 ng/L	TB-18 Fld Blk 02/11 ng/L	TB-41 Fld Blk 04/15 ng/L	TB-49 Fld Blk 05/07 ng/L	AVG Fcl Blk ng/L
Dichlorodifluoromethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=8.00
Chloromethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=4.00
2-Methylpropene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=1.00
Vinyl Chloride	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=2.00
Bromomethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=2.30
Chloroethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=1.90
Trichlorofluoromethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=1.10
1,1-Dichloroethene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=1.80
Carbon Disulfide	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=1.50
Iodomethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=1.70
Acetonitrile	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=13.10
trans-1,2-Dichloroethene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=0.80
2-Methyl-2-Propanol	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=4.00
1,1-Dichloroethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=1.90
Vinyl Acetate	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=7.00
Chloroform	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=1.60
1,1,1-Trichloroethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=1.10
Carbon Tetrachloride	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=1.50
Benzene	5.0	--	1.70[DEG]	1.30[DEG]	2.22[DE]	5.27[DE]	1.92[DE]	1.66[DE]	1.40[DE]	1.37[DE]	--	--	--	--	<=2.13
1,2-Dichloroethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=1.70
Fluorobenzene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=1.90
2-Chloro-2-Methylpropane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=0.60

a = Compounds are listed in retention time order
Fcl Blk = Facility blank
Fld Blk = Field blank
Trip Bk = Trip blank
PQL = Practical quantitation limit

-- = Not detected at the PQL and satisfies the conditions for footnotes D and E
D = Air concentration of this compound in this sample is NOT greater than three times (3X) that day's field blank concentration
E = Air concentration of this compound in this sample is NOT greater than three times (3X) the average field blank concentration, whichever is greater
G = Compound detected at less than a practical quantitation limit of 5 ng/L

(continued)

TABLE B-3. TARGETED VOLATILE ORGANIC COMPOUND RESULTS--FACILITY BLANKS AIR CONCENTRATIONS (continued)

Sample ID Sample Type Collection Date (1993) Compound[a]	PQL ng/L	TB-9 Fcl Blk 02/05 ng/L	TB-15 Fcl Blk 02/11 ng/L	TB-16 Fcl Blk 02/11 ng/L	TB-39 Fcl Blk 04/15 ng/L	TB-38 Fcl Blk 04/15 ng/L	TB-40 Fcl Blk 04/15 ng/L	TB-48 Fcl Blk 05/07 ng/L	TB-46b Fcl Blk 05/07 ng/L	TB-47 Fcl Blk 05/07 ng/L	TB-19 Trip Bk 02/11 ng/L	TB-18 Fld Blk 02/11 ng/L	TB-41 Fld Blk 04/15 ng/L	TB-49 Fld Blk 05/07 ng/L	AVG Fcl Blk ng/L
2,5-Dimethyl-3-Hexene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=1.41
Heptane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=1.70
Trichloroethene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=1.90
1,2-Dichloropropane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=2.40
Dibromomethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=2.70
1,4-Dioxane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=7.80
Bromodichloromethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=1.70
cis-1,3-Dichloropropene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=1.60
4-Methyl-2-Pentanone	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=6.30
Toluene	5.0	2.10[DEG]	5.81[DE]	4.00[DEG]	4.69[DE]	61.20	4.85[DE]	2.40[DE]	2.02[DE]	1.97[DE]	1.60[DEG]	2.00[DEG]	2.04[DE]	1.42[DE]	<=9.89
trans-1,3-Dichloropropene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=0.90
1,1,2-Trichloroethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=2.00
Tetrachloroethene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=2.10
Bromoacetone	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=20.00
2-Hexanone	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=19.60
Dibromochloromethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=2.20
1,2-Dibromoethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=2.70
Chlorobenzene	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=3.20
1,1,1,2-Tetrachloroethane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=2.00
Ethyl Benzene	5.0	--	--	--	--	7.12[DE]	--	--	--	--	--	--	--	--	<=3.37
m,p-Xylene	5.0	2.90[DEG]	3.60[DEG]	6.02[DE]	2.73[DE]	25.95	2.59[DE]	--	--	--	1.70[DEG]	3.10[DEG]	1.42[DE]	--	<=7.23
Nonane	5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	<=11.60

(continued)

a = Compounds are listed in retention time order
Fcl.Blk = Facility blank
Fld Blk = Field blank
Trip Bk = Trip blank
PQL = Practical quantitation limit

-- = Not detected at the PQL and satisfies the conditions for footnotes D and E
D = Air concentration of this compound in this sample is NOT greater than three times (3X) that day's field blank concentration
E = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration or 3X the average field blank concentration, whichever is greater
G = Compound detected at less than a practical quantitation limit of 5 ng/L

TABLE B-3. TARGETED VOLATILE ORGANIC COMPOUND RESULTS--FACILITY BLANKS AIR CONCENTRATIONS (concluded)

Sample ID Sample Type Collection Date (1993) Compound[#]	PQL ng/L	TB-9 Fcl Blk 02/05 ng/L	TB-15 Fcl Blk 02/11 ng/L	TB-16 Fcl Blk 02/11 ng/L	TB-39 Fcl Blk 04/15 ng/L	TB-38 Fcl Blk 04/15 ng/L	TB-40 Fcl Blk 04/15 ng/L	TB-48 Fcl Blk 05/07 ng/L	TB-46b Fcl Blk 05/07 ng/L	TB-47 Fcl Blk 05/07 ng/L	TB-19 Trip Bk 02/11 ng/L	TB-18 Fld Blk 02/11 ng/L	TB-41 Fld Blk 04/15 ng/L	TB-49 Fld Blk 05/07 ng/L	AVG Fcl Blk ng/L
o-Xylene	5.0	..	..	1.50[DE]	..	8.86[DE]	1.56[DE]	..	..	..	..	..	..	..	<=3.66
Styrene	5.0	..	..	..	..	..	..	..	..	..	..	..	..	..	<=4.10
Bromoform	5.0	..	..	..	..	..	..	..	..	..	..	..	..	..	<=2.20
Cumene	5.0	..	..	..	..	..	..	..	..	..	..	..	..	..	<=8.10
1,1,2,2-Tetrachloroethane	5.0	..	..	..	..	..	..	..	..	..	..	..	..	..	<=6.10
1,2,3-Trichloropropane	5.0	..	..	..	..	..	..	..	..	..	..	..	..	..	<=4.00
1,4-Dichloro-2-Butene	5.0	..	..	..	..	..	..	..	..	..	..	..	..	..	<=20.00
Pentachloroethane	5.0	..	..	..	..	..	..	..	..	..	..	..	..	..	<=5.30
1,3-Dichlorobenzene	5.0	..	..	..	..	..	..	..	..	..	..	..	..	..	<=2.60
1,4-Dichlorobenzene	5.0	..	..	..	..	..	..	..	..	..	..	..	..	..	<=4.30
1,2-Dichlorobenzene	5.0	..	..	..	..	..	..	..	..	..	..	..	..	..	<=3.50
1,2-Dibromo-3-Chloropropane	5.0	..	..	..	..	..	..	..	..	..	..	..	..	..	<=7.00

= Compounds are listed in retention time order
Fcl Blk = Facility blank
Fld Blk = Field blank
Trip Bk = Trip blank
PQL = Practical quantitation limit

.. = Not detected at the PQL and satisfies the conditions for footnotes D and E
D = Air concentration of this compound in this sample is NOT greater than three times (3X) that day's field blank concentration
E = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration or 3X the average field blank concentration, whichever is greater

TABLE B-4. TENTATIVE VOLATILE ORGANIC COMPOUNDS--AC10 THIN AIR CONCENTRATIONS

Sample ID Sample Type Collection Date Compound#	PQL ng/L	TB-10 Thin 02/05/93 ng/L	TB-11 Thin 02/05/93 ng/L	TB-12 Thin 02/05/93 ng/L	TB-20 Thin 02/18/93 ng/L	TB-21 Thin 02/18/93 ng/L	TB-22 Thin 02/18/93 ng/L	TB-25 Thin 02/25/93 ng/L	TB-26 Thin 02/25/93 ng/L	TB-27 Thin 02/25/93 ng/L	TB-23 Field Blk 02/18/93 ng/L	TB-28 Field Blk 02/25/93 ng/L	AVERAGE Thin ng/L
C5 Alkane	5	--	--	--	--	--	--	--	--	--	--	--	<=5.00
C6 Alkane	5	167	133	--	--	--	--	--	--	--	--	--	<=37.22
Cycloalkane or branched alkene	5	369	221	--	--	66	181	--	--	--	--	24[HL]	<=95.78
Butanal	5	--	--	29	--	--	427	--	--	--	--	54[HL]	<=54.56
C6 Alkane	5	--	--	--	--	--	--	--	--	--	--	--	<=5.00
2-Butenal	5	--	--	--	--	--	--	--	--	--	--	--	<=5.00
2-Methylfuran	5	--	--	--	--	--	--	--	--	--	--	--	<=5.00
3-Buten-2-one	5	--	--	--	--	--	--	--	--	--	--	--	<=5.00
Cycloalkane or branched alkene	5	--	--	--	--	--	--	--	--	--	--	--	<=5.00
Apparently Butanal	5	--	--	--	--	--	--	--	--	--	--	--	<=5.00
Cyclohexane	5	--	--	--	--	--	--	--	20	--	--	--	<=6.67
Unknown Chlorocarbon	5	--	--	--	--	--	--	--	--	--	--	--	<=5.00
Pentanal	5	34	--	--	--	--	--	--	--	--	--	--	<=5.00
Unknown	5	--	--	--	--	--	--	--	--	--	--	--	<=8.22
>C4 Aldehyde	5	--	--	--	--	--	--	--	--	--	--	--	<=5.00
C8 or 9 Alkane	5	--	--	--	--	--	--	--	--	--	--	--	<=5.00
Acetic Acid	5	--	--	--	--	--	--	--	--	--	--	--	<=5.00
Unknown	5	--	--	--	--	--	--	--	--	--	--	--	<=5.00
Hexanal	5	--	--	--	--	23[L]	--	--	--	--	--	--	<=5.00
Siloxane	5	--	--	--	--	--	--	--	--	--	--	--	<=7.00
Unknown	5	--	--	--	--	--	--	--	--	--	--	--	<=5.00
Unknown	5	--	--	--	--	--	--	--	--	--	--	--	<=5.00

# = Compounds are listed in retention time order
Thin = AC10 hot-mix without rubber, thin layer
Field Blk = Field blank
PQL = Practical quantitation limit

-- = Not detected at the PQL and satisfies the conditions for footnotes H and L
H = Air concentration of this compound in this sample is NOT greater than three times (3X) that day's field blank concentration or the detection limit
L = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration or 3X the average field blank concentration, whichever is greater

(continued)

TABLE B-4. TENTATIVE VOLATILE ORGANIC COMPOUNDS--AC10 THIN AIR CONCENTRATIONS (concluded)

Sample ID Sample Type Collection Date Compound[#]	PQL ng/L	TB-10 Thin 02/05/93 ng/L	TB-11 Thin 02/05/93 ng/L	TB-12 Thin 02/05/93 ng/L	TB-20 Thin 02/18/93 ng/L	TB-21 Thin 02/18/93 ng/L	TB-22 Thin 02/18/93 ng/L	TB-25 Thin 02/25/93 ng/L	TB-26 Thin 02/25/93 ng/L	TB-27 Thin 02/25/93 ng/L	TB-23 Field Blk 02/18/93 ng/L	TB-28 Field Blk 02/25/93 ng/L	AVERAGE Thin ng/L
N,N-dimethylacetamide	5	--	--	--	178[L]	167[L]	618[L]	--	--	186[HL]	51[HL]	444[HL]	<=130.44
C11 Alkane	5	--	--	--	--	--	--	--	--	--	--	--	<=5.00
Unknown Ketone	5	--	--	--	--	--	--	--	--	37	--	--	<=8.56
Benzaldehyde	5	--	--	--	--	--	--	--	--	--	--	--	<=5.00
Apparently Trimethylbenzene	5	--	--	--	--	--	--	--	--	--	--	--	<=5.00
Octanal	5	--	--	--	--	--	--	--	--	--	--	--	<=5.00
C12 Alkane	5	--	--	--	--	--	--	--	--	--	--	--	<=5.00
Unknown	5	--	--	--	--	--	--	--	--	--	--	--	<=5.00
Unknown	5	--	--	--	--	--	--	--	--	--	--	--	<=5.00
Unknown	5	--	--	--	--	--	--	--	--	--	--	--	<=5.00
C12 or 13 Alkane	--	--	--	--	--	--	--	--	--	--	--	--	<=5.00
Unknown	5	--	--	--	--	--	--	--	--	--	--	--	<=5.00
Unknown	5	--	--	--	--	--	--	--	--	51	--	--	<=10.11
Unknown	5	--	--	--	--	40	30	--	--	--	--	--	<=11.67
Unknown	5	--	--	--	--	--	--	--	--	--	--	--	<=5.00
Tridecane	5	--	--	--	--	--	--	21[L]	--	--	--	--	<=6.78
Unknown	5	--	--	--	--	--	--	38[HL]	--	213	--	65[H]	<=31.78
Tetradecane	5	--	--	--	--	--	--	--	--	--	--	--	<=5.00
Unknown	5	--	--	--	--	--	--	--	--	84[H]	--	105[H]	<=13.78
												49[H]	<=5.00

# = Compounds are listed in retention time order
Thin = AC10 hot-mix without rubber, thin layer
Field Blk = Field blank
PQL = Practical quantitation limit

-- = Not detected at the PQL and satisfies the conditions for footnotes H and L
H = Air concentration of this compound in this sample is NOT greater than three times (3X) that day's field blank concentration or the detection limit
L = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration or 3X the average field blank concentration, whichever is greater

TABLE B-5. TENTATIVE VOLATILE ORGANIC COMPOUNDS--AC10 THIN WITH RUBBER AIR CONCENTRATIONS

Sample ID Sample Type Collection Date	PQL ng/L	TB-43 Thin Rub 04/27/93 ng/L	TB-44 Thin Rub 04/27/93 ng/L	TB-45 Thin Rub 04/27/93 ng/L	TB-50 Thin Rub 05/24/93 ng/L	TB-51 Thin Rub 05/24/93 ng/L	TB-52 Thin Rub 05/24/93 ng/L	TB-46a Field Blk 04/27/93 ng/L	TB-53 Field Blk 05/24/93 ng/L	AVERAGE Thin Rub ng/L
C5 Alkane	5	--	--	--	--	--	--	--	--	<=5.00
C6 Alkane	5	--	--	--	--	--	--	--	--	<=5.00
Cycloalkane or branched alkene	5	--	--	--	--	--	--	--	--	<=5.00
Butanal	5	--	--	--	--	--	--	--	--	<=5.00
C6 Alkane	5	--	--	--	--	--	--	--	--	<=5.00
2-Butenal	5	27[H]	17[HL]	--	24	25	--	17[HL]	--	<=17.17
2-Methylfuran	5	--	--	--	14[HL]	--	--	--	--	<=6.50
3-Buten-2-one	5	--	38[H]	--	81	52	21[L]	38[H]	--	<=33.67
Cycloalkane or branched alkene	5	--	--	--	--	--	--	--	--	<=5.00
Apparently Butanal	5	--	--	--	--	--	--	--	--	<=5.00
Cyclohexane	5	--	--	--	45	--	--	--	--	<=11.67
Unknown Chlorocarbon	5	--	--	--	--	39	--	--	--	<=10.67
Pentanal	5	--	--	--	--	--	--	--	--	<=5.00
Unknown	5	--	--	--	12[HL]	--	--	--	--	<=6.17
>C4 Aldehyde	5	23[H]	--	--	22[L]	28	14[HL]	18[HL]	--	<=16.17
C8 or 9 Alkane	5	--	--	--	--	--	--	--	--	<=5.00
Acetic Acid	5	--	--	--	--	26	12[HL]	--	--	<=9.67
Unknown	5	--	--	--	--	--	--	17[HL]	--	<=5.00
Hexanal	5	27[H]	23[HL]	--	43	27	10[HL]	23[HL]	--	<=22.50
Siloxane	5	--	--	--	--	42	--	--	--	<=11.17
Unknown	5	--	--	--	14[HL]	--	--	--	--	<=6.50
Unknown	5	27[H]	--	--	41	29	11[HL]	22[HL]	--	<=19.67

= Compounds are listed in retention time order
Thin Rub = AC10 hot-mix with rubber, thin layer
Field Blk = Field blank
PQL = Practical quantitation limit

-- = Not detected at the PQL and satisfies the conditions for footnotes H and L
H = Air concentration of this compound in this sample is NOT greater than three times (3X) that day's field blank concentration or the detection limit
L = Air concentration of this compound in this sample is NOT greater than three times (3X) the average hut blank air concentration or 3X the average field blank concentration, whichever is greater

(continued)

TABLE B-5. TENTATIVE VOLATILE ORGANIC COMPOUNDS--AC10 THIN WITH RUBBER AIR CONCENTRATIONS (concluded)

Sample ID Sample Type Collection Date	PQL ng/L	TB-43 Thin Rub 04/27/93 ng/L	TB-44 Thin Rub 04/27/93 ng/L	TB-45 Thin Rub 04/27/93 ng/L	TB-50 Thin Rub 05/24/93 ng/L	TB-51 Thin Rub 05/24/93 ng/L	TB-52 Thin Rub 05/24/93 ng/L	TB-46a Field Blk 04/27/93 ng/L	TB-53 Field Blk 05/24/93 ng/L	AVERAGE Thin Rub ng/L
N,N-dimethylacetamide	5	391[HL]	796[HL]	444[HL]	1021[L]	741[L]	1040[L]	303[HL]	..	<=738.83
C11 Alkane	5	..	..	..	..	..	..	..	..	<=5.00
Unknown Ketone	5	..	..	..	28	23	7[HL]	14[HL]	..	<=12.17
Benzaldehyde	5	..	..	..	30	..	..	..	..	<=9.17
Apparently Trimethylbenzene	5	..	..	..	..	..	..	..	..	<=5.00
Octanal	5	38[H]	13[HL]	..	51	33	16[L]	20[HL]	..	<=26.00
C12 Alkane	5	..	..	..	..	..	9[HL]	..	..	<=5.67
Unknown	5	..	..	..	13[HL]	..	..	..	..	<=6.33
Unknown	5	..	..	..	18[HL]	37[HL]	20[HL]	..	19[HL]	<=15.00
C12 or 13 Alkane	5	40[HL]	29[HL]	..	50[L]	48[L]	37[L]	24[HL]	..	<=34.83
Unknown	5	..	..	..	..	..	..	..	..	<=5.00
Unknown	5	..	..	..	..	..	..	..	..	<=5.00
Unknown	5	..	..	..	..	..	..	..	..	<=5.00
Unknown	5	27	..	..	20	30	20	..	..	<=17.83
Unknown	5	32[H]	..	..	..	29	12[HL]	18[HL]	..	<=14.67
Tridecane	5	27[L]	..	..	..	79	8[HL]	..	..	<=21.50
Unknown	5	..	..	..	..	70	8[HL]	..	..	<=16.33
Tetradecane	5	..	..	..	..	59[L]	34[L]	..	..	<=18.83
Unknown	5	..	..	..	..	..	..	..	..	<=5.00

= Compounds are listed in retention time order
Thin Rub = AC10 hot-mix with rubber, thin layer
Field Blk = Field blank
PQL = Practical quantitation limit

.. = Not detected at the PQL and satisfies the conditions for footnotes H and L
H = Air concentration of this compound in this sample is NOT greater than three times (3X) that day's field blank concentration or the detection limit
L = Air concentration of this compound in this sample is NOT greater than three times (3X) the average hut blank air concentration or 3X the average field blank concentration, whichever is greater

TABLE B-6. TENTATIVE VOLATILE ORGANIC COMPOUNDS--FACILITY BLANK AIR CONCENTRATIONS

Sample ID Sample Type Collection Date Compound[a]	PQL ng/L	TB-15 Facility Blk 02/11/93 ng/L	TB-16 Facility Blk 02/11/93 ng/L	TB-39 Facility Blk 04/15/93 ng/L	TB-38 Facility Blk 04/15/93 ng/L	TB-40 Facility Blk 04/15/93 ng/L	TB-48 Facility Blk 05/07/93 ng/L	TB-46b Facility Blk 05/07/93 ng/L	TB-47 Facility Blk 05/07/93 ng/L	TB-41 Field Blk 04/15/93 ng/L	AVERAGE Facility Blk ng/L
C5 Alkane	5	--	--	--	55	--	--	--	--	--	<=11.25
C6 Alkane	5	61	--	--	--	--	--	--	--	--	<=12.00
Cycloalkane or branched alkene	5	136	--	--	--	--	--	--	--	--	<=21.38
Butanal	5	--	--	--	--	--	--	--	--	--	<=5.00
C6 Alkane	5	--	--	--	--	--	--	--	--	--	<=5.00
2-Butenal	5	--	--	--	--	--	--	--	--	--	<=5.00
2-Methylfuran	5	--	--	--	--	--	--	--	--	--	<=5.00
3-Buten-2-one	5	--	--	--	--	--	--	--	--	--	<=5.00
Cycloalkane or branched alkene	5	--	--	--	--	--	--	--	--	--	<=5.00
Apparently Butanal	5	--	--	--	--	--	--	--	--	--	<=5.00
Cyclohexane	5	--	--	--	--	--	--	--	--	--	<=5.00
Unknown Chlorocarbon	5	--	--	--	--	--	--	--	--	--	<=5.00
Pentanal	5	--	--	--	--	--	--	--	--	--	<=5.00
Unknown	5	--	--	--	--	--	--	--	--	--	<=5.00
>C4 Aldehyde	5	--	--	--	--	--	--	--	--	--	<=5.00
C8 or 9 Alkane	5	--	--	--	--	--	--	--	--	--	<=5.00
Acetic Acid	5	--	--	--	43	--	--	--	--	--	<=9.75
Unknown	5	--	--	--	--	--	--	--	--	--	<=5.00
Hexanal	5	--	--	--	--	--	--	--	--	--	<=5.00
Siloxane	5	--	--	--	--	--	--	--	--	--	<=5.00
Unknown	5	--	--	--	--	--	--	--	--	--	<=5.00
Unknown	5	--	--	--	--	--	--	--	--	--	<=5.00

[a] = Compounds are listed in retention time order
Facility Blk = Facility blank
Field Blk = Field blank

-- = Not detected at the PQL and satisfies the conditions for footnotes H and L
PQL = Practical quantitation limit

(continued)

TABLE B-6. TENTATIVE VOLATILE ORGANIC COMPOUNDS--FACILITY BLANK AIR CONCENTRATIONS (concluded)

Sample ID Sample Type Collection Date Compound[#]	PQL ng/L	TB-15 Facility Blk 02/11/93 ng/L	TB-16 Facility Blk 02/11/93 ng/L	TB-39 Facility Blk 04/15/93 ng/L	TB-38 Facility Blk 04/15/93 ng/L	TB-40 Facility Blk 04/15/93 ng/L	TB-48 Facility Blk 05/07/93 ng/L	TB-46b Facility Blk 05/07/93 ng/L	TB-47 Facility Blk 05/07/93 ng/L	TB-41 Field Blk 04/15/93 ng/L	AVERAGE Facility Blk ng/L
N,N-dimethylacetamide	5	--	--	962[HL]	564[HL]	1217[HL]	765[L]	765[L]	823[L]	1112[HL]	<=638.25
C11 Alkane	5	--	--	--	71	--	--	--	--	--	<=13.25
Unknown Ketone	5	--	--	--	--	--	--	--	--	--	<=5.00
Benzaldehyde	5	--	--	--	--	--	--	--	--	--	<=5.00
Apparently Trimethylbenzene	5	--	--	--	23	--	--	--	--	--	<=7.25
Octanal	5	--	--	--	--	--	14[HL]	14[HL]	--	--	<=7.25
C12 Alkane	5	--	--	--	81	--	--	--	--	--	<=14.50
Unknown	5	--	--	--	--	--	--	--	--	--	<=5.00
Unknown	5	--	--	48[HL]	--	--	29[L]	26[L]	34[L]	39[HL]	<=19.63
Unknown	5	--	--	47[L]	--	37[L]	75[L]	22[L]	59[L]	--	<=31.88
C12 or 13 Alkane	5	--	--	--	30	--	--	--	--	--	<=8.13
Unknown	5	--	--	--	--	--	--	--	--	--	<=5.00
Unknown	5	--	--	--	--	--	--	--	--	--	<=5.00
Unknown	5	--	--	--	--	--	--	--	--	--	<=5.00
Unknown	5	--	--	--	--	--	--	--	--	--	<=5.00
Tridecane	5	--	--	--	--	--	--	--	--	--	<=5.00
Unknown	5	--	--	--	--	--	--	--	--	--	<=5.00
Tetradecane	5	--	--	--	--	--	--	--	--	--	<=5.00
Unknown	5	--	--	--	--	--	--	--	--	--	<=5.00

= Compounds are listed in retention time order
Facility Blk = Facility blank
Field Blk = Field blank
PQL = Practical quantitation limit

-- = Not detected at the PQL and satisfies the conditions for footnotes H and L
H = Air concentration of this compound in this sample is NOT greater than three times (3X) that day's field blank concentration or the detection limit
L = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration or 3X the average field blank concentration, whichever is greater

TABLE B-7. TENTATIVE VOLATILE ORGANIC COMPOUNDS--AC10 THIN ESTIMATED EMISSIONS

Sample ID Sample Type Collection Date Compound[#]	PQL ng/L	TB-10 Thin 02/05/93 µG/(m²•min)	TB-11 Thin 02/05/93 µG/(m²•min)	TB-12 Thin 02/05/93 µG/(m²•min)	TB-20 Thin 02/18/93 µG/(m²•min)	TB-21 Thin 02/18/93 µG/(m²•min)	TB-22 Thin 02/18/93 µG/(m²•min)	TB-25 Thin 02/25/93 µG/(m²•min)	TB-26 Thin 02/25/93 µG/(m²•min)	TB-27 Thin 02/25/93 µG/(m²•min)	AVERAGE Thin µG/(m²•min)
C5 Alkane	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
C6 Alkane	5	2025.47	1613.10	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=451.45
Cycloalkane or branched alkene	5	4475.44	2680.41	<60.64[HL]	<60.64[HL]	800.49	2195.27	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=1161.65
Butanal	5	<60.64[HL]	<60.64[HL]	351.73	<60.64[HL]	<60.64[HL]	5178.90	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=661.68
C6 Alkane	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
2-Butenal	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
2-Methylfuran	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
3-Buten-2-one	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Cycloalkane or branched alkene	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Apparently Butanal	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	242.57	<60.64[HL]	<=80.86
Cyclohexane	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Unknown Chlorocarbon	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Pentanal	5	412.37	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=99.72
Unknown	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
>C4 Aldehyde	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
C8 or 9 Alkane	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Acetic Acid	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Unknown	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Hexanal	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	278.96[L]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=84.90
Siloxane	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Unknown	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Unknown	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
N,N-dimethylacetamide	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	2158.89[L]	2025.47[L]	7495.46[L]	<60.64[HL]	<60.64[HL]	2255.91[HL]	<=1582.11

# = Compounds are listed in retention time order
Thin = AC10 hot-mix without rubber, thin layer
PQL = Practical quantitation limit

HL = Air concentration of this compound in this sample is NOT greater than three times (3X) that day's field blank concentration or the detection limit
L = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration or 3X the average field blank concentration, whichever is greater

(continued)

TABLE B-7. TENTATIVE VOLATILE ORGANIC COMPOUNDS--AC10 THIN ESTIMATED EMISSIONS (concluded)

Sample ID Sample Type Collection Date Compound[#]	PQL ng/L	TB-10 Thin 02/05/93 µG/(m²*min)	TB-11 Thin 02/05/93 µG/(m²*min)	TB-12 Thin 02/05/93 µG/(m²*min)	TB-20 Thin 02/18/93 µG/(m²*min)	TB-21 Thin 02/18/93 µG/(m²*min)	TB-22 Thin 02/18/93 µG/(m²*min)	TB-25 Thin 02/25/93 µG/(m²*min)	TB-26 Thin 02/25/93 µG/(m²*min)	TB-27 Thin 02/25/93 µG/(m²*min)	AVERAGE Thin µG/(m²*min)
C11 Alkane	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Unknown Ketone	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	448.76	<=103.77
Benzaldehyde	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Apparently Trimethylbenzene	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Octanal	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
C12 Alkane	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Unknown	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Unknown	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Unknown	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
C12 or 13 Alkane	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Unknown	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Unknown	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	618.56	<=122.63
Unknown	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	485.14	363.86	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=141.50
Unknown	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Tridecane	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	254.70[L]	<60.64[HL]	<60.64[HL]	<=82.20
Unknown	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	360.89[HL]	<60.64[HL]	2583.39	<=385.42
Tetradecane	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Unknown	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	1018.80[H]	<=167.10

# = Compounds are listed in retention time order
Thin = AC10 hot-mix without rubber, thin layer
PQL = Practical quantitation limit

H = Air concentration of this compound in this sample is NOT greater than three times (3X) that day's field blank concentration or the detection limit
L = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration or 3X the average field blank concentration, whichever is greater

TABLE B-8. TENTATIVE VOLATILE ORGANIC COMPOUNDS--AC10 THIN WITH RUBBER ESTIMATED EMISSIONS

Sample ID Sample Type Collection Date Compound#	PQL ng/L	TB-43 Thin Rub 04/27/93 µG/(m²*min)	TB-44 Thin Rub 04/27/93 µG/(m²*min)	TB-45 Thin Rub 04/27/93 µG/(m²*min)	TB-50 Thin Rub 05/24/93 µG/(m²*min)	TB-51 Thin Rub 05/24/93 µG/(m²*min)	TB-52 Thin Rub 05/24/93 µG/(m²*min)	AVERAGE Thin Rub µG/(m²*min)
C5 Alkane	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
C6 Alkane	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Cycloalkane or branched alkene	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Butanal	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
C6 Alkane	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
2-Butenal	5	327.47[H]	206.19[HL]	<60.64[HL]	291.09	303.21	<60.64[HL]	<=208.21
2-Methylfuran	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	169.80[HL]	<60.64[HL]	<60.64[HL]	<=78.84
3-Buten-2-one	5	<60.64[HL]	460.89[H]	<60.64[HL]	982.41	630.69	254.70[L]	<=408.33
Cycloalkane or branched alkene	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Apparently Butanal	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Cyclohexane	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	545.79	<60.64[HL]	<60.64[HL]	<=141.50
Unknown Chlorocarbon	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	473.01	<60.64[HL]	<=129.37
Pentanal	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Unknown	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	145.54[HL]	<60.64[HL]	<60.64[HL]	<=74.79
>C9 Aldehyde	5	278.96[H]	<60.64[HL]	<60.64[HL]	266.83[L]	339.60	169.80[HL]	<=196.08
C8 or 9 Alkane	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Acetic Acid	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	315.34	145.54[HL]	<=117.24
Unknown	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Hexanal	5	327.47[H]	278.96[HL]	<60.64[HL]	521.53	327.47	121.29[HL]	<=272.89
Siloxane	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	509.40	<60.64[HL]	<=135.44
Unknown	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	169.80[HL]	<60.64[HL]	<60.64[HL]	<=78.84
Unknown	5	327.47[H]	<60.64[HL]	<60.64[HL]	497.27	351.73	133.41[HL]	<=238.53
N,N-dimethylacetamide	5	4742.27[HL]	9654.34[HL]	5385.09[HL]	12383.27[L]	8987.27[L]	12613.72[L]	<=8960.99

= Compounds are listed in retention time order
Thin Rub = AC10 hot-mix with rubber, thin layer
PQL = Practical quantitation limit

H = Air concentration of this compound in this sample is NOT greater than three times (3X) that day's field blank concentration or the detection limit
L = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration or 3X the average field blank concentration, whichever is greater

(continued)

TABLE B-8. TENTATIVE VOLATILE ORGANIC COMPOUNDS--AC10 THIN WITH RUBBER ESTIMATED EMISSIONS (concluded)

Sample ID Sample Type Collection Date Compound#	PQL ng/L	TB-43' Thin Rub 04/27/93 µG/(m²*min)	TB-44 Thin Rub 04/27/93 µG/(m²*min)	TB-45 Thin Rub 04/27/93 µG/(m²*min)	TB-50 Thin Rub 05/24/93 µG/(m²*min)	TB-51 Thin Rub 05/24/93 µG/(m²*min)	TB-52 Thin Rub 05/24/93 µG/(m²*min)	AVERAGE Thin Rub µG/(m²*min)
C11 Alkane	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Unknown Ketone	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	339.60	278.96	84.90[HL]	<=147.56
Benzaldehyde	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	363.86	<60.64[HL]	<60.64[HL]	<=111.18
Apparently Trimethylbenzene	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Octanal	5	460.89[H]	157.67[HL]	<60.64[HL]	618.56	400.24	194.06[L]	<=315.34
C12 Alkane	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	109.16[HL]	<=68.73
Unknown	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	157.67[HL]	<60.64[HL]	<60.64[HL]	<=76.81
Unknown	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	218.31[HL]	448.76[HL]	242.57[HL]	<=181.93
C12 or 13 Alkane	5	485.14[HL]	351.73[HL]	<60.64[HL]	606.43[L]	582.17[L]	448.76[L]	<=422.48
Unknown	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Unknown	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Unknown	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Unknown	5	327.47	<60.64[HL]	<60.64[HL]	242.57	363.86	242.57	<=216.29
Unknown	5	388.11[H]	<60.64[HL]	<60.64[HL]	<60.64[HL]	351.73	145.54[HL]	<=177.89
Tridecane	5	327.47[L]	<60.64[HL]	<60.64[HL]	<60.64[HL]	958.16	97.03[HL]	<=260.76
Unknown	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	849.00	97.03[HL]	<=198.10
Tetradecane	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	715.59[L]	412.37[L]	<=228.42
Unknown	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64

= Compounds are listed in retention time order
Thin Rub = AC10 hot-mix with rubber, thin layer
PQL = Practical quantitation limit

H = Air concentration of this compound in this sample is NOT greater than three times (3X) that day's field blank concentration or the detection limit
L = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration or 3X the average field blank concentration, whichever is greater

TABLE B-9. TENTATIVE VOLATILE ORGANIC COMPOUNDS--FACILITY BLANK ESTIMATED EMISSIONS

Sample ID Sample Type Collection Date Compound*	PQL ng/L	TB-15 Facility Blk 02/11/93 µG/(m²*min)	TB-16' Facility Blk 02/11/93 µG/(m²*min)	TB-39 Facility Blk 04/15/93 µG/(m²*min)	TB-38 Facility Blk 04/15/93 µG/(m²*min)	TB-40 Facility Blk 04/15/93 µG/(m²*min)	TB-48 Facility Blk 05/07/93 µG/(m²*min)	TB-46b Facility Blk 05/07/93 µG/(m²*min)	TB-47 Facility Blk 05/07/93 µG/(m²*min)	AVERAGE Facility Blk µG/(m²*min)
C5 Alkane	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	667.07	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=136.45
C6 Alkane	5	739.84	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=145.54
Cycloalkane or branched alkene	5	1649.49	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=259.25
Butanal	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
C6 Alkane	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
2-Butenal	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
2-Methylfuran	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
3-Buten-2-one	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Cycloalkane or branched alkene	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Apparently Butanal	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Cyclohexane	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Unknown Chlorocarbon	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Pentanal	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Unknown	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
>C4 Aldehyde	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
C8 or 9 Alkane	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	521.53	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=118.25
Acetic Acid	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Unknown	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Hexanal	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Siloxane	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Unknown	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Unknown	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
N,N-dimethylacetamide	5	<60.64[HL]	<60.64[HL]	11667.69[HL]	6840.52[HL]	14760.47[HL]	9278.36[L]	9278.36[L]	9981.82[L]	<=7741.06

