

# Chemical Fume Hood Commissioning: $\text{SF}_6$ vs. $\text{N}_2\text{O}$

Presentation to the Fugitive Emissions Work Group

May 12, 2011

Presented by Peter D. Pohlott

**BROOKHAVEN**  
NATIONAL LABORATORY

*a passion for discovery*



# Chemical Fume Hood Commissioning

Building	Project	Directorate	Low Flow Hoods	SF <sub>6</sub> pounds
555	RSL II	BES	38	152
510	Renovation	BES	6	24
703	Lab	PO	2	8
734	ISB	Multi	60	240
480	Renovation	BES	20	80
<b>TOTAL</b>			<b>126</b>	<b>504</b>

As indicated in the table above, BNL will be installing 126 new high efficiency, low flow lab hoods within the next two years.

ASHRAE 110 reveal that 30-50% of the hoods tested, which meet industry standard face velocity specifications, have leakage rates that exceed industry guidelines.

BNL is specifying that the lab hoods be tested as manufactured, and as installed. The energy efficiency of these hoods is considerable, but must be made safe for the users.

# Chemical Fume Hood Commissioning

The accepted ASHRAE 110 test method utilizes sulfur hexafluoride ( $\text{SF}_6$ ) as the tracer gas to determine hood performance. Section 4.1.2 of this method allows the substitution of another gas, as long as certain conditions are met.

Considering 1 test per low flow hood as manufactured and installed (2 pounds per test) at least 504 pounds of  $\text{SF}_6$  would be released over the next 1-2 years.

## Sulfur Hexafluoride ( $\text{SF}_6$ ) Awareness

DOE Office of Health, Safety and Security safety bulletin No. 2009-01, providing information on the environmental and sustainable management of sulfur hexafluoride ( $\text{SF}_6$ ) at DOE sites.  $\text{SF}_6$  is an extremely potent greenhouse gas.

# Chemical Fume Hood Commissioning

At BNL, the Safety & Health Services Division and the Environmental Protection Division are in the process of investigating alternatives to using SF<sub>6</sub>, as part of the ASHRAE 110 test method, for newly installed hoods.

Interpretation IC 110-1995-1 of  
ASHRAE Standard 110-1995  
Method of Testing Performance of Laboratory Fume Hoods

“The data generated by Mr. Burke indicates that Nitrous Oxide may be an appropriate substitute for Sulfur Hexafluoride.”

# Chemical Fume Hood Commissioning

The release of one ton of SF<sub>6</sub> is equivalent to 23,900 tons of Carbon Dioxide (CO<sub>2</sub>).

Release of one ton of N<sub>2</sub>O is equivalent to 310 tons of Carbon Dioxide (CO<sub>2</sub>).

**If BNL uses SF<sub>6</sub>, to test these lab hoods, 5,564 MTCO<sub>2</sub>e will be released.**

**Using N<sub>2</sub>O, lab hood testing emissions would be 71 MTCO<sub>2</sub>e.**