Air Toxics benchmark for nickel for analyzing glass manufacturing emissions

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There has been some public concern with the fact that although nickel detected in the October 2015 air sampling conducted at SE 22nd and Powell was compared to an Oregon Ambient Benchmark Concentration (ABC) of two nanograms per cubic meter (ng/m^3), a different nickel ABC of four ug/m^3 is presented on the DEQ/OHA joint website.

Benchmarks for different forms of nickel

The ABC of two ng/m^3 is DEQ's current benchmark for nickel subsulfide (known to be cancer-causing), which is a rarely-occurring form of nickel associated with the nickel ore refinement, and is not known nor expected to occur at glass manufacturing facilities. Even though nickel subsulfide is not a common form of nickel at glass manufacturing plants, DEQ used that benchmark for comparison to the October 2015 monitoring results because it was the most protective level. At the time, DEQ was not sure what kinds of nickel compounds might be generated by the glass facilities, so using the most protective level was the appropriate choice to make for initial comparisons to air data. Note that in addition to the current ABC for nickel subsulfide, two other nickel ABCs are available: an ABC of four ng/m3 for nickel refinery dust (known to be cancer-causing) and an ABC of 50 ug/m3 for soluble nickel compounds (known to have non-cancer effects).

Once DEQ held further discussions with Bullseye Glass, including DEQ visiting the facility and getting a detailed understanding of how their operations worked, it was clear that Bullseye Glass was not emitting nickel subsulfide. Therefore, that particular ABC no longer made sense to use to compare to related nickel emissions in air.

Current benchmark for nickel

DEQ now is using the benchmark of four ng/m^3 because, in addition to it already being the ABC for nickel refinery dust and protective to a cancer risk level of one additional occurrence of cancer in a population of one million people (1×10^{-6}), it is also the DEQ Air Toxics Science Advisory Committee's 2015-2016 recommended revised ABC for nickel insoluble compounds, which are cancer-causing. This benchmark has not yet been adopted but represents DEQ's most current toxicological knowledge about nickel, which is analytically distinguishable as soluble and insoluble groups of nickel compounds.

This recommendation for the two revised nickel ABCs is an improvement from the previous descriptions related to the currently-available ABCs for nickel subsulfide, nickel refinery dust, and soluble nickel compounds, which were primarily related to industrial processing, and which were thus somewhat limited in to what they could be applied. ATSAC has has recommended using 10 ng/m3 for soluble nickel compounds that are associated with non-cancer effects, and this too is based on the currently best available toxicological information.

By using the cancer-based ABC of 4 ng/m^3 as our current level for comparison, we are using the most scientifically accurate recommended benchmark and the most protective. Although it may be unlikely that cancer-causing nickel compounds are being emitted, using the cancer-based ABC for nickel is appropriate, since it is unknown at this point whether other forms of cancer-causing nickel emissions could occur as part of the glass manufacturing process.

Using the nickel benchmark

It is important to keep in mind that air toxics benchmarks are set very low, in order to be protective of health over an entire lifetime of constant exposure. But exposure times near the glass facilities occur over much shorter periods; therefore, comparing ABCs against emitted concentrations is highly protective, and perhaps over-protective. Because ABCs are set to protect people who are exposed over many years' time, they are not appropriate for comparing to 12- or 24-hour air samples. However, they are on the website as context, as they were used for initial comparison to the October 2015 air monitoring data collected by DEQ near Bullseye Glass.