* = Compounds are listed in retention time order
Facility Blk = Facility blank
PQL = Practical quantitation limit

H = Air concentration of this compound in this sample is NOT greater than three times (3X) that day's field blank concentration or the detection limit
L = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration or 3X the average field blank concentration, whichever is greater

(continued)

TABLE B-9. TENTATIVE VOLATILE ORGANIC COMPOUNDS--FACILITY BLANK ESTIMATED EMISSIONS (concluded)

Sample ID Sample Type Collection Date Compound[a]	PQL ng/L	TB-15 Facility Blk 02/11/93 µG/(m²•min)	TB-16' Facility Blk 02/11/93 µG/(m²•min)	TB-39 Facility Blk 04/15/93 µG/(m²•min)	TB-38 Facility Blk 04/15/93 µG/(m²•min)	TB-40 Facility Blk 04/15/93 µG/(m²•min)	TB-48 Facility Blk 05/07/93 µG/(m²•min)	TB-46b Facility Blk 05/07/93 µG/(m²•min)	TB-47 Facility Blk 05/07/93 µG/(m²•min)	AVERAGE Facility Blk µG/(m²•min)
C11 Alkane	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	861.13	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=160.70
Unknown Ketone	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Benzaldehyde	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Apparently Trimethylbenzene	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	278.96	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=87.93
Octanal	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	169.80[HL]	169.80[HL]	<60.64[HL]	<=87.93
C12 Alkane	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	982.41	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=175.86
Unknown	5	<60.64[HL]	<60.64[HL]	582.17[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Unknown	5	<60.64[HL]	<60.64[HL]	570.04[L]	<60.64[HL]	448.76[L]	909.64[L]	266.83[L]	715.59[L]	<=386.60
C12 or 13 Alkane	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	363.86	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=98.54
Unknown	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Unknown	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Unknown	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Tridecane	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Unknown	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Tetradecane	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64
Unknown	5	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<60.64[HL]	<=60.64

[a] = Compounds are listed in retention time order
Facility Blk = Facility blank
PQL = Practical quantitation limit

H = Air concentration of this compound in this sample is NOT greater than three times (3X) that day's field blank concentration or the detection limit
L = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration or 3X the average field blank concentration, whichever is greater

TABLE B-10. ORGANIC XAD-2 TRAIN TARGETED SEMIVOLATILE MASSES

Sample Name Sample Type Date of Collection Compound[#]	MDL (µG)	XAD-3 Thick 1/28/93 (µG)	XAD-6 Thin 2/4/93 (µG)	XAD-9* Thin 2/18/93 (µG)	XAD-12 Thin 2/25/93 (µG)	XAD-40 Field Blk 2/25/93 (µG)	XAD-16 Thin Rub 4/7/93 (µG)	XAD-27 Thin Rub 4/27/93 (µG)	XAD-31 Thin Rub 5/24/93 (µG)	XAD-27D Thin Rub 4/27/93 (µG)	XAD-41 Field Blk 4/27/93 (µG)	XAD-8 Facility Blk 2/11/93 (µG)	XAD-18* Facility Blk 4/14/93 (µG)	XAD-30 Facility Blk 5/7/93 (µG)
Phenol	1.0	120.0	--	54.0	13.0	--	17.0	3.4[AB]	5.3[AB]	3.8[AB]	7.2[AB]	--	4.9[AB]	--
bis(2-Chloroethyl) Ether	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Chlorophenol	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
1,3-Dichlorobenzene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
1,4-Dichlorobenzene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichlorobenzene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylphenol	1.0	--	--	--	6.8[AB]	7.4[AB]	9.2[A]	6.0[AB]	8.7[A]	5.8[AB]	4.7[AB]	--	--	4.5[AB]
bis(2-Chloroisopropyl) Ether	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
N-Nitroso-di-n-Propylamine	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Methylphenol	1.0	--	--	--	4.3[A]	--	--	1.3[AB]	--	1.4[AB]	2.0[AB]	--	--	--
Hexachloroethane	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrobenzene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Isophorone	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Nitrophenol	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4-Dimethylphenol	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzoic Acid	1.0	--	--	--	--	--	--	7.0[A]	--	4.9[A]	39.0[AB]	--	--	--
bis(2-Chloroethoxy) Methane	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4-Dichlorophenol	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,4-Trichlorobenzene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	1.0	95.0[C]	91.0[C]	42.0[AC]	26.0[AB]	30.0[AB]	35.0[A]	10.0[AB]	29.0[AB]	9.7[AB]	6.7[AB]	4.0[ABC]	5.3[AB]	22.0[AB]
4-Chloroaniline	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Hexachlorobutadiene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--

# = Compounds are listed in retention time order
Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer
Fld Blk = Field blank
Facility Blk = Facility blank
MDL = Method detection limit

-- = Not detected at the MDL and satisfies the conditions for footnotes A and B
A = Mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages will include detection limits as appropriate)
B = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration
C = Compound present in laboratory blank; background subtraction NOT performed
* = Some visible damage to filter edge

(continued)

TABLE B-10. ORGANIC XAD-2 TRAIN TARGETED SEMIVOLATILE MASSES (continued)

Sample Name Sample Type Date of Collection Compound#	MDL (µG)	XAD-3 Thick 1/28/93 (µG)	XAD-6 Thin 2/4/93 (µG)	XAD-9* Thin 2/18/93 (µG)	XAD-12 Thin 2/25/93 (µG)	XAD-40 Field Blk 2/25/93 (µG)	XAD-16 Thin Rub 4/7/93 (µG)	XAD-27 Thin Rub 4/27/93 (µG)	XAD-31 Thin Rub 5/24/93 (µG)	XAD-27D Thin Rub 4/27/93 (µG)	XAD-41 Field Blk 4/27/93 (µG)	XAD-8 Facility Blk 2/11/93 (µG)	XAD-18* Facility Blk 4/14/93 (µG)	XAD-30 Facility Blk 5/7/93 (µG)
4-Chloro-3-Methylphenol	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	1.0	4.1^{A}	--	--	1.1^{AB}	--	9.1^{A}	--	9.2^{A}	--	11.0^{AB}	--	--	--
Hexachlorocyclopentadiene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4,6-Trichlorophenol	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4,5-Trichlorophenol	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Chloronaphthalene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Nitroaniline	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Dimethylphthalate	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Acenaphthylene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
2,6-Dinitrotoluene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
3-Nitroaniline	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Acenaphthene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4-Dinitrophenol	1.0	--	--	--	--	--	--	--	--	--	2.9^{AB}	--	--	--
4-Nitrophenol	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4-Dinitrotoluene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Dibenzofuran	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Diethylphthalate	1.0	6.0	12.0^{AB}	15.0^{AB}	11.0^{AB}	4.5^{AB}	14.0^{AB}	7.6^{AB}	13.0^{AB}	7.7^{AB}	11.0^{AB}	3.5^{AB}	7.2^{AB}	6.2^{AB}
Fluorene	1.0	--	--	--	--	--	1.5^{AB}	--	--	--	2.9^{AB}	--	--	--
4-Chlorophenyl-Phenyl Ether	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Nitroaniline	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
4,6-Dinitro-2-Methylphenol	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
N-Nitrosodiphenylamine	1.0	--	--	--	1.8^{AB}	--	6.4^{A}	--	7.7^{A}	--	10.0^{AB}	--	--	--

# = Compounds are listed in retention time order
Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer
Fld Blk = Field blank
Facility Blk = Facility blank

-- = Not detected at the MDL and satisfies the conditions for footnotes A and B
A = Mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages will include detection limits as appropriate)
B = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration
MDL = Method detection limit
* = Some visible damage to filter edge

(continued)

TABLE B-10. ORGANIC XAD-2 TRAIN TARGETED SEMIVOLATILE MASSES (concluded)

Sample Name Sample Type Date of Collection Compound*	MDL (µG)	XAD-3 Thick 1/28/93 (µG)	XAD-6 Thin 2/4/93 (µG)	XAD-9 Thin 2/18/93 (µG)	XAD-12 Thin 2/25/93 (µG)	XAD-40 Field Blk 2/25/93 (µG)	XAD-16 Thin Rub 4/7/93 (µG)	XAD-27 Thin Rub 4/27/93 (µG)	XAD-31 Thin Rub 5/24/93 (µG)	XAD-27D Thin Rub 4/27/93 (µG)	XAD-41 Field Blk 4/27/93 (µG)	XAD-8 Facility Blk 2/11/93 (µG)	XAD-18* Facility Blk 4/14/93 (µG)	XAD-30 Facility Blk 5/7/93 (µG)
4-Bromophenyl-Phenyl Ether	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Hexachlorobenzene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Pentachlorophenol	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenanthrene	1.0	1.0^{AB}	4.4^{A}	2.2^{AB}	2.0^{AB}	--	2.4^{AB}	--	--	--	12.0^{AB}	--	--	--
Anthracene	1.0	--	--	--	--	--	--	--	--	--	2.7^{AB}	--	--	--
di-n-Butylphthalate	1.0	94.0^{AB}	100.0^{AB}	84.0^{AB}	32.0^{AB}	34.0^{AB}	48.0^{AB}	200.0^{F}	80.0^{AB}	200.0^{F}	51.0^{AB}	48.0^{AB}	16.0^{AB}	96.0^{AB}
Fluoranthene	1.0	--	--	--	--	--	--	--	--	--	3.7^{AB}	--	--	--
Pyrene	1.0	--	--	--	--	--	--	--	2.1^{AB}	--	3.9^{AB}	--	--	--
Butylbenzylphthalate	1.0	--	--	4.3	--	--	--	1.3^{AB}	5.7	1.5^{AB}	1.5^{AB}	--	--	1.4^{AB}
3,3'-Dichlorobenzidine	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Chrysene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
bis(2-Ethylhexyl)phthalate	1.0	5.8^{AB}	5.1^{AB}	8.7^{AB}	3.2^{ABC}	5.9^{ABC}	5.2^{ABC}	5.3^{AB}	9.0^{AB}	5.4^{AB}	4.3^{AB}	3.7^{AB}	4.8^{ABC}	4.3^{AB}
Di-n-Octylphthalate	1.0	--	--	--	--	--	--	--	9.4^{AB}	--	7.3^{AB}	--	--	8.5^{AB}
Benzo(b)fluoranthene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(e)pyrene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--

* = Compounds are listed in retention time order
Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer
Fld Blk = Field blank
Facility Blk = Facility blank
MDL = Method detection limit

-- = Not detected at the MDL and satisfies the conditions for footnotes A and B
A = Mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages will include detection limits as appropriate)
B = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration
C = Compound present in laboratory blank; background subtraction NOT performed
F = The mass for this compound in this sample exceeds the instrument calibration range but is within linear range
* = Some visible damage to filter edge

TABLE B-11. ORGANIC XAD-2 TRAIN TARGETED SEMIVOLATILE AIR CONCENTRATIONS

Sample Name Sample Type Date of Collection Compound[#]	MDL (µG)	XAD-3 Thick 1/28/93 µG/m³	XAD-6 Thin 2/4/93 µG/m³	XAD-9 Thin 2/18/93 µG/m³	XAD-12 Thin 2/25/93 µG/m³	AVERAGE Thin µG/m³	XAD-16 Thin Rub 4/7/93 µG/m³	XAD-27 Thin Rub 4/27/93 µG/m³	XAD-31 Thin Rub 5/24/93 µG/m³	XAD-27D Thin Rub 4/27/93 µG/m³	AVERAGE Thin Rub µG/m³	XAD-8 Facility Blk 2/11/93 µG/m³	XAD-18* Facility Blk 4/14/93 µG/m³	XAD-30 Facility Blk 5/7/93 µG/m³	AVERAGE Facility Blk µG/m³
Phenol	1.0	22.638	..	11.758	2.542	<=4.841	4.063	0.773[AB]	1.398[AB]	0.864[AB]	<=2.078	..	1.233[AB]	..	<=0.563
bis(2-Chloroethyl) Ether	1.0	..	..	..	..	<=0.212	..	..	..	..	<=0.243	..	..	..	<=0.236
2-Chlorophenol	1.0	..	..	..	..	<=0.212	..	..	..	..	<=0.243	..	..	..	<=0.236
1,3-Dichlorobenzene	1.0	..	..	..	..	<=0.212	..	..	..	..	<=0.243	..	..	..	<=0.236
1,4-Dichlorobenzene	1.0	..	..	..	..	<=0.212	..	..	..	..	<=0.243	..	..	..	<=0.236
1,2-Dichlorobenzene	1.0	..	..	..	..	<=0.212	..	..	..	..	<=0.243	..	..	..	<=0.236
2-Methylphenol	1.0	..	..	..	1.329[AB]	<=0.590	2.199[A]	1.364[AB]	2.295[A]	1.318[AB]	<=1.952	..	..	1.185[AB]	<=0.543
bis(2-Chloroisopropyl) Ether	1.0	..	..	..	..	<=0.212	..	..	..	..	<=0.243	..	..	..	<=0.236
N-Nitroso-di-n-Propylamine	1.0	..	..	..	..	<=0.212	..	..	..	..	<=0.243	..	..	..	<=0.236
4-Methylphenol	1.0	..	..	..	0.841[A]	<=0.427	..	0.295[AB]	..	0.318[AB]	<=0.266	..	..	..	<=0.236
Hexachloroethane	1.0	..	..	..	..	<=0.212	..	..	..	..	<=0.243	..	..	..	<=0.236
Nitrobenzene	1.0	..	..	..	..	<=0.212	..	..	..	..	<=0.243	..	..	..	<=0.236
Isophorone	1.0	..	..	..	..	<=0.212	..	..	..	..	<=0.243	..	..	..	<=0.236
2-Nitrophenol	1.0	..	..	..	..	<=0.212	..	..	..	..	<=0.243	..	..	..	<=0.236
2,4-Dimethylphenol	1.0	..	..	..	..	<=0.212	..	..	..	..	<=0.243	..	..	..	<=0.236
Benzoic Acid	1.0	..	..	..	..	<=0.212	..	1.591[A]	..	1.114[A]	<=0.698	..	..	..	<=0.236
bis(2-Chloroethoxy) Methane	1.0	..	..	..	..	<=0.212	..	..	..	..	<=0.243	..	..	..	<=0.236
2,4-Dichlorophenol	1.0	..	..	..	..	<=0.212	..	..	..	..	<=0.243	..	..	..	<=0.236
1,2,4-Trichlorobenzene	1.0	..	..	..	..	<=0.212	..	..	..	..	<=0.243	..	..	..	<=0.236
Naphthalene	1.0	17.921[C]	20.239[C]	9.145[AC]	5.083[AB]	<=11.489	8.364[A]	2.273[AB]	7.650[AB]	2.205[AB]	<=6.096	0.772[ABC]	1.333[AB]	5.791[AB]	<=2.632
4-Chloroaniline	1.0	..	..	..	..	<=0.212	..	..	..	..	<=0.243	..	..	..	<=0.236
Hexachlorobutadiene	1.0	..	..	..	..	<=0.212	..	..	..	..	<=0.243	..	..	..	<=0.236
4-Chloro-3-Methylphenol	1.0	..	..	..	..	<=0.212	..	..	..	..	<=0.243	..	..	..	<=0.236
2-Methylnaphthalene	1.0	0.773[A]	..	..	0.215[AB]	<=0.218	2.175[A]	..	2.427[A]	..	<=1.610	..	..	..	<=0.236

(continued)

# = Compounds are listed in retention time order
Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer
Facility Blk = Facility blank
MDL = Method detection limit

.. = Not detected at the MDL and satisfies the conditions for footnotes A and B
A = Mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages will include detection limits as appropriate)
B = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration
C = Compound present in laboratory blank; background subtraction NOT performed
* = Some visible damage to filter edge

TABLE B-11. ORGANIC XAD-2 TRAIN TARGETED SEMIVOLATILE AIR CONCENTRATIONS (continued)

Sample Name Sample Type Date of Collection Compound#	MDL (µG)	XAD-3 Thick 1/28/93 µG/m³	XAD-6 Thin 2/4/93 µG/m³	XAD-9 Thin 2/18/93 µG/m³	XAD-12 Thin 2/25/93 µG/m³	AVERAGE Thin µG/m³	XAD-16 Thin Rub 4/7/93 µG/m³	XAD-27 Thin Rub 4/27/93 µG/m³	XAD-31 Thin Rub 5/24/93 µG/m³	XAD-27D Thin Rub 4/27/93 µG/m³	AVERAGE Thin Rub µG/m³	XAD-8 Facility Blk 2/11/93 µG/m³	XAD-18* Facility Blk 4/14/93 µG/m³	XAD-30 Facility Blk 5/7/93 µG/m³	AVERAGE Facility Blk µG/m³
Hexachlorocyclopentadiene	1.0	--	--	--	--	<=0.212	--	--	--	--	<=0.243	--	--	--	<=0.236
2,4,6-Trichlorophenol	1.0	--	--	--	--	<=0.212	--	--	--	--	<=0.243	--	--	--	<=0.236
2,4,5-Trichlorophenol	1.0	--	--	--	--	<=0.212	--	--	--	--	<=0.243	--	--	--	<=0.236
2-Chloronaphthalene	1.0	--	--	--	--	<=0.212	--	--	--	--	<=0.243	--	--	--	<=0.236
2-Nitroaniline	1.0	--	--	--	--	<=0.212	--	--	--	--	<=0.243	--	--	--	<=0.236
Dimethylphthalate	1.0	--	--	--	--	<=0.212	--	--	--	--	<=0.243	--	--	--	<=0.236
Acenaphthylene	1.0	--	--	--	--	<=0.212	--	--	--	--	<=0.243	--	--	--	<=0.236
2,6-Dinitrotoluene	1.0	--	--	--	--	<=0.212	--	--	--	--	<=0.243	--	--	--	<=0.236
3-Nitroaniline	1.0	--	--	--	--	<=0.212	--	--	--	--	<=0.243	--	--	--	<=0.236
Acenaphthene	1.0	--	--	--	--	<=0.212	--	--	--	--	<=0.243	--	--	--	<=0.236
2,4-Dinitrophenol	1.0	--	--	--	--	<=0.212	--	--	--	--	<=0.243	--	--	--	<=0.236
4-Nitrophenol	1.0	--	--	--	--	<=0.212	--	--	--	--	<=0.243	--	--	--	<=0.236
2,4-Dinitrotoluene	1.0	--	--	--	--	<=0.212	--	--	--	--	<=0.243	--	--	--	<=0.236
Dibenzofuran	1.0	--	--	--	--	<=0.212	--	--	--	--	<=0.243	--	--	--	<=0.236
Diethylphthalate	1.0	12.073	2.669[AB]	3.266[AB]	2.151[AB]	<=2.695	3.346[AB]	1.727[AB]	3.429[AB]	1.750[AB]	<=2.834	0.676[AB]	1.812[AB]	1.632[AB]	<=1.373
Fluorene	1.0	--	--	--	--	<=0.212	0.358[AB]	--	--	--	<=0.283	--	--	--	<=0.236
4-Chlorophenyl-Phenyl Ether	1.0	--	--	--	--	<=0.212	--	--	--	--	<=0.243	--	--	--	<=0.236
4-Nitroaniline	1.0	--	--	--	--	<=0.212	--	--	--	--	<=0.243	--	--	--	<=0.236
4,6-Dinitro-2-Methylphenol	1.0	--	--	--	--	<=0.212	--	--	--	--	<=0.243	--	--	--	<=0.236
N-Nitrosodiphenylamine	1.0	--	--	--	0.352[AB]	<=0.261	1.529[A]	--	2.031[A]	--	<=1.263	--	--	--	<=0.236
4-Bromophenyl-Phenyl Ether	1.0	--	--	--	--	<=0.212	--	--	--	--	<=0.243	--	--	--	<=0.236
Hexachlorobenzene	1.0	--	--	--	--	<=0.212	--	--	--	--	<=0.243	--	--	--	<=0.236
Pentachlorophenol	1.0	--	--	--	--	<=0.212	--	--	--	--	<=0.243	--	--	--	<=0.236
Phenanthrene	1.0	0.189[AB]	0.979[A]	0.479[AB]	0.391[AB]	<=0.616	0.574[AB]	--	--	--	<=0.355	--	--	--	<=0.236

(continued)

# = Compounds are listed in retention time order
Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer
Facility Blk = Facility blank
MDL = Method detection limit

-- = Not detected at the MDL and satisfies the conditions for footnotes A and B
A = Mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages will include detection limits as appropriate)
B = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration
* = Some visible damage to filter edge

TABLE B-11. ORGANIC XAD-2 TRAIN TARGETED SEMIVOLATILE AIR CONCENTRATIONS (concluded)

Sample Name Sample Type Date of Collection Compound#	MDL (µG)	XAD-3 Thick 1/28/93 µG/m³	XAD-6 Thin 2/4/93 µG/m³	XAD-9 Thin 2/18/93 µG/m³	XAD-12* Thin 2/25/93 µG/m³	AVERAGE Thin µG/m³	XAD-16 Thin Rub 4/1/93 µG/m³	XAD-27 Thin Rub 4/27/93 µG/m³	XAD-31 Thin Rub 5/24/93 µG/m³	XAD-27D Thin Rub 4/27/93 µG/m³	AVERAGE Thin Rub µG/m³	XAD-8 Facility Blk 2/11/93 µG/m³	XAD-18* Facility Blk 4/14/93 µG/m³	XAD-30 Facility Blk 5/1/93 µG/m³	AVERAGE Facility Blk µG/m³
Anthracene	1.0	--	--	--	--	<=0.212	--	--	--	--	<=0.243	--	--	--	<=0.236
di-n-Butylphthalate	1.0	17.733^{AB}	22.241^{AB}	18.290^{AB}	6.256^{AB}	<=15.596	11.471^{AB}	45.455^{F}	21.104^{AB}	45.455^{F}	<=26.010	9.270^{AB}	4.027^{AB}	25.270^{AB}	<=12.855
Fluoranthene	1.0	--	--	--	--	<=0.212	--	--	--	--	<=0.243	--	--	--	<=0.236
Pyrene	1.0	--	--	--	--	<=0.212	--	--	0.554^{AB}	--	<=0.340	--	--	--	<=0.236
Butylbenzylphthalate	1.0	--	--	0.936	--	<=0.451	--	0.295^{AB}	1.504	0.341^{AB}	<=0.679	--	--	0.369^{AB}	<=0.271
3,3'-Dichlorobenzidine	1.0	--	--	--	--	<=0.212	--	--	--	--	<=0.243	--	--	--	<=0.236
Chrysene	1.0	--	--	--	--	<=0.212	--	--	--	--	<=0.243	--	--	--	<=0.236
Benzo(a)anthracene	1.0	--	--	--	--	<=0.212	--	--	--	--	<=0.243	--	--	--	<=0.236
bis(2-Ethylhexyl)phthalate	1.0	1.094^{AB}	1.134^{AB}	1.894^{AB}	0.626^{ABC}	<=1.218	1.243^{ABC}	1.205^{AB}	2.374^{AB}	1.227^{AB}	<=1.607	0.715^{AB}	1.208^{ABC}	1.132^{AB}	<=1.018
Di-n-Octylphthalate	1.0	--	--	--	--	<=0.212	--	--	2.480^{AB}	--	<=0.982	--	--	2.237^{AB}	<=0.894
Benzo(b)fluoranthene	1.0	--	--	--	--	<=0.212	--	--	--	--	<=0.243	--	--	--	<=0.236
Benzo(k)fluoranthene	1.0	--	--	--	--	<=0.212	--	--	--	--	<=0.243	--	--	--	<=0.236
Benzo(a)pyrene	1.0	--	--	--	--	<=0.212	--	--	--	--	<=0.243	--	--	--	<=0.236
Indeno(1,2,3-cd)pyrene	1.0	--	--	--	--	<=0.212	--	--	--	--	<=0.243	--	--	--	<=0.236
Dibenz(a,h)anthracene	1.0	--	--	--	--	<=0.212	--	--	--	--	<=0.243	--	--	--	<=0.236
Benzo(g,h,i)perylene	1.0	--	--	--	--	<=0.212	--	--	--	--	<=0.243	--	--	--	<=0.236
Benzo(e)pyrene	1.0	--	--	--	--	<=0.212	--	--	--	--	<=0.243	--	--	--	<=0.236

# = Compounds are listed in retention time order
Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer
Facility Blk = Facility blank
MDL = Method detection limit
* = Some visible damage to filter edge

-- = Not detected at the MDL and satisfies the conditions for footnotes A and B
A = Mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages will include detection limits as appropriate)
B = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration
C = Compound present in laboratory blank; background subtraction NOT performed
F = The mass for this compound in this sample exceeds the instrument calibration range but is within linear range

TABLE B-12. VAPOR PHASE, TENATIVELY IDENTIFED, SEMIVOLATILE COMPOUNDS - AMOUNT/SAMPLE

Sample Name Sample Type Date of Collection Compound#	XAD-3 Thick 1/28/93 µg	XAD-6 Thin 2/4/93 µg	XAD-9 Thin 2/18/93 µg	XAD-12 Thin 2/25/93 µg	XAD-40 Field Blk 2/25/93 µg	XAD-16 Thin Rub 4/1/93 µg	XAD-27 Thin Rub 4/27/93 µg	XAD-31 Thin Rub 5/24/93 µg	XAD-41 Field Blk 4/27/93 µg	XAD-8 Facility Blk 2/11/93 µg	XAD-18 Facility Blk 4/14/93 µg	XAD-30 Facility Blk 5/7/93 µg
2,4-Dimethyl-2-Pentanol								310[MN]	110			340
2,5,8,11,14-Pentaoxapentadecane												21
2-(2-Methoxyethoxy)ethanol	31[MN]											
>C15 Alkane		29[MN]		37[MN]								
>C15 Alkane		28[MN]	42[MN]	47[MN]		65[M]				14	17	
>C15 Alkylamide					60							
>C16 Hexanedioic Acid Ester				620	49	940	220[M]	520	230		77	
>C20 Alkene	50[MN]	51[MN]	57[MN]							35		
>C20 Alkene	63[MN]									23		
>C8 Acid				33[MN]							18	
>C8 Hexanedioic Acid Ester			19[MN]									
Acid Ester												
Acid Ester												
Acid Ester												
Alkene or Cycloalkane						130						
Alkene or Cycloalkane/Coelution					48							
Alkyl Cyclopropane												
Benzaldehyde								110[M]	110			
Benzothiazole						110[M]		61[M]	86			
C11 Acid Ester												35
C13-C15 Alkane												

# = Compounds are listed in retention time order
Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer
Field Blk = Field blank
Facility Blk = Facility blank
M = Mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages include minimum TIC amounts as appropriate)
N = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank concentration

(continued)

TABLE B-12. VAPOR PHASE, TENATIVELY IDENTIFED, SEMIVOLATILE COMPOUNDS - AMOUNT/SAMPLE (continued)

Sample Name Sample Type Date of Collection Compound#	XAD-3 Thick 1/28/93 µg	XAD-6 Thin 2/4/93 µg	XAD-9 Thin 2/18/93 µg	XAD-12 Thin 2/25/93 µg	XAD-40 Field Blk 2/25/93 µg	XAD-16 Thin Rub 4/7/93 µg	XAD-27 Thin Rub 4/27/93 µg	XAD-31 Thin Rub 5/24/93 µg	XAD-41 Field Blk 4/27/93 µg	XAD-8 Facility Blk 2/11/93 µg	XAD-18 Facility Blk 4/14/93 µg	XAD-30 Facility Blk 5/7/93 µg
C13-C15 Alkane												
C13-C15 Alkane												
C2 Benzene									92	10		
C8 Phthalate				50[MN]		79	160	29[MN]	29			
Diene or Alcohol												
Diethylbenzene Isomer					36							
Ethyl Ester-3-Phenyl-2-Propenoic Acid	35[MN]	100	41[MN]		32	67[MN]	27[MN]	53[MN]				
Ethyl Ester-3-Phenyl-2-Propenoic Acid	20[MN]	32[MN]	43[MN]	50[MN]	20		29[MN]					45
Hexanedioic Acid, Dioctyl Ester										43	23	26
Heptanal	200	400										
Nonanal	47[MN]	82	45[MN]							59		
Octanal		100										
Possible Alkylcyclohexane	35[MN]	77[M]				58[M]		47[M]	46			
Styrene												20
Unknown	200[MN]		340[MN]	1400	82	1500	2000	530[MN]	530	580	220	240
Unknown			86[MN]	58[MN]	63	81[MN]	53[MN]	46[MN]	43	230	34	18
Unknown				38[MN]		95[MN]	50[MN]		59	39	15	60
Unknown				49[MN]			150[MN]				210	
Unknown w/>1 Oxygens							73[M]					
Unknown w/>1 Oxygens												
Unknown/Possible Coelution												

# = Compounds are listed in retention time order.
Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer
Field Blk = Field blank
Facility Blk = Facility blank
M = Mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages include minimum TIC amounts as appropriate)
N = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank concentration

(continued)

TABLE B-12. VAPOR PHASE, TENATIVELY IDENTIFED, SEMIVOLATILE COMPOUNDS - AMOUNT/SAMPLE (concluded)

Sample Name Sample Type Date of Collection Compound[#]	XAD-3 Thick 1/28/93 µg	XAD-6 Thin 2/4/93 µg	XAD-9 Thin 2/18/93 µg	XAD-12 Thin 2/25/93 µg	XAD-40 Field Blk 2/25/93 µg	XAD-16 Thin Rub 4/7/93 µg	XAD-27 Thin Rub 4/27/93 µg	XAD-31 Thin Rub 5/24/93 µg	XAD-41 Field Blk 4/27/93 µg	XAD-8 Facility Blk 2/11/93 µg	XAD-18 Facility Blk 4/14/93 µg	XAD-30 Facility Blk 5/7/93 µg
n-Methylbenzaldehyde			31[MN]									
n-Methyl-n-Propenylbenzene	53[MN]	64[M]	43[MN]		29						22	
C14 Hexanedioic Acid Ester										21		
C8 Phthalate					30		74[MN]	53[MN]			20	44
Minimum TIC Amount Reported	20	28	18	33	20	58	27	29	29	10	15	18

# = Compounds are listed in retention time order
Thick = AC10 hot-mix without rubber, *thick layer*
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, *thin layer*
Field Blk = Field blank
Facility Blk = Facility blank
M = Mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages include minimum TIC amounts as appropriate)
N = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank concentration

TABLE B-13. VAPOR PHASE, TENATIVELY IDENTIFED, SEMIVOLATILE COMPOUNDS - AIR CONCENTRATIONS

Sample Name Sample Type Date of Collection Compound[#]	XAD-3 Thick 1/28/93 µg/m³	XAD-6 Thin 2/4/93 µg/m³	XAD-9 Thin 2/18/93 µg/m³	XAD-12 Thin 2/25/93 µg/m³	XAD-40 Field Blk 2/25/93 µg/m³	XAD-16 Thin Rub 4/7/93 µg/m³	XAD-27 Thin Rub 4/27/93 µg/m³	XAD-31 Thin Rub 5/24/93 µg/m³	XAD-41 Field Blk 4/27/93 µg/m³	XAD-8 Facility Blk 2/11/93 µg/m³	XAD-18 Facility Blk 4/4/93 µg/m³	XAD-30 Facility Blk 5/7/93 µg/m³
2,4-Dimethyl-2-Pentanol								81.79[MN]	0.00			89.51
2,5,8,11,14-Pentaoxapentadecane												5.53
2-(2-Methoxyethoxy)ethanol	5.85[MN]											
>C15 Alkane		6.45[MN]		7.23M[N]								
>C15 Alkane		6.23[MN]	9.15[MN]	9.19[MN]		15.54[M]				2.70	4.28	
>C15 Alkylamide					0.00							
>C16 Hexanedioic Acid Ester				121.23	0.00	224.66	50.01[M]	137.19	0.00		19.38	
>C20 Alkene	9.43[MN]	11.34[MN]	12.41[MN]							6.76		
>C20 Alkene	11.89[MN]									4.44		
>C8 Acid				6.45[MN]							4.53	
>C8 Hexanedioic Acid Ester			4.14[MN]									
Acid Ester												
Acid Ester												
Acid Ester												
Alkene or Cycloalkane						31.07						
Alkene or Cycloalkane/Coelution					0.00							
Alkyl Cyclopropane												
Benzaldehyde								29.02[M]	0.00			
Benzothiazole						26.29[M]		16.09[M]	0.00			
C11 Acid Ester												9.21
C13-C15 Alkane												

# = Compounds are listed in retention time order
Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer
Field Blk = Field blank
Facility Blk = Facility blank
M = Mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages include minimum TIC amounts as appropriate)
N = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank concenration

(continued)

TABLE B-13. VAPOR PHASE, TENATIVELY IDENTIFED, SEMIVOLATILE COMPOUNDS - AIR CONCENTRATIONS (continued)

Sample Name Sample Type Date of Collection Compound[#]	XAD-3 Thick 1/28/93 µg/m³	XAD-6 Thin 2/4/93 µg/m³	XAD-9 Thin 2/18/93 µg/m³	XAD-12 Thin 2/25/93 µg/m³	XAD-40 Field Blk 2/25/93 µg/m³	XAD-16 Thin Rub 4/7/93 µg/m³	XAD-27 Thin Rub 4/27/93 µg/m³	XAD-31 Thin Rub 5/24/93 µg/m³	XAD-41 Field Blk 4/27/93 µg/m³	XAD-8 Facility Blk 2/11/93 µg/m³	XAD-18 Facility Blk 4/4/93 µg/m³	XAD-30 Facility Blk 5/7/93 µg/m³
C13-C15 Alkane												
C13-C15 Alkane												
C2 Benzene				9.78[MN]		18.88	36.37	7.65[MN]	0.00	1.93		
C8 Phthalate									0.00			
Diene or Alcohol					0.00							
Diethylbenzene Isomer	6.60[MN]	22.24	8.93[MN]		0.00	16.01[MN]	6.14[MN]	13.98[MN]				11.85
Ethyl Ester-3-Phenyl-2-Propenoic Acid	3.77[MN]	7.12[MN]	9.36[MN]	9.78[MN]	0.00		6.59[MN]			8.31	5.79	6.84
Ethyl Ester-3-Phenyl-2-Propenoic Acid												
Hexanedioic Acid, Dioctyl Ester	37.73	88.97								11.40		
Heptanal	8.87[MN]	18.24	9.80[MN]									
Nonanal		22.24										
Octanal	6.60[MN]	17.13[M]	[MN]			13.86[M]		12.40[M]	0.00			
Possible Alkylcyclohexane												5.27
Styrene	37.73[MN]		74.04[MN]	273.74	0.00	358.50	454.60	139.83[MN]	0.00	112.02	55.37	63.18
Unknown			18.73[MN]	11.34[MN]	0.00	19.36[MN]	12.05[MN]	12.14[MN]	0.00	44.42	8.56	4.74
Unknown				7.43[MN]		22.71[MN]	11.37[MN]		0.00	7.53	3.78	15.80
Unknown				9.58[MN]			34.10[MN]				52.86	
Unknown							16.59[M]					
Unknown w/>1 Oxygens												
Unknown w/>1 Oxygens												

# = Compounds are listed in retention time order
Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer
Field Blk = Field blank
Facility Blk = Facility blank
M = Mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages include minimum TIC amounts as appropriate)
N = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank concentration

(continued)

TABLE B-13. VAPOR PHASE, TENATIVELY IDENTIFED, SEMIVOLATILE COMPOUNDS - AIR CONCENTRATIONS (concluded)

