

Los Alamos National Laboratory

Radiation Protection Group RP-2

Aerosol Engineering Facility Wind Tunnel

2010 Air Monitoring Users Group Meeting, Las Vegas, NV

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AEROSOL ENGINEERING FACILITY GROUP RP-2 (Radiation Protection) LOS ALAMOS NATIONAL LABORATORY

Murray E. Moore, Ph.D., P.E.

Programs and Capabilities

**Airborne radioactivity sampler testing

ANSI N42-17B-1989

**Radioactive air emissions stack engineering

ANSI N13.1-1999

**EPA-compliant air sampler testing

US EPA 40 CFR 53.42

**Nuclear-grade HEPA filter engineering

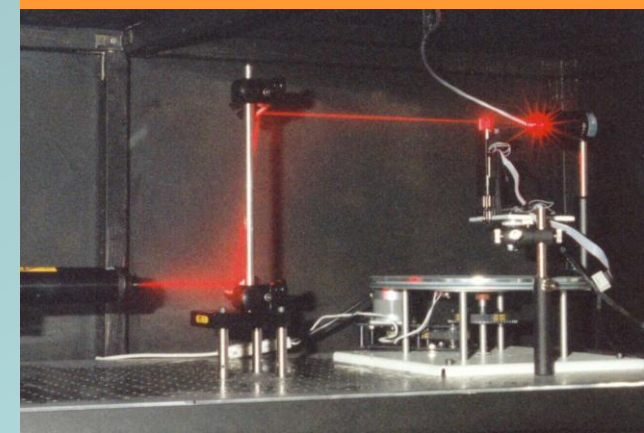
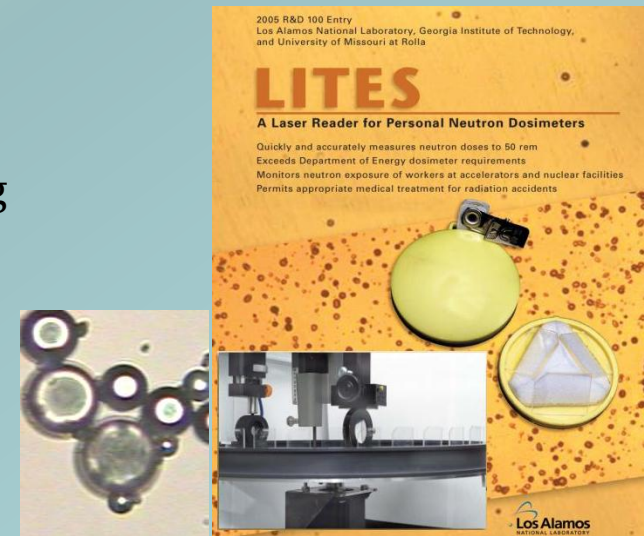
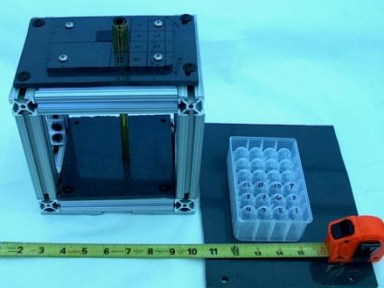
ASME AG-1a-2004

**Ventilation studies and tracer gas analysis

ASTM E741-93

**Bioaerosol consulting programs

**Track etch neutron dosimetry



****EPA-compliant air sampler testing**

US EPA 40 CFR 53.42

****Airborne radioactivity sampler testing**

ANSI N42-17B-1989

****Radioactive air emissions stack engineering**

ANSI N13.1-1999

****Engineering studies for nuclear-grade
HEPA filters**

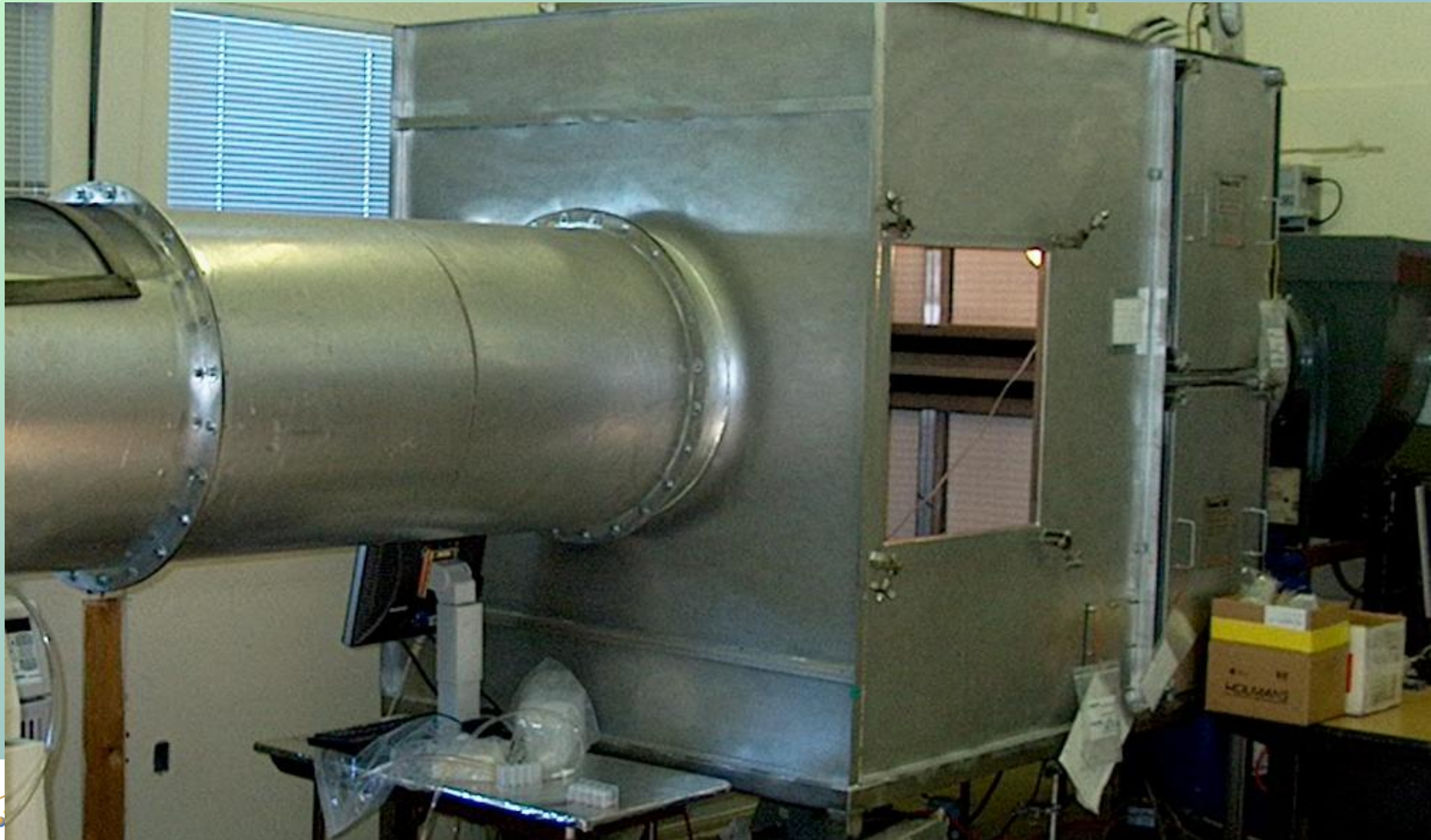
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****Ventilation studies and tracer gas analysis**

