

## SECTION 4

### SAMPLING AND ANALYSIS PROCEDURES COSTS

The cost of performing stack sampling and analysis for toxic organic compounds will vary considerably depending on the degree of validation of the method. For compounds where a validated method is available the cost of collecting a sample and determining the concentration of a specific compound is provided in Table 4. In most cases duplicate or triplicate samples should be collected. For compounds assigned to sampling/analytical methods where a degree of success with sampling and analysis has been demonstrated but the methodology is not validated through spiking sampling trains and analysis of the components in the sample matrix of interest, field sampling must be preceded by laboratory spiking and analysis of samples taken from identical or similar matrices. Where no method has been investigated (i.e., methods were chosen using physical properties alone or previous experience with similar analytes), laboratory conditions for analysis of samples must be evaluated, analytical precision and recovery must be determined, and common interferences must be investigated (e.g., H<sub>2</sub>O, CO<sub>2</sub>, acids, laboratory solvents, hydrocarbons, coeluting compounds for chromatographic methods). Once analytical conditions have been determined, a full validation should be performed using the EPA protocol for method validation. A full method development and validation for a single analyte can cost more than \$20,000. Method validation for multiple analytes can frequently be performed efficiently at minimal additional cost.

The use of the cost figures presented in Table 4 assumes that the data quality objectives for the program where sampling/analysis is required do not require data to be generated that will be used for regulatory purposes. Furthermore, when the most generic methods available are applied to determine the broadest range of compounds simultaneously in a screening approach, significant compromises of individual compound precision and accuracy may be encountered.

Table 4

## Estimated Sampling and Analytical Costs

Source Methods	Average Cost Single Sample	Average Cost Triplicate Samples
Method 0010 Semivolatile Organics	\$ 7,460	\$ 22,380
Method 0011 Aldehydes/Ketones	\$ 6,780	\$ 20,340
Method 0030 Volatile Organics	\$ 6,080	\$ 18,240
Method 0012 Metals	\$ 8,180	\$ 24,540
Method 18 GC/General	\$ 5,660	\$ 18,240
Method 23 PCDD/PCDF	\$ 12,140	\$ 36,420
CARB 427 Asbestos	\$ 7,200	\$21,600
Method 26 Halo-acids	\$ 5,170	\$ 15,510
Method 13/14 HF	\$ 5,170	\$ 15,510
Method 15 H <sub>2</sub> S and CS <sub>2</sub>	\$ 6,430	\$ 19,290
CARB 429 PAH/POM	\$ 6,640	\$ 19,920
Radionuclides/Particulate	\$ 6,780	\$ 20,340
Radionuclides/Part.+Gases	\$ 8,180	\$ 24,540
TO-01 Aromatic VOC	\$ 3,240	\$ 9,720
TO-02 Halocarbon VOC	\$ 3,240	\$ 9,720
TO-04 PUF/Biphenyls	\$ 5,330	\$ 15,990
TO-05 Aldehydes	\$ 3,570	\$ 10,710
TO-06 Phosgene	\$ 3,460	\$ 10,380
TO-07 N-NitrosoDPA	\$ 3,060	\$ 9,180

Table 4  
(Continued)

Source Methods	Average Cost Single Sample	Average Cost Triplicate Samples
TO-08 Phenols	\$ 2,800	\$ 8,400
TO-09 PCDD&PCDF-HRMS	\$ 7,090	\$ 21,270
TO-10 PUF/Pesticides	\$ 4,670	\$ 14,010
TO-11 Aldehydes	\$ 2,940	\$ 8,820
TO-13 PUF-XAD/PAH	\$ 4,370	\$ 13,110
TO-14 VOC Canisters	\$ 3,490	\$ 10,470
NIOSH 2515 Diazomethane	\$ 3,240	\$ 9,720

Assumptions:

Standard stack sampling is occurring concurrently at the site.

Audit personnel are already at the site for criteria pollutants.

Travel to or from the site by sampling personnel is not included in costs.

Only one sample of a given type will be taken.

Efficiencies are possible when multiple samples are taken per episode.

ODC costs include one night lodging and two days per diem.

Each train requires only one person in the field for sampling.

Laboratory analysis includes sample preparation, analysis, validation of results.

Laboratory results are forwarded to the project team in tabular format.

Reporting costs involve inclusion of laboratory results into a larger project report.

As an example, the cost to add screening for semivolatile organic compounds should encompass: test plan revisions, presampling sampling train preparation, onsite train setup, actual sampling, sample recovery from the train, laboratory analysis which may require specialized techniques to include non-routine analytes, data interpretation and reporting. The cost to perform this addition to an existing program is on the order of \$30,000. This cost does not include any in-stack spiking or method validation procedures, nor does the cost include any laboratory presampling/preanalysis method development.