Sample Name Sample Type Date of Collection Compound[#]	XAD-3 Thick 1/28/93 µg/m³	XAD-6 Thin 2/4/93 µg/m³	XAD-9 Thin 2/18/93 µg/m³	XAD-12 Thin 2/25/93 µg/m³	XAD-40 Field Blk 2/25/93 µg/m³	XAD-16 Thin Rub 4/7/93 µg/m³	XAD-27 Thin Rub 4/27/93 µg/m³	XAD-31 Thin Rub 5/24/93 µg/m³	XAD-41 Field Blk 4/27/93 µg/m³	XAD-8 Facility Blk 2/11/93 µg/m³	XAD-18 Facility Blk 4/4/93 µg/m³	XAD-30 Facility Blk 5/7/93 µg/m³
Unknown/Possible Coelution												
n-Methylbenzaldehyde			6.75[MN]									
n-Methyl-n-Propenylbenzene	10.00[MN]	14.24[M]	9.36[MN]								5.54	
C14 Hexanedioic Acid Ester					0.00					4.06		
C8 Phthalate												
Minimum TIC Amount Reported	3.77	6.23	3.92	6.45	0.00	13.86	6.14	7.65	0.00	1.93	3.78	4.74

# = Compounds are listed in retention time order
Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer
Field Blk = Field blank
Facility Blk = Facility blank
M = Mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages include minimum TIC amounts as appropriate)
N = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank concentration

TABLE B-14. ORGANIC PARTICLE TRAIN TARGETED SEMIVOLATILE MASSES

Sample Name Sample Type Date of Collection Compound#	MDL (µG)	TF-4 Thick 1/28/93 (µG)	TF-5 Thin 2/4/93 (µG)	TF-10 Thin 2/18/93 (µG)	TF-11 Field Blk 2/18/93 (µG)	TF-13 Thin 2/25/93 (µG)	TF-17 Thin Rub 4/7/93 (µG)	TF-28 Thin Rub 4/27/93 (µG)	TF-32 Thin Rub 5/24/93 (µG)	TF-28 Dup Thin Rub 4/27/93 (µG)	TF-33 Field Blk 5/24/93 (µG)	TF-7 Facility Blk 2/11/93 (µG)	TF-26 Facility Blk 4/14/93 (µG)	TF-29 Facility Blk 5/7/93 (µG)
Phenol	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
bis(2-Chloroethyl) Ether	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Chlorophenol	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
1,3-Dichlorobenzene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
1,4-Dichlorobenzene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichlorobenzene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylphenol	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
bis(2-Chloroisopropyl) Ether	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
N-Nitroso-di-n-Propylamine	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Methylphenol	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Hexachloroethane	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrobenzene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Isophorone	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Nitrophenol	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4-Dimethylphenol	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzoic Acid	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
bis(2-Chloroethoxy) Methane	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4-Dichlorophenol	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,4-Trichlorobenzene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Chloroaniline	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Hexachlorobutadiene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Chloro-3-Methylphenol	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--

# = Compounds are listed in retention time order
Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer
Fld Blk = Field blank
Facility Blk = Facility blank
MDL = Method detection limit
-- = Not detected at the MDL *and* the mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages will include detection limits as appropriate) *and* the air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration

(continued)

TABLE B-14. ORGANIC PARTICLE TRAIN TARGETED SEMIVOLATILE MASSES (continued)

Sample Name Sample Type Date of Collection Compound#	MDL (µG)	TF-4 Thick 1/28/93 (µG)	TF-5 Thin 2/4/93 (µG)	TF-10 Thin 2/18/93 (µG)	TF-11 Field Blk 2/18/93 (µG)	TF-13 Thin 2/25/93 (µG)	TF-17 Thin Rub 4/7/93 (µG)	TF-28 Thin Rub 4/27/93 (µG)	TF-32 Thin Rub 5/24/93 (µG)	TF-28 Dup Thin Rub 4/27/93 (µG)	TF-33 Field Blk 5/24/93 (µG)	TF-7 Facility Blk 2/11/93 (µG)	TF-26 Facility Blk 4/14/93 (µG)	TF-29 Facility Blk 5/7/93 (µG)
2-Methylnaphthalene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Hexachlorocyclopentadiene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4,6-Trichlorophenol	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4,5-Trichlorophenol	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Chloronaphthalene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Nitroaniline	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Dimethylphthalate	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Acenaphthylene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
2,6-Dinitrotoluene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
3-Nitroaniline	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Acenaphthene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4-Dinitrophenol	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Nitrophenol	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4-Dinitrotoluene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Dibenzofuran	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Diethylphthalate	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Fluorene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Chlorophenyl-Phenyl Ether	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Nitroaniline	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
4,6-Dinitro-2-Methylphenol	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
N-Nitrosodiphenylamine	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Bromophenyl-Phenyl Ether	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Hexachlorobenzene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--

# = Compounds are listed in retention time order
Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer
Fld Blk = Field blank

Facility Blk = Facility blank
MDL = Method detection limit
-- = Not detected at the MDL *and* the mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages will include detection limits as appropriate) *and* the air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration

(continued)

TABLE B-14. ORGANIC PARTICLE TRAIN TARGETED SEMIVOLATILE MASSES (concluded)

Sample Name Sample Type Date of Collection Compound[a]	MDL (µG)	TF-4 Thick 1/28/93 (µG)	TF-5 Thin 2/4/93 (µG)	TF-10 Thin 2/18/93 (µG)	TF-11 Field Blk 2/18/93 (µG)	TF-13 Thin 2/25/93 (µG)	TF-17 Thin Rub 4/7/93 (µG)	TF-28 Thin Rub 4/27/93 (µG)	TF-32 Thin Rub 5/24/93 (µG)	TF-28 Dup Thin Rub 4/27/93 (µG)	TF-33 Field Blk 5/24/93 (µG)	TF-7 Facility Blk 2/11/93 (µG)	TF-26 Facility Blk 4/14/93 (µG)	TF-29 Facility Blk 5/7/93 (µG)
Pentachlorophenol	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenanthrene	1.0	--	3.1	--	--	1.1[AB]	1.1[AB]	2.0[AB]	--	1.8[AB]	--	--	--	--
Anthracene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
di-n-Butylphthalate	1.0	--	--	--	2.5[AB]	1.6[AB]	1.6[AB]	1.3[AB]	--	1.3[AB]	2.8[AB]	--	--	1.5[AB]
Fluoranthene	1.0	--	--	--	--	2.5[AB]	3.1	4.8	--	4.8	--	--	--	--
Pyrene	1.0	--	--	--	--	3.7	4.9	7.0	--	6.6	--	--	--	--
Butylbenzylphthalate	1.0	--	--	--	--	4.9	3.6	3.9	--	3.5	--	--	--	--
3,3'-Dichlorobenzidine	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Chrysene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	1.0	--	--	--	--	8.9	5.7	--	--	--	--	--	--	--
bis(2-Ethylhexyl)phthalate	1.0	--	--	11.0	2.2[AB]	11.0[C]	8.5[ABC]	9.4[BC]	4.1[ABC]	9.6[C]	1.8[ABC]	2.2[AB]	3.4[AB]	3.3[AB]
Di-n-Octylphthalate	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(b)fluoranthene	1.0	--	--	--	--	1.5[AB]	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	1.0	--	--	--	--	2.3[AB]	1.1[AB]	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(e)pyrene	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--

[a] = Compounds are listed in retention time order
Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer
Fld Blk = Field blank
Facility Blk = Facility blank

MDL = Method detection limit
-- = Not detected at the MDL and satisfies the conditions for footnotes A and B
A = Mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages will include detection limits as appropriate)
B = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration
C = Compound present in laboratory blank; background subtraction NOT performed

TABLE B-15. ORGANIC PARTICLE TRAIN TARGETED SEMIVOLATILE AIR CONCENTRATIONS

Sample Name Sample Type Date of Collection Compound#	MDL (µG)	TF-4 Thick 1/28/93 µG/m³	TF-5 Thin 2/4/93 µG/m³	TF-10 Thin 2/18/93 µG/m³	TF-13 Thin 2/25/93 µG/m³	AVERAGE Thin µG/m³	TF-17 Thin Rub 4/7/93 µG/m³	TF-28 Thin Rub 4/27/93 µG/m³	TF-32 Thin Rub 5/24/93 µG/m³	TF-28 Dup Thin Rub 4/27/93 µG/m³	AVERAGE Thin Rub µG/m³	TF-7 Facility Blk 2/11/93 µG/m³	TF-26 Facility Blk 4/14/93 µG/m³	TF-29 Facility Blk 5/7/93 µG/m³	AVERAGE Facility Blk µG/m³
Phenol	1.0	--	--	--	--	<=0.059	--	--	--		<=0.060	--	--	--	<=0.062
bis(2-Chloroethyl) Ether	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
2-Chlorophenol	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
1,3-Dichlorobenzene	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
1,4-Dichlorobenzene	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
1,2-Dichlorobenzene	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
2-Methylphenol	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
bis(2-Chloroisopropyl) Ether	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
N-Nitroso-di-n-Propylamine	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
4-Methylphenol	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
Hexachloroethane	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
Nitrobenzene	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
Isophorone	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
2-Nitrophenol	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
2,4-Dimethylphenol	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
Benzoic Acid	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
bis(2-Chloroethoxy) Methane	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
2,4-Dichlorophenol	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
1,2,4-Trichlorobenzene	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
Naphthalene	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
4-Chloroaniline	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
Hexachlorobutadiene	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
4-Chloro-3-Methylphenol	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062

# = Compounds are listed in retention time order
Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer
Facility Blk = Facility blank
MDL = Method detection limit
-- = Not detected at the MDL *and* the mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages will include detection limits as appropriate) *and* the air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration

(continued)

TABLE B-15. ORGANIC PARTICLE TRAIN TARGETED SEMIVOLATILE AIR CONCENTRATIONS (continued)

Sample Name Sample Type Date of Collection Compound[#]	MDL (µG)	TF-4 Thick 1/28/93 µG/m³	TF-5 Thin 2/4/93 µG/m³	TF-10 Thin 2/18/93 µG/m³	TF-13 Thin 2/25/93 µG/m³	AVERAGE Thin µG/m³	TF-17 Thin Rub 4/7/93 µG/m³	TF-28 Thin Rub 4/27/93 µG/m³	TF-32 Thin Rub 5/24/93 µG/m³	TF-28 Dup Thin Rub 4/27/93 µG/m³	AVERAGE Thin Rub µG/m³	TF-7 Facility Blk 2/11/93 µG/m³	TF-26 Facility Blk 4/14/93 µG/m³	TF-29 Facility Blk 5/7/93 µG/m³	AVERAGE Facility Blk µG/m³
2-Methylnaphthalene	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
Hexachlorocyclopentadiene	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
2,4,6-Trichlorophenol	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
2,4,5-Trichlorophenol	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
2-Chloronaphthalene	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
2-Nitroaniline	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
Dimethylphthalate	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
Acenaphthylene	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
2,6-Dinitrotoluene	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
3-Nitroaniline	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
Acenaphthene	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
2,4-Dinitrophenol	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
4-Nitrophenol	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
2,4-Dinitrotoluene	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
Dibenzofuran	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
Diethylphthalate	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
Fluorene	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
4-Chlorophenyl-Phenyl Ether	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
4-Nitroaniline	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
4,6-Dinitro-2-Methylphenol	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
N-Nitrosodiphenylamine	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
4-Bromophenyl-Phenyl Ether	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
Hexachlorobenzene	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062

# = Compounds are listed in retention time order
Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer

Facility Blk = Facility blank
MDL = Method detection limit
-- = Not detected at the MDL *and* the mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages will include detection limits as appropriate) *and* the air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration

(continued)

TABLE B-15. ORGANIC PARTICLE TRAIN TARGETED SEMIVOLATILE AIR CONCENTRATIONS (concluded)

Sample Name Sample Type Date of Collection Compound#	MDL (µG)	TF-4 Thick 1/28/93 µG/m³	TF-5 Thin 2/4/93 µG/m³	TF-10 Thin 2/18/93 µG/m³	TF-13 Thin 2/25/93 µG/m³	AVERAGE Thin µG/m³	TF-17 Thin Rub 4/7/93 µG/m³	TF-28 Thin Rub 4/27/93 µG/m³	TF-32 Thin Rub 5/24/93 µG/m³	TF-28 Dup Thin Rub 4/27/93 µG/m³	AVERAGE Thin Rub µG/m³	TF-7 Facility Blk 2/11/93 µG/m³	TF-26 Facility Blk 4/14/93 µG/m³	TF-29 Facility Blk 5/7/93 µG/m³	AVERAGE Facility Blk µG/m³
Pentachlorophenol	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
Phenanthrene	1.0	--	0.213	--	0.057[AB]	<=0.109	0.067[AB]	0.116[AB]	--	0.104[AB]	<=0.082	--	--	--	<=0.062
Anthracene	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
di-n-Butylphthalate	1.0	--	--	--	0.083[AB]	<=0.070	0.097[AB]	0.075[AB]	--	0.075[AB]	<=0.078	--	--	0.091[AB]	<=0.072
Fluoranthene	1.0	--	--	--	0.130[AB]	<=0.085	0.188	0.278	--	0.278	<=0.176	--	--	--	<=0.062
Pyrene	1.0	--	--	--	0.193	<=0.106	0.297	0.406	--	0.382	<=0.255	--	--	--	<=0.062
Butylbenzylphthalate	1.0	--	--	--	0.255	<=0.127	0.218	0.226	--	0.203	<=0.169	--	--	--	<=0.062
3,3'-Dichlorobenzidine	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
Chrysene	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
Benzo(a)anthracene	1.0	--	--	--	0.463	<=0.196	0.346	--	--	--	<=0.155	--	--	--	<=0.062
bis(2-Ethylhexyl)phthalate	1.0	--	--	0.630	0.573[C]	<=0.424	0.516[ABC]	0.545[BC]	0.255[ABC]	0.556[C]	<=0.439	0.136[AB]	0.215[AB]	0.199[AB]	<=0.184
Di-n-Octylphthalate	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
Benzo(b)fluoranthene	1.0	--	--	--	0.078[AB]	<=0.068	--	--	--	--	<=0.060	--	--	--	<=0.062
Benzo(k)fluoranthene	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
Benzo(a)pyrene	1.0	--	--	--	0.120[AB]	<=0.082	0.067[AB]	--	--	--	<=0.062	--	--	--	<=0.062
Indeno(1,2,3-cd)pyrene	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
Dibenz(a,h)anthracene	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
Benzo(g,h,i)perylene	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062
Benzo(e)pyrene	1.0	--	--	--	--	<=0.059	--	--	--	--	<=0.060	--	--	--	<=0.062

# = Compounds are listed in retention time order
Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer
Facility Blk = Facility blank
MDL = Method detection limit

-- = Not detected at the MDL and satisfies the conditions for footnotes A and B
A = Mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages will include detection limits as appropriate)
B = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration
C = Compound present in laboratory blank; background subtraction NOT performed

TABLE B-16. PARTICULATE-BOUND, TENATIVELY IDENTIFIED, SEMIVOLATILE COMPOUNDS - MASSES

Sample Name Sample Type Date of Collection Compound[#]	TF-4 Thick 1/28/93 µg	TF-5 Thin 2/4/93 µg	TF-10 Thin 2/18/93 µg	TF-11 Field Blk 2/18/93 µg	TF-17 Thin Rub 4/7/93 µg	TF-28 Thin Rub 4/27/93 µg	TF-32 Thin Rub 5/24/93 µg	TF-33 Field Blk 5/24/93 µg	TF-7 Facility Blk 2/11/93 µg	TF-26 Facility Blk 4/14/93 µg	TF-29 Facility Blk 5/7/93 µg
2,4-Dimethyl-2-Pentanol			28[MN]			78[MN]	220[MN]		30		350
2,5,8,11,14-Pentaoxapentadecane	45[MN]	23[MN]	25[MN]		37[MN]	13[MN]			64	31	39
9,10-Anthracenedione											
>C13 Acid						110					
>C13 Alkane						8[MN]					
>C13 Alkane						31[M]					
>C13 Alkane						23[MN]					
>C15 Alkane					17[MN]	43[M]	10[MN]				
>C15 Alkane							19[MN]				
>C18 Alkane							23[MN]				
>C18 Alkane							27[M]				
>C18 Alkane							25[MN]				
>C20 Acid						63					
Alkene or Cycloalkane								13			
Butylcyclohexylphthalate											
C4 Alkylcyclohexane								11			
Hexadecanoic Acid					97						
Hexanedioic Acid, Dioctyl Ester	150						28[MN]		10	8	13
Toluene			11[MN]	22							
Unknown											

# = Compounds are listed in retention time order
Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer
Field Blk = Field blank
Facility Blk = Facility blank

Note: Sample TF-13 was excluded from this data set because the data package transmitted by the contracted labratory for this sample was incomplete as regards the tenatively identified compounds.
M = Mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages include minimum TIC amounts as appropriate)
N = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank concentration

(continued)

TABLE B-16. PARTICULATE-BOUND, TENATIVELY IDENTIFIED, SEMIVOLATILE COMPOUNDS - MASSES (concluded)

Sample Name Sample Type Date of Collection Compound[#]	TF-4 Thick 1/28/93 µg	TF-5 *Thin* 2/4/93 µg	TF-10 Thin 2/18/93 µg	TF-11 Field Blk 2/18/93 µg	TF-17 Thin Rub 4/7/93 µg	TF-28 Thin Rub 4/27/93 µg	TF-32 Thin Rub 5/24/93 µg	TF-33 Field Blk 5/24/93 µg	TF-7 Facility Blk 2/11/93 µg	TF-26 Facility Blk 4/14/93 µg	TF-29 Facility Blk 5/7/93 µg
Unknown											
Unknown											
Unknown										8	
Unknown						44[M]					
Unknown/Possible Coelution						31[M]					
Unknown/Possible Coelution											
Unknown/Possible Coelution											
Unknown/Possible Coelution											*18*
Unknown/Possible Coelution							13[MN]	27			22
Minimum TIC Amount Reported	45	23	11	22	17	8	10	11	10	8	9

# = Compounds are listed in retention time order
Thick = AC10 hot-mix without rubber, *thick layer*
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer
Field Blk = Field blank
Facility Blk = Facility blank

Note: Sample TF-13 was excluded from this data set because the data package transmitted by the contracted *labratory for this sample* was incomplete as regards the tenatively identified compounds.
M = Mass of this compound in this sample is NOT greater *than three times (3X) the* average facility blank mass or the average field blank mass, whichever is greater (averages include minimum TIC amounts as appropriate)
N = Air concenuration of this compound in this sample is NOT *greater than three times (3X)* the average facility blank concenuration

TABLE B-17. PARTICULATE-BOUND, TENATIVELY IDENTIFIED, SEMIVOLATILE COMPOUNDS - AIR CONCENTRATIONS

Sample Name Sample Type Date of Collection Compound[#]	TF-4 Thick 1/28/93 µg/m³	TF-5 Thin 2/4/93 µg/m³	TF-10 Thin 2/18/93 µg/m³	TF-11 Field Blk 2/18/93 µg/m³	TF-17 Thin Rub 4/7/93 µg/m³	TF-28 Thin Rub 4/27/93 µg/m³	TF-32 Thin Rub 5/24/93 µg/m³	TF-33 Field Blk 5/24/93 µg/m³	TF-7 Facility Blk 2/11/93 µg/m³	TF-26 Facility Blk 4/14/93 µg/m³	TF-29 Facility Blk 5/7/93 µg/m³
2,4-Dimethyl-2-Pentanol			1.60[MN]			4.52[MN]	13.71[MN]		1.85		21.15
2,5,8,11,14-Pentaoxapentadecane	2.60[MN]	1.58[MN]	1.43[MN]		2.24[MN]	0.75[MN]			3.96	1.96	2.36
9,10-Anthracenedione											
>C13 Acid						6.37					
>C13 Alkane						0.46[MN]					
>C13 Alkane						1.80[M]					
>C13 Alkane						1.33[MN]					
>C15 Alkane					1.03[MN]	2.49[M]	0.62[MN]				
>C15 Alkane							1.18[MN]				
>C18 Alkane							1.43[MN]				
>C18 Alkane							1.68[M]				
>C18 Alkane							1.56[MN]				
>C20 Acid						3.65					
Alkene or Cycloalkane								0.00			
Butylcyclohexylphthalate											
C4 Alkylcyclohexane								0.00			
Hexadecanoic Acid					5.88						
Hexanedioic Acid, Dioctyl Ester	8.68						1.74[MN]		0.62	0.51	0.79
Toluene			0.63[MN]	0.00							
Unknown											

# = Compounds are listed in retention time order
Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer
Field Blk = Field blank
Facility Blk = Facility blank

Note: Sample TF-13 was excluded from this data set because the data package transmitted by the contracted labratory for this sample was incomplete as regards the tenatively identified compounds.
M = Mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages include minimum TIC amounts as appropriate)
N = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank concentration

(continued)

TABLE B-17. PARTICULATE-BOUND, TENATIVELY IDENTIFIED, SEMIVOLATILE COMPOUNDS - AIR CONCENTRATIONS (concluded)

Sample Name Sample Type Date of Collection Compound[#]	TF-4 Thick 1/28/93 µg/m³	TF-5 Thin 2/3/93 µg/m³	TF-10 Thin 2/18/93 µg/m³	TF-11 Field Blk 2/18/93 µg/m³	TF-17 Thin Rub 4/7/93 µg/m³	TF-28 Thin Rub 4/27/93 µg/m³	TF-32 Thin Rub 5/24/93 µg/m³	TF-33 Field Blk 5/24/93 µg/m³	TF-7 Facility Blk 2/11/93 µg/m³	TF-26 Facility Blk 4/14/93 µg/m³	TF-29 Facility Blk 5/7/93 µg/m³
Unknown											
Unknown											
Unknown										0.51	
Unknown						2.55[M]					
Unknown/Possible Coelution						1.80[M]					
Unknown/Possible Coelution											
Unknown/Possible Coelution											
Unknown/Possible Coelution											1.09
Unknown/Possible Coelution							0.81[MN]	0.00			1.33
Minimum TIC Amount Reported	2.60	1.58 0	0.63 0	0.00	1.03	0.46	0.62	0.00	0.62	0.51	0.54

# = Compounds are listed in retention time order
Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer
Field Blk = Field blank
Facility Blk = Facility blank

Note: *Sample TF-13* was excluded from this data set because the data package transmitted by the contracted labratory for this sample was incomplete as regards the tenatively identified compounds.
M = Mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages include minimum TIC amounts as appropriate)
N = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank concentration

TABLE B-18. TARGETED ORGANIC PARTICULATE TRAIN SEMIVOLATILE MASSES--ACUREX ENVIRONMENTAL ANALYSES

Sample Name Sample Type Date of Collection Compounds#	PQL (µG)	TF-4 Thick 1/28/93 (µG)	TF-5 Thin 2/4/93 (µG)	TF-10 Thin 2/18/93 (µG)	TF-11 Field Blk 2/18/93 (µG)	TF-13 Thin 2/25/93 (µG)	TF-17 Thin Rub 4/7/93 (µG)	TF-28 Thin Rub 4/27/93 (µG)	TF-32 Thin Rub 5/23/93 (µG)	TF-33 Field Blk 5/24/93 (µG)	TF-7 Facility Blk 2/11/93 (µG)	TF-26 Facility Blk 4/14/93 (µG)	TF-29 Facility Blk 5/7/93 (µG)
Naphthalene	0.05	0.20	0.11[AB]	0.22	--	0.10[AB]	0.13[AB]	0.07[AB]	0.06[AB]	0.05[AB]	--	--	0.03[AB]
Acenaphthylene	0.05	--	--	--	--	--	0.05[AB]	0.03[AB]	--	--	--	--	--
Acenaphthene	0.05	--	--	--	--	--	0.03[AB]	0.02[AB]	--	--	--	--	--
Fluorene	0.05	--	0.05[AB]	--	--	--	--	0.04[AB]	--	--	--	--	--
Phenanthrene	0.05	0.97	2.93	0.80	--	0.65	0.63	1.34	0.11[AB]	0.01[AB]	--	--	0.02[AB]
Anthracene	0.05	0.09[AB]	0.36	0.12[A]	--	0.12[AB]	0.07[AB]	0.27	0.02[AB]	--	--	--	0.01[AB]
Fluoranthene	0.05	0.98	3.70	1.48	--	1.32	1.76	2.82	0.34	0.01[AB]	0.06[AB]	0.11[AB]	0.06[AB]
Pyrene	0.05	0.65	3.26	1.31	--	1.24	2.45	3.78	0.50	0.01[AB]	0.04[AB]	0.09[AB]	0.06[AB]
Benzo(a)anthracene	0.05	0.07[AB]	1.75	--	--	1.37	0.97	1.44	0.31	--	--	--	--
Chrysene	0.05	0.08[AB]	7.99	5.09	--	4.86	3.12	4.10	0.92	0.15[AB]	--	--	0.07[AB]
Benzo(b)fluoranthene	0.05	--	--	--	--	--	--	1.42	--	--	--	--	0.09[AB]
Benzo(k)fluoranthene	0.05	0.09[AB]	1.77	1.32	--	1.47	0.80	--	0.39	--	--	--	0.05[AB]
Benzo(a)pyrene	0.05	0.08[AB]	0.75	1.44	--	0.56	0.30	0.46	0.09[AB]	--	--	--	0.05[AB]
Indeno(1,2,3-c,d)pyrene	0.05	0.02[AB]	0.25	0.12[AB]	--	0.21	0.08[AB]	0.15[AB]	0.04[AB]	0.01[AB]	--	--	0.06[AB]
Dibenzo(a,h)anthracene	0.05	0.02[AB]	0.32	0.10[AB]	--	0.17[AB]	0.08[AB]	0.11[AB]	0.04[AB]	0.02[AB]	--	--	0.07[AB]
Benzo(g,h,i)perylene	0.05	0.03[AB]	0.36	0.16[AB]	--	0.18[B]	0.12[AB]	0.21	0.07[AB]	0.02[AB]	--	--	0.07[AB]

# = Compounds are listed in retention time order
Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer
Fld Blk = Field blank
Facility Blk = Facility blank

PQL = Practical quantitation limit
-- = Not detected at the MDL and satisfies the conditions for footnotes A and B
A = Mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages will include detection limits as appropriate)
B = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration

TABLE B-19. ORGANIC PARTICULATE TRAIN SEMIVOLATILE AIR CONCENTRATIONS--ACUREX ENVIRONMENTAL ANALYSES

Sample Name Sample Type Date of Collection Compounds[#]	PQL (µG)	TF-4 Thick 1/28/93 µG/m³	TF-5 Thin 2/4/93 µG/m³	TF-10 Thin 2/18/93 µG/m³	TF-13 Thin 2/25/93 µG/m³	AVERAGE Thin µG/m³	TF-17 Thin Rub 4/1/93 µG/m³	TF-28 Thin Rub 4/27/93 µG/m³	TF-32 Thin Rub 5/24/93 µG/m³	AVERAGE Thin Rub µG/m³	TF-7 Facility Blk 2/11/93 µG/m³	TF-26 Facility Blk 4/14/93 µG/m³	TF-29 Facility Blk 5/7/93 µG/m³	AVERAGE Facility Blk µG/m³
Naphthalene	0.05	0.012	0.008[AB]	0.013	0.005[AB]	<=0.008	0.008[AB]	0.004[AB]	0.004[AB]	<=0.005	--	--	0.002[AB]	<=0.003
Acenaphthylene	0.05	--	--	--	--	<=0.003	0.003[AB]	0.002[AB]	--	<=0.003	--	--	--	<=0.003
Acenaphthene	0.05	--	--	--	--	<=0.003	0.002[AB]	0.001[AB]	--	<=0.002	--	--	--	<=0.003
Fluorene	0.05	--	0.003[AB]	--	--	<=0.003	--	0.002[AB]	--	<=0.003	--	--	--	<=0.003
Phenanthrene	0.05	0.056	0.201	0.046	0.034	<=0.094	0.038	0.078	0.007[AB]	<=0.041	--	--	0.001[AB]	<=0.002
Anthracene	0.05	0.005[AB]	0.025	0.003[A]	0.006[AB]	<=0.013	0.004[AB]	0.016	0.001[AB]	<=0.007	--	--	0.001[AB]	<=0.002
Fluoranthene	0.05	0.057	0.254	0.085	0.069	<=0.136	0.107	0.163	0.021	<=0.097	0.003[AB]	0.007[AB]	0.004[AB]	<=0.005
Pyrene	0.05	0.038	0.224	0.075	0.065	<=0.121	0.149	0.219	0.031	<=0.133	0.002[AB]	0.006[AB]	0.004[AB]	<=0.004
Benzo(a)anthracene	0.05	0.004[AB]	0.120	--	0.071	<=0.065	0.059	0.083	0.019	<=0.054	--	--	--	<=0.003
Chrysene	0.05	0.005[AB]	0.549	0.292	0.253	<=0.364	0.189	0.238	0.057	<=0.161	--	--	0.004[AB]	<=0.003
Benzo(b)fluoranthene	0.05	--	--	--	--	<=0.003	--	0.082	--	<=0.029	--	--	0.005[AB]	<=0.004
Benzo(k)fluoranthene	0.05	0.005[AB]	0.122	0.076	0.077	<=0.091	0.049	--	0.024	<=0.025	--	--	0.003[AB]	<=0.003
Benzo(a)pyrene	0.05	0.005[AB]	0.051	0.082	0.029	<=0.054	0.018	0.027	0.006[AB]	<=0.017	--	--	0.003[AB]	<=0.003
Indeno(1,2,3-c,d)pyrene	0.05	0.001[AB]	0.017	0.007[AB]	0.011	<=0.012	0.005[AB]	0.009[AB]	0.002[AB]	<=0.005	--	--	0.004[AB]	<=0.003
Dibenzo(a,h)anthracene	0.05	0.001[AB]	0.022	0.006[AB]	0.009[AB]	<=0.012	0.005[AB]	0.006[AB]	0.002[AB]	<=0.005	--	--	0.004[AB]	<=0.003
Benzo(g,h,i)perylene	0.05	0.002[AB]	0.025	0.009[AB]	0.009[B]	<=0.014	0.007[AB]	0.012	0.004[AB]	<=0.008	--	--	0.004[AB]	<=0.003

(continued)

# = Compounds are listed in retention time order
Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer
Facility Blk = Facility blank

PQL = Practical quantitation limit
-- = Not detected at the MDL and satisfies the conditions for footnotes A and B
A = Mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages will include detection limits as appropriate)
B = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration

TABLE B-19. ORGANIC PARTICULATE TRAIN SEMIVOLATILE AIR CONCENTRATIONS--ACUREX ENVIRONMENTAL ANALYSES (concluded)

Sample Name Sample Type Date of Collection Compounds[#]	PQL (µG)	TF-4 Thick 1/28/93 µG/m³	TF-5 Thin 2/4/93 µG/m³	TF-10 Thin 2/18/93 µG/m³	TF-13 Thin 2/25/93 µG/m³	AVERAGE Thin µG/m³	TF-17 Thin Rub 4/1/93 µG/m³	TF-28 Thin Rub 4/27/93 µG/m³	TF-32 Thin Rub 5/24/93 µG/m³	AVERAGE Thin Rub µG/m³	TF-7 Facility Blk 2/11/93 µG/m³	TF-26 Facility Blk 4/14/93 µG/m³	TF-29 Facility Blk 5/7/93 µG/m³	AVERAGE Facility Blk µG/m³
Naphthalene	0.05	0.012	0.008[AB]	0.013	0.005[AB]	<=0.008	0.008[AB]	0.004[AB]	0.004[AB]	<=0.005	--	--	0.002[AB]	<=0.003
Acenaphthylene	0.05	--	--	--	--	<=0.003	0.003[AB]	0.002[AB]	--	<=0.003	--	--	--	<=0.003
Acenaphthene	0.05	--	--	--	--	<=0.003	0.002[AB]	0.001[AB]	--	<=0.002	--	--	--	<=0.003
Fluorene	0.05	--	0.003[AB]	--	--	<=0.003	--	0.002[AB]	--	<=0.003	--	--	--	<=0.003
Phenanthrene	0.05	0.056	0.201	0.046	0.034	<=0.094	0.038	0.078	0.007[AB]	<=0.041	--	--	0.001[AB]	<=0.002
Anthracene	0.05	0.005[AB]	0.025	0.007[A]	0.006[AB]	<=0.013	0.004[AB]	0.016	0.001[AB]	<=0.007	--	--	0.001[AB]	<=0.002
Fluoranthene	0.05	0.057	0.254	0.085	0.069	<=0.136	0.107	0.163	0.021	<=0.097	0.004[AB]	0.007[AB]	0.004[AB]	<=0.005
Pyrene	0.05	0.038	0.224	0.075	0.065	<=0.121	0.149	0.219	0.031	<=0.133	0.002[AB]	0.006[AB]	0.004[AB]	<=0.004
Benzo(a)anthracene	0.05	0.004[AB]	0.120	--	0.071	<=0.065	0.059	0.083	0.019	<=0.054	--	--	--	<=0.003
Chrysene	0.05	0.005[AB]	0.549	0.292	0.253	<=0.364	0.189	0.238	0.057	<=0.161	--	--	0.004[AB]	<=0.003
Benzo(b)fluoranthene	0.05	--	--	--	--	<=0.003	--	0.082	--	<=0.029	--	--	0.005[AB]	<=0.004
Benzo(k)fluoranthene	0.05	0.005[AB]	0.122	0.076	0.077	<=0.091	0.049	--	0.024	<=0.025	--	--	0.003[AB]	<=0.003
Benzo(a)pyrene	0.05	0.005[AB]	0.051	0.082	0.029	<=0.054	0.018	0.027	0.006[AB]	<=0.017	--	--	0.003[AB]	<=0.003
Indeno(1,2,3-c,d)pyrene	0.05	0.001[AB]	0.017	0.007[AB]	0.011	<=0.012	0.005[AB]	0.009[AB]	0.002[AB]	<=0.005	--	--	0.004[AB]	<=0.003
Dibenzo(a,h)anthracene	0.05	0.001[AB]	0.022	0.006[AB]	0.009[AB]	<=0.012	0.005[AB]	0.006[AB]	0.002[AB]	<=0.005	--	--	0.004[AB]	<=0.003
Benzo(g,h,i)perylene	0.05	0.002[AB]	0.025	0.009[AB]	0.009[B]	<=0.014	0.007[AB]	0.012	0.004[AB]	<=0.008	--	--	0.004[AB]	<=0.003

# = Compounds are listed in retention time order
Thick = AC10 hot-mix without rubber, thick layer
Thin = AC10 hot-mix without rubber, thin layer
Thin Rub = AC10 hot-mix with rubber, thin layer
Facility Blk = Facility blank

PQL = Practical quantitation limit
-- = Not detected at the MDL and satisfies the conditions for footnotes A and B
A = Mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages will include detection limits as appropriate)
B = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration

TABLE B-20. SEMIVOLATILE BLANK MASSES

Sample Name: Sample Type: Date of Collection: Compound[#]	MDL (µG)	Lab Blank Lab Blk NA (µG)	Lab Blank Lab Blk NA (µG)	Lab Blank Lab Blk NA (µG)	SVBLK610 Ext Blk NA (µG)	SVBLK610 Dup Ext Blk NA (µG)	SVBLK611 Ext Blk NA (µG)
Phenol	1.0	--	--	--	--	--	--
bis(2-Chloroethyl) Ether	1.0	--	--	--	--	--	--
2-Chlorophenol	1.0	--	--	--	--	--	--
1,3-Dichlorobenzene	1.0	--	--	--	--	--	--
1,4-Dichlorobenzene	1.0	--	--	--	--	--	--
1,2-Dichlorobenzene	1.0	--	--	--	--	--	--
2-Methylphenol	1.0	--	--	--	--	--	--
bis(2-Chloroisopropyl) Ether	1.0	--	--	--	--	--	--
N-Nitroso-di-n-Propylamine	1.0	--	--	--	--	--	--
4-Methylphenol	1.0	--	--	--	--	--	--
Hexachloroethane	1.0	--	--	--	--	--	--
Nitrobenzene	1.0	--	--	--	--	--	--
Isophorone	1.0	--	--	--	--	--	--
2-Nitrophenol	1.0	--	--	--	--	--	--
2,4-Dimethylphenol	1.0	--	--	--	--	--	--
Benzoic Acid	1.0	--	--	--	--	--	--
bis(2-Chloroethoxy) Methane	1.0	--	--	--	--	--	--
2,4-Dichlorophenol	1.0	--	--	--	--	--	--
1,2,4-Trichlorobenzene	1.0	--	--	--	--	--	--
Naphthalene	1.0	66.0[AB]	--	--	--	--	--
4-Chloroaniline	1.0	--	--	--	--	--	--
Hexachlorobutadiene	1.0	--	--	--	--	--	--

= Compounds are listed in retention time order
Lab Blk = Laboratory blank
Ext Blk = Extrusion blank
MDL = Method detection limit
-- = Not detected at the MDL and satisfies the conditions for footnotes A and B

A = Mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages will include detection limits as appropriate)
B = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration

(continued)

TABLE B-20. SEMIVOLATILE BLANK MASSES (continued)

Sample Name: Sample Type: Date of Collection: Compound#	MDL (µG)	Lab Blank Lab Blk NA (µG)	Lab Blank Lab Blk NA (µG)	Lab Blank Lab Blk NA (µG)	SVBLK610 Ext Blk NA (µG)	SVBLK610 Dup Ext Blk NA (µG)	SVBLK611 Ext Blk NA (µG)
4-Chloro-3-Methylphenol	1.0	--	--	--	--	--	--
2-Methylnaphthalene	1.0	--	--	--	--	--	--
Hexachlorocyclopentadiene	1.0	--	--	--	--	--	--
2,4,6-Trichlorophenol	1.0	--	--	--	--	--	--
2,4,5-Trichlorophenol	1.0	--	--	--	--	--	--
2-Chloronaphthalene	1.0	--	--	--	--	--	--
2-Nitroaniline	1.0	--	--	--	--	--	--
Dimethylphthalate	1.0	--	--	--	--	--	--
Acenaphthylene	1.0	--	--	--	--	--	--
2,6-Dinitrotoluene	1.0	--	--	--	--	--	--
3-Nitroaniline	1.0	--	--	--	--	--	--
Acenaphthene	1.0	--	--	--	--	--	--
2,4-Dinitrophenol	1.0	--	--	--	--	--	--
4-Nitrophenol	1.0	--	--	--	--	--	--
2,4-Dinitrotoluene	1.0	--	--	--	--	--	--
Dibenzofuran	1.0	--	--	--	--	--	--
Diethylphthalate	1.0	--	--	--	--	--	--
Fluorene	1.0	--	--	--	--	--	--
4-Chlorophenyl-Phenyl Ether	1.0	--	--	--	--	--	--
4-Nitroaniline	1.0	--	--	--	--	--	--
4,6-Dinitro-2-Methylphenol	1.0	--	--	--	--	--	--
N-Nitrosodiphenylamine	1.0	--	--	--	--	--	--
4-Bromophenyl-Phenyl Ether	1.0	--	--	--	--	--	--
Hexachlorobenzene	1.0	--	--	--	--	--	--

(continued)

= Compounds are listed in retention time order
Lab Blk = Laboratory blank
Ext Blk = Extrusion blank
MDL = Method detection limit

-- = Not detected at the MDL *and* the mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages will include detection limits as appropriate) *and* the air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration

TABLE B-20. SEMIVOLATILE BLANK MASSES (concluded)

Sample Name: Sample Type: Date of Collection: Compound[#]	MDL (µG)	Lab Blank Lab Blk NA (µG)	Lab Blank Lab Blk NA (µG)	Lab Blank Lab Blk NA (µG)	SVBLK610 Ext Blk NA (µG)	SVBLK61C Dup Ext Blk NA (µG)	SVBLK611 Ext Blk NA (µG)
Pentachlorophenol	1.0	..	..	..	..	..	..
Phenanthrene	1.0	..	..	..	..	..	..
Anthracene	1.0	..	..	..	..	..	..
di-n-Butylphthalate	1.0	..	..	..	..	..	..
Fluoranthene	1.0	..	..	..	..	..	..
Pyrene	1.0	..	..	..	..	..	..
Butylbenzylphthalate	1.0	19.0[B]	..	..	..	..	..
3,3'-Dichlorobenzidine	1.0	..	..	..	..	..	..
Chrysene	1.0	..	..	..	..	..	..
Benzo(a)anthracene	1.0	..	..	..	..	..	..
bis(2-Ethylhexyl)phthalate	1.0	..	1.7[AB]	..	..	..	1.0[AB]
Di-n-Octylphthalate	1.0	..	..	..	..	..	..
Benzo(b)fluoranthene	1.0	..	..	..	..	..	..
Benzo(k)fluoranthene	1.0	..	..	..	..	..	..
Benzo(a)pyrene	1.0	..	..	..	..	..	..
Indeno(1,2,3-cd)pyrene	1.0	..	..	..	..	..	..
Dibenz(a,h)anthracene	1.0	..	..	..	..	..	..
Benzo(g,h,i)perylene	1.0	..	..	..	..	..	..
Benzo(e)pyrene	1.0	..	..	..	..	1.0[AB]	..

