HOSPITAL WILDFIRE SMOKE CONTAMINANTS

Joe Spurgeon 09-11-19

METHODS

The contaminants and sampling method included in the study were listed in Table 1. The NIOSH sampling methods were selected because they were quantitative, standardized, validated, and could be applied in a consistent manner.

Table 1. Contaminants and sampling methods

Contaminant	Method	Assessment
Total Carbon	NIOSH 5040	Accessible Surfaces

NIOSH: National Institute for Occupational Safety and Health

NIOSH Method 5040. Combustion particulate was collected on a 37 mm glass fiber filter that had been heat treated to 700 ºC to remove organic binders. Since binders had been removed, the filter was easily degraded by rough surfaces.An area of 1.5 cm^2 was punched out of the center of the 10.8 cm^2 filter by the laboratory and analyzed for Elemental Carbon (EC), Organic Carbon (OC), and Total Carbon (TC = EC + OC)using Evolved Gas Analysis (EGA). Sample media and analyzes were provided by ALS Environmental, Salt Lake City, UT.

Hard Surfaces. The heat-treated filters that were used as wipes were supplied in individual plastic cases. The filter was removed from its protective case using disposable latex gloves, the filter was folded into quarters, and the center of the filter was repeatedly wiped across an area estimated to be 4 square inches. An area template was not used since some surfaces were irregular. The filter was returned to the protective case and labeled. Samples collected from hard surfaces using wipe samples were reported in units of micrograms per sample (ug/sample).

RESULTS AND DISCUSSION

Total, Elemental, and Organic Carbon

Source of Particulate

The probable sources of surface particulates were assessed using the criteria in Table 2 and Table 3. The source assessment was based on the concentrations of TC, OC and EC detected on accessible surfaces. The OC/TC ratio, the percent of EC in the particulate, and the OC/EC ratio can be associated with the source of the particulate. The parameters for burning wood and vegetation were described in Table 2.[(1)]

Table 2. Particulate from burning wood and vegetation

Source	OC/TC Ratio	EC (%)
Vehicles (average)	0.58	- -
Coal Burning	0.73	26%
Wood Burning (dry)	0.81	12%
Vegetation Burning	0.93	- -
Forest Fire (wet)	0.94	3%
Charcoal Cooking	0.95	- -

Thirteen surface samples were collected in the indoor environment and submitted for analysis. The results were reported in Table 3.

Table 3. OC/TC Ratios of Sampled Surfaces.

SAMPLE	OC (ug)	EC (ug)	TC (ug)	EC (%)	OC/TC
1	50	0.9	50	1.8	1.0
2	61	0.9	61	1.5	1.0
3	160	6.6	170	3.9	0.94
4	29	0.9	29	3.1	1.0
5	83	0.9	83	1.1	1.0
6	270	6	280	2.1	0.96
7	51	0.9	51	1.8	1.0
8	16	0.9	16	5.6	1.0
9	420	39	460	8.5	0.91
10	76	1.8	77	2.3	0.99
11	33	0.9	33	2.7	1.0
12	48	0.9	48	1.9	1.0
13	240	2.3	240	1.0	1.0

Conclusions:

EC (%): Inconclusive but consistent with a forest fire or burning vegetation

OC/TC Ratio: Consistent with burning wood and vegetation

Therefore, it was concluded that the smoke from the adjacent wildfire reached the air intakes of the hospital and did affect the indoor environment.

REFERENCES

1. Chow, J., Watson, J. Guideline on Speciated Particulate Monitoring; US EPA, RTP, 1998.

.