

Thank You for Attending Today's Webinar



Your Host

Tom Douglas
Sales
RAECO-LIC LLC
tom@raeco.com



Our Featured Speaker

Ron Roberson
Industrial Hygienist/H&S Technical Manager
Sensidyne
rroberson@sensidyne.com

Personal Air Sampling for Crystalline Silica Exposure



New OSHA Silica Standard Overview

- ◉ Effective 6/23/16
- ◉ New PEL is 50 $\mu\text{g}/\text{M}^3$ for an 8 hour TWA
- ◉ Employers must provide engineering controls to limit the exposure to the PEL or lower
- ◉ Employers must provide PPE (i.e., respirators) whenever engineering controls are inadequate
- ◉ Employers must provide medical screening and training

OSHA Standard Overview Continued

- ◉ Compliance for construction industry by 6/23/17
- ◉ Compliance for general industry by 6/23/18
- ◉ Compliance for fracking by 6/23/21 (5 yrs) for engineering controls and 6/23/18 (2 yrs) for all else
- ◉ Air sampling is covered in Appendix A

Traditional Sampling Methods for Respirable Crystalline Silica

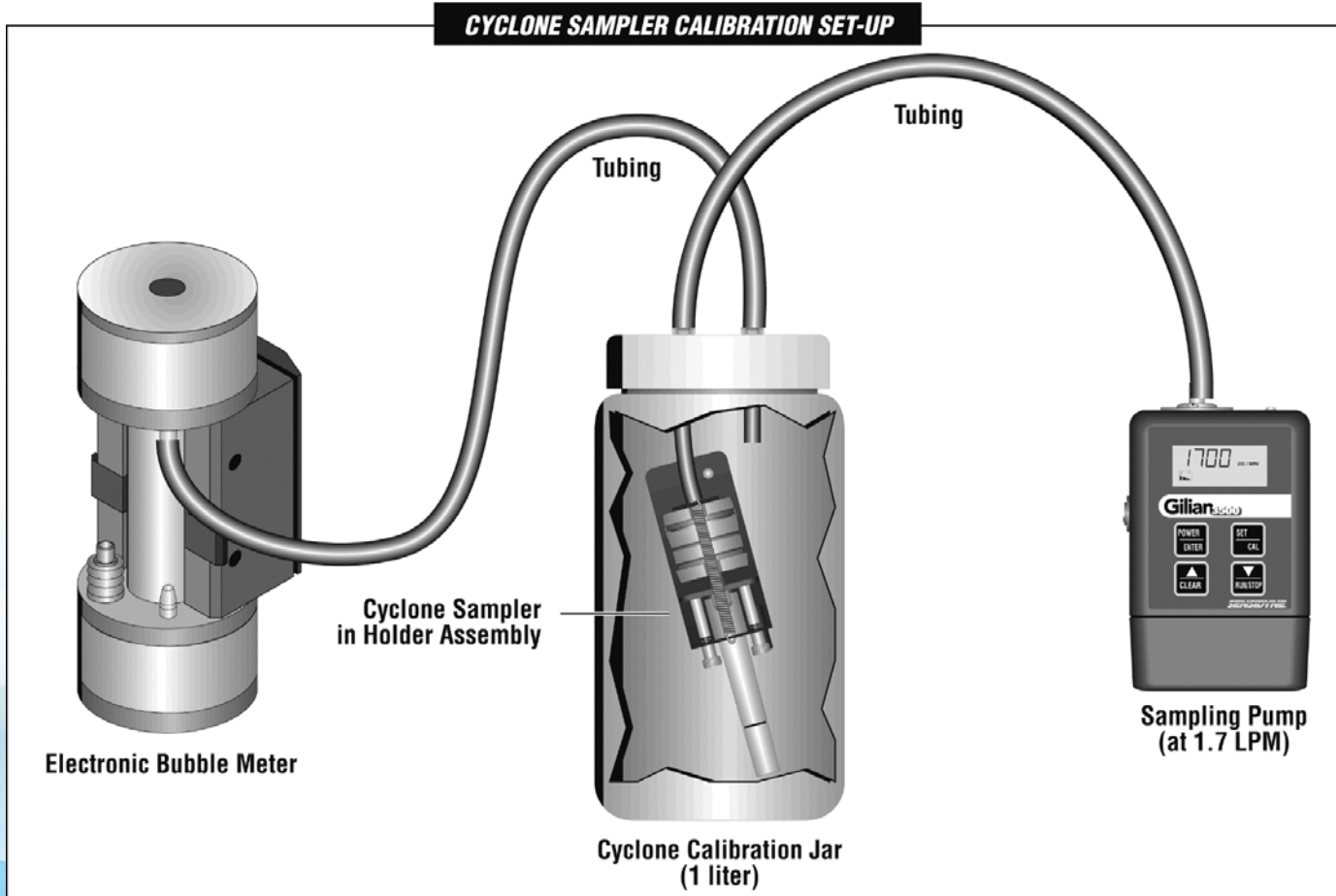
- ⦿ NIOSH 7500: Crystalline Silica via XRD
- ⦿ NIOSH 7601: Crystalline Silica via Visible Spec
- ⦿ NIOSH 7602: Crystalline Silica via IR
- ⦿ OSHA ID-142: Crystalline Silica via XRD
- ⦿ Field methods were similar, but lab method varied

