

MEASUREMENT AND DISPERSION MODELING OF PM_{2.5} AND PM₁₀ USING BETA ATTENUATION MASS MONITORING

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INTRODUCTION.

Kazakhstan accounts for over 85% of the Gross Domestic Product of the combined central countries (including Tajikistan, Kyrgyzstan, Uzbekistan and Turkmenistan). This is largely due to the wealth of natural resources found in the country as well as the country's leadership that has successfully balanced development of natural resources with consideration of social issues. As a result of resource development and population growth, the country has many potential sources of air pollution including oil and gas production and refining, coal and metals mining, coal fired power generation stations, historical nuclear testing, as well as automobile emissions. While there is a growing awareness of air pollution issues in Kazakhstan, the authors have been unable to find any data relating to measurement and modeling of particulate matter, specifically PM_{2.5} and PM₁₀. Particulate matter, especially in the size range indicated, is a particularly problematic air pollutant. The World Health Organization (WHO) estimates that approximately 800,000 premature deaths each year are attributable to particulate matter air pollution [1].

MATERIALS AND METHODS.

The researchers have experience with an innovative new technology for measuring PM_{2.5} and PM₁₀ in ambient air. Standard previous methodologies required time consuming, operator intensive and expensive gravimetric techniques. The researchers will use Beta Attenuation Monitoring (BAM) devices which are reliable and far less expensive than previous gravimetric procedures. This technology was recently (late 2013) designated by the United States Environmental Protection Agency, as codified in the Code of Federal Regulations, as an Equivalent Method for measuring particulate matter [2].

As a first step in evaluating levels of particulate matter air pollution in Kazakhstan, researchers will sample ambient air in the major population center of Almaty and also in the capital city, Astana. During air sampling events, meteorological data will be collected and the data so collected will be used to develop preliminary air pollutant dispersion models. The project is planned to initiate in the first half of 2014.

RESULTS AND DISCUSSION.

It is expected that this research will bring air pollution issues to a new level of recognition within the Republic of Kazakhstan. In addition to establishing a baseline for future studies, the results will be compared to existing Ambient Air Quality Standards (US based) and WHO Annual Mean Air Quality Guidelines for PM_{2.5} and PM₁₀. This comparison will be used to assess potential health issues associated with particulate air pollution.

REFERENCES.

1. World Health Organization. (2013). Health Effects of Particulate Matter: Policy implications for countries in Eastern Europe, Caucasus and Central Asia. WHO Regional Office for Europe.
2. List of Designated Reference and Equivalent Methods. (2013). United States Environmental Protection Agency, National Exposure Research Laboratory, Human Exposure and Atmospheric Sciences Division (MD-D205-03).