ASTM E741-93

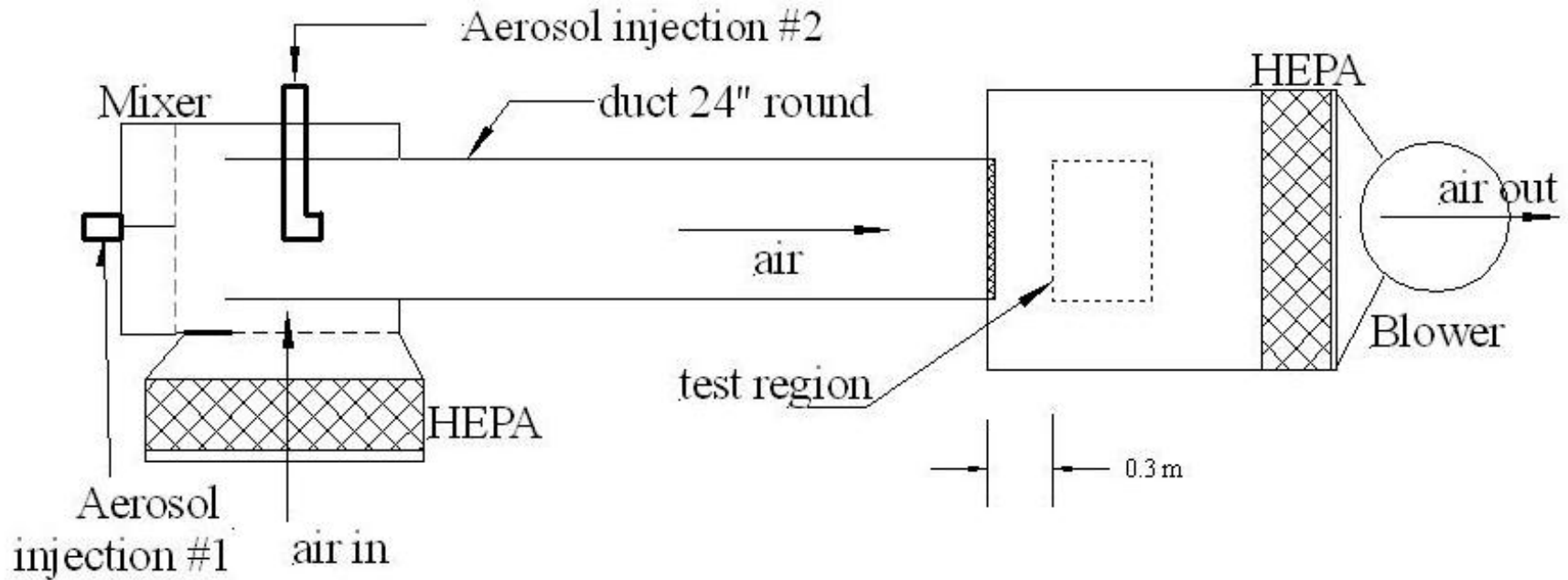
**EPA-compliant air sampler testing

US EPA 40 CFR 53.42





TOP VIEW



*** Wind tunnel requirements for EPA-compliant air sampler testing**

*** 15% area max blockage by tested