Traditional Cyclones for Respirable Silica Sampling

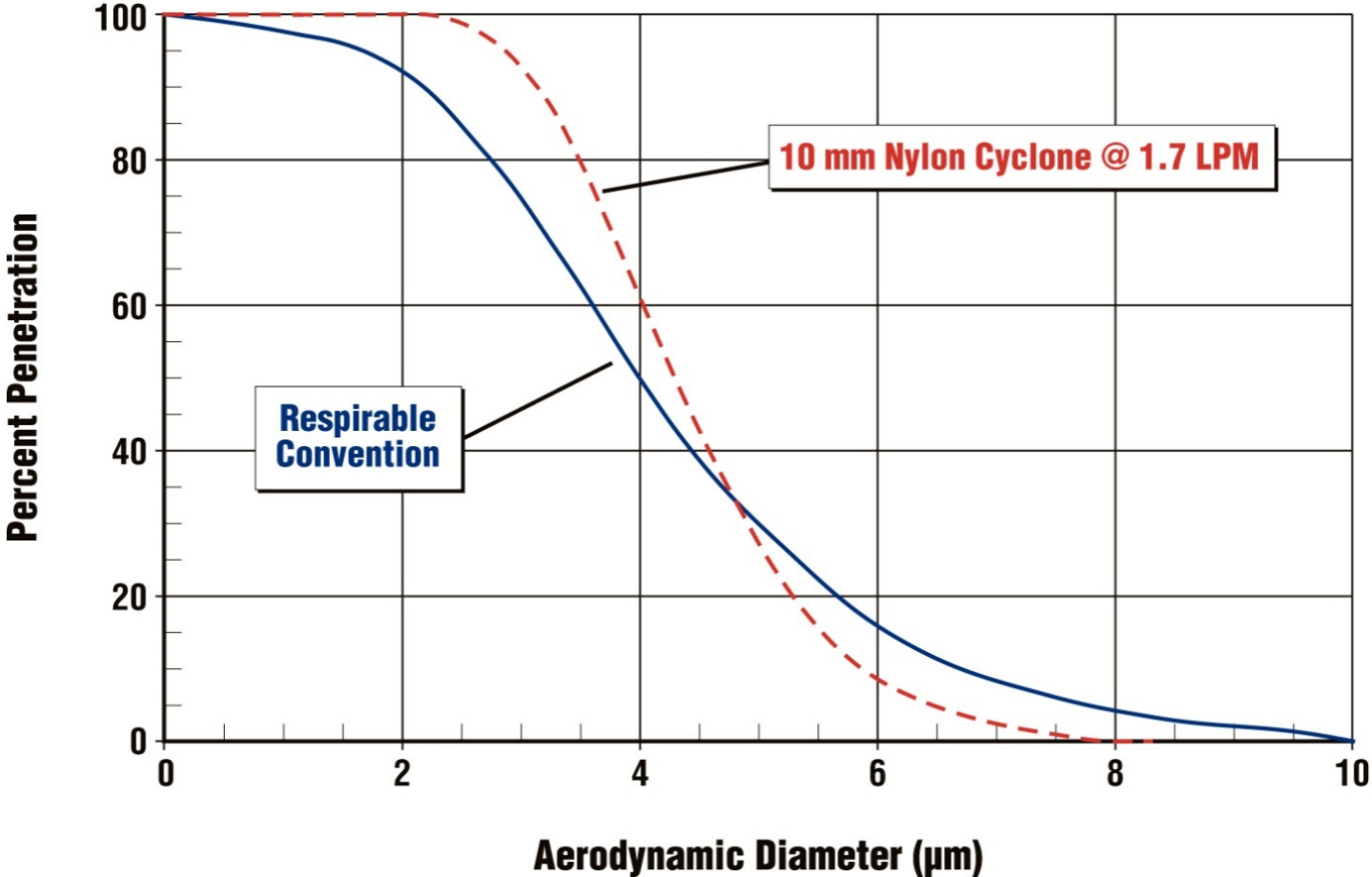
- ⦿ Dorr-Oliver 10 mm Nylon Cyclone at 1.7 LPM
- ⦿ Higgins-Dewell Cyclone at 2.2 LPM
- ⦿ Aluminum Cyclone at 2.5 LPM