= Compounds are listed in retention time order
Lab Blk = Laboratory blank
Ext Blk = Extrusion blank
MDL = Method detection limit
.. = Not detected at the MDL and satisfies the conditions for footnotes A and B

A = Mass of this compound in this sample is NOT greater than three times (3X) the average facility blank mass or the average field blank mass, whichever is greater (averages will include detection limits as appropriate)
B = Air concentration of this compound in this sample is NOT greater than three times (3X) the average facility blank air concentration

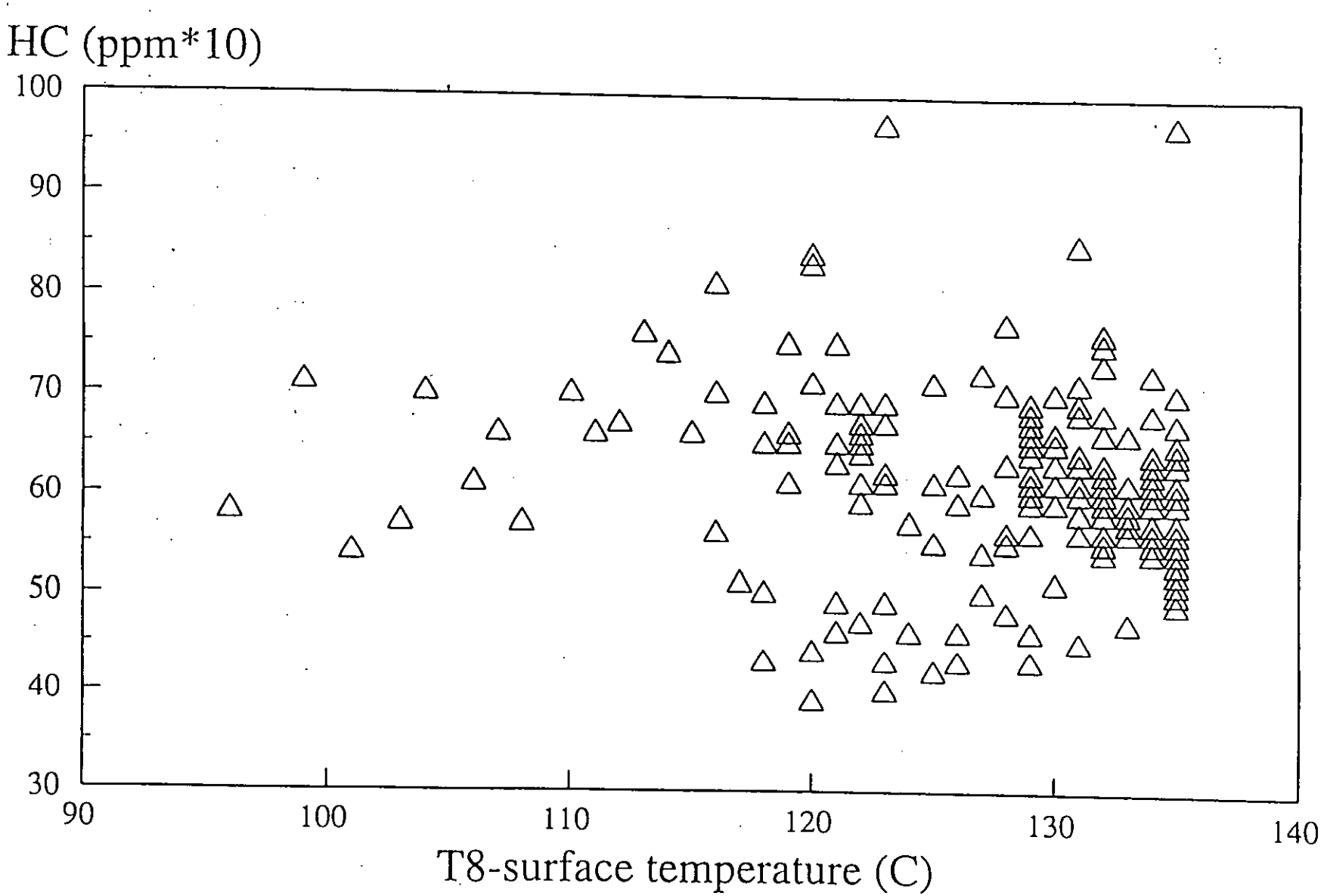


Figure B-1. 1/28/93 - AC10 Asphalt Test, total hydrocarbon concentration vs. surface temperature.

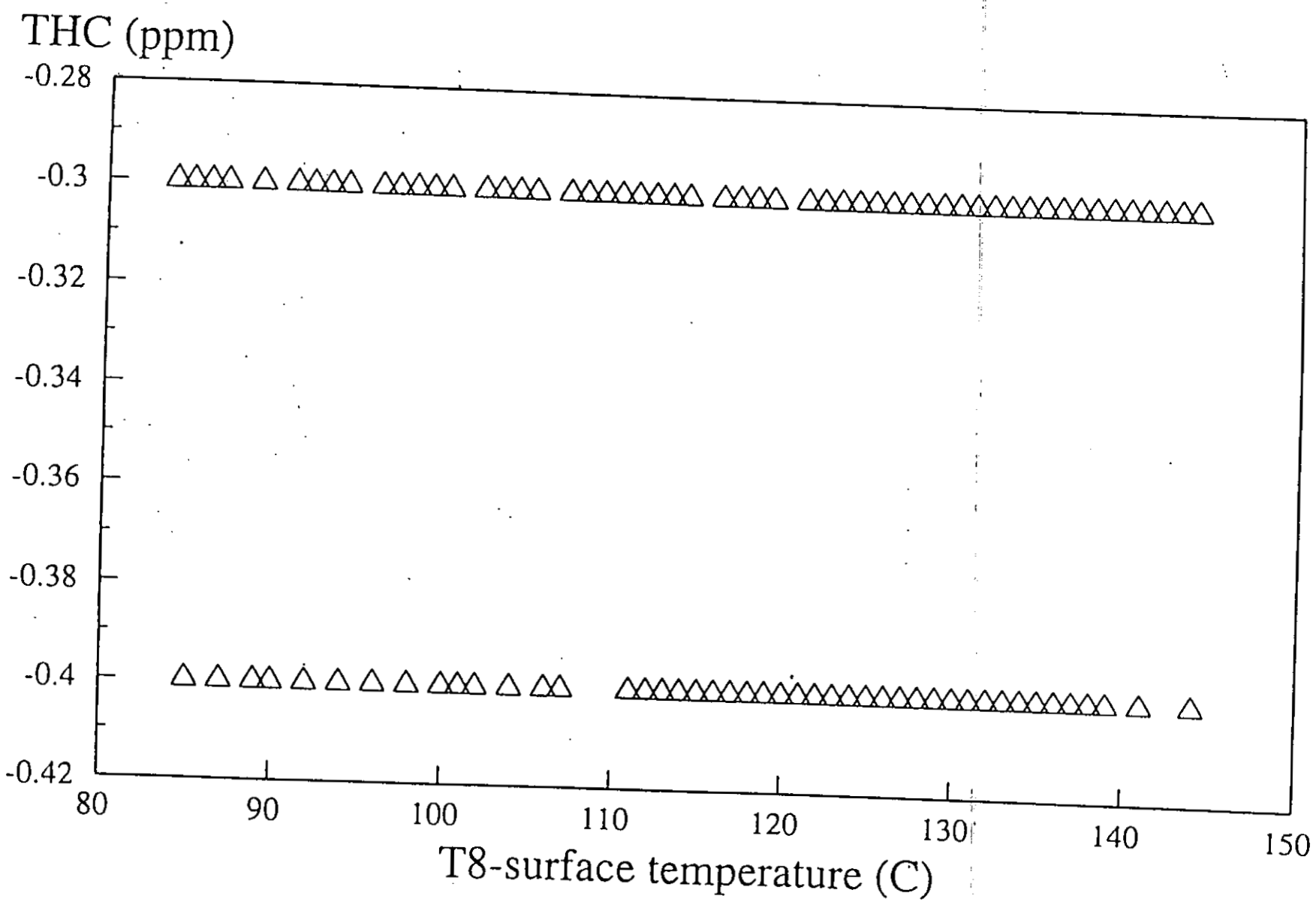


Figure B-2. 2/4/93 AC10 Test, total hydrocarbon concentration vs. surface temperature.

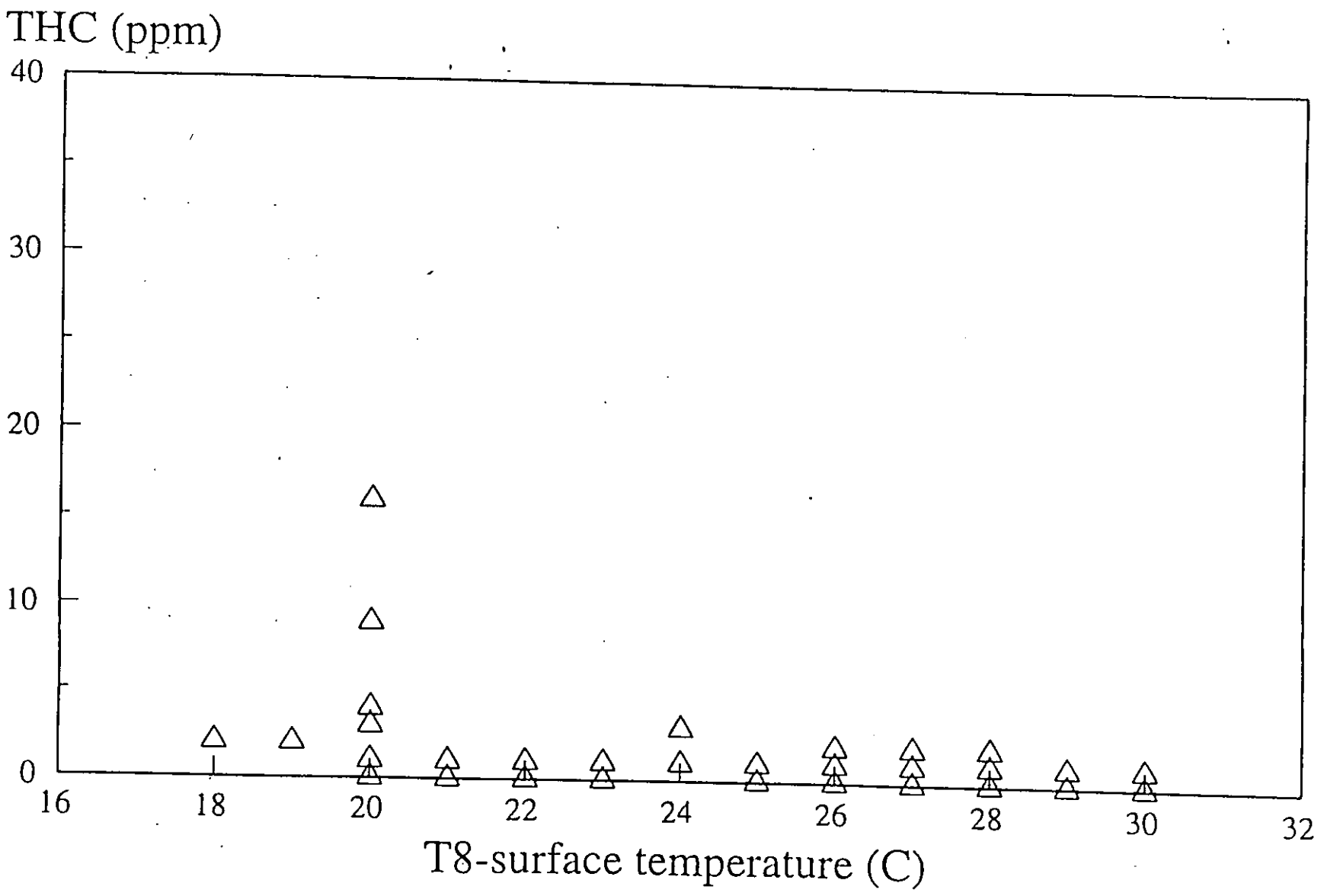


Figure B-3. 2/11/93 Hut blank, total hydrocarbon concentration vs. surface temperature.

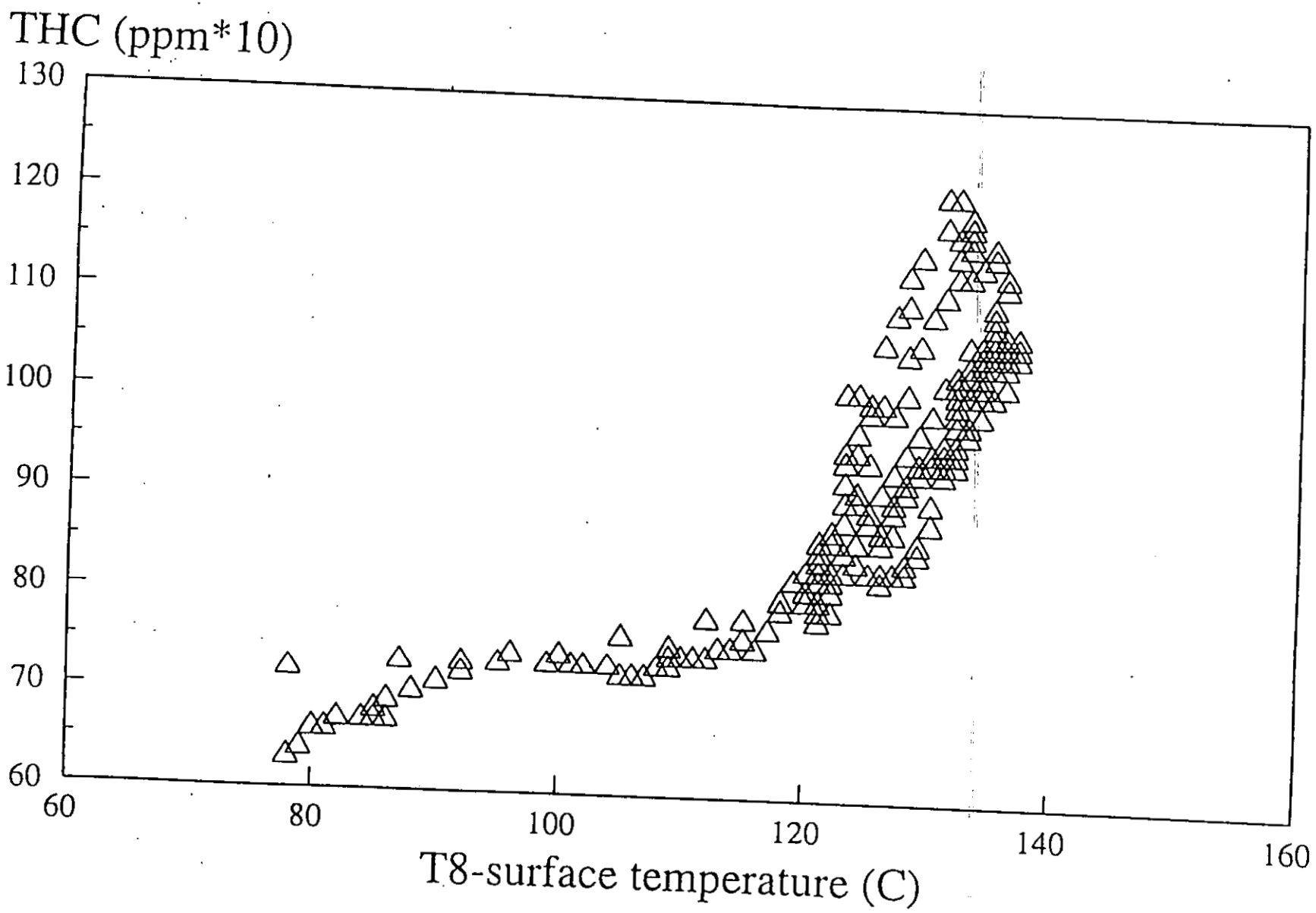


Figure B-4. 2/18/93 AC10 Thin test, total hydrocarbon concentration vs. surface temperature.

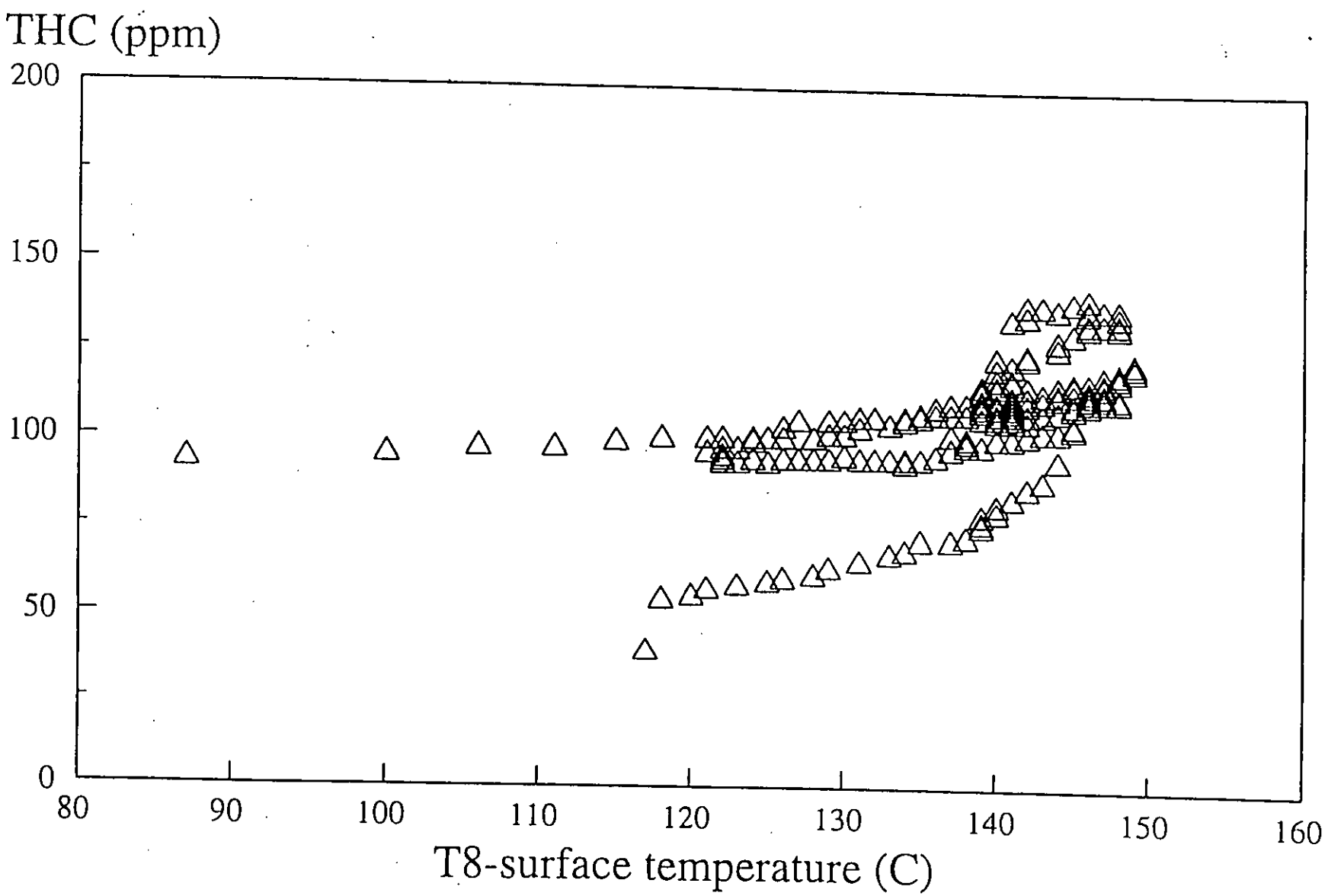


Figure B-5. 2/25/93 AC10 Thin test, total hydrocarbon concentration vs. surface temperature.

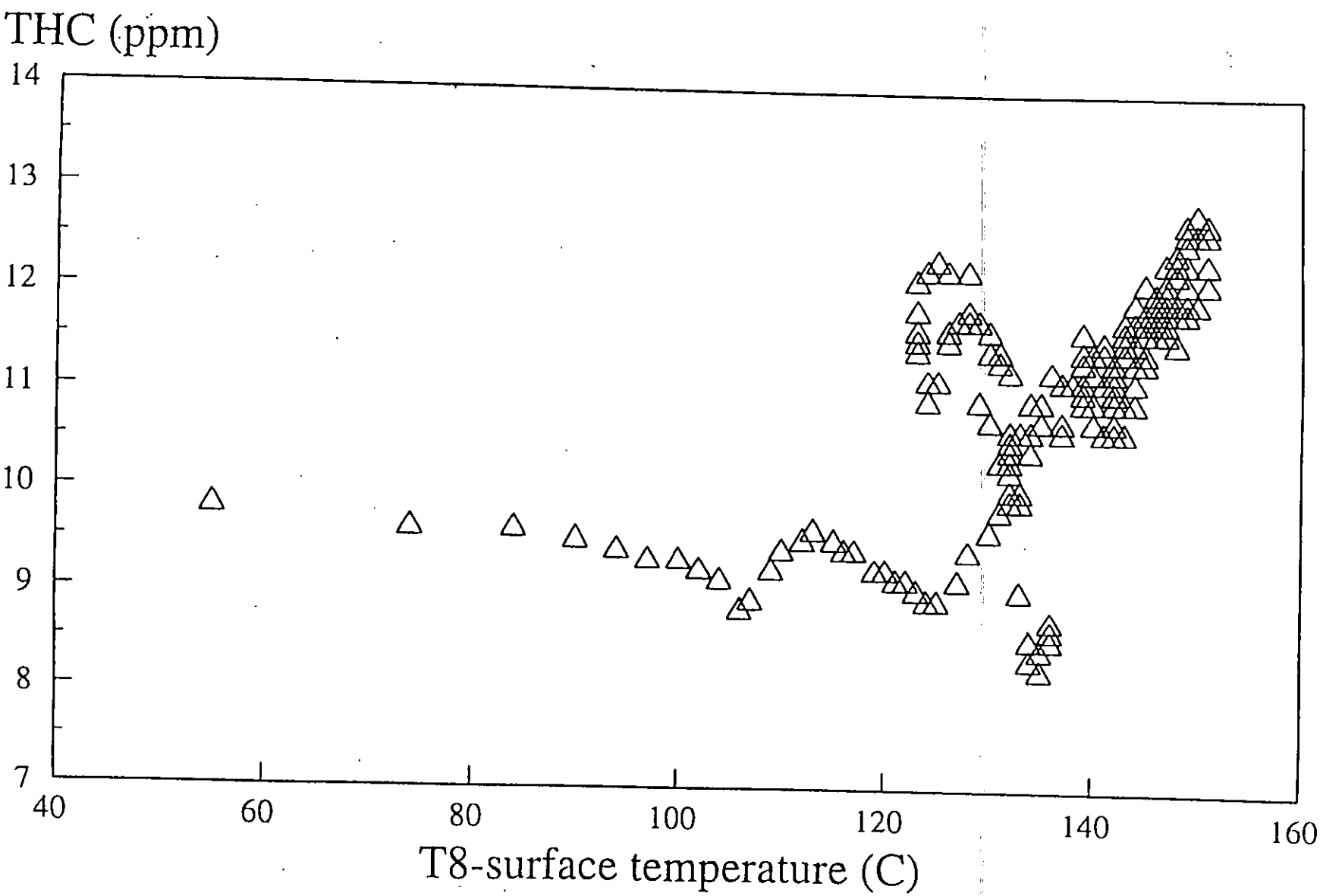


Figure B-6. 4/7/93 Crumb rubber test, total hydrocarbon concentration vs. surface temperature.

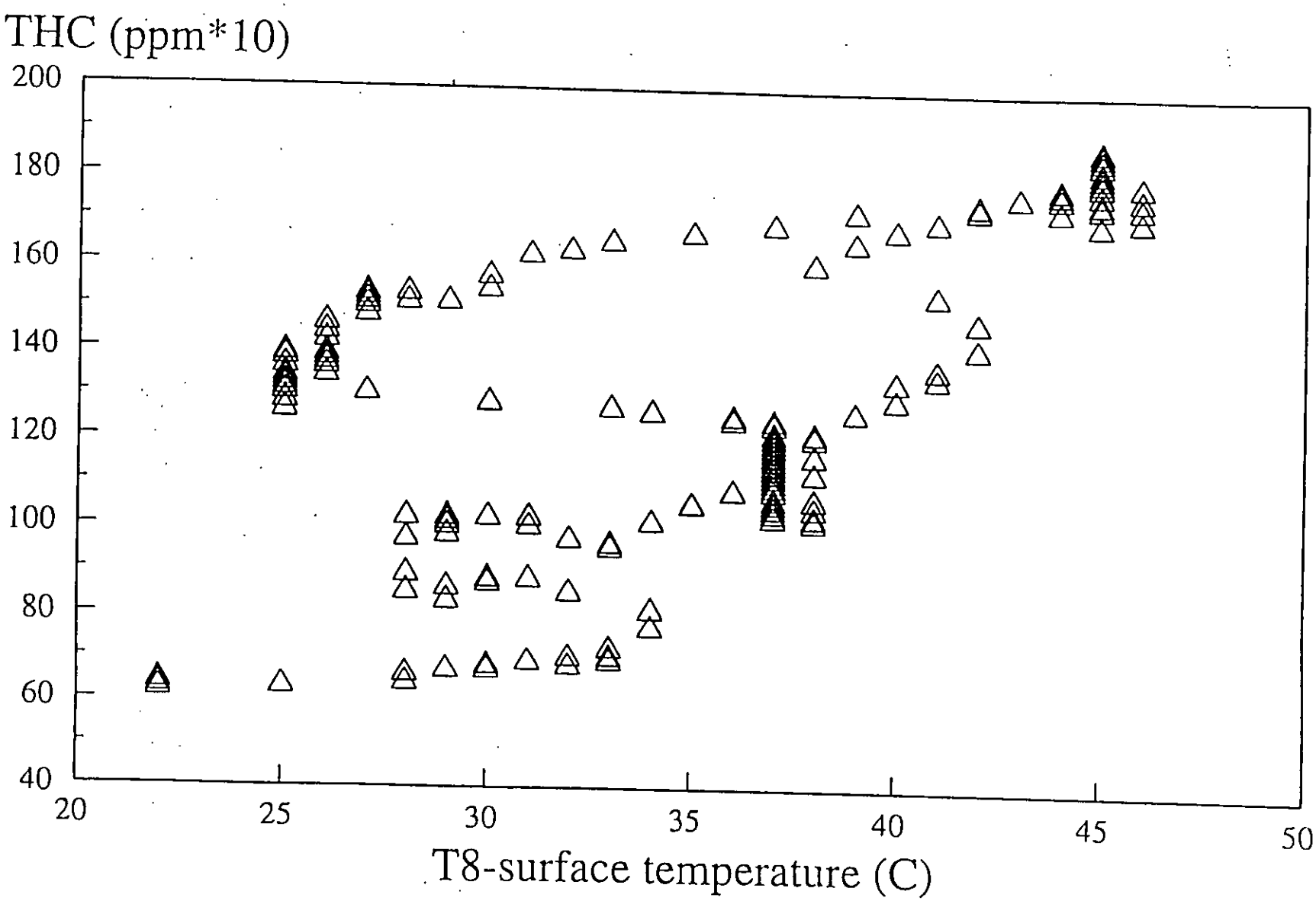


Figure B-7. 4/14/93 Hut blank, total hydrocarbon concentration vs. surface temperature.

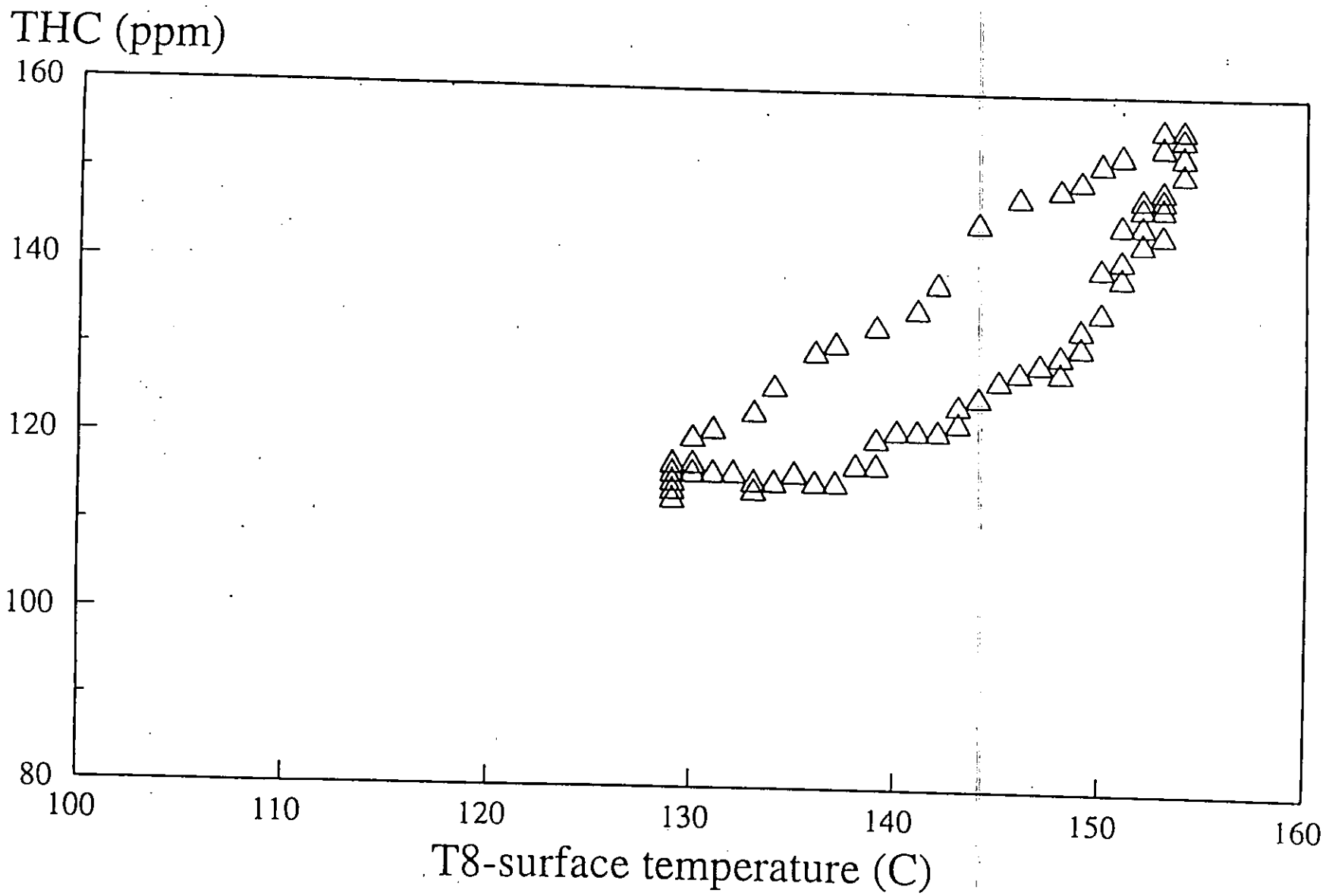


Figure B-8. 4/27/93 AC10/Rubber thin test, total hydrocarbon concentration vs. surface temperature.