sampler**

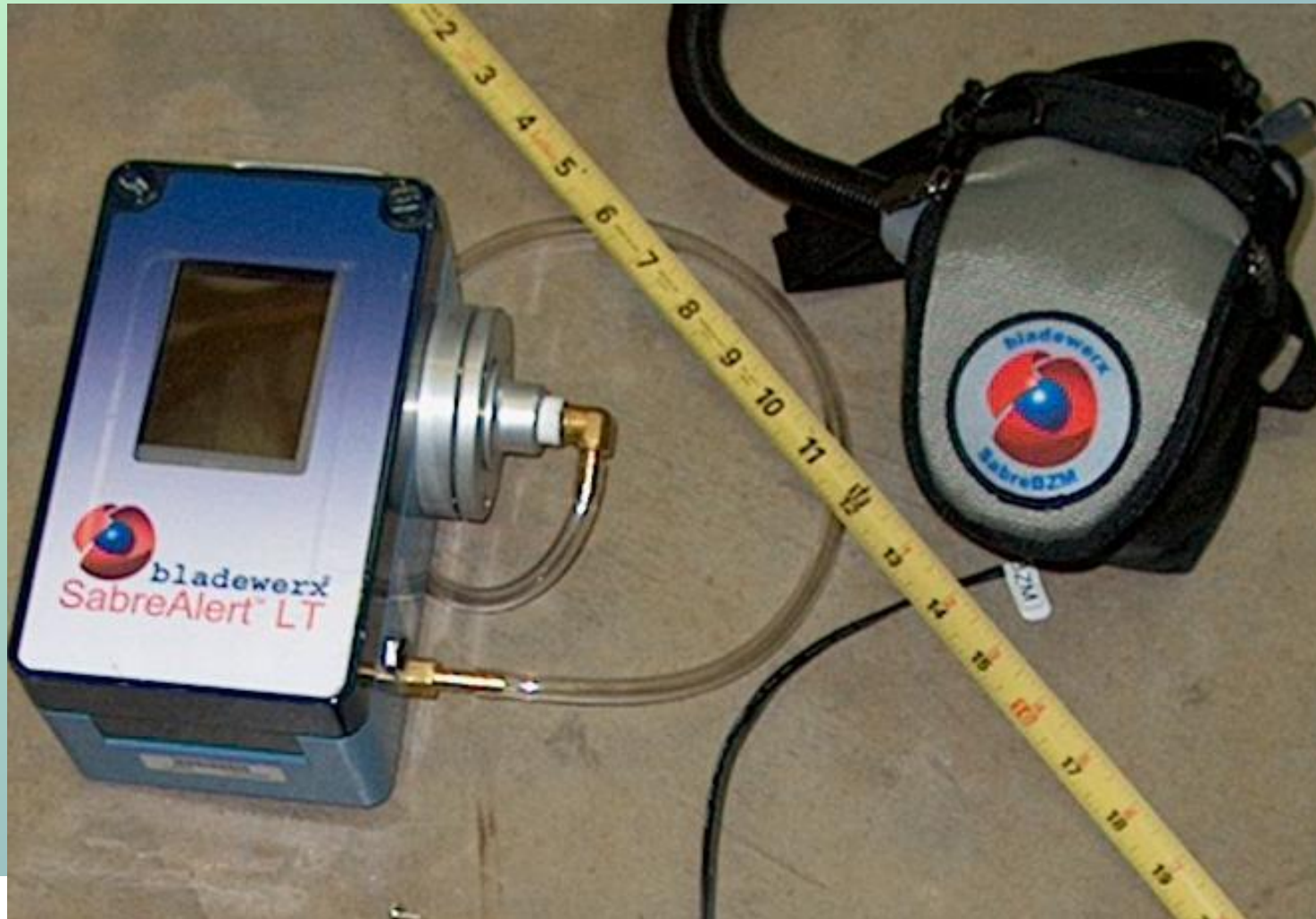
*** Velocities (0.5, 2.2, 6.7 m/s)**

*** Aerosol concentration $\pm 10\%$ of mean**

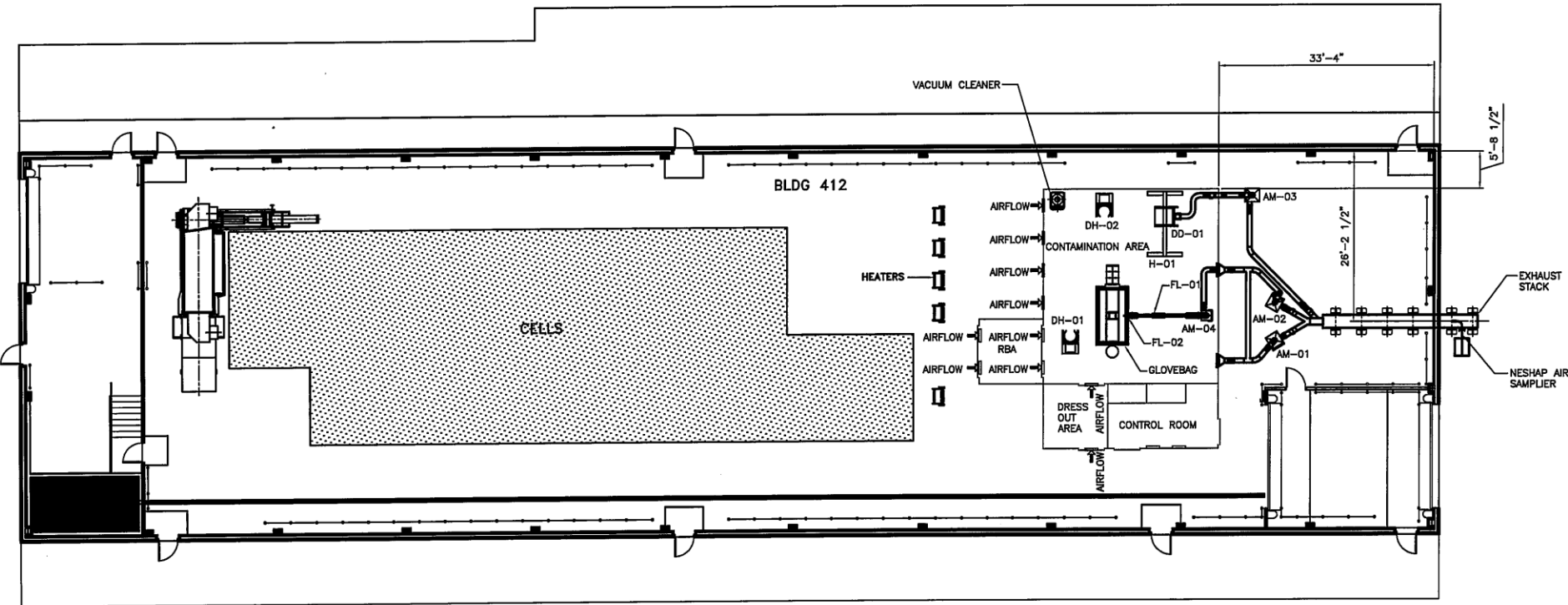
*** Air velocity uniformity $\pm 10\%$ of mean**

