www.elsevier.com/locate/jaerosci

Characterization of Aerosolized Particles Produced by Demolition of a Skyscraper by Blasting

Andrea C. Wagner, Anton Bergen, Sophia Brilke, Bertram Bühner, Martin Ebert, Werner Haunold, Martin Heinritzi, Stephan Herzog, Stefan Jacobi, Andreas Kürten, Felix Piel, Alfons Ramme, Daniel Weber, Stephan Weinbruch, Joachim Curtius

PII: S0021-8502(16)30060-X
DOI: http://dx.doi.org/10.1016/j.jaerosci.2017.06.007
Reference: AS5140

To appear in: *Journal of Aerosol Science*

Received date: 22 February 2016
Revised date: 22 December 2016
Accepted date: 23 June 2017

Cite this article as: Andrea C. Wagner, Anton Bergen, Sophia Brilke, Bertram Bühner, Martin Ebert, Werner Haunold, Martin Heinritzi, Stephan Herzog Stefan Jacobi, Andreas Kürten, Felix Piel, Alfons Ramme, Daniel Weber, Stephan Weinbruch and Joachim Curtius, Characterization of Aerosolized Particles Produced by Demolition of a Skyscraper by Blasting, *Journal o Aerosol Science,* http://dx.doi.org/10.1016/j.jaerosci.2017.06.007

Characterization of Aerosolized Particles Produced by Demolition of a Skyscraper by Blasting

Andrea C. Wagner[1,a], Anton Bergen[a], Sophia Brilke[a], Bertram Bühner[a], Martin Ebert[c], Werner Haunold†[a], Martin Heinritzi[a], Stephan Herzog[a], Stefan Jacobi[b], Andreas Kürten[a], Felix Piel[a], Alfons Ramme[b], Daniel Weber[a], Stephan Weinbruch[c], Joachim Curtius[a]

[a] *Institute for Atmospheric and Environmental Sciences, Goethe University Frankfurt, Frankfurt am Main, Germany*
[b] *Hessian Agency for the Environment and Geology, Wiesbaden, Germany*
[c] *Institute for Applied Geosciences, Technical University of Darmstadt, Darmstadt, Germany*

Abstract

We present a study characterizing aerosol particles resulting from a skyscraper blasting. High PM_{10} mass concentrations with a maximum of 844.9 $\mu g\,m^{-3}$ were present for a short time period of approximately 15 minutes. They result in a day mean of 32.6 $\mu g\,m^{-3}$ compared to a 27.6 $\mu g\,m^{-3}$ background not exceeding the 50 $\mu g\,m^{-3}$ EU maximum permissive value. The increase in particle number concentration was less pronounced with a maximum concentration of $6.9 \cdot 10^4 cm^{-3}$ compared to the local background value of $1.8 \cdot 10^4 cm^{-3}$. The size-resolved number concentration shows a single mode of ultrafine particles at approximately 93 nm. The spatial distribution of deposited dust was investigated with Bergerhoff glass collection vessels, showing a decrease with distance. In the deposited dust samples the concentrations of twelve metals was determined, non of them exceeded the regional background concentrations significantly. The chemical composition of individual particles emitted by the demolition was studied by scanning electron microscopy. They were mainly concrete and steel particles, with 60% calcium carbonates, 19% calcium sulfates, 19% silicates and 2% steel. In energy-dispersive X-ray spectroscopy, no fibers like asbestos were observed. Using a broad spectrum of instruments and methods, we obtain comprehensive characterization of the particles emitted by the demolition.

[1] Corresponding author. E-mail: acwagner@iau.uni-frankfurt.de
[2] †deceased