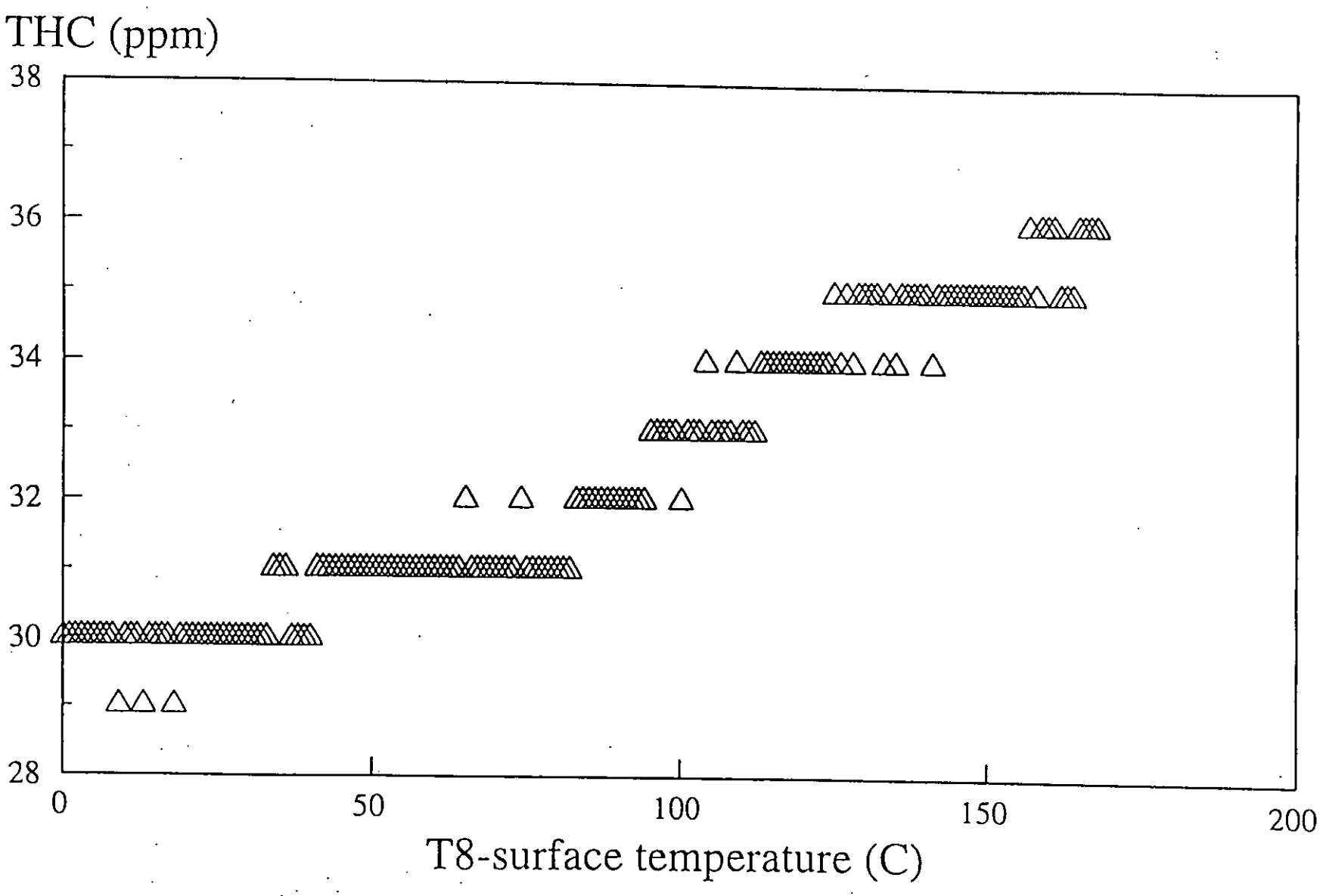


Figure B-9. 5/7/93 Hut blank, total hydrocarbon concentration vs. surface temperature.

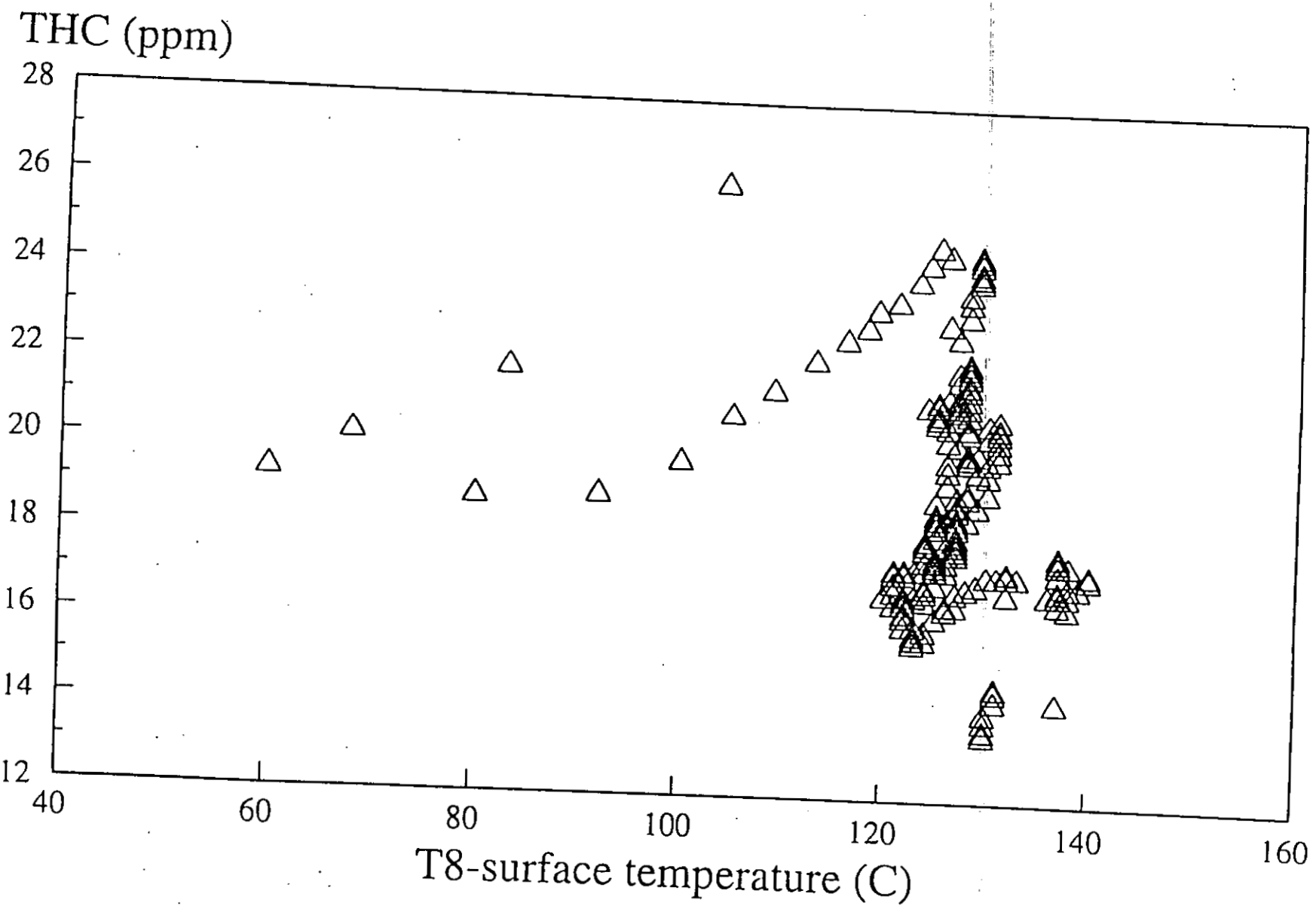


Figure B-10. 5/24/93 AC10/Rubber thin test, total hydrocarbon concentration vs. surface temperature.

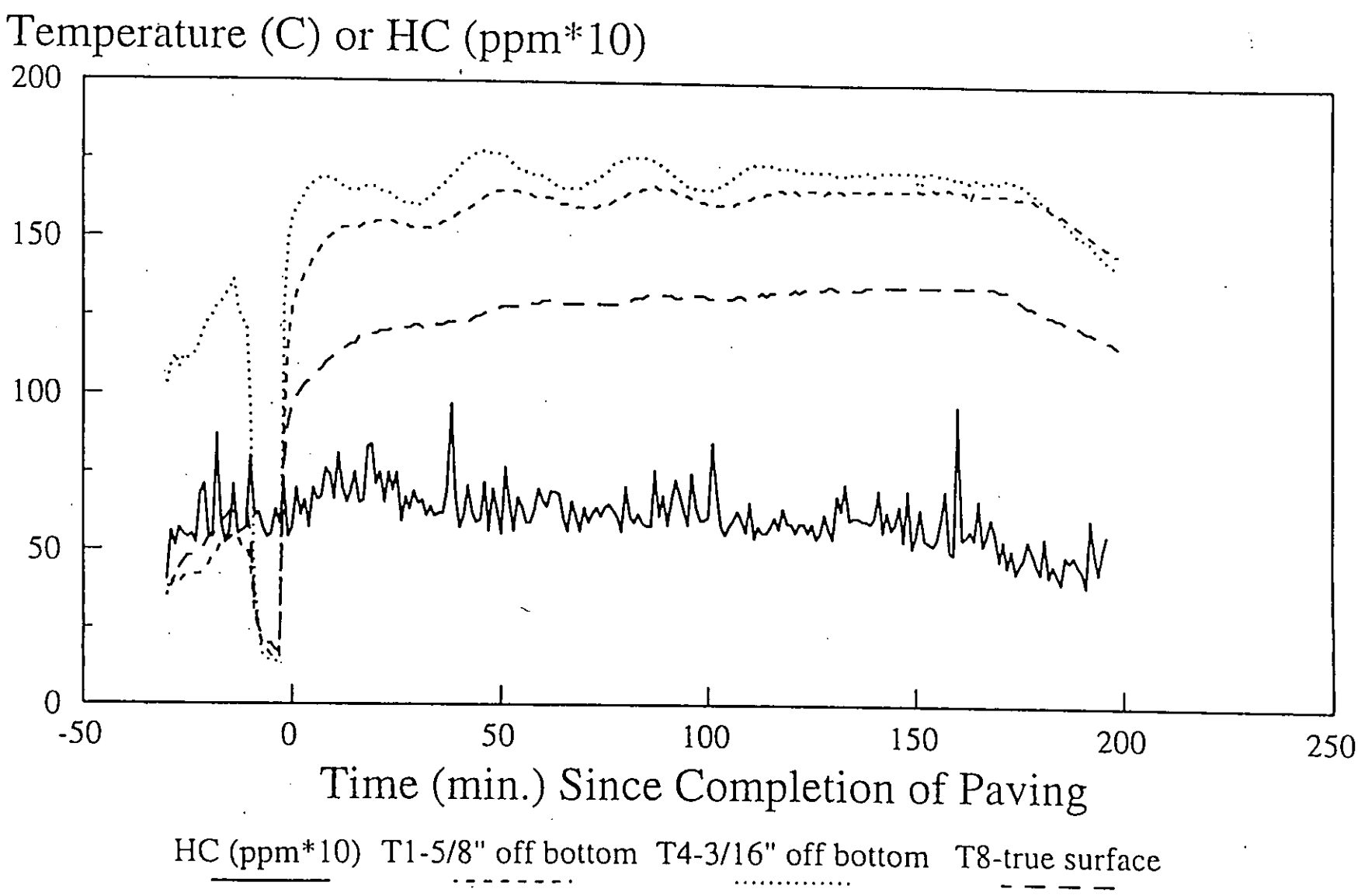


Figure B-11. 1/28/93- AC10 Asphalt test, temperature and total hydrocarbon concentration vs. time.

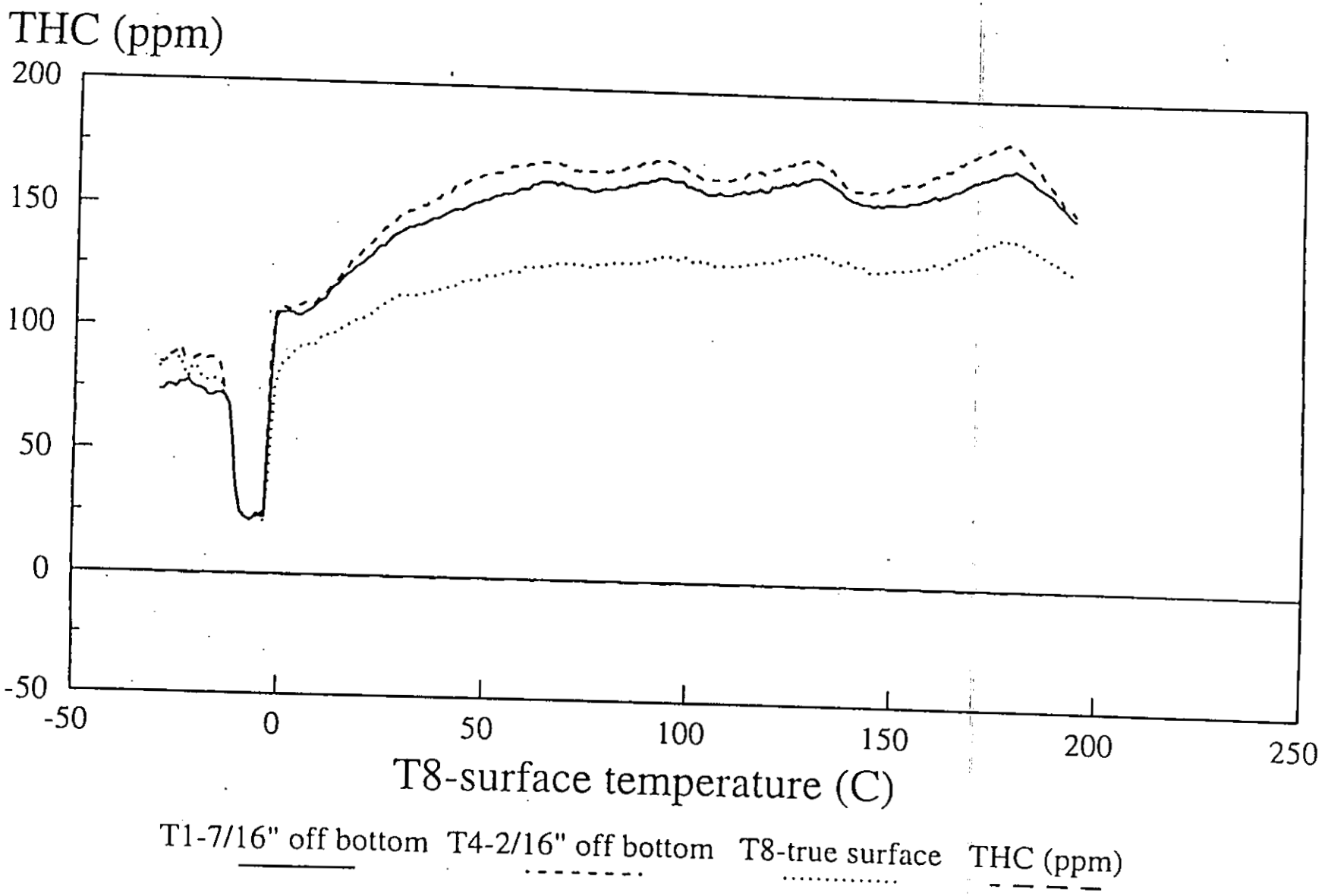


Figure B-12. 2/4/93 AC10 test, temperature and total hydrocarbon concentratio[illegible]e.

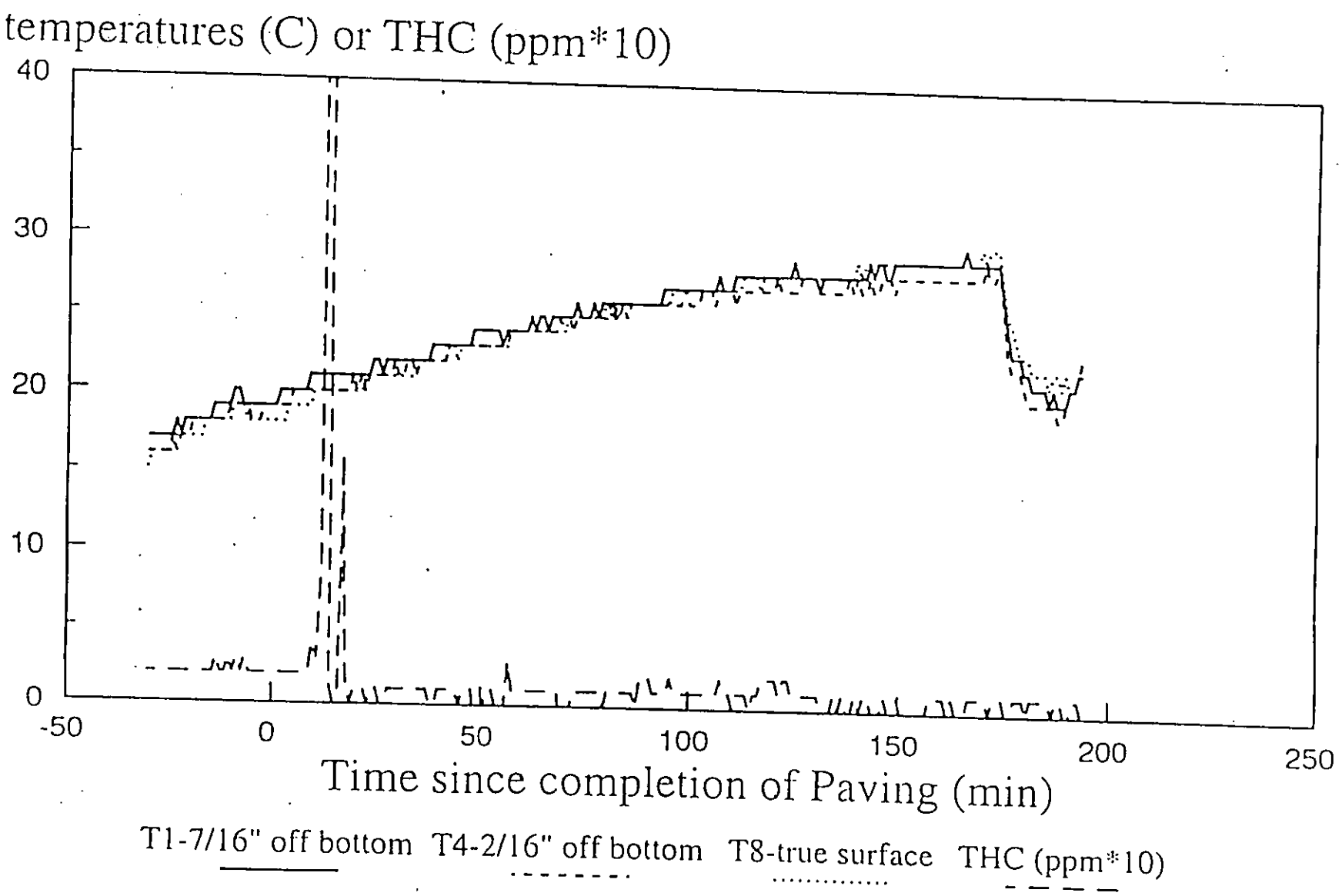


Figure B-13. 2/11/93 Hut Blank test, temperature and total hydrocarbon concentration vs. time.

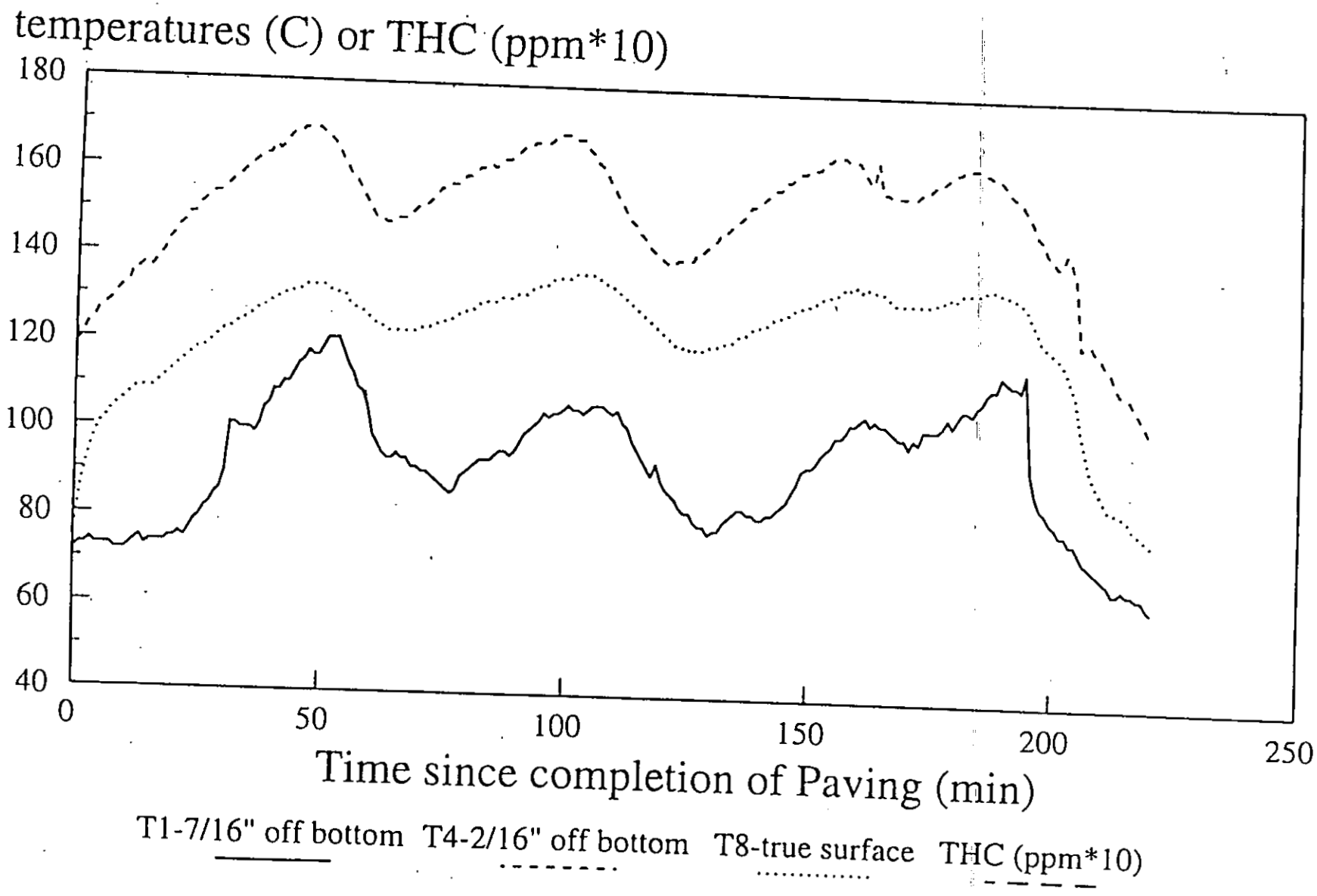


Figure B-14. 2/18/93 AC10 Thin test, temperature and total hydrocarbon concentration vs. time.

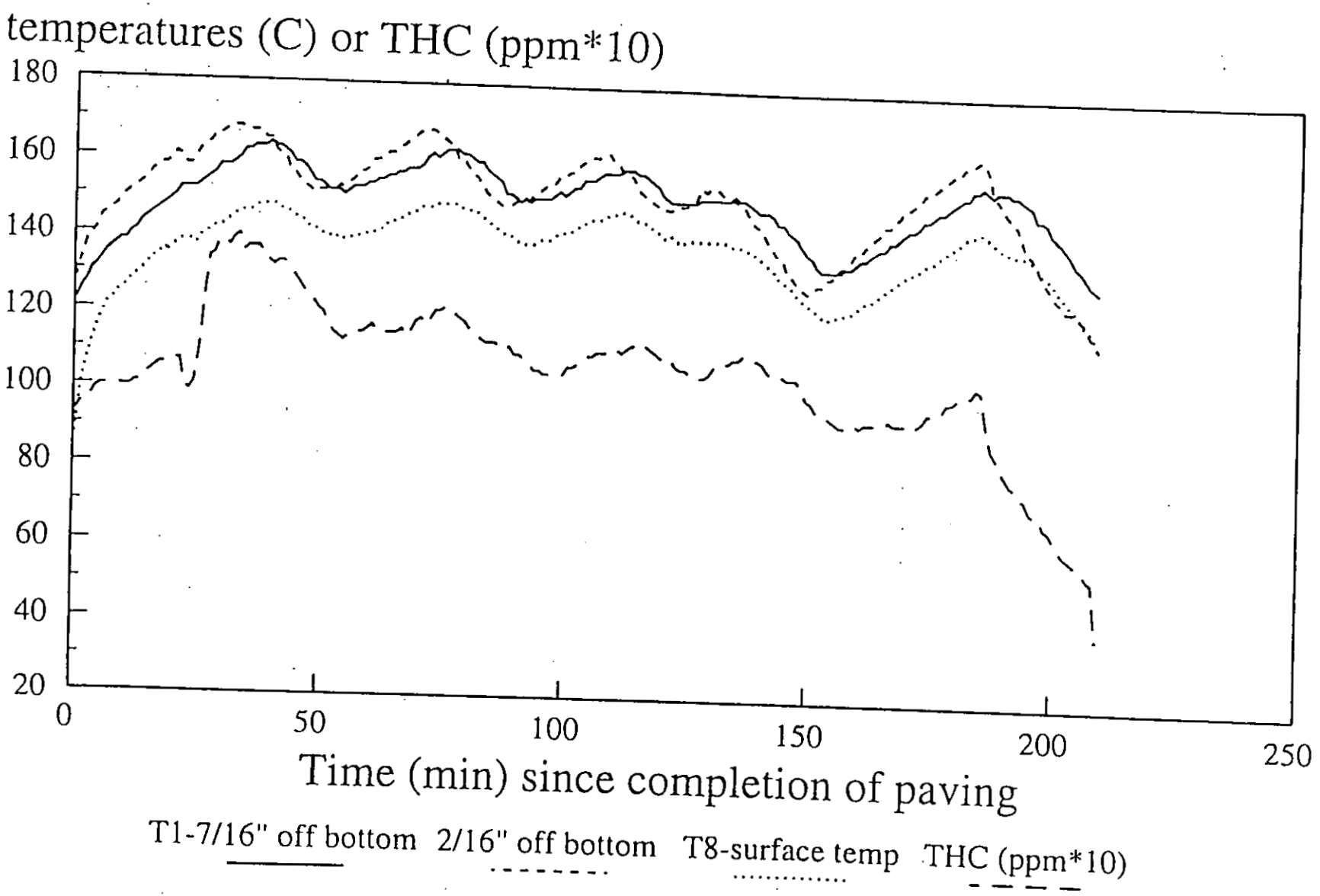


Figure B-15. 2/25/93 AC10 Thin test, temperature and total hydrocarbon concentration vs. time.

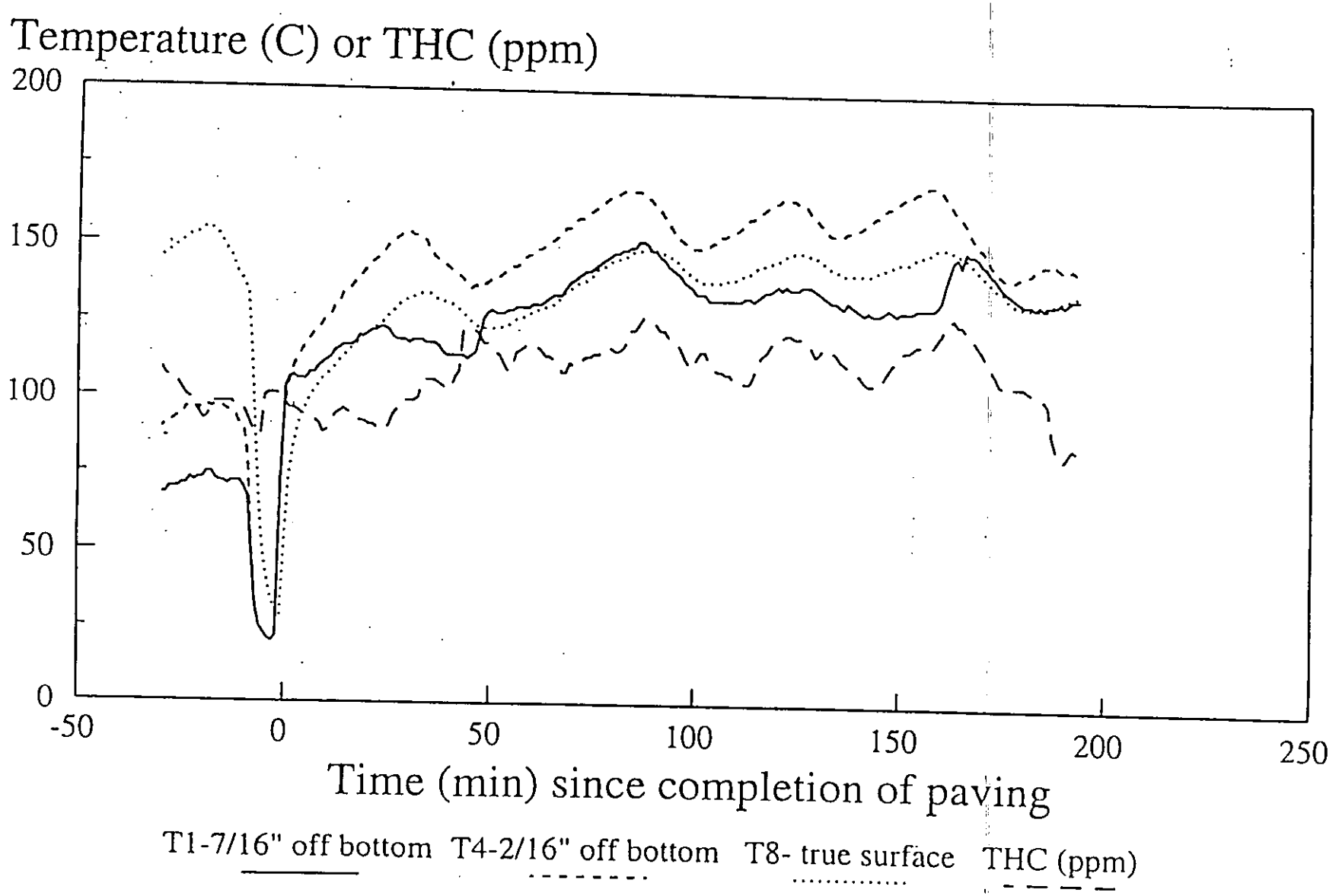


Figure B-16. 4/7/93 Crumb rubber test, temperature and total hydrocarbon concentration vs. time.

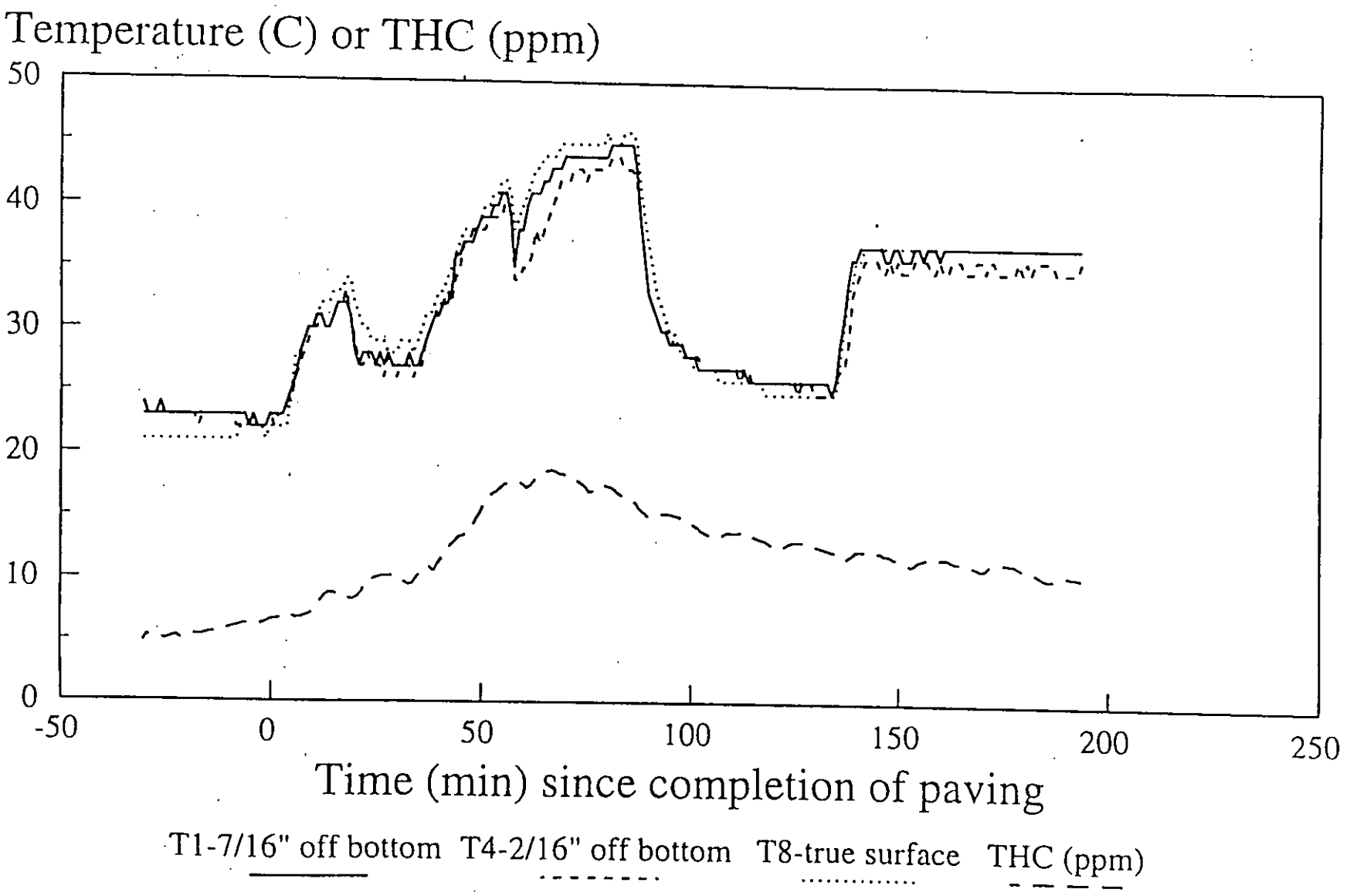


Figure B-17. 4/14/93 Hut blank, temperature and total hydrocarbon concentration vs. time.