Cyclone Calibration Jar For Dorr-Oliver Cyclone



Particle Size Distribution-US ACGIH



High Flow Rate Cyclones

- ⦿ GK 2.69 at 4.2 LPM
(37mm NIOSH
Cassette)
- ⦿ GK 4.162 RASCAL
at 9 LPM (47mm)
- ⦿ FSP-10 at 11.2 LPM
(37mm Euro
Cassette)



NIOSH Testing of High Flow Cyclones

- Performance of High Flow Rate Samplers for Respirable Particle Collection; NIOSH; Lee, Kim, Chisolm, Slaven & Harper; *Amer Occup Hyg*; Vol 54, No. 6, 2010.
- Quartz Measurement in Coal Dust with High-Flow Rate Samplers: Laboratory Study; NIOSH; Lee, Lee, Kim, Chisolm, Kashon & Harper; *Amer Occup Hyg*; Vol 56, No. 4, 2011.
- Evaluation of the Penetration Characteristics of a High Flow Rate Personal Cyclone Sampler for NIOSH; Andrew Thorpe, Health & Safety Laboratory, UK, 12/19/2011

Gilian Cyclones

Cyclone Model	Part Number	Construction Material	Overall Height (mm)	Approximate Weight in (Kg)	Flow rate ACGIH Respirable (50% @ 4 µm) (US)	Flow rate BMRC Respirable (50% @ 5 µm) (Europe)	Flow rate Thoracic (50% @ 10 µm)
10 mm Dorr-Oliver	800061	Nylon	160	0.08	1.7 LPM		
BGI-4L, HD style (US version)	811-9924-01	Aluminum	105	0.15	2.2 LPM	2.0 LPM	1.0 LPM
FSP-2 HD style-European Version	811-9930-01	Aluminum	130	0.14	2.2 LPM	2.0 LPM	
Medium flow rate GK 2.69 for 37 mm Cassettes	811-9926-01	Aluminum	125	0.10	4.2 LPM		1.6 LPM
High flow rate RASCAL Cyclone with Plastic Filter Holder	811-9925-01	Aluminum	170	0.26	8.5 to 9.5 LPM		
FSP-10, High flow rate cyclone	811-9931-01	Aluminum	203	0.26	11.2 LPM	10 LPM	

Gilian 10i High Flow Sampling Pump



- ◉ 4 – 10 LPM Flow Rates
- ◉ Backpressure Capability up to 50" H₂O @ 4 LPM
- ◉ Intrinsically Safe Certified
- ◉ Built on the Proven-reliable Gilian 5000 Platform

