**What are these agreements and what do they do?**

DEQ has entered into Air Emissions Agreements with Bullseye and Uroboros. The agreements require the facilities to install emission control devices. Until the emission control devices are installed, the agreements allow the use of certain metals at levels determined by DEQ to be protective. The agreements contain action levels where the companies must reduce metal usage or stop metal usage in the event that ambient monitoring concentrations exceed protective levels. The agreements also prohibit the use of arsenic, cadmium and chromium VI until the emission control devices are installed.

**Why are you letting Bullseye and Uroboros use metals in their stained-glass furnaces when you know the ambient levels were too high?**

The levels of arsenic and cadmium found in the air samples near Bullseye were over DEQ’s Ambient Benchmark Concentrations. Uroboros has not used arsenic for 20 years and does not plan to ever use it again. Bullseye agreed not to use arsenic until emission controls are installed. Both companies agreed not to use cadmium and chromium VI until emission controls are installed. The data also shows nickel at slightly above the benchmark concentrations but it will also be reduced by the emission control. Until then, DEQ and OHA have determined that in the short term, an ambient level that is 20 times higher than the ABC is protective.

For cobalt, lead, and manganese, the monitored ambient concentrations were significantly below the ABC. DEQ believes that continued use of these metals, as limited by the agreement, would not likely result in ambient concentrations that exceed the ABCs.

The situation for ambient chromium VI is different than the other metals for two reasons. First, DEQ does not have chromium VI ambient monitoring data when Bullseye was using chromium. Second, we don’t know how much, if any, chromium III gets converted to chromium VI in the furnaces. Therefore, the agreements limit the maximum amount of chromium III that the companies can begin using and the agreements then allow the amount to increase if ambient monitoring is below the action levels in the agreements. As noted above, neither company can use chromium VI until they have emission controls installed.

Selenium: need info from OHA about selenium. There is no ABC, and selenium is not addressed in 6S.

and selenium at ambient monitors in North and Southeast Portland

**Why is beryllium not in the agreement?**

Neither Bullseye nor Uroboros use beryllium in the stained-glass furnaces.

**Why is DEQ monitoring for beryllium?**

DEQ is monitoring for beryllium because it is automatically covered by the analytical method used for monitoring the other metals.

**Why is cobalt not in the agreement?**

Cobalt is not in the agreement because the ambient levels of cobalt monitored in October of 2015 are far below DEQ’s Ambient Benchmark Concentration. The Ambient Benchmark Concentration for cobalt is 100 ng/m3; the maximum monitored level is 3.5 ng/m3 and the average of the October data is 0.9 ng/m3.

**How do we know if levels of metals in the air are safe after they start using chromium again?**

DEQ has installed ambient monitors near both facilities and will monitor ambient levels of chromium VI at least until the emission controls are installed. The agreements require the companies to reduce or stop use of chromium III if the ambient levels of chromium VI exceed the action levels in the agreements. The purpose of this is to allow the companies to operate in a manner that is protective of public health.

**How did DEQ establish the action levels?**

For metals that have carcinogenic effects (hexavalent chromium, cadmium, nickel, and arsenic), DEQ has decided to multiply the Ambient Benchmark Concentration (ABC) for each of these metals by 20 to obtain a Stop Use Level. The Stop Use Level is then divided by 2 to obtain the lower Reduce Use Level.

For metals that have non-carcinogenic health effects (cobalt, lead, manganese), the ABCs are based on a non-cancer Hazard Quotient limit of 1. Therefore, an exceedance of a non-cancer ABC (and hence an exceedance of a Hazard Quotient of 1) indicates that health effects will almost certainly occur. Therefore, for metals with non-cancer effects, the Stop Use Level is set equal to the ABC. Again, this Stop Use Level is divided by 2 to obtain the Reduce Use Level.

The one exception to this protocol is related to lead. In this particular case, the Reduce Use Level for lead, and the Stop Use Level for lead are both set at the ABC for lead. The ABC level matches the primary level set by EPA for lead as a National Ambient Air Quality Standard, or NAAQS value. This level has been determined to be protective of neurological health effects due to exposure to lead in air.

