

AFFIDAVIT OF FREDERICK W. BOELTER
Tyndall Effect Lighting

STATE OF ILLINOIS §
 §
COUNTY OF COOK §

I, Fred W. Boelter, being first duly sworn, deposes and states as follows:

1 I am a Principal of Boelter & Yates, Inc. - Environmental Engineers and Scientists. Boelter & Yates, Inc.'s headquarters are located at 1300 Higgins Road, Suite 301, Park Ridge, Illinois.

2 I am a licensed professional engineer and certified industrial hygienist. I have worked as an environmental engineer and industrial hygienist since 1973. I have designed, inspected, tested, and validated many types of ventilation systems during my career. I have also designed, monitored and certified completion of many types of asbestos abatement projects. A copy of my Curriculum Vitae is attached as Exhibit 1.

3 All scientific fields, including engineering and industrial hygiene, rely upon reliable, reproducible, relevant, and accepted methodologies from which to draw sound conclusions.

4 Turbidity is caused by the scattering of light by particles in a liquid or a gas. The turbidity value provides information about the concentration of solids in liquids and gaseous media. Practical interpretation of turbidity is achieved by comparison with a standard suspension.¹

5 One process that takes place when light is scattered is diffraction. The angle of light scatter depends on the size of the particle. The diffracted light radiated from a particle is also known as the Tyndall Effect.

6 The Tyndall Effect is observed with the light source in front and somewhat to the side of the viewer as the diffracted light is visible from this angle.²

7 Simple light reflection off an object, as observed by the viewer from behind the light source, is not diffraction and therefore is not the Tyndall Effect.

8 Without calibration and application protocol, the use of the Tyndall Effect is not accepted in the industrial hygiene professional as a reliable scientific method:

"Aerosol photometry can usually only provide an approximate analysis of particulate, classified according to particle size in industrial surveys. This is because calibrating the instrument with each type of particulate to be measured in (sic) not practicable. The great variations in shape, size, agglomerative effects, and refractive indices of the various components in a given dust suspension make such calibrations virtually impossible. Whereas photometry can indicate the particulate concentration in the different size ranges of interest, it is usually necessary to perform size distribution analyses by microsieving or microscopic procedures." ³

9 The use of the Tyndall Effect has been offered to the "practical engineer":

"... the practical engineer may find (Tyndall beam illumination) extremely useful in determining the order of magnitude of an emitted dust cloud, either from an existing (dust control) installation or when testing new capture hood designs" ⁴

10 I have never used, and know of no other engineer or industrial hygienist who has used, Tyndall Effect lighting as a practical method of evaluating a dust control installation or open air emission source.

11 The use of air sampling is acknowledged as the "only absolute method" of testing:

"The only absolute method (for testing) is to sample the airborne particles in the vicinity of the machine, usually for asbestos by drawing air through a membrane filter. The membrane filter... is then examined using phase-contrast microscopy. This (PCM) method... produces highly accurate results." ⁵

12 The use of light scattering (Tyndall Effect) is not a method specified by any governmental agency for determining the concentration of or migratory pathway of airborne aerosols or particulates.

13 Prior to promulgating the Asbestos Hazard Emergency Response Act, the US Environmental Protection Agency suggested the use of a dark room and flashlight beam as a alternative test to establish that the "no dust" on surfaces requirement has been met following an abatement activity. This is not the Tyndall Effect. Further, an airborne test as "aggressive sampling" of air is the specified pass/fail criteria.

"Examine all surfaces for dust and debris... and then inspect the cloth for evidence of dust.. (as) a practical way to establish that the "no dust" requirement has been met. A more sensitive test for dust is to darken the room and shine a flashlight so that the beam just glances any smooth horizontal surface. Run

your finger across the illuminated area. If a line is left on the surface, or if airborne particles shine in the light, dust is still present* ^{6, 7}.

14 There is no correlation between surficial dust and airborne concentrations of dust whether or not the dusts are observable by Tyndall Effect lighting.

15 Air sampling, and not visual assessment, is the method of quantifying completion of an asbestos removal action as specified by the AHERA rules promulgated in 1987.⁸

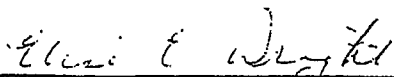
16 Personal air sampling, and not visual assessment, is the method of determining concentrations of asbestos fibers in air. ^{9, 10}

Further Your Affiant Sayeth Not.

DATED:



Subscribed and sworn to before me
this 17th day of November, 2000.



Notary Public



1. Scattered Light, Sigrist Process-Photometer, http://www.photometer.ch/en/abc/abc_110.htm
2. Asbestos, Volume 2, Edited by S.S. Chissick and R. Derricott, John Wiley & Sons, 1983, Page 198.
3. Patty's Industrial Hygiene and Toxicology, Third Revised Edition, Volume I, General Principles, John Wiley & Sons, 1978, Page 757.
4. Asbestos, Volume 2, Edited by S.S. Chissick and R. Derricott, John Wiley & Sons, 1983, Page 198.
5. ib.id., Page 197.
6. Guidance for Controlling Asbestos-Containing Materials in Buildings, United States Environmental Protection Agency, EPA 560 / 5-85-024, June 1985, Page 6-4.
7. ib.id., Page 6-5.

8. 40CFR Part 763 - Asbestos, United States Environmental Protection Agency, October 30, 1987.
9. 29 CFR 1910.1001 - Asbestos, US Department of Labor Occupational Safety and Health Administration, General Industry Standards, (c)1.
10. 29 CFR 1926.1101 - Asbestos, US Department of Labor Occupational Safety and Health Administration, Construction Industry Standards, (c)1).