*** Measure turbulent eddy size scale**

**Airborne radioactivity sampler testing ANSI N42-17B-1989

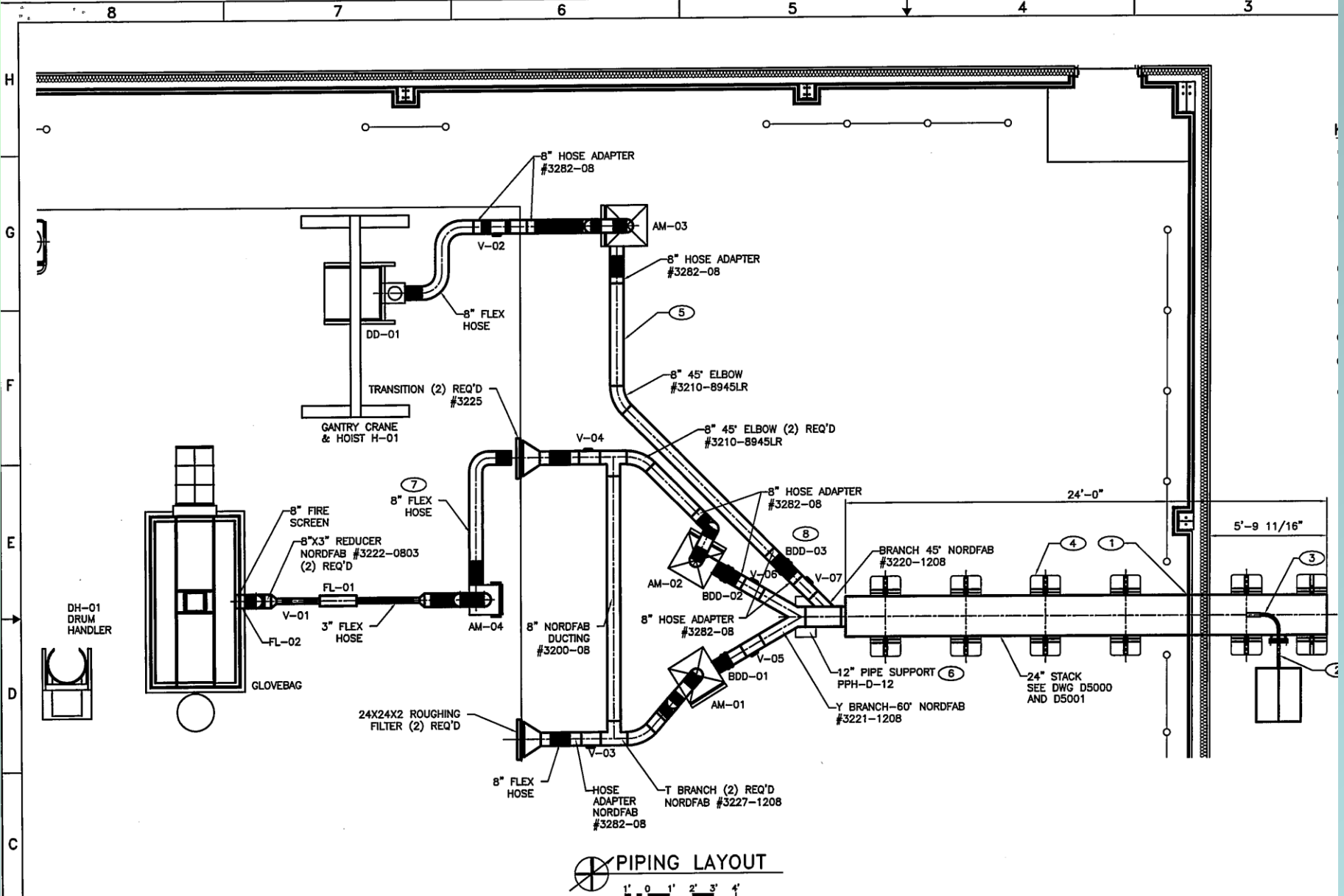


**Radioactive air emissions stack engineering ANSI N13.1-1999



CONTAINMENT TENT ARRANGEMENT IN BLDG. 412

1/8"=1'-0"



VALVE LIST

ENERGY SOLUTIONS

176 CENTRAL PARK SQ.
LOS ALAMOS, NM 87544

Entry
6" dia
pipe

1 ft =
Duct Dia

to pump

Shrouded
probe

Filter

Open end
discharge

10 * Duct Dia =
10 feet
Upstream of
Sample

2 * Duct Dia =
2 feet
Downstream
of sample

Concept: Medium Universal Sampler (ANSI N13.1-1999 compliant)
Source: David P. Fuehne (LANL)

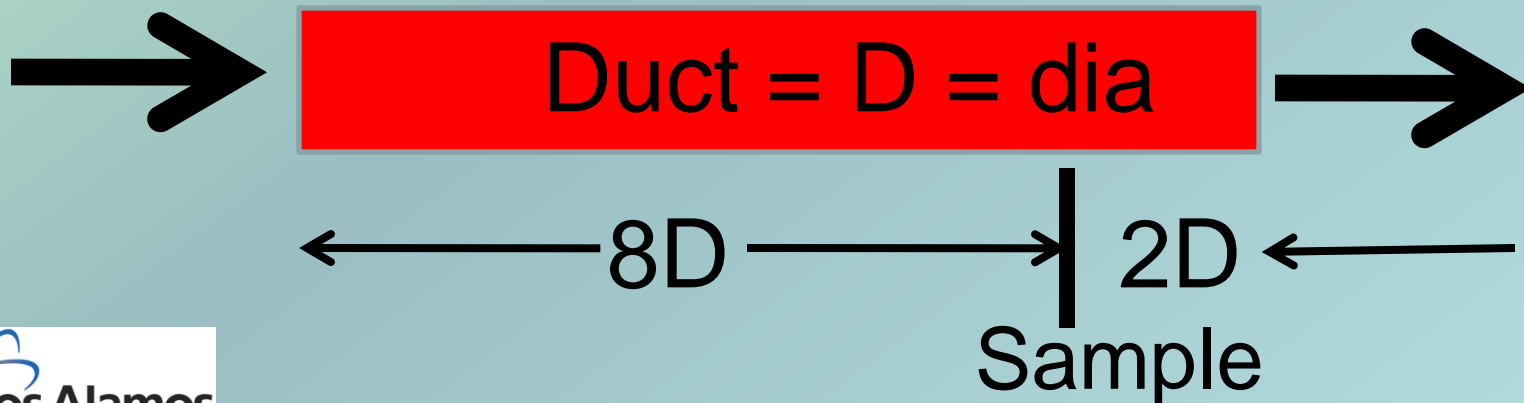
ANSI N13.1-1999 compliant duct:

Sample site:

8*D downstream and
2*D upstream of

“any flow disturbance such as a bend, expansion,
contraction”, etc.

From 40CFR60 App. A, Methods 1-2



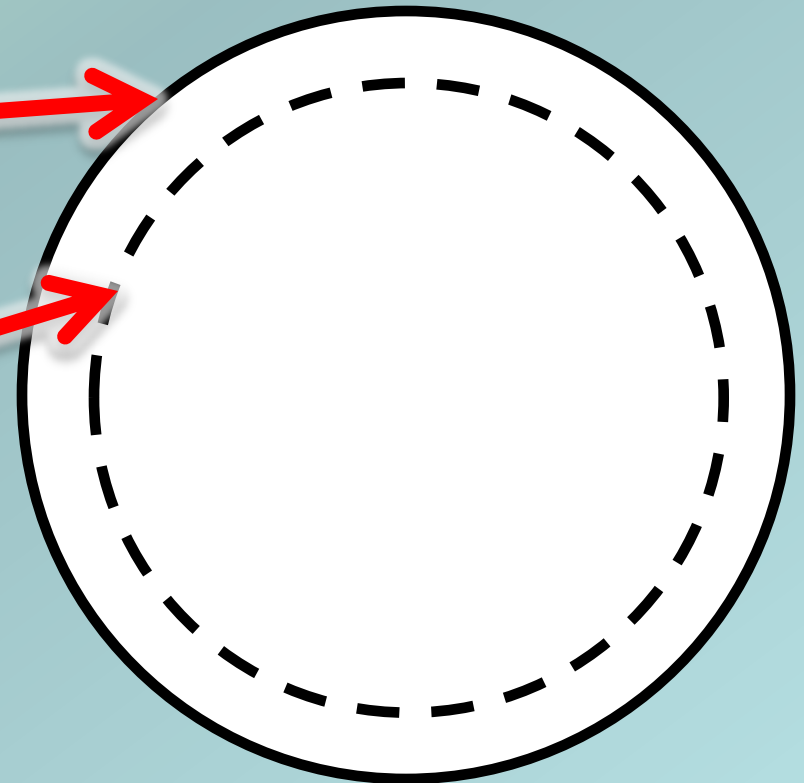
COV = Coefficient of Variation =

$$\frac{100\% * 1 \text{ STD}}{\text{AVG reading}}$$

For a 12-inch
diameter duct,

2/3 area,

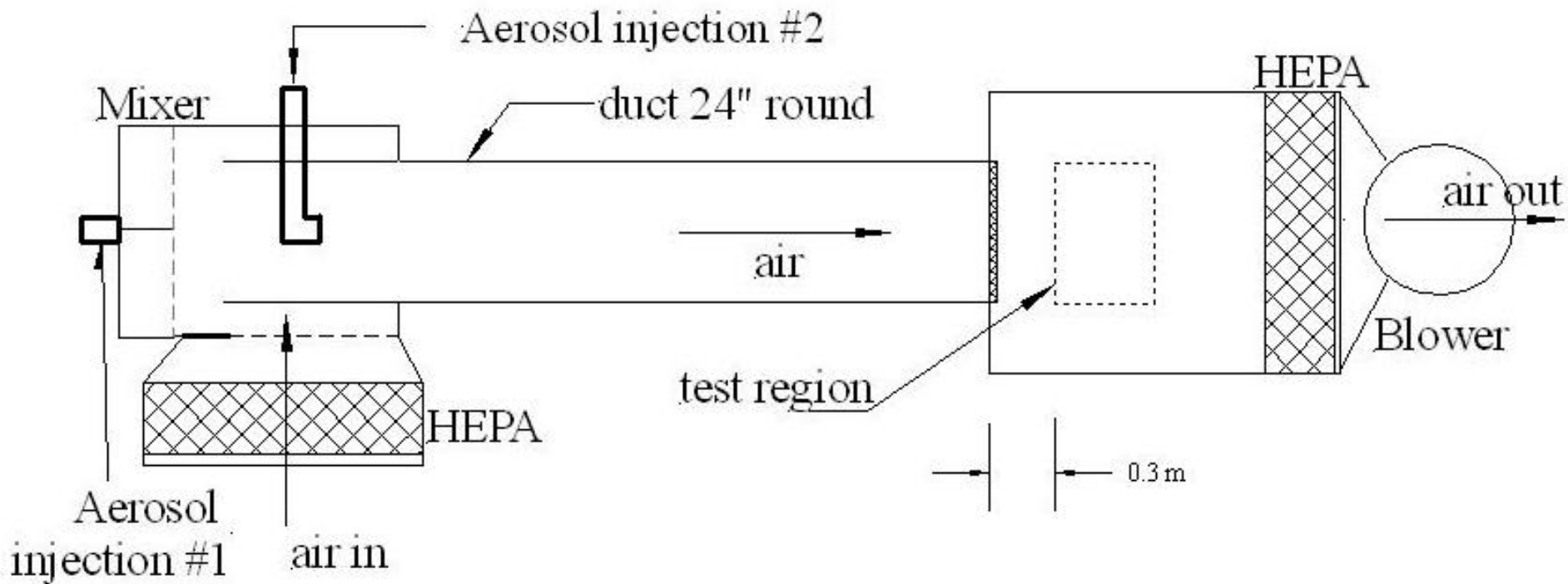
$D_{2/3} = 9.8$ inches.