**How can 20 times the benchmark be safe? For children?**

The multiplier of 20 is associated only with carcinogenic compounds. But all of our Ambient Benchmark Concentrations have layers of conservatism (protection) built into them. For example, the ABCs assume a person will be exposed to a particular concentration for an entire lifetime, which doesn’t usually occur. The ABCs are also protective of sensitive groups such as children and the elderly. In DEQ's risk based air toxics program, a pollutant becomes a priority focus for investigation and reduction if it is more than ten times above a benchmark.  If the ABC is related to a carcinogenic risk of 1 cancer occurrence in a population of 1 million people (1 x 10-6), then 10 x the ABC would be related to a carcinogenic risk of 10 occurrences of cancer in a population of one million people (1 x 10-5). In addition, DEQ considered that the upper bound of acceptable risk in EPA regulatory determinations is 100 in a million, and 20 in a million is well below that level.

**What kind of emission control devices can be used on stained-glass furnaces?**

Baghouses, electrostatic precipitators and certain types of wet scrubbers are emission control devices that could be effective at controlling these emissions. They are all designed to remove particulate matter (dust) from exhaust gases, which can contain metals. Spectrum Glass in Woodinville, Washington uses a baghouse on its stained-glass furnace. Source test results from two furnaces at Spectrum Glass show that the baghouses control particulate matter to levels of 0.004 and 0.005 grains per dry standard cubic foot when the permit limit is 0.010 grains per dry standard cubic foot.

**What is a baghouse?**

A baghouse or fabric filter is an emission control device that removes particulate matter (dust) from exhaust gases. A baghouse can be described as a giant vacuum-cleaner. Most baghouses use long, cylindrical bags made of woven or felted fabric as the filter. Dust-laden gas enters the baghouse, is drawn through the bags and a layer of dust accumulates on the bag surface until air can no longer move through it. At that point the automatic cleaning process begins. Cleaning can take place while the baghouse is filtering or is in isolation. When the compartment is clean, normal filtering can resume. Baghouses are very efficient particle collectors because the dust cake formed on the surface of the bags acts as a filter.

**How do you know a baghouse will make the air safe?**

Baghouses typically have a particulate matter (dust) removal efficiency of 99% or better, even when the particle size is very small. The following table shows the average of the monitored data near Bullseye from 10/06/15 through 11/02/15 followed by a rough estimate of the effect of an emission control device that provides 99% removal efficiency.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Arsenic**  **(ng/m3)** | **Cadmium**  **(ng/m3)** | **Cobalt**  **(ng/m3)** | **Lead**  **(ng/m3)** | **Manganese**  **(ng/m3)** | **Nickel**  **(ng/m3)** |
| Average of monitored data from 10/06/15-11/02/15 | 31.7 | 29.4 | 0.9 | 42.9 | 18.6 | 5.4 |
| Estimated average assuming 99% control & all ambient concentrations due to Bullseye | 0.3 | 0.3 | 0.009 | 0.4 | 0.2 | 0.05 |
| ABC | 0.2 | 0.6 | 100 | 150 | 90 | 4 |

NOTE: DEQ cannot make a similar estimate for chromium VI because ambient monitoring data for chromium VI while Bullseye was operating is not available.

**How do you know if the baghouse is working?**

Inlet and outlet gas temperature and pressure drop are the two most important factors that affect baghouse performance:

* Gas Temperature – Fabrics are designed to operate within a certain temperature range. Exceeding the maximum inlet temperature can weaken, damage, or ruin the bags. Bullseye and Uroboros must install their baghouses to ensure that the exhaust gases are within the temperature ranges of the fabric bags for optimal operation. DEQ will require Bullseye and Uroboros to monitor the baghouse inlet temperature to ensure the baghouses do not exceed the maximum inlet temperature.
* Pressure Drop - Pressure drop describes the resistance to air flow through the filter fabric: the higher the pressure drop, the higher the resistance to air flow. The pressure drop of a baghouse is determined by measuring the difference in total pressure at two points, usually the inlet and outlet. Baghouses operate most effectively within a certain pressure drop range. Operation outside the desired pressure drop range is an important factor when diagnosing and troubleshooting issues with the baghouse system. When the dust cake builds up to a significant thickness, the pressure drop will become too high. Before this point is reached the filter must be cleaned. DEQ will require Bullseye and Uroboros to monitor the baghouse pressure drop to ensure the baghouses are operating in the optimum pressure drop range.