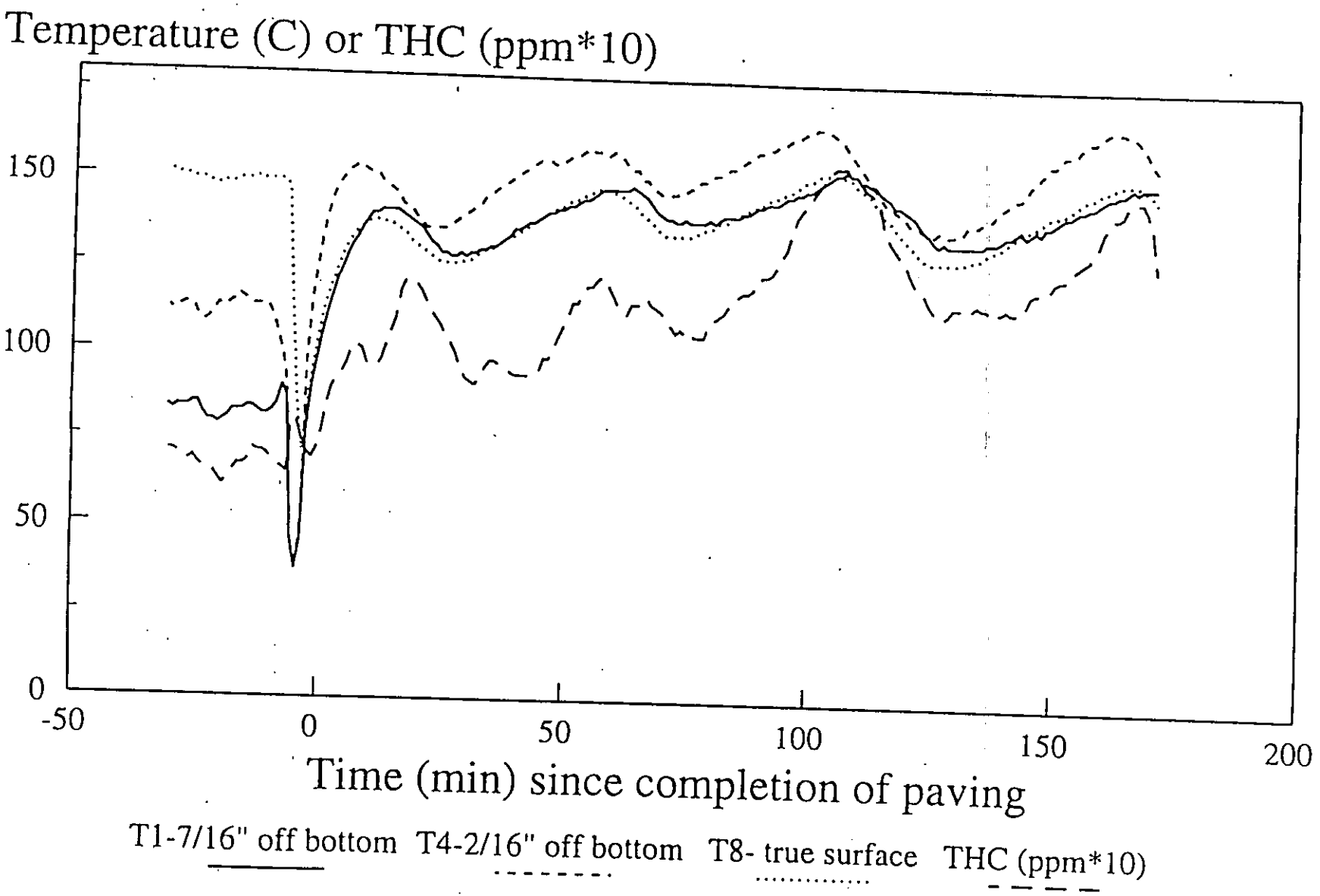


Figure B-18. 4/27/93 AC10/Rubber thin test, temperature and total hydrocarbon concentration vs. time.

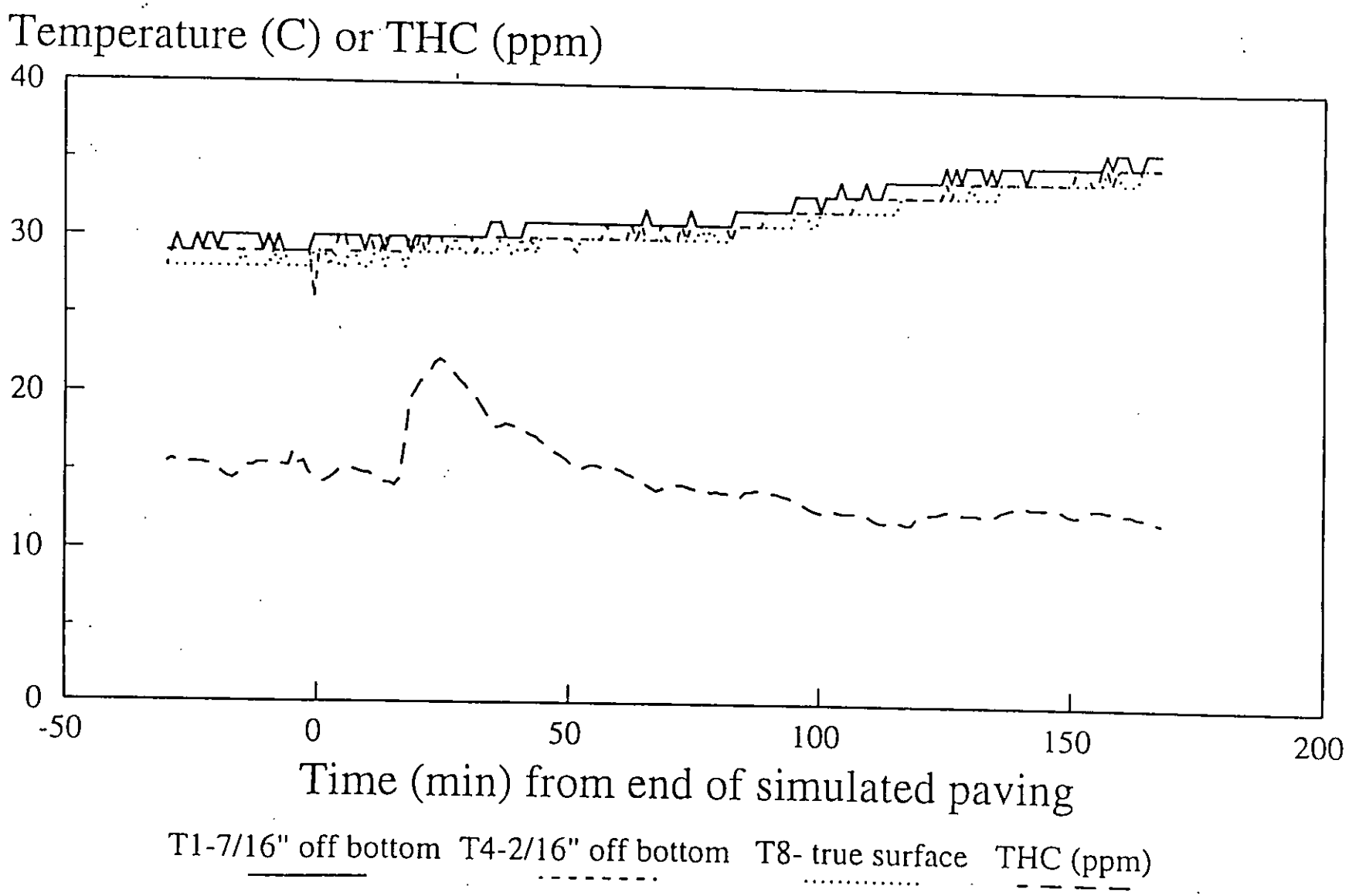


Figure B-19. 5/7/93 Hut blank, temperature and total hydrocarbon concentration vs. time.

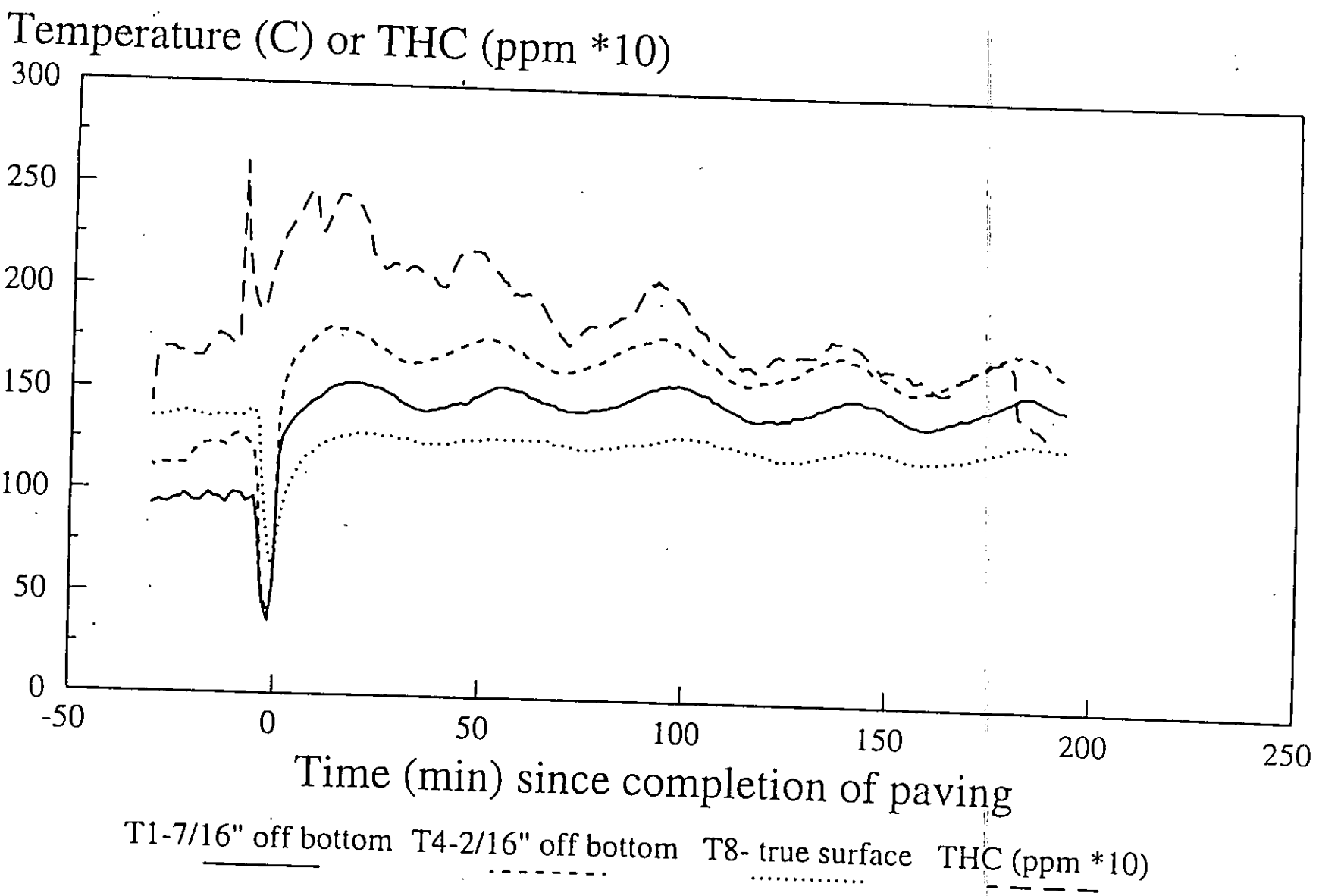


Figure B-20. 5/24/93 AC10/Rubber thin test, temperature and total hydrocarbon concentration vs. time.

APPENDIX C

ADDITIONAL QUALITY CONTROL DATA

TABLE C-1. SVOC RECOVERIES FROM FILTERS

SAMPLE ID: TF-20

ANALYTE	RTI VALUE (µg)	AIR TOXICS VALUE (µg)	PERCENT RECOVERY	RECOVERY DQO (%)	DQO MET
Naphthalene	150	0.0	0.0	50-150	No
Acenaphthylene	300	1.4	0.5	50-150	No
Acenaphthene	150	1.5	1.0	50-150	No
Fluorene	30	7.9	26.3	50-150	No
Phenanthrene	15	13.0	86.7	50-150	Yes
Anthracene	15	13.0	86.7	50-150	Yes
Fluoranthene	30	31.0	103.3	50-150	Yes
Pyrene	15	18.0	120.0	50-150	Yes
Chrysene	15	17.0	113.3	50-150	Yes
Benzo(a)anthracene	15	17.0	113.3	50-150	Yes
Benzo(b)fluoranthene	30	29.0	96.7	50-150	Yes
Benzo(k)fluoranthene	15	16.0	106.7	50-150	Yes
Benzo(a)pyrene	15	15.0	100.0	50-150	Yes
Indeno(1,2,3-cd)pyrene	15	11.0	73.3	50-150	Yes
Dibenz(a,h)anthracene	30	26.0	86.7	50-150	Yes
Benzo(g,h,i)perylene	30	22.0	73.3	50-150	Yes

(continued)

Other Compounds Detected

Diethylphthalate	0	2.6
di-n-Butylphthalate	0	4.5
bis(2-Ethylhexyl)phthalate	0	2.1

TABLE C-1. SVOC RECOVERIES FROM FILTERS (continued)

SAMPLE ID: TF-21

ANALYTE	RTI VALUE (µg)	AIR TOXICS VALUE (µg)	PERCENT RECOVERY	RECOVERY DQO (%)	DQO MET
Naphthalene	0	0	NA	NA	NA
Acenaphthylene	0	0	NA	NA	NA
Acenaphthene	0	0	NA	NA	NA
Fluorene	0	0	NA	NA	NA
Phenanthrene	0	0	NA	NA	NA
Anthracene	0	0	NA	NA	NA
Fluoranthene	0	0	NA	NA	NA
Pyrene	0	0	NA	NA	NA
Chrysene	0	0	NA	NA	NA
Benzo(a)anthracene	0	0	NA	NA	NA
Benzo(b)fluoranthene	0	0	NA	NA	NA
Benzo(k)fluoranthene	0	0	NA	NA	NA
Benzo(a)pyrene	0	0	NA	NA	NA
Indeno(1,2,3-cd)pyrene	0	0	NA	NA	NA
Dibenz(a,h)anthracene	0	0	NA	NA	NA
Benzo(g,h,i)perylene	0	0	NA	NA	NA

(continued)

Other Compounds Detected		
Diethylphthalate	0	2.3
di-n-Butylphthalate	0	3.2
bis(2-Ethylhexyl)phthalate	0	1.7

NA = Not Applicable

TABLE C-1. SVOC RECOVERIES FROM FILTERS (continued)

SAMPLE ID: TF-22

ANALYTE	RTI VALUE (µg)	AIR TOXICS VALUE (µg)	PERCENT RECOVERY	RECOVERY DQO %	DQO MET
Naphthalene	60	0.0	0.0	50-150	No
Acenaphthylene	120	0.0	0.0	50-150	No
Acenaphthene	60	0.0	0.0	50-150	No
Fluorene	12	2.3	19.2	50-150	No
Phenanthrene	6	4.2	70.0	50-150	Yes
Anthracene	6	3.9	65.0	50-150	Yes
Fluoranthene	12	10.0	83.3	50-150	Yes
Pyrene	6	5.9	98.3	50-150	Yes
Chrysene	6	5.2	86.7	50-150	Yes
Benzo(a)anthracene	6	5.3	88.3	50-150	Yes
Benzo(b)fluoranthene	12	8.4	70.0	50-150	Yes
Benzo(k)fluoranthene	6	4.8	80.0	50-150	Yes
Benzo(a)pyrene	6	4.2	70.0	50-150	Yes
Indeno(1,2,3-cd)pyrene	6	2.7	45.0	50-150	No
Dibenz(a,h)anthracene	12	6.9	57.5	50-150	Yes
Benzo(g,h,i)perylene	12	6.7	55.8	50-150	Yes

(continued)

Other Compounds Detected		
Diethylphthalate	0	2.7
di-n-Butylphthalate	0	4.8
bis(2-Ethylhexyl)phthalate	0	2.6

TABLE C-1. SVOC RECOVERIES FROM FILTERS (continued)

SAMPLE ID: TF-23

ANALYTE	RTI VALUE (µg)	AIR TOXICS VALUE (µg)	PERCENT RECOVERY	RECOVERY DQO (%)	DQO MET
Naphthalene	60	0.0	0.0	50-150	No
Acenaphthylene	120	1.2	1.0	50-150	No
Acenaphthene	60	1.1	1.8	50-150	No
Fluorene	12	3.6	30.0	50-150	No
Phenanthrene	6	5.2	86.7	50-150	Yes
Anthracene	6	5.3	88.3	50-150	Yes
Fluoranthene	12	12.0	100.0	50-150	Yes
Pyrene	6	6.8	113.3	50-150	Yes
Chrysene	6	6.5	108.3	50-150	Yes
Benzo(a)anthracene	6	6.3	105.0	50-150	Yes
Benzo(b)fluoranthene	12	11.0	91.7	50-150	Yes
Benzo(k)fluoranthene	6	7.0	116.7	50-150	Yes
Benzo(a)pyrene	6	5.5	91.7	50-150	Yes
Indeno(1,2,3-cd)pyrene	6	3.6	60.0	50-150	Yes
Dibenz(a,h)anthracene	12	8.8	73.3	50-150	Yes
Benzo(g,h,i)perylene	12	8.5	70.8	50-150	Yes

(continued)

Other Compounds Detected		
Diethylphthalate	0	2.6
di-n-Butylphthalate	0	4.8
bis(2-Ethylhexyl)phthalate	0	3.4

TABLE C-1. SVOC RECOVERIES FROM FILTERS (concluded)

SAMPLE ID: TF-24

ANALYTE	RTI VALUE (µg)	AIR TOXICS VALUE (µg)	PERCENT RECOVERY	RECOVERY DQO (%)	DQO MET
Naphthalene	150	0.0	0.0	50-150	No
Acenaphthylene	300	1.7	0.6	50-150	No
Acenaphthene	150	1.8	1.2	50-150	No
Fluorene	30	8.4	28.0	50-150	No
Phenanthrene	15	13.0	86.7	50-150	Yes
Anthracene	15	13.0	86.7	50-150	Yes
Fluoranthene	30	31.0	103.3	50-150	Yes
Pyrene	15	18.0	120.0	50-150	Yes
Chrysene	15	18.0	120.0	50-150	Yes
Benzo(a)anthracene	15	18.0	120.0	50-150	Yes
Benzo(b)fluoranthene	30	31.0	103.3	50-150	Yes
Benzo(k)fluoranthene	15	17.0	113.3	50-150	Yes
Benzo(a)pyrene	15	15.0	100.0	50-150	Yes
Indeno(1,2,3-cd)pyrene	15	12.0	80.0	50-150	Yes
Dibenz(a,h)anthracene	30	26.0	86.7	50-150	Yes
Benzo(g,h,i)perylene	30	25.0	83.3	50-150	Yes

Other Compounds Detected		
Diethylphthalate	0	2.5
di-n-Butylphthalate	0	5.5
Butylbenzylphthatate	0	1.3
bis(2-Ethylhexyl)phthalate	0	2.9

TABLE C-2. SVOC RECOVERIES FROM XAD-2 MODULES

SAMPLE ID: XAD-50 RESULTS

ANALYTE	RTI VALUE (µg)	AIR TOXICS VALUE (µg)	PERCENT RECOVERY	RECOVERY DQO (%)	DQO MET
Naphthalene	80	95.0	118.8	50-150	Yes
Acenaphthylene	160	130.0	81.3	50-150	Yes
Acenaphthene	80	69.0	86.3	50-150	Yes
Fluorene	16	16.0	100.0	50-150	Yes
Phenanthrene	8	8.0	100.0	50-150	Yes
Anthracene	8	8.2	102.5	50-150	Yes
Fluoranthene	16	15.0	93.8	50-150	Yes
Pyrene	8	8.6	107.5	50-150	Yes
Chrysene	8	8.6	107.5	50-150	Yes
Benzo(a)anthracene	8	8.6	107.5	50-150	Yes
Benzo(b)fluoranthene	16	15.0	93.8	50-150	Yes
Benzo(k)fluoranthene	8	78.5	106.3	50-150	Yes
Benzo(a)pyrene	8	7.6	95.0	50-150	Yes
Indeno(1,2,3-cd)pyrene	8	5.9	73.8	50-150	Yes
Dibenz(a,h)anthracene	16	13.0	81.3	50-150	Yes
Benzo(g,h,i)perylene	16	12.0	75.0	50-150	Yes

Other Compounds Detected

Phenol	0	8.5
2-Methylphenol	0	6.7
4-Methylphenol	0	4.1
Dimethylphthalate	0	2.0
Diethylphthalate	0	17.0
di-n-Butylphthalate	0	36.0
Butylbenzylphthalate	0	33.0
bis(2-Ethylhexyl)phthalate	0	12.0

(continued)

TABLE C-2. SVOC RECOVERIES FROM XAD-2 MODULES (continued)

SAMPLE ID: XAD-51 RESULTS

ANALYTE	RTI VALUE (µg)	AIR TOXICS VALUE (µg)	PERCENT RECOVERY	RECOVERY DQO (%)	DQO MET
Naphthalene	100	120.0	120	50-150	Yes
Acenaphthylene	200	150.0	75	50-150	Yes
Acenaphthene	100	79.0	79	50-150	Yes
Fluorene	20	18.0	90	50-150	Yes
Phenanthrene	10	9.2	92	50-150	Yes
Anthracene	10	9.6	96	50-150	Yes
Fluoranthene	20	18.0	90	50-150	Yes
Pyrene	10	10.0	100	50-150	Yes
Chrysene	10	9.4	94	50-150	Yes
Benzo(a)anthracene	10	9.3	93	50-150	Yes
Benzo(b)fluoranthene	20	16.0	80	50-150	Yes
Benzo(k)fluoranthene	10	9.1	91	50-150	Yes
Benzo(a)pyrene	10	8.9	89	50-150	Yes
Indeno(1,2,3-cd)pyrene	10	9.5	95	50-150	Yes
Dibenz(a,h)anthracene	20	14.0	70	50-150	Yes
Benzo(g,h,i)perylene	20	13.0	65	50-150	Yes

Other Compounds Detected

(continued)

Phenol	0	6.6
2-Methylphenol	0	5.7
4-Methylphenol	0	3.4
Dimethylphthalate	0	1.7
Diethylphthalate	0	37.0
di-n-Butylphthalate	0	32.0
bis(2-Ethylhexyl)phthalate	0	7.6

TABLE C-2. SVOC RECOVERIES FROM XAD-2 MODULES (continued)

SAMPLE ID: XAD-52 RESULTS*

ANALYTE	RTI VALUE (µg)	AIR TOXICS VALUE (µg)	PERCENT RECOVERY	RECOVERY DQO (%)	DQO MET
Naphthalene	100	0.0	0	50-150	No
Acenaphthylene	200	0.0	0	50-150	No
Acenaphthene	100	0.0	0	50-150	No
Fluorene	20	0.0	0	50-150	No
Phenanthrene	10	3.2	32	50-150	No
Anthracene	10	3.5	35	50-150	No
Fluoranthene	20	16.0	80	50-150	Yes
Pyrene	10	9.3	93	50-150	Yes
Chrysene	10	10.0	100	50-150	Yes
Benzo(a)anthracene	10	11.0	110	50-150	Yes
Benzo(b)fluoranthene	20	18.0	90	50-150	Yes
Benzo(k)fluoranthene	10	11.0	110	50-150	Yes
Benzo(a)pyrene	10	9.3	93	50-150	Yes
Indeno(1,2,3-cd)pyrene	10	7.7	77	50-150	Yes
Dibenz(a,h)anthracene	20	15.0	75	50-150	Yes
Benzo(g,h,i)perylene	20	15.0	75	50-150	Yes

(continued)

Other Compounds Detected

Diethylphthalate	0	1.8
di-n-Butylphthalate	0	35.0
bis(2-Ethylhexyl)phthalate	0	9.3

* Reported sample went to dryness during the concentration stage.

TABLE C-2. SVOC RECOVERIES FROM XAD-2 MODULES (continued)

SAMPLE ID: XAD-53 RESULTS

ANALYTE	RTI VALUE (µg)	AIR TOXICS VALUE (µg)	PERCENT RECOVERY	RECOVERY DQO (%)	DQO MET
Naphthalene	80	110.0	137.5	50-150	Yes
Acenaphthylene	160	140.0	87.5	50-150	Yes
Acenaphthene	80	72.0	90.0	50-150	Yes
Fluorene	16	16.0	100.0	50-150	Yes
Phenanthrene	8	7.3	91.3	50-150	Yes
Anthracene	8	7.6	95.0	50-150	Yes
Fluoranthene	16	14.0	87.5	50-150	Yes
Pyrene	8	8.5	106.3	50-150	Yes
Chrysene	8	8.1	101.3	50-150	Yes
Benzo(a)anthracene	8	8.9	111.3	50-150	Yes
Benzo(b)fluoranthene	16	16.0	100.0	50-150	Yes
Benzo(k)fluoranthene	8	6.9	86.3	50-150	Yes
Benzo(a)pyrene	8	7.6	95.0	50-150	Yes
Indeno(1,2,3-cd)pyrene	8	9.6	120.0	50-150	Yes
Dibenz(a,h)anthracene	16	14.0	87.5	50-150	Yes
Benzo(g,h,i)perylene	16	13.0	81.3	50-150	Yes

Other Compounds Detected (continued)

Phenol	0	9.0
2-Methylphenol	0	6.1
4-Methylphenol	0	4.9
Dimethylphthalate	0	2.1
Diethylphthalate	0	47.0
di-n-Butylphthalate	0	46.0
Butylbenzylphthalate	0	3.4
bis(2-Ethylhexyl)phthalate	0	10.0

TABLE C-2. SVOC RECOVERIES FROM XAD-2 MODULES (concluded)

SAMPLE ID: XAD-54 RESULTS (BLANK)

ANALYTE	RTI VALUE (µg)	AIR TOXICS VALUE (µg)	PERCENT RECOVERY	RECOVERY DQO (%)	DQO MET
Naphthalene	0	61	NA	NA	NA
Acenaphthylene	0	0	NA	NA	NA
Acenaphthene	0	0	NA	NA	NA
Fluorene	0	0	NA	NA	NA
Phenanthrene	0	0	NA	NA	NA
Anthracene	0	0	NA	NA	NA
Fluoranthene	0	0	NA	NA	NA
Pyrene	0	0	NA	NA	NA
Chrysene	0	0	NA	NA	NA
Benzo(a)anthracene	0	0	NA	NA	NA
Benzo(b)fluoranthene	0	0	NA	NA	NA
Benzo(k)fluoranthene	0	0	NA	NA	NA
Benzo(a)pyrene	0	0	NA	NA	NA
Indeno(1,2,3-cd)pyrene	0	0	NA	NA	NA
Dibenz(a,h)anthracene	0	0	NA	NA	NA
Benzo(g,h,i)perylene	0	0	NA	NA	NA

Other Compounds Detected		
Phenol	0	12.0
2-Methylphenol	0	6.9
4-Methylphenol	0	4.7
Dimethylphthalate	0	2.0
Diethylphthalate	0	14.0
di-n-Butylphthalate	0	53.0
Butylbenzylphthalate	0	68.0
bis(2-Ethylhexyl)phthalate	0	9.4

NA = Not Applicable

TABLE C-3. SVOC FILTER RPDS (%)

ANALYTE	% RECOVERY		RPDs (%)	%RSD DQO	DQO MET
	TF-22	TF-23			
Naphthalene	0.0	0.0	NA	25	No
Acenaphthylene	0.0	1.0	200.0	25	No
Acenaphthene	0.0	1.8	200.0	25	No
Fluorene	19.2	30.0	43.9	25	No
Phenanthrene	70.0	86.7	21.3	25	Yes
Anthracene	65.0	88.3	30.4	25	No
Fluoranthene	83.3	100.0	18.2	25	Yes
Pyrene	98.3	113.3	14.2	25	Yes
Chrysene	86.7	108.3	22.2	25	Yes
Benzo(a)anthracene	88.3	105.0	17.3	25	Yes
Benzo(b)fluoranthene	70.0	91.7	26.8	25	No
Benzo(k)fluoranthene	80.0	116.7	37.3	25	No
Benzo(a)pyrene	70.0	91.7	26.8	25	No
Indeno(1,2,3-cd)pyrene	45.0	60.0	20.0	25	Yes
Dibenz(a,h)anthracene	57.5	73.3	24.2	25	Yes
Benzo(g,h,i)perylene	55.8	70.8	23.7	25	Yes

(continued)

TABLE C-3. SVOC FILTER RPDS (%) (concluded)

ANALYTE	% RECOVERY		RPDs (%)	%RSD DQO	DQO MET
	TF-20	TF-24			
Naphthalene	0.0	0.0	NA	25	NA
Acenaphthylene	0.5	0.6	18.2	25	Yes
Acenaphthene	1.0	1.2	18.2	25	Yes
Fluorene	26.3	28.0	6.3	25	Yes
Phenanthrene	86.7	86.7	0.0	25	Yes
Anthracene	86.7	86.7	0.0	25	Yes
Fluoranthene	103.3	103.3	0.0	25	Yes
Pyrene	120.0	120.0	0.0	25	Yes
Chrysene	113.3	120.0	5.7	25	Yes
Benzo(a)anthracene	113.3	120.0	5.7	25	Yes
Benzo(b)fluoranthene	96.7	103.3	6.6	25	Yes
Benzo(k)fluoranthene	106.7	113.3	6.0	25	Yes
Benzo(a)pyrene	100.0	100.0	0.0	25	Yes
Indeno(1,2,3-cd)pyrene	73.3	80.0	8.7	25	Yes
Dibenz(a,h)anthracene	86.7	86.7	0.0	25	Yes
Benzo(g,h,i)perylene	73.3	83.3	12.8	25	Yes

TABLE C-4. XAD-2 MODULE RPDS (%)

ANALYTE	% RECOVERY		RPDs (%)	%RSD DQO	DQO MET
	XAD-50	XAD-53			
Naphthalene	118.8	137.5	14.6	25	Yes
Acenaphthylene	81.3	87.5	7.3	25	Yes
Acenaphthene	86.3	90.0	4.2	25	Yes
Fluorene	100.0	100.0	0.0	25	Yes
Phenanthrene	100.0	91.3	9.1	25	Yes
Anthracene	102.5	95.0	7.6	25	Yes
Fluoranthene	93.8	87.5	6.9	25	Yes
Pyrene	107.5	106.3	1.1	25	Yes
Chrysene	107.5	101.3	5.9	25	Yes
Benzo(a)anthracene	107.5	111.3	3.7	25	Yes
Benzo(b)fluoranthene	93.8	100.0	6.4	25	Yes
Benzo(k)fluoranthene	106.3	86.3	20.8	25	Yes
Benzo(a)pyrene	95.0	95.0	0.0	25	Yes
Indeno(1,2,3-cd)pyrene	73.8	120.0	47.7	25	No
Dibenz(a,h)anthracene	81.3	87.5	7.3	25	Yes
Benzo(g,h,i)perylene	75.0	81.3	8.1	25	Yes

(continued)

TABLE C-4. XAD-2 MODULE RPDS (%) (concluded)

ANALYTE	% RECOVERY		RPDs (%)	%RSD DQO	DQO MET
	TF-22	TF-23			
Naphthalene	120	0	200.0	25	No
Acenaphthylene	75	0	200.0	25	No
Acenaphthene	79	0	200.0	25	No
Fluorene	90	0	200.0	25	No
Phenanthrene	92	32	96.8	25	No
Anthracene	96	35	93.1	25	No
Fluoranthene	90	80	11.8	25	Yes
Pyrene	100	93	7.3	25	Yes
Chrysene	94	100	6.2	25	Yes
Benzo(a)anthracene	93	110	16.7	25	Yes
Benzo(b)fluoranthene	80	90	11.8	25	Yes
Benzo(k)fluoranthene	91	110	18.9	25	Yes
Benzo(a)pyrene	89	93	4.4	25	Yes
Indeno(1,2,3-cd)pyrene	95	77	20.9	25	Yes
Dibenz(a,h)anthracene	70	75	6.9	25	Yes
Benzo(g,h,i)perylene	65	75	14.2	25	Yes

TABLE C-5. LEAD RECOVERIES AND PERCENT BIAS

SAMPLE ID	RTI VALUE (mg)	IEA VALUE (mg)	PERCENT RECOVERY[1]	BIAS (%)[2]	BIAS DQO (%)	DQO MET
QF 7	.060	.025	41.7	-58.3	25	No
QF 8	.035	.017	48.6	-51.4	25	No
QF 9	.060	.019	31.7	-68.3	25	No
QF 10	.035	.015	42.9	-57.1	25	No

1 $\%\text{Recovery} = \dfrac{\text{IEA concentration} - \text{known concentration}}{\text{known concentration}} \times 100$

2 % Bias = Percent recovery - 100

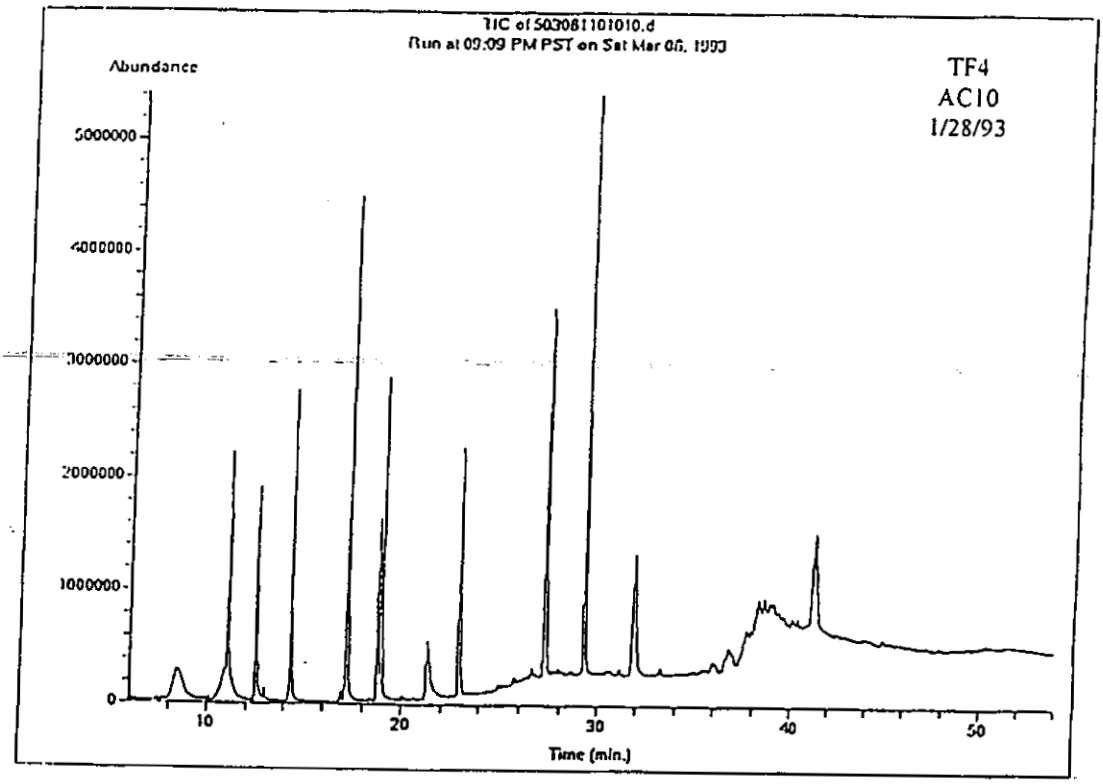
TABLE C-6. LEAD PRECISION AND PERCENT RPD

DUPLICATE ANALYSES	IEA RECOVERIES	RPD[1] (%)	RPD DQO (%)	DQO MET
QF 7	41.7	27.2	25	No
QF 9	31.7			
QF 8	48.6	12.5	25	Yes
QF 10	42.9			

1 $\%\text{ RPD} = \dfrac{\text{Duplicate 1} - \text{Duplicate 2}}{\text{Mean of Duplicate 1 and Duplicate 2}} \times 100$