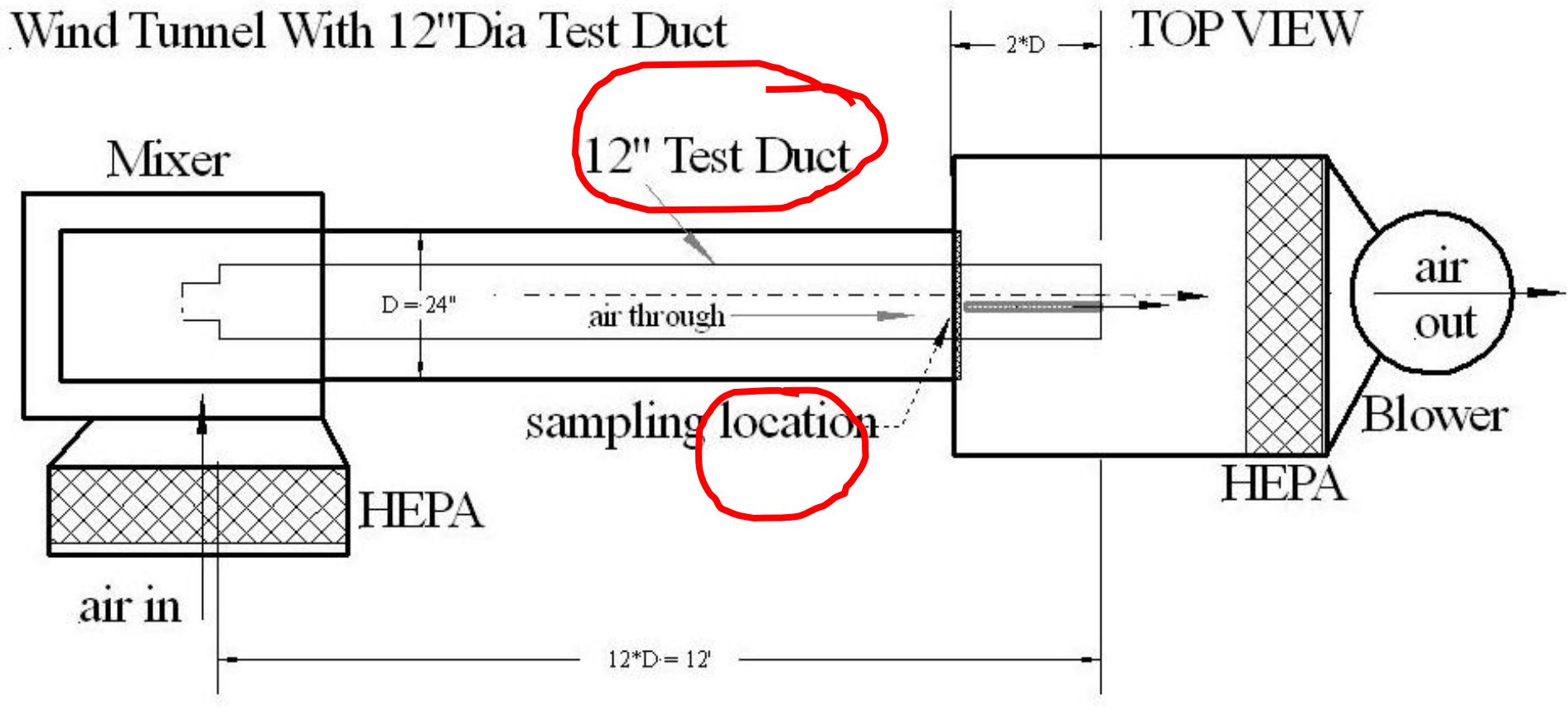
Velocity profile:	COV \leq 20% over center 2/3 duct area
Cyclonic flow:	average total angle $<$ 20 ⁰
Tracer gas conc:	COV \leq 20% over center 2/3 duct area
Max tracer conc	\leq 1.3*average value
Aerosol particle conc:	COV \leq 20% over center 2/3 duct area