Gilian 12 High Flow Sampling Pump

- ◉ Flow Rates from 4 – 12 LPM
- ◉ Extreme Backpressure
Capability to 67" H2O @ 4LPM
- ◉ Designed for high Flow Rate
Cyclones
- ◉ Ideal for Sampling Trains
Creating High Backpressure
Across the Entire Sampling
Period



Appendix A: Methods of Sample Analysis

- ⦿ “This appendix specifies the procedures for analyzing air samples for respirable crystalline silica, as well as the quality control procedures that employers must ensure that laboratories use when performing an analysis required under 29 CFR 1926.1153 (d)(2)(v)”.
- ⦿ References the six methods as acceptable for the laboratory analysis methodology & specifies minimum QA.
- ⦿ Makes the statement: “Optimizes methods and instruments to obtain a quantitative limit of detection that represents a value no higher than 25 percent of the PEL based on sample air volume”.

Methods Listed in Silica Standard For Lab Reference

Method No.	Analysis	Published Limit of Detection
OSHA ID-142	XRD, Redeposition	12.0 µg/m ³ (qtz)
NIOSH 7500	XRD, Redeposition	5 µg
NIOSH 7602	IR, KBr Pellet	5 µg
NIOSH 7603	IR, Redeposition	10 µg
MSHA P-2	XRD, Redeposition	20 µg
MSHA P-7	IR, Redeposition	20 µg

Limit of Detection

- ◉ The LOD for the lab method is listed in each sampling method (e.g., 5 µg of silica)
- ◉ The laboratory LOD should also be stated on the lab report in µg. Ask for it ahead of time
- ◉ Divide this weight by the sample volume to obtain the LOD in µg/M3 (“...no higher than 25 percent of the PEL based on sample air volume”)
- ◉ Sample volume may be calculated by flow rate X sample time (1.7 L/Min x 480 minutes = 816 L= 0.816 M3)
- ◉ In this example 5 µg of silica/ 0.816 M3 = 6.12 µg/M3

Methods Listed in Silica Standard and Calculated Limit of Detection

Method No.	Analysis	LOD (1.7LPM)
OSHA ID-142	XRD, Redeposition	12.0 µg/m ³ (qtz)
NIOSH 7500	XRD, Redeposition	6.12 µg/m ³ (8 hr)
NIOSH 7602	IR, KBr Pellet	6.12 µg/m ³ (8 hr)
NIOSH 7603	IR, Redeposition	12.24 µg/m ³ (8 hr)
MSHA P-2	XRD, Redeposition	24.48 µg/m ³ (8 hr)
MSHA P-7	IR, Redeposition	24.48 µg/m ³ (8 hr)

Air Sampling Review

- ⦿ Must have a large enough sample to obtain a maximum limit of detection of 12.5 micrograms per cubic meter (i.e., 25% of 50 micrograms per cubic meter). “Optimize(s) methods and instruments...”
- ⦿ Must use the analysis by XRD or IR, as described in the six listed methods.
- ⦿ The laboratory must meet minimum specified QA requirements.

Air Sampling Equipment Review

- ⦿ Always observe the cyclone flow rate specification for meeting the ACGIH size selection curve (50% at 4 microns).
- ⦿ Always use a constant flow control pump that will keep the flow rate at +/- 5% of set flow.
- ⦿ A medium flow cyclone can meet the detecting limit in a 4 to 8 hour sample and still be comfortable to wear.



THANK YOU

www.Sensidyne.com

800-451-9444 / 727-530-3602



A company of the **SCHAUENBURG** International Group

Sensidyne sampling pumps are available to rent at our partner company RAECO Rents!

Visit there website to learn more: www.raecorents.com

Get Social with RAECO



- Our Website
 - www.raeco.com
- Our Blog
 - Blog.raeco.com
- Follow us on LinkedIn
 - www.linkedin.com/company/raeco-lic-llc
- Follow us on Twitter
 - [@RAECOLIC](https://twitter.com/RAECOLIC)
- Check Out our YouTube Channel
 - www.youtube.com/user/RaecoVideos

Upcoming Webinar:

Improving Remote Worker Safety

Tuesday, July 26 1pm CST



Featured Speaker

Louis Basque

National Channel Sales Manager

CAN Telematics

Webinar invitation e-mail coming soon...