APPENDIX D

TOTAL ION CHROMATOGRAMS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1000000
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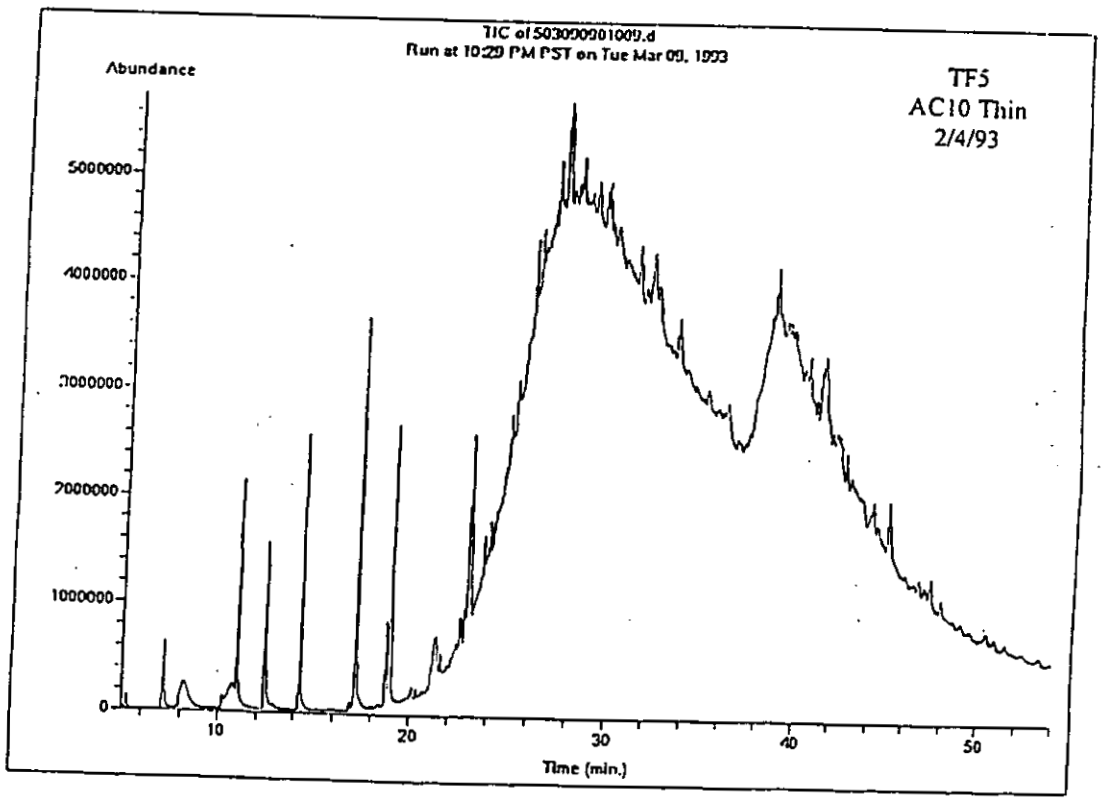
20
30
40
50
Time (min.)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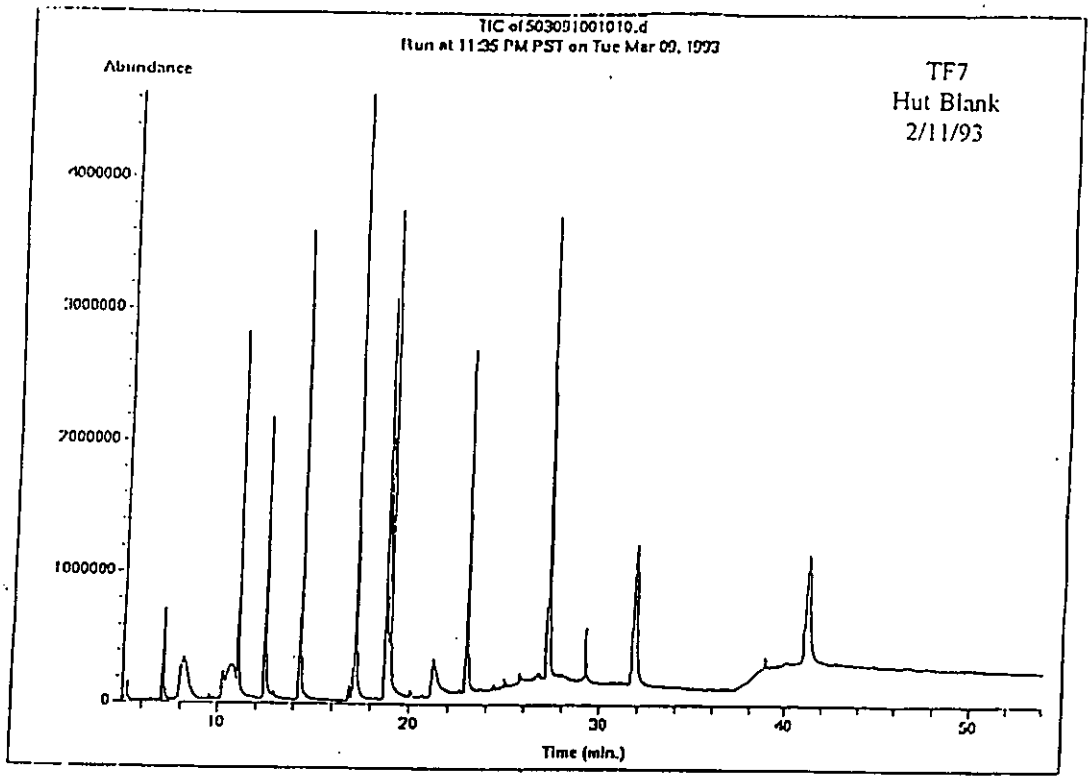
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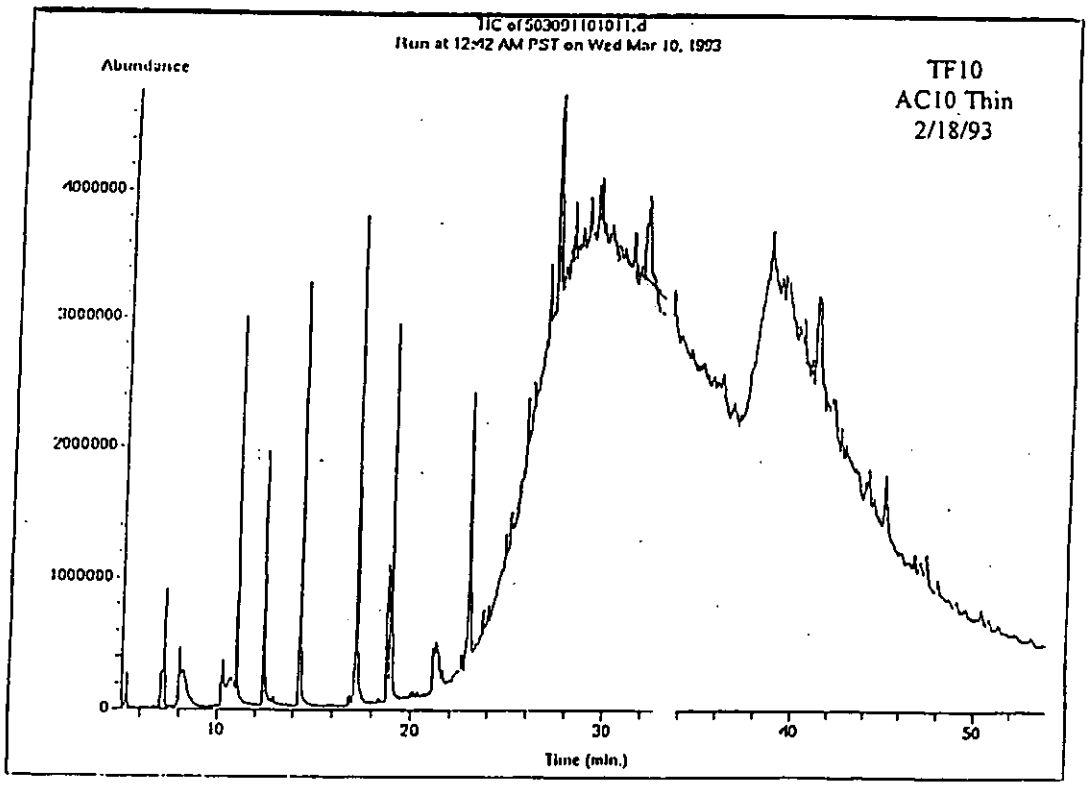
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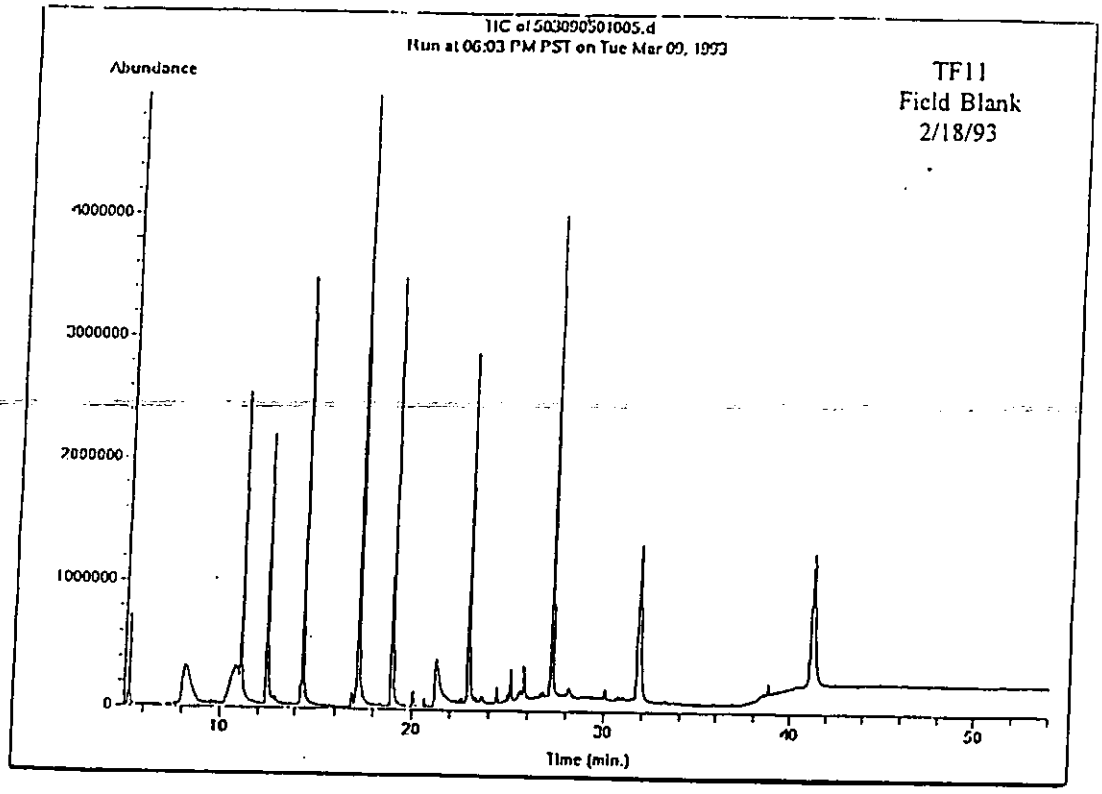
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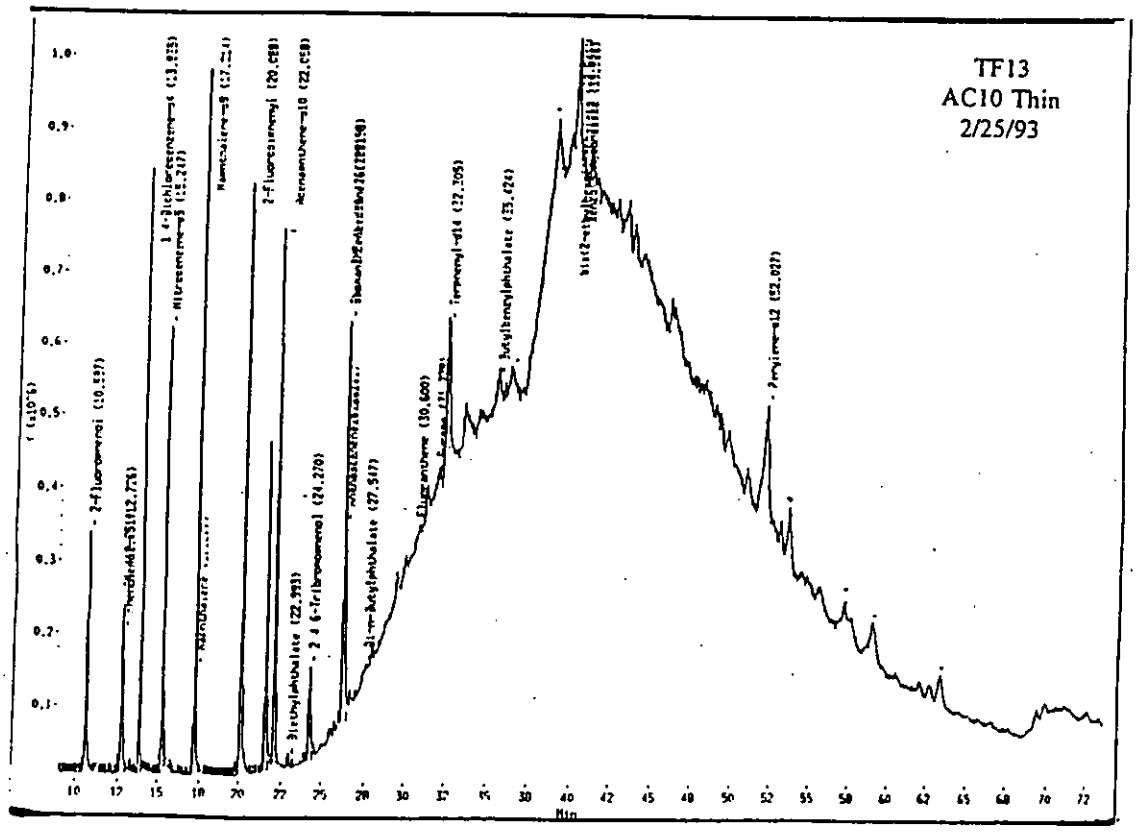
2/18/93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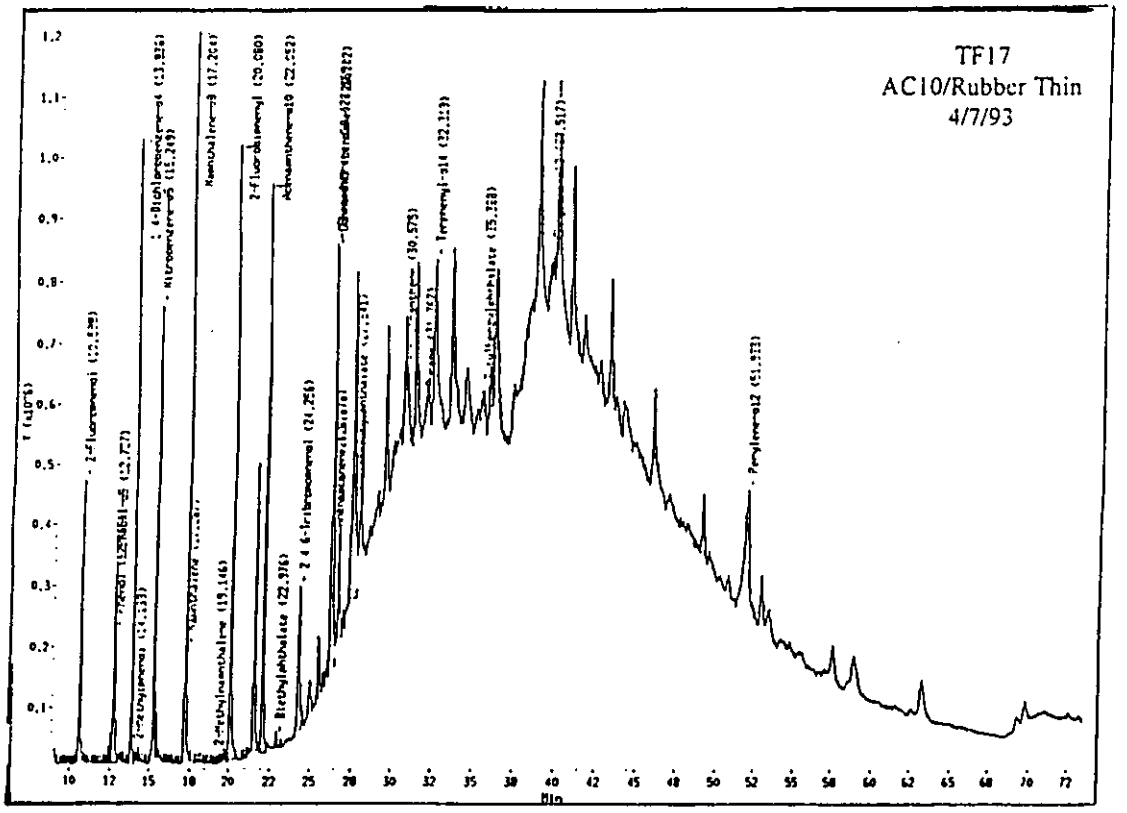
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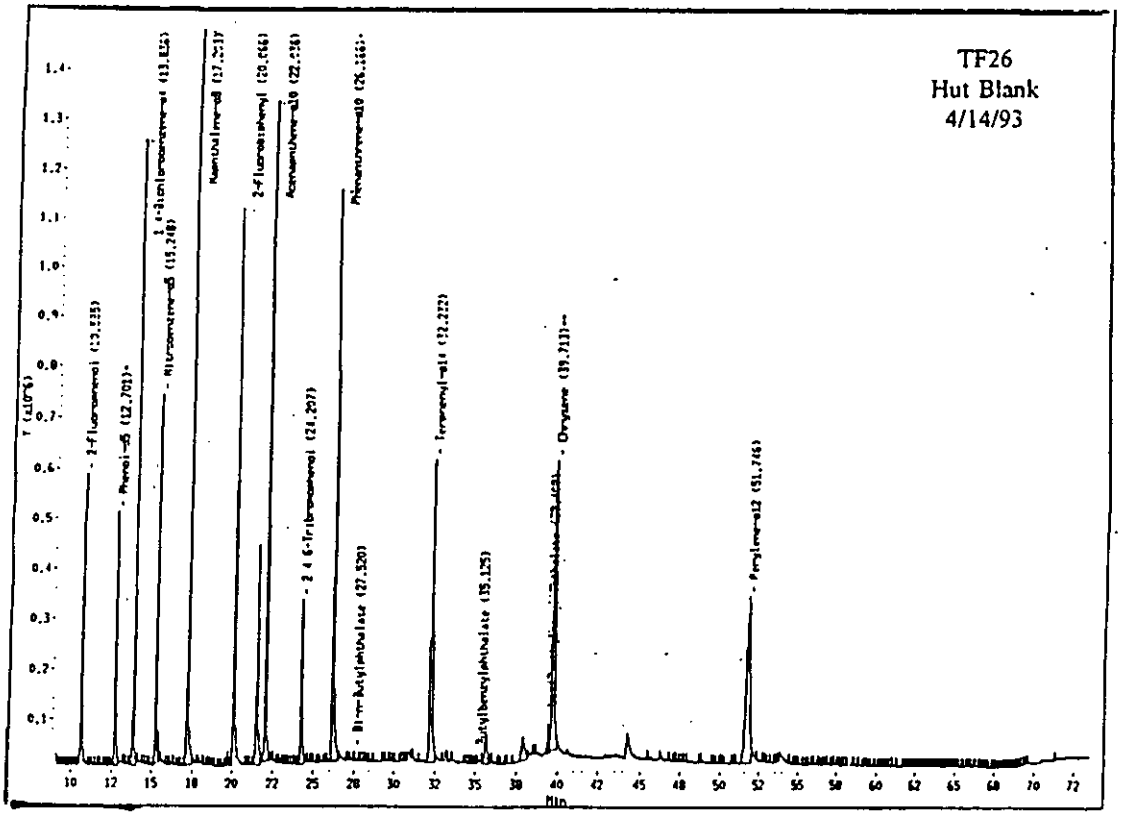
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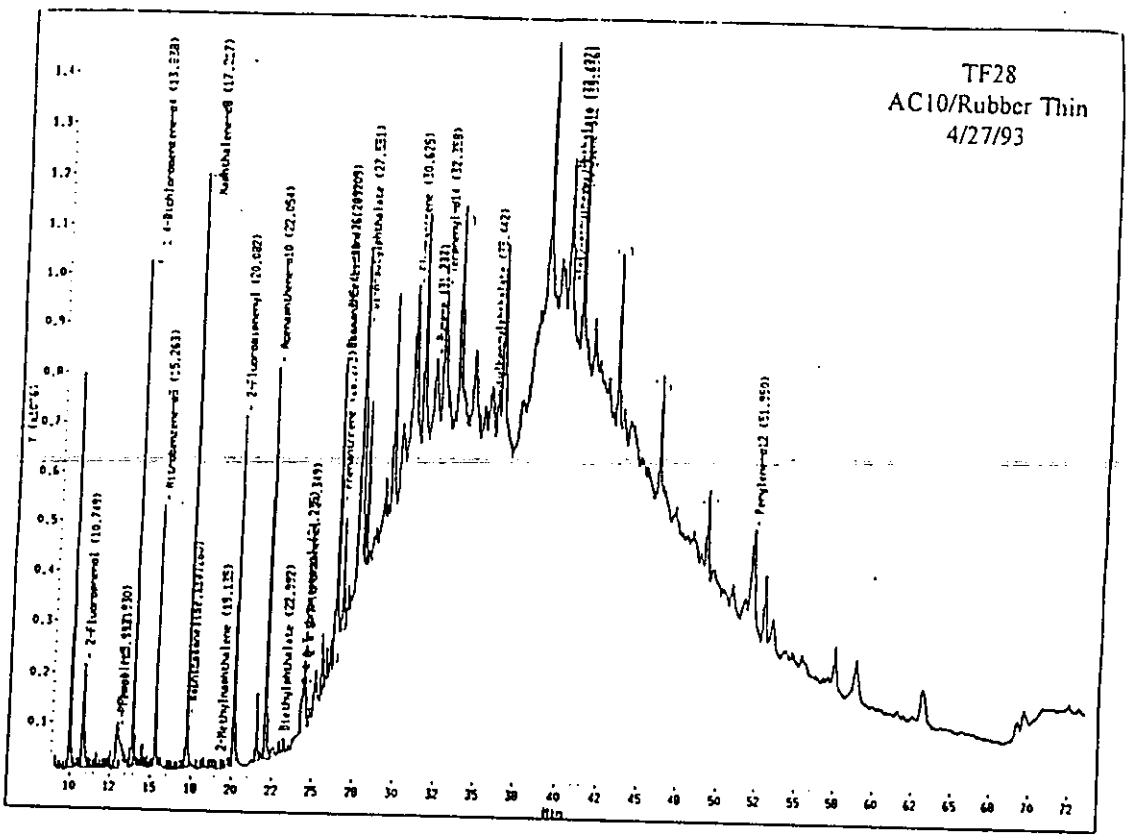
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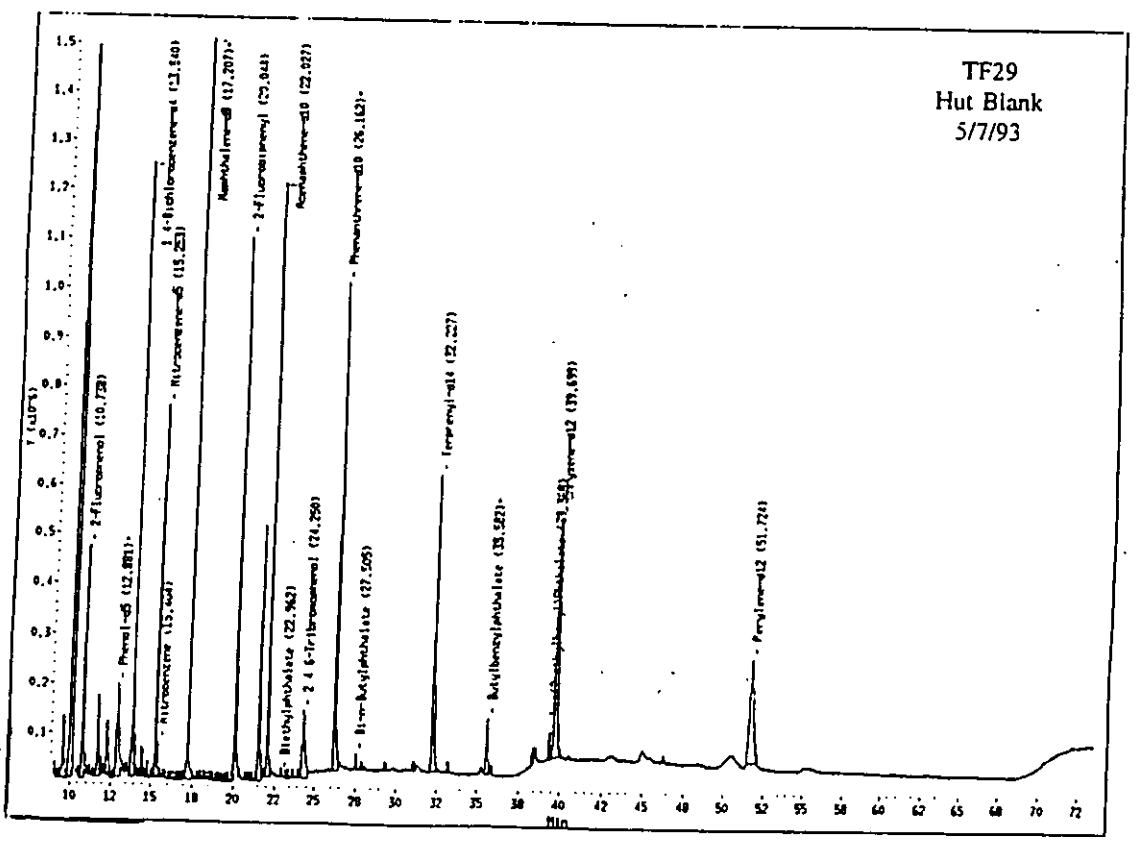
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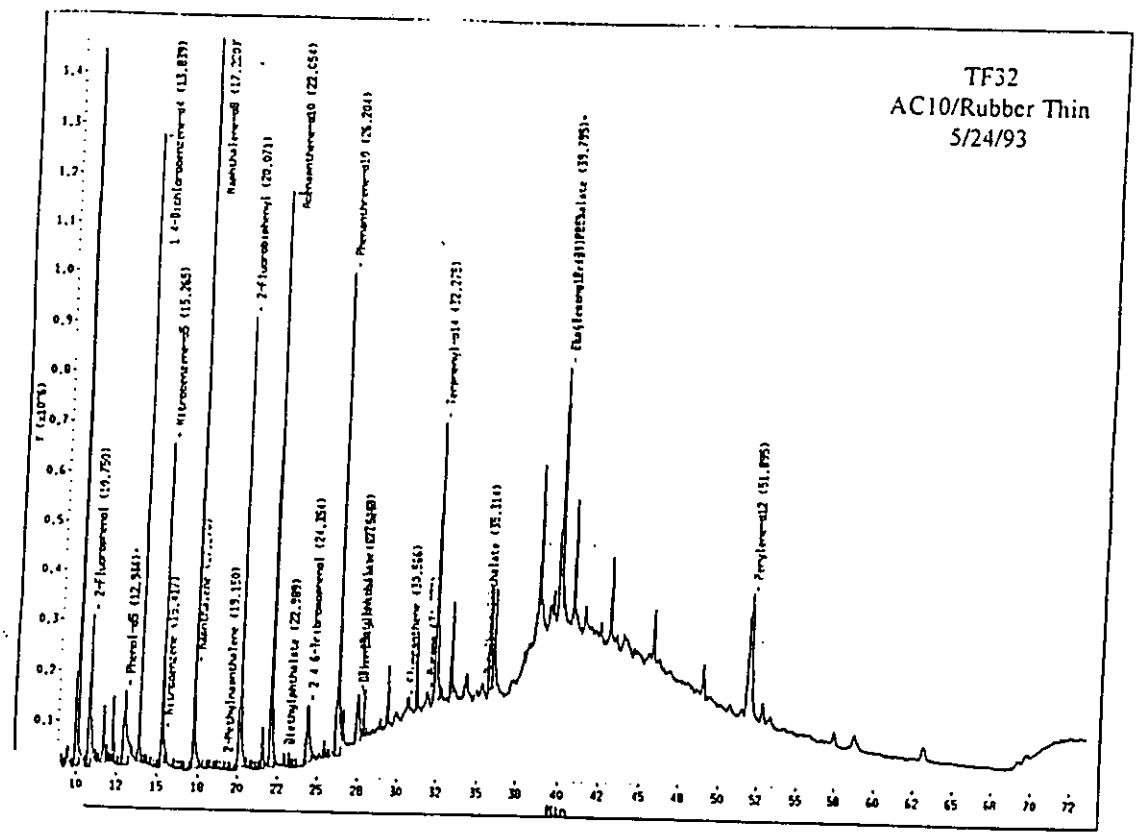
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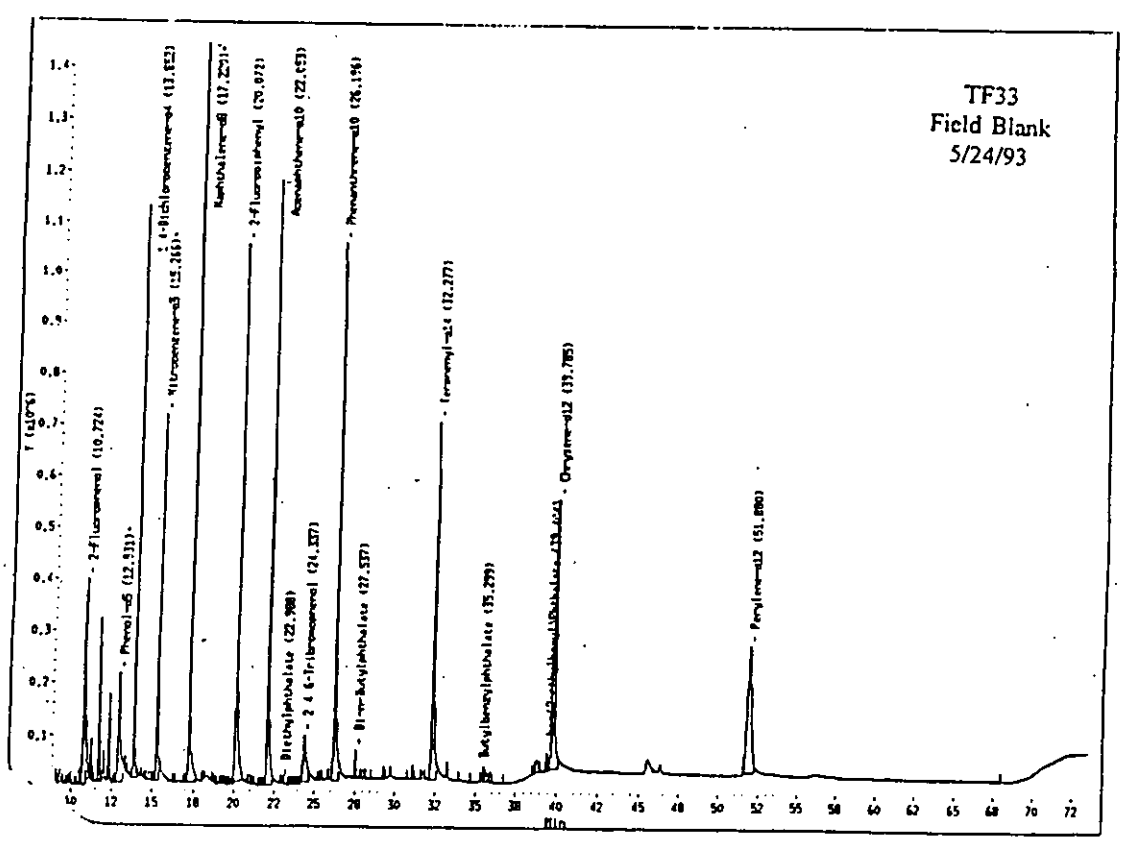
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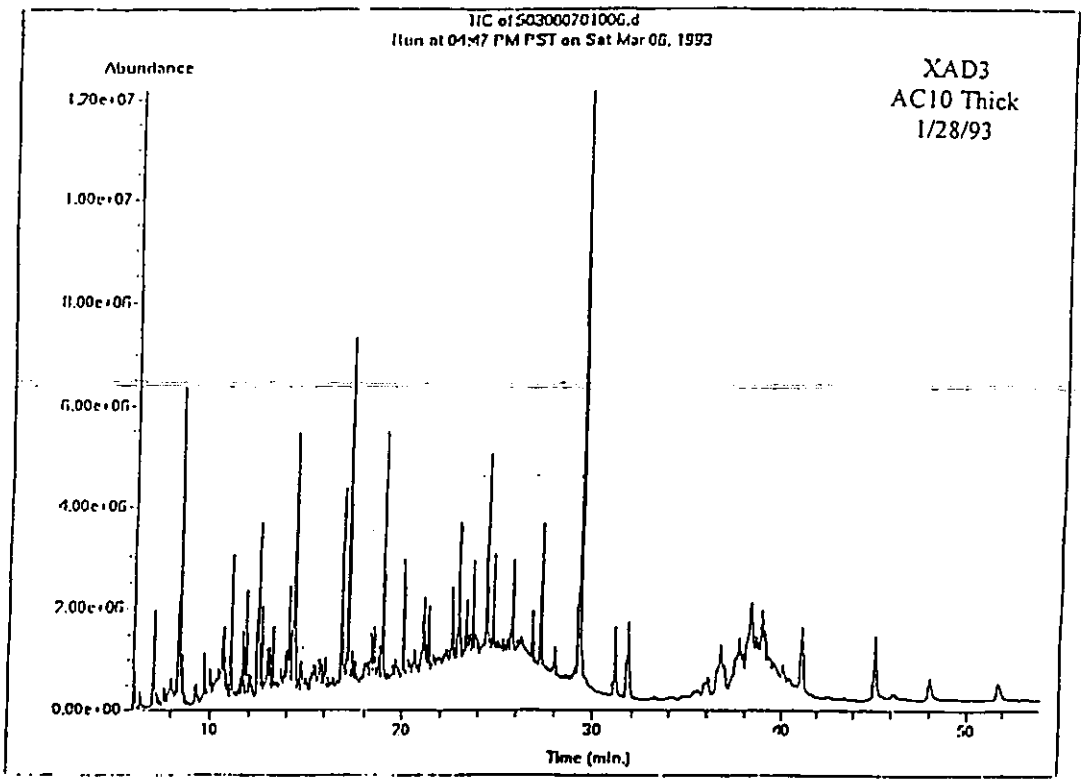
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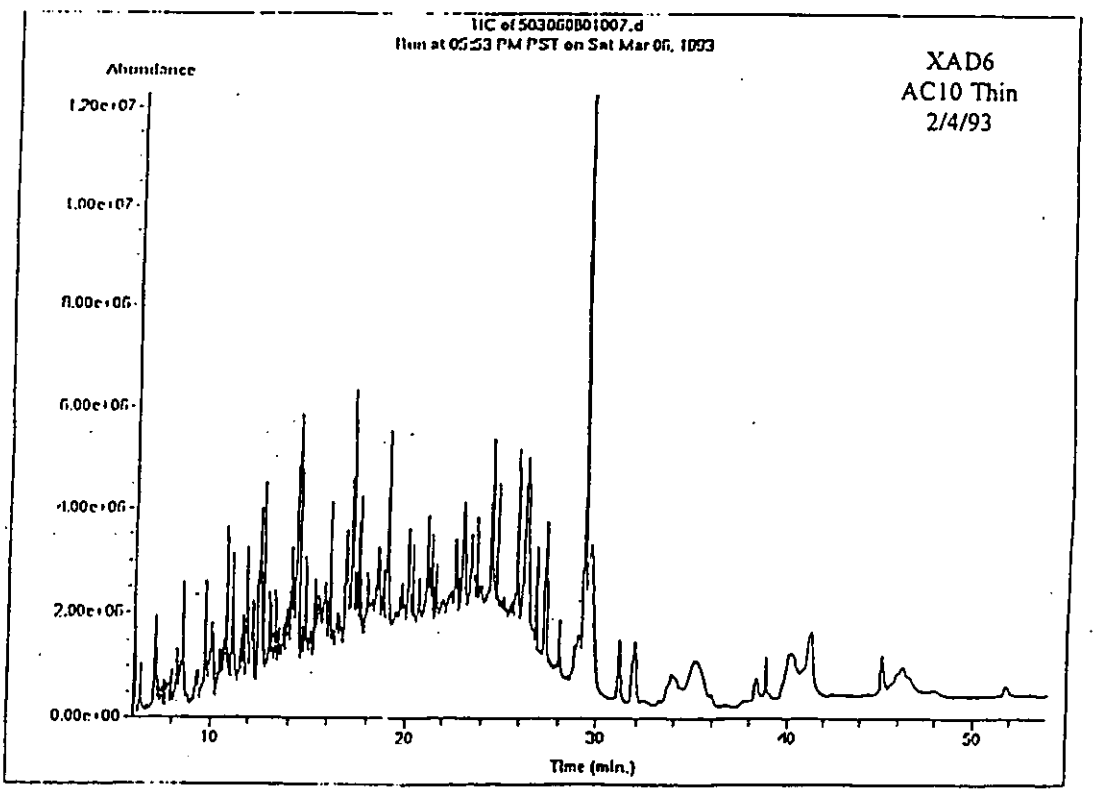
1/28/93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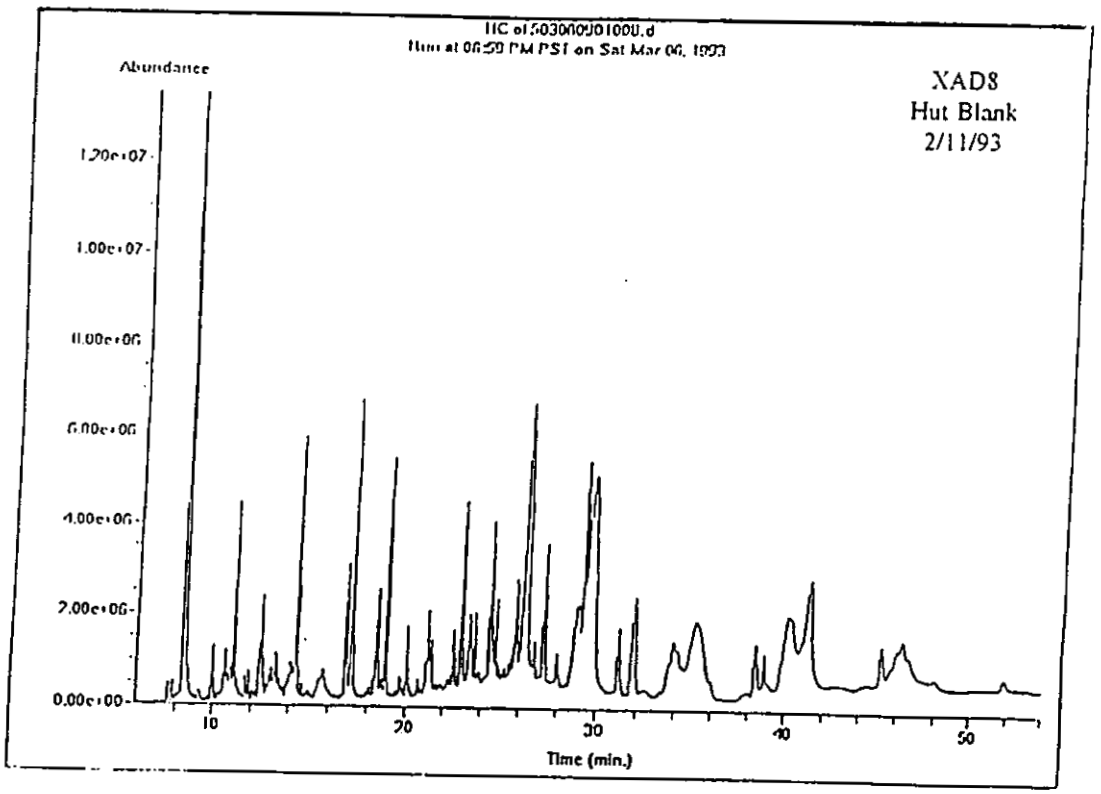
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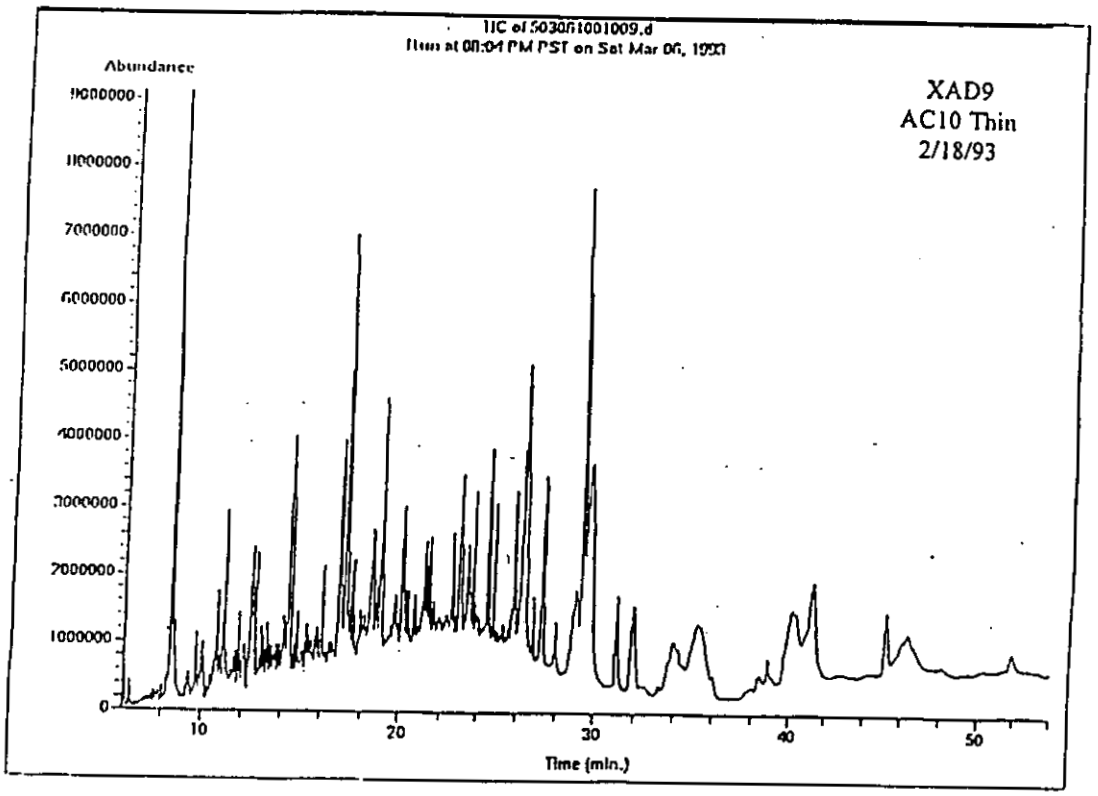
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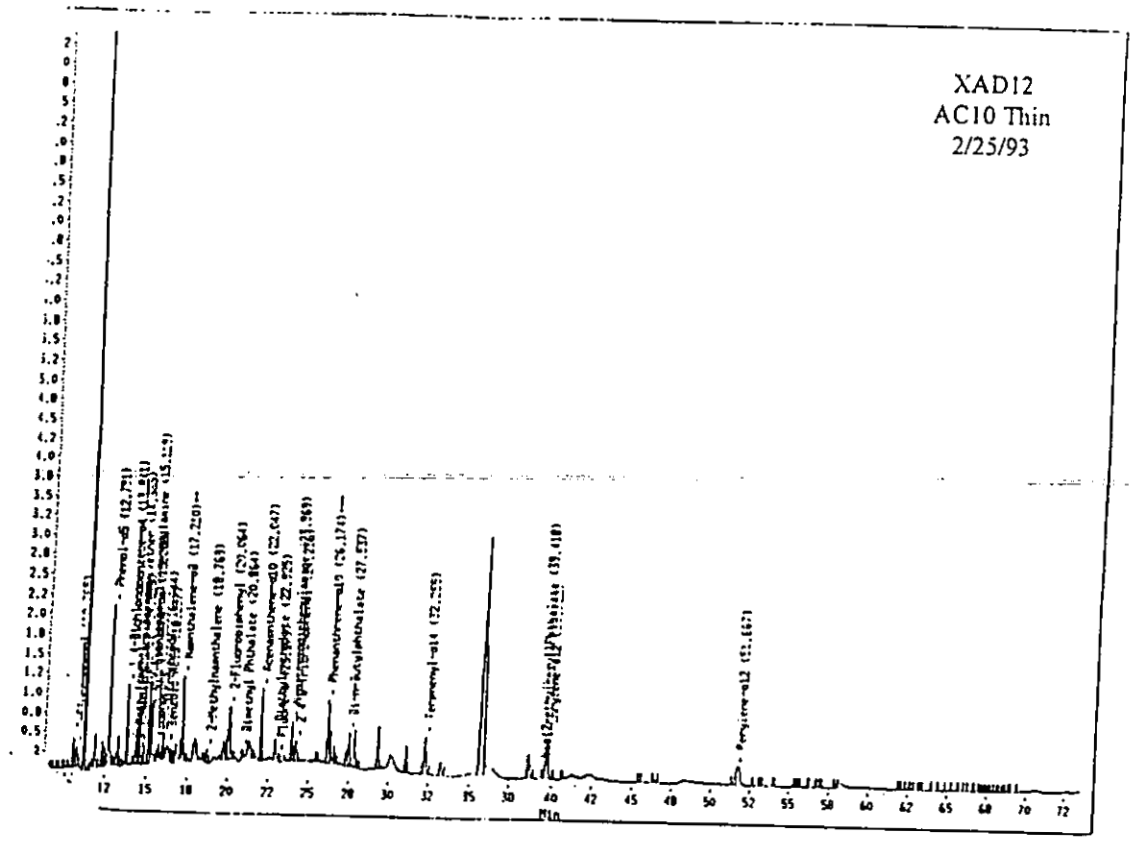
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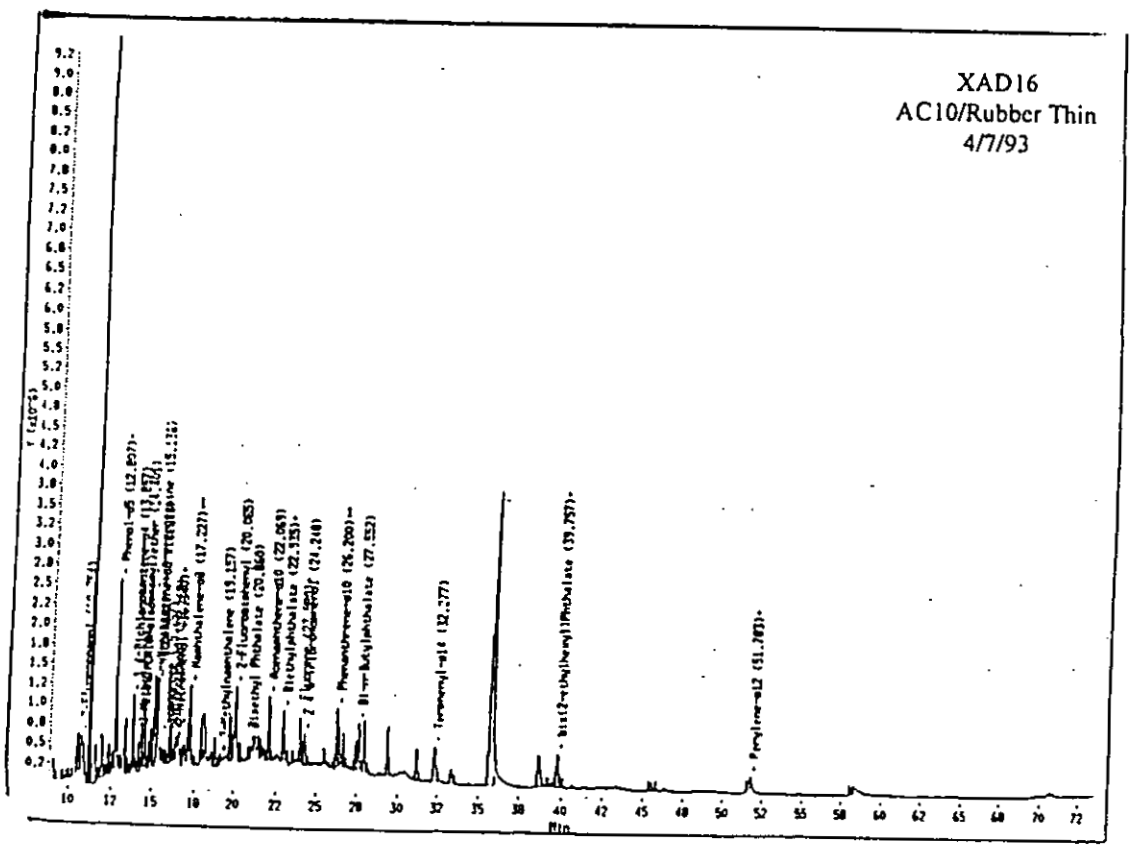
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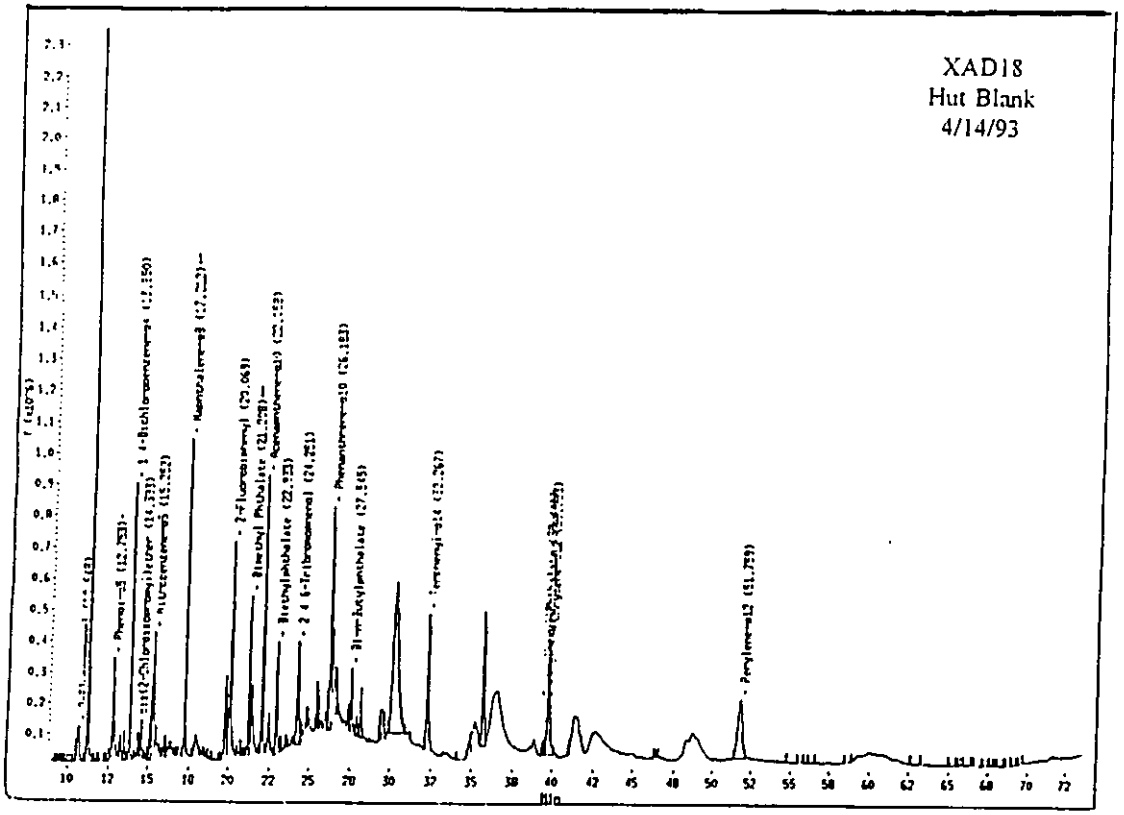
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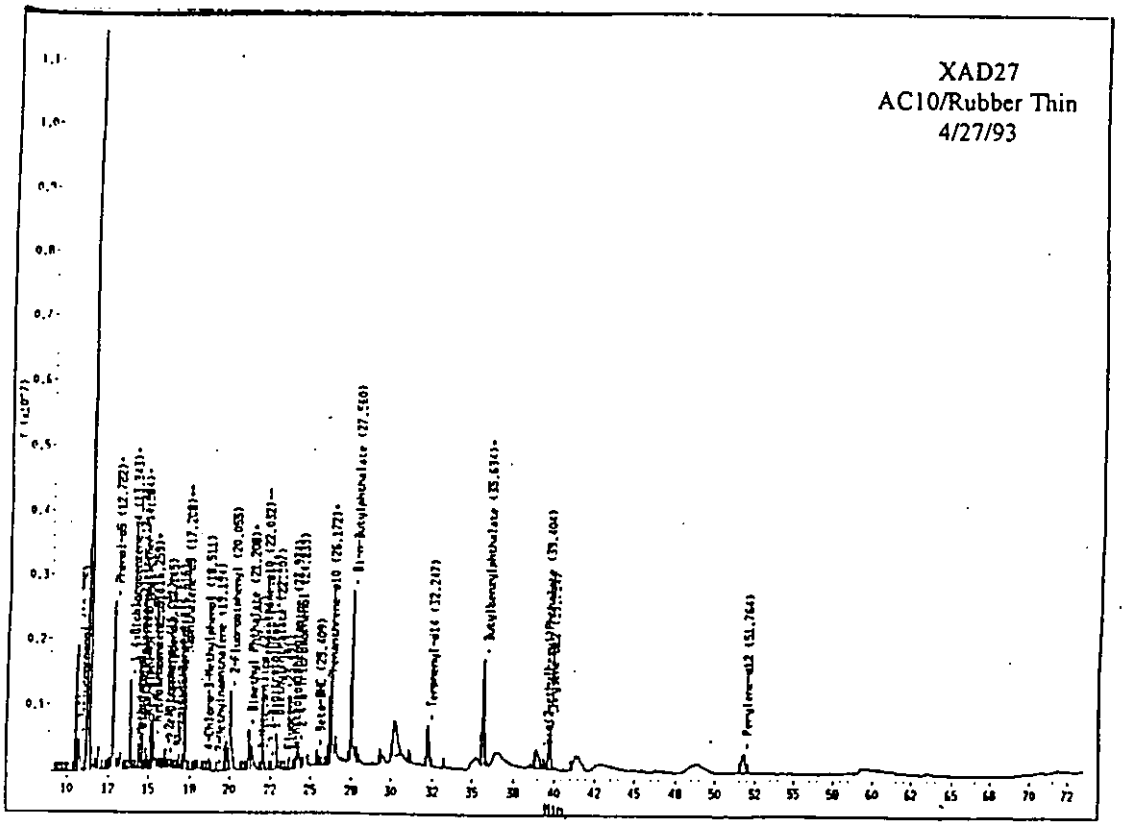
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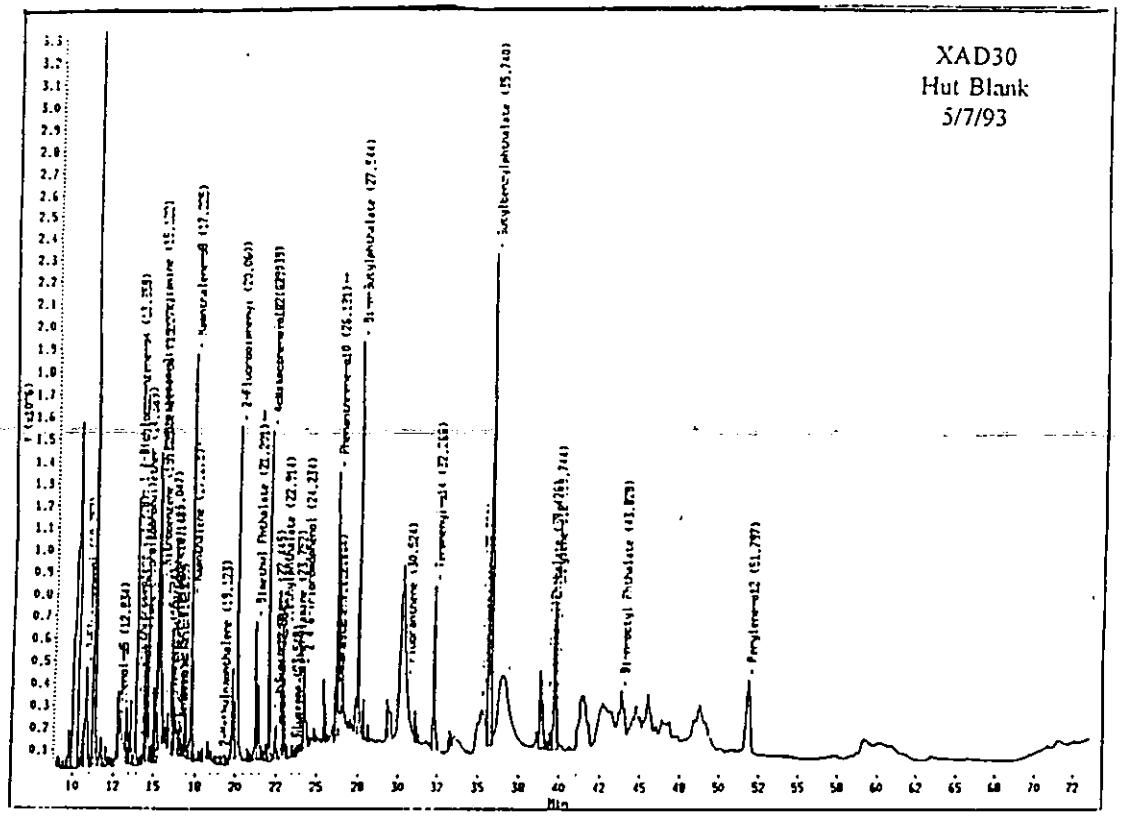
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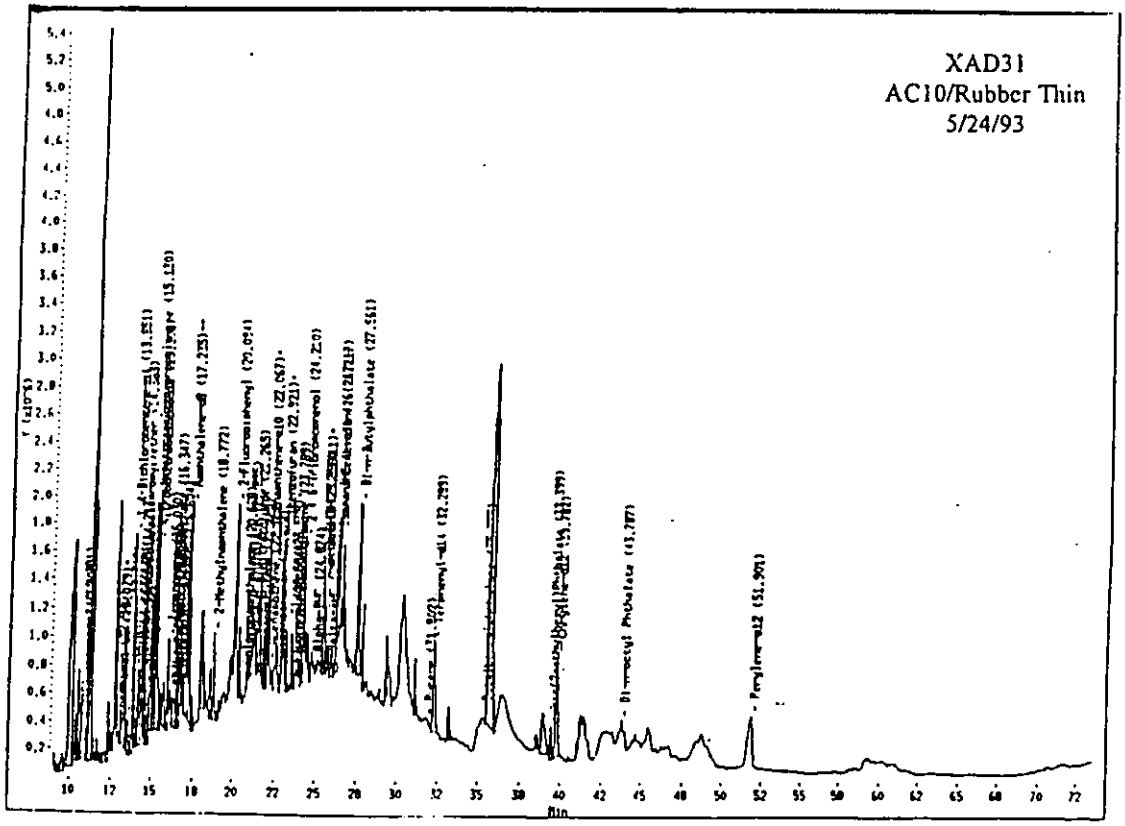
5/7/93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5/24/93

