

Elevated Environmental Arsenic and Cadmium Levels

Cancer Incidence Evaluation

Southeast Portland, Multnomah County, 2009-2013

February 18, 2016

1. BACKGROUND

In January 2016, the Oregon Department of Environmental Quality (DEQ) released preliminary data from air quality monitoring that showed elevated levels of arsenic and cadmium near Southeast 22nd Avenue and Southeast Powell Boulevard. The DEQ concluded that the air toxins were likely related to emissions from the Bullseye Glass Company manufacturing facility located at 3722 SE 21st Avenue.

Response to these findings has been a collaborative effort among various Oregon agencies, including DEQ, the Oregon Health Authority (OHA), the Multnomah County Health Department (MCHD), and the U.S. Forest Service. One of OHA's roles in this response is to assess the public health risk posed by these air toxins.

Both arsenic and cadmium are recognized human carcinogens.^{1,2} There is evidence from many epidemiological studies that inhalation exposure to inorganic arsenic increases the risk of lung cancer. In addition, there is convincing evidence that oral ingestion of inorganic arsenic is associated with an increased risk of skin cancer, and growing evidence that it is associated with bladder cancer.

With regard to cadmium, there is suggestive evidence of an increased risk of lung cancer in humans following prolonged inhalation exposure.

The Oregon State Cancer Registry (OSCaR), established by the Oregon State Legislature in 1995, collects incidence data on cancers diagnosed among Oregon residents. Data for this assessment are available for lung and bladder cancer; the types of skin cancers associated with arsenic exposure are not reportable to OSCaR.

Initial analysis indicates that, based on available cancer data, there is no increase in rates of either lung or bladder cancer among residents of the area of SE Portland identified as having elevated environmental levels of cadmium and arsenic.

The results of the analysis presented in this document should be considered in the context of the preliminary environmental assessment performed by the U. S. Forestry Service and DEQ.

2. METHODS

Incident cases of lung and bladder cancers among residents of Multnomah County were identified from the Oregon State Cancer Registry (OSCaR) database for the 5-year period of 2009–2013. Residence on the date of diagnosis was used for case assignment to county and Census tract. Census tracts were selected based on two sources:

1. The map of estimated cadmium concentrations released by MCHD on February 11, 2016.

(<http://multco.maps.arcgis.com/apps/SimpleViewer/index.html?appid=fc1b6465dfad408281c37f6301d756ac>)

2. The map of estimated arsenic concentrations provided by MCHD, dated February 17, 2016 (see Exhibit 1, Appendix).

Both of these maps are based on data belonging to the U.S. Forest Service.

Population data used to calculate rates were obtained using U.S. Census data from 2010; the 2010 Multnomah County population (all ages; pop. 735,334) was used as the referent population to estimate expected numbers of lung and bladder cancer cases for standardized incidence ratio (SIR) calculations.

Underlying Census tracts were identified, which included 1000, 9.01, and 9.02. In 2010, the population for Census tract 1000 was 5,353, and the three Census tract combined population was 13,725. Census tract 1000 was identified as the primary area of interest, based on data showing the highest cadmium concentrations (Figure 1) and the highest arsenic levels (Figure 2) in the neighborhood surrounding the Bullseye Glass manufacturing facility.

The other two census tracts considered in this analysis are contiguous with Census tract 1000. The estimated cadmium concentrations detected for Census tracts 9.01 and 9.02 were 5 to 10 nanograms per cubic meter, and detected only within limited areas of Census tracts 9.01 and 9.02 (Figure 1).

The three census tracts also include locations of particular community concern. These include the CCLC at Fred Meyer (day care), Cleveland High School, and Winterhaven School.

Figure 1.