Los Alamos Wind Tunnel – Original Layout

TOP VIEW



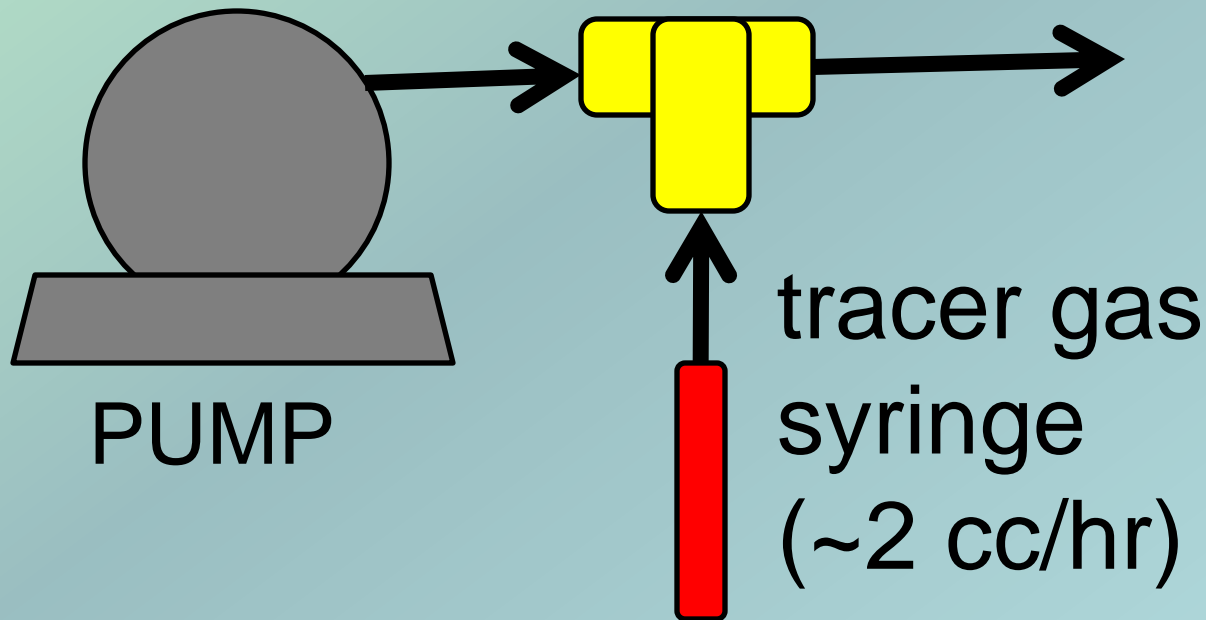
Wind Tunnel With 12" Dia Test Duct

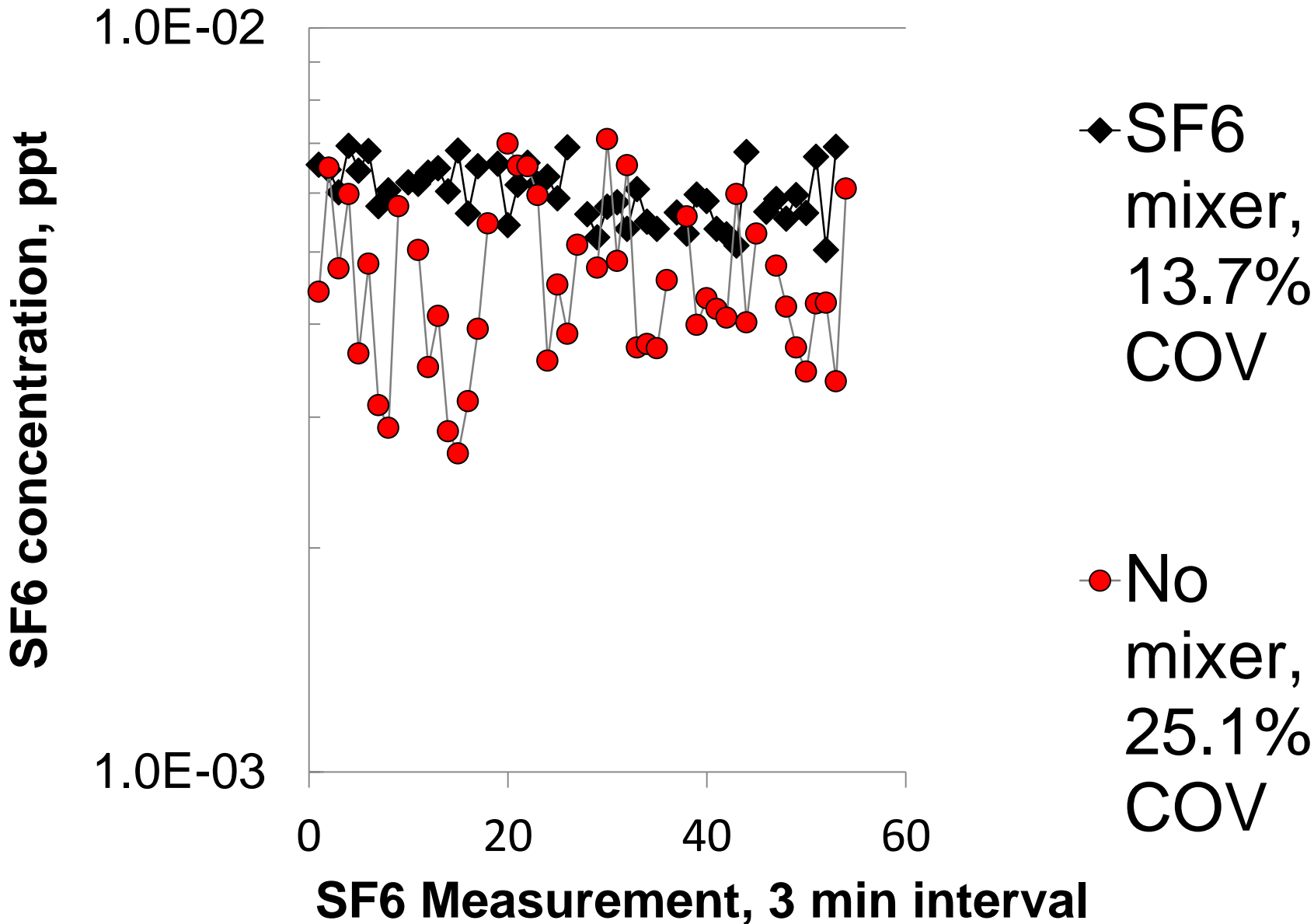


Tracer Gas Mixer – needed for uniform test results

air in
~ 1 CFM

air + gas
to wind tunnel