APPENDIX E

STANDARDS ADDITION ANALYSIS

Introduction

The method of standard additions is a well-known technique for counteracting interfering matrix effects (see for example Skoog, D.A. "Principles of Instrumental Analysis", 3rd Ed. Philadelphia; Saunders College Publishing, 1985 P210. and Bader, M. "A Systematic Approach to Standard Addition Methods in Instrumental Analysis", Journal of Chemical Education, 57(10):703-6, 1980). Because, as discussed in Section 4.9 of the text, concerns regarding interferences were not completely ameliorated by the use of the selected ion monitoring technique, it was decided to further investigate the possibility of interferences using a brief standards additions experiment.

Methodology

Unfortunately, limited project resources constrained this experiment in scope to the reanalysis of one sample (TF5) selected because it appeared to have a typically severe chromatographic resolution problem in the full-scan data set. The standards addition methodology was modeled after Bader's Case 5: Variable Total Volume with Continuous Variation of the Standard. Multiple 50 µL aliquots of sample TF5 were withdrawn from the final analytical volume of 1 mL. These aliquots were then treated with 0, 1, 2, 5, 25, 200 µL additions of a standard containing 5 ng/µL of the 16 PAH species listed in Table E-1. The mixtures thus generated were then analyzed using the selected ion monitoring method described in Section 2.10.2. Quantification in this instance was based not on the isotope dilution method (in which responses are quantified based on the ratio of the integrated area

of the analyte to the integrated area of a isotopically labeled internal standard) but on the standards additions calculations as presented by Bader (using the integrated area counts of the analyte as the instrument response). Using Bader's method the quantity (Vx + N * Vs) * Rn was plotted vs. N (Vx is the fixed unit volume of the unknown, N is a integer denoting how many increments of standard have been added to the mixture, Vs is the fixed unit volume of the standard and Rn is the instrument response.) A linear regression was then performed and the concentration of the analyte Cx was then determined from the equation Cx = b * Vs * Cs/(m * Vx), (b is the intercept and m is the slope of the regressed line, and Cs is the stock concentration of the standard). Unfortunately a computer failure resulted in the loss of data from the 25 and 200 µL additions.

Results and Discussion

The results calculated using the remaining four points are shown in Table E-1. The quality of the regression fit obtained was highly variable (r^2 = 0.412 - 0.99). This variability could in part be attributed to the fact that the addition of small amounts of standard had little impact on the concentration of compounds whose concentrations were high in sample TF5. Under these conditions a regression of a function of instrument response versus the number of increments of standard added would have a shallow slope and thus would be subject to analytical variability. The lost data, if available, would have made the standards additions analysis of some compounds less subject to this problem. However this reasoning does not explain all the nonlinear results observed since poor linearity is observed for some compounds (such as Anthracene) that appear to be in low concentration. The instances of non-linearity appear to be clustered in a elution order range from Phenanthrene to Chrysene (and especially from Phenanthrene to Pyrene) which corresponds to the middle of the unresolved peak seen on the sample chromatograms (see Appendix D).

When values derived using this SIM - standards additions approach are compared to values obtained using the SIM - isotope dilution approach, generally good agreement is found in the "fingerprint" of the concentrations of the various PAH species (Table E-1 and Figure E-1). Not

surprisingly, the agreement of concentrations appears to be worse in compounds with poor linearity in the standards additions experiment. The instances of poor agreement also appear to be clustered in a elution order range from Phenanthrene to Chrysene which corresponds to the middle of the unresolved peak seen on the sample chromatograms (see Appendix D).

TABLE E-1. STANDARDS ADDITIONS RESULTS

	Constant	X Coefficient	R^2	SIM - Standards Additions Calculated Concentration (ug/sample)	SIM (isotope dilution) Calculated Concentration (ug/sample)
Naphthalene	2373628	1113101	0.841	0.21	0.11
Acenaphthylene	906506	1226751	0.922	0.07	<0.05
Acenaphthene	803093	866786	0.900	0.09	<0.05
Fluorene	1213290	903425	0.907	0.13	0.05
Phenanthrene	34491996	2593430	0.617	1.33	2.93
Anthracene	6480584	931213	0.412	0.70	0.36
Fluoranthene	55833071	3865922	0.450	1.44	3.7
Pyrene	50571298	3538935	0.582	1.43	3.26
Benzo(a)anthracene	17110501	2926126	0.968	0.58	1.75
Chrysene	61153753	2894878	0.791	2.11	7.99
Benzo(b)fluoranthene	352080	959287	0.916	0.04	<0.05
Benzo(k)fluoranthene	18788542	1564003	0.993	1.20	1.77
Benzo(a)pyrene	6499156	977314	0.896	0.67	0.75
Indeno(1,2,3-cd)pyrene	2503304	687436	0.926	0.36	0.25
Dibenzo(a,h)anthracene	2716415	600465	0.855	0.45	0.32
Benzo(g,h,i)perylene	3383863	568627	0.916	0.60	0.36

Conclusion

This analysis would suggest that although the standards additions analysis generally supports the results of the isotope dilution analysis the presence of these unresolved interfering compounds may

still be causing inaccuracies in the quantitation of a subset of the PAHs of interest. Some form of cleanup or fractionation chromatography may be necessary as a part of the analysis for these species in future work with particulate derived from asphalt sources.

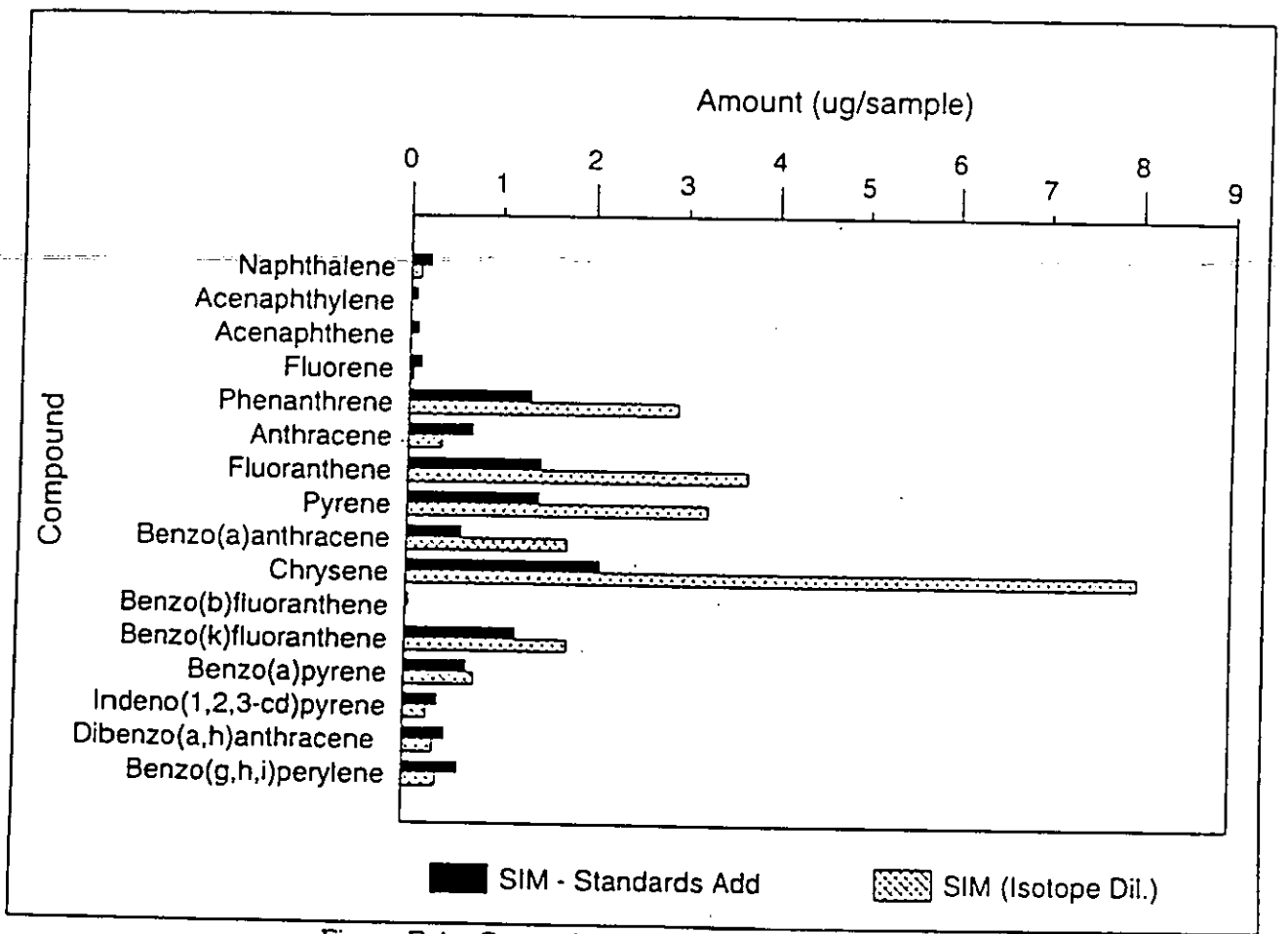

Figure E-1. Comparison of SIM standards addition (and SIM isotope dilution sample TF5).

TECHNICAL REPORT DATA (Please read Instructions on the reverse before completing)		
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4. TITLE AND SUBTITLE Evaluation of Emissions from Paving Asphalts		5. REPORT DATE August 1994
		6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) Christopher C. Lutes, Raymond J. Thomas, and Renee Burnette		8. PERFORMING ORGANIZATION REPORT NO.
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15. SUPPLEMENTARY NOTES AEERL project officer is Bobby E. Daniel, Mail Drop 61, 919/541-0108.

16. ABSTRACT The report provides data from pilot-scale measurements of the emissions of specific air pollutants from paving asphalt both with and without recycled crumb rubber additives. The methods used in this work measured emissions from a static layer of asphalt maintained for several hours near the highest temperature likely to be encountered in a "real" paving operation (176 C). Although concentration levels observed for most species were in most cases near the detection limits of the analytical methods applied, statistically significant emissions of a variety of pollutant species were observed. Volatile organic compound (VOC) analyses showed significant amounts of benzene emitted from both types of asphalt studied. An analysis targeting 16 polycyclic aromatic hydrocarbon (PAH) species of primary interest revealed significant emissions of 7 of the 16 species when the ACIO asphalt without rubber tests were compared to the facility blank tests. The emissions of 5 of 16 PAH species were significantly higher in the ACIO thin layer with rubber tests than in the facility blank tests. The concentrations observed, though significant, were close to the limit of detection. Statistically significant emissions of both total particulates and PM10 were found from both types of asphalt hot-mix material tested.

17. KEY WORDS AND DOCUMENT ANALYSIS			
a. DESCRIPTORS		b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Pollution Emission Flexible Pavements Paving Asphalts Benzene	Particles Elastomers	Pollution Control Stationary Sources Crumb Rubber Particulate	13B 14C 11L 08G, 13C 07C
18. DISTRIBUTION STATEMENT Release to Public		19. SECURITY CLASS (This Report) Unclassified	21. NO. OF PAGES 205
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