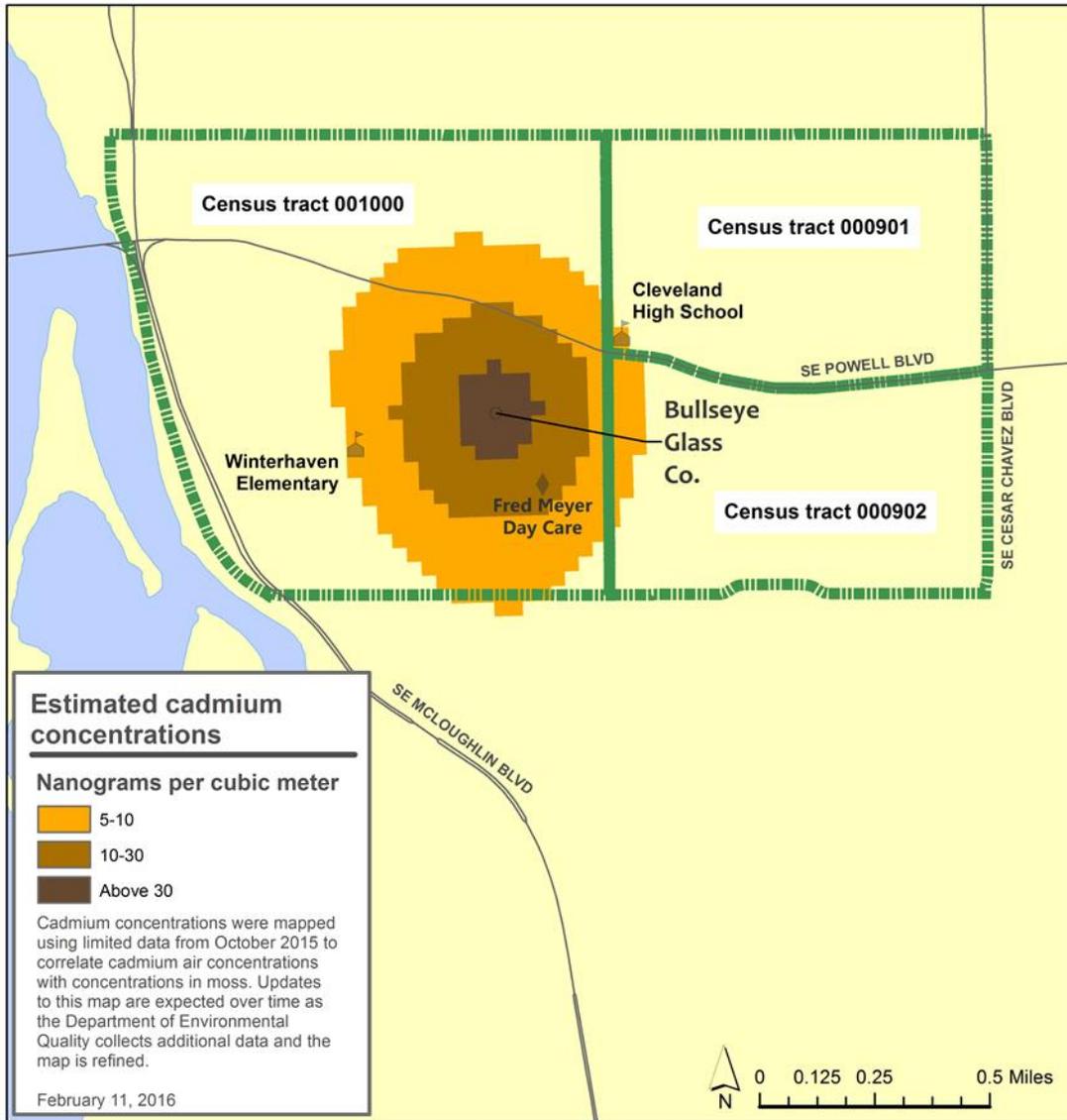
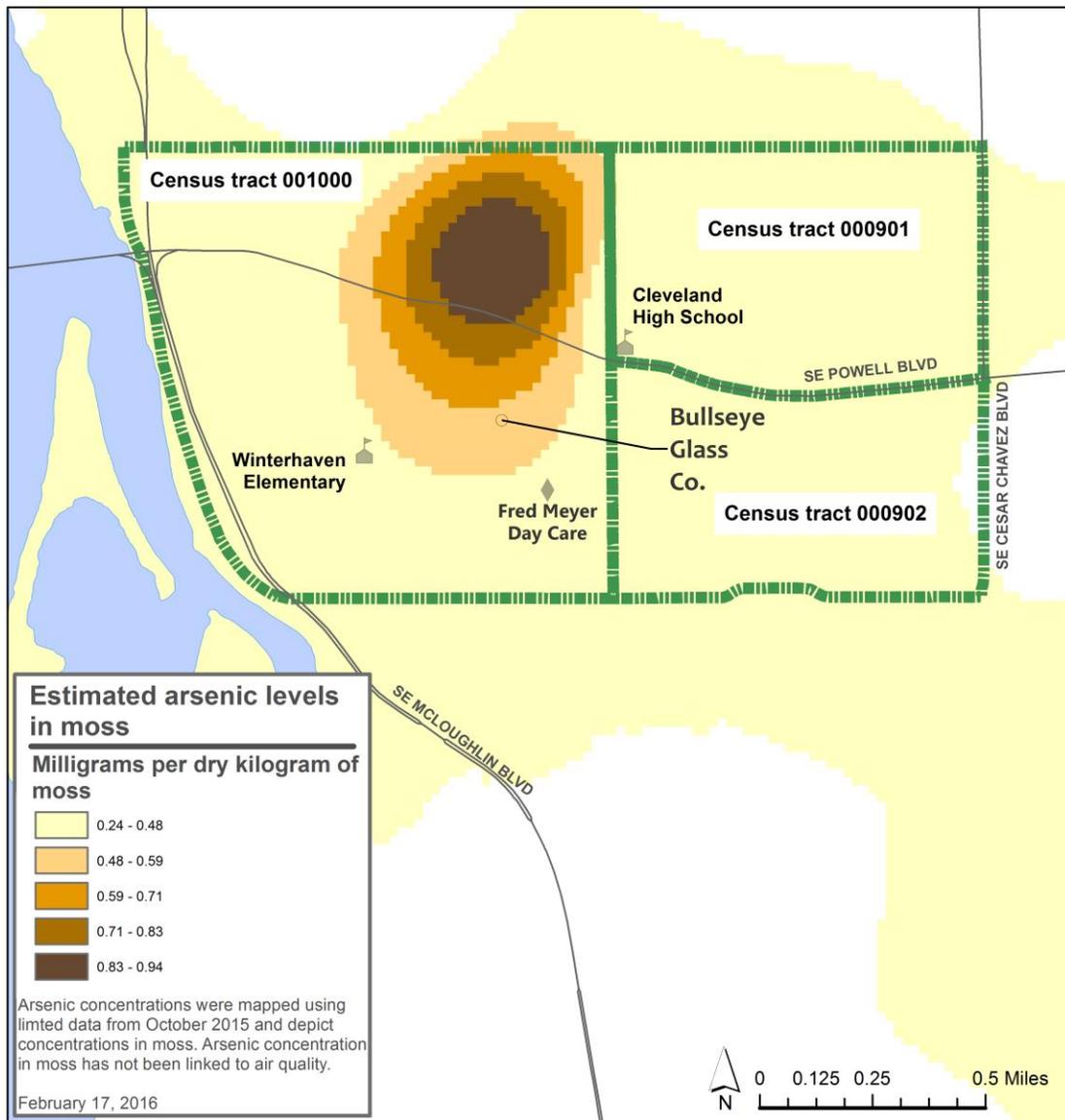