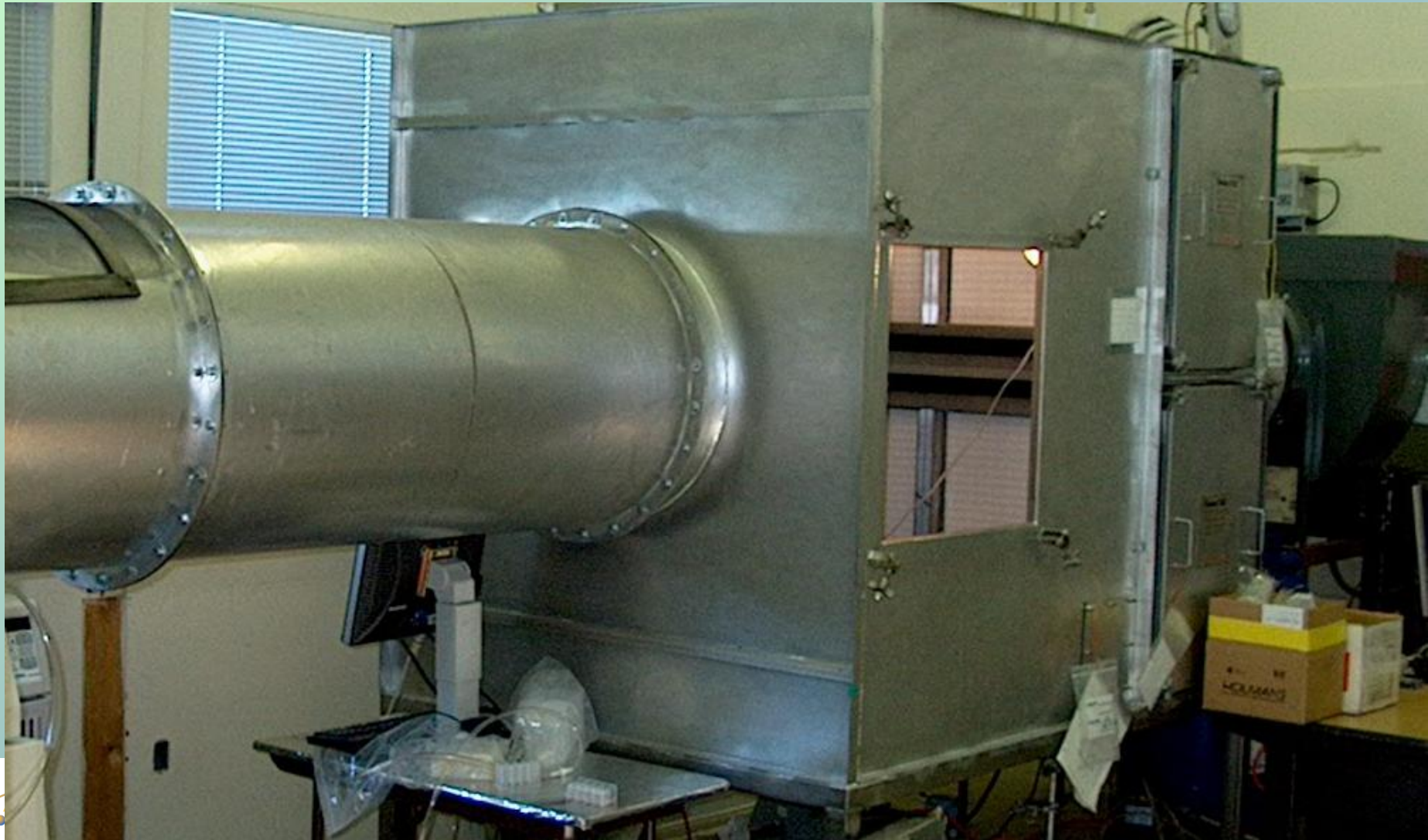


Engineering studies for nuclear-grade HEPA filters

ASME AG-1a-2004

**EPA-compliant air sampler testing

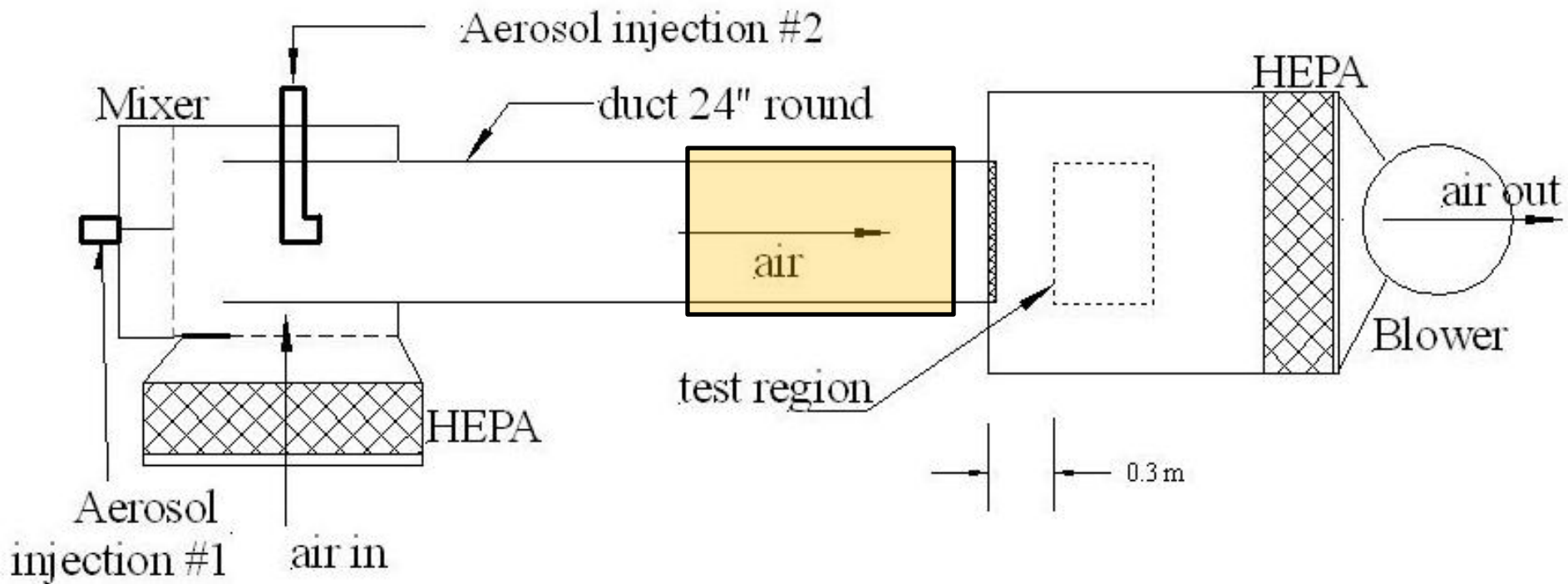
US EPA 40 CFR 53.42





Los Alamos Wind Tunnel

TOP VIEW



END