Figure 2.



3. RESULTS

During 2009–2013, 2,163 cases of lung cancer were reported among residents of Multnomah County, with nine cases reported in Census tract 1000, and a total of 26 cases of lung cancer reported in the three census tracts combined (Table 1). During the same time period, 712 cases of bladder cancer were reported among residents of Multnomah County, with four cases reported in Census tract 1000, and a total of 11 cases of bladder cancer reported in the three census tracts combined.

Table 1. Number of Cancer Cases

	Census Tract 1000	Census Tracts 1000, 9.01 and 9.02	Multnomah County
Lung cancer	9	26	2,163
Bladder cancer	4	11	712

Rates of lung and bladder cancers in Multnomah County during 2009-2013 were used to generate an expected number of cases for both cancers in the selected Census tracts during the same time period.

Standardized Incidence Ratios (SIR) were calculated for each cancer, comparing the observed number of lung and bladder cancers in the Census tracts of interest to the expected number of cases for those areas.

Results indicate that the number of lung and bladder cancers for Census tract 1000, and for the three Census tracts combined, were not significantly higher than expected during this time period.

The SIR for lung cancer in Census tract 1000 was 0.88 (95% confidence interval 0.4, 1.7); the SIR for the three Census tracts combined was 0.89 (95% confidence interval 0.6, 1.3) (Table 2).

The SIR for bladder cancer in Census tract 1000 was 1.22 (95% confidence interval 0.3, 3.1); the SIR for the three Census tracts combined was 1.16 (95% confidence interval 0.58, 2.1).

Table 2. Standardized Incidence Ratios and Confidence Intervals

	Census Tract 1000	Census Tracts 1000, 9.01 and 9.02
Bladder cancer	1.22 (0.3, 3.1)	1.16 (0.6, 2.1)
Lung cancer	0.88 (0.4, 1.7)	0.89 (0.6, 1.3)

4. CONCLUSIONS

The results of these analyses indicate that the observed number of lung and bladder cancer cases among individuals living in the Census tracts selected was not significantly higher than expected during 2009-2013.

5. FOLLOW UP

Continue to follow rates of lung and bladder cancers in the area of interest and in the state and county over time.

6. REFERENCES

1. Agency for Toxic Substances and Disease Registry (ATSDR). 2007. *Toxicological Profile for Arsenic*. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.
2. Agency for Toxic Substances and Disease Registry (ATSDR). 2012. *Toxicological Profile for Cadmium*. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

7. APPENDIX

Exhibit 1.