**How often will the baghouse be cleaned?**

Baghouses are equipped with automatic self-cleaning systems. The cleaning frequency will be determined by the baghouse designer.

**What do you do with the material collected from the baghouses?**

The materials collected by the baghouse can be reused in the glass furnaces so disposal is not needed.

**What else could be used instead of a baghouse?**

Wet scrubbers and electrostatic precipitators are other pollution control devices that could also be used to control metals emissions from stained glass furnaces.

* Wet scrubbers remove dust particles by capturing them in a spray of liquid droplets. The liquid is then caught in a tank at the bottom of the scrubber. Certain types of wet scrubbers perform very well at controlling particulate matter emissions, but a significant disadvantage of wet scrubbers is that they result in wastewater that must also be treated before it can be discharged to a public sewer system. For this reason, DEQ considers the use of wet scrubbers to be unlikely.
* An electrostatic precipitator, usually called an ESP for short, function by electrostatically charging the dust particles in the exhaust gas. The charged particles are then attracted to and deposited on plates. When enough dust has accumulated, the collector plates are shaken to dislodge the dust, causing it to fall to hoppers below. ESPs are very efficient emission control devices and Bullseye and Uroboros may consider installing one; however, an ESP may require significant upgrading of their electric power service, which may make an ESP a less attractive option compared to a baghouse.

**What happens if the levels are still high after the emission control device is installed?**

DEQ believes that the required emission control device will reduce ambient concentrations of the metals to below the Ambient Benchmark Concentration. In addition, DEQ has committed to develop a health based air toxics program that will address air toxics impacts from industrial sources around the state. DEQ does not yet know what the air toxics program will look like but is looking at existing programs in California and Washington. If ambient levels of metals are still high after the baghouses are installed, DEQ will regulate these emissions under the health based air toxics program.

**Why don’t you make Bullseye and Uroboros shut down?**

**What are the results of the soil sampling?**

**What are the results of the air sampling?**

**Why does it take so long to get results?**

The ambient monitors take samples each day. A week’s worth of samples are gathered each Wednesday. A lot of specialized equipment and set-up time is needed to analyze a sample so it is inefficient to run a single sample each day. Therefore, samples are gathered for one week and are all analyzed at the same time. Following the actual analysis, there are other quality assurance steps that need to be taken to ensure that the samples have been analyzed correctly and that there are no errors in the calculations. This entire process of analysis until the quality assurance is done takes approximately nine days. Therefore, the results for a set of samples gathered on a Wednesday are not available until the Friday of the following week.

**Why are the air sampling results for chromium VI so high when Bullseye was not using chromium?**

DEQ does not know why the air sampling results for chromium VI were high while Bullseye was not operating. There are other possible sources of metals emissions in the area that may be contributing to the ambient concentrations of chromium VI, but DEQ has not been able to confirm other sources.

**What could other sources of high cadmium or chromium be and what are you doing to control them?**

Diesel locomotive emissions at rail yards contain metals, including cadmium and chromium. A study by the California Air Resources Board (Diesel fuel Effects on Locomotive Exhaust Emissions, October 2000) shows values of chromium in milligrams per hour with non-detect levels for all other metals tested (antimony, arsenic, beryllium, cadmium, cobalt, copper, lead, manganese, mercury, nickel, and selenium). GET MORE DIESEL STUFF FROM KEVIN

**Does CIII turn into CVI under any circumstance?  What science is available on this matter?**

Chromium metal is not found in nature, but is produced principally from the mineral chromite (chrome ore). Chromite contains chromium III. Chromium combines with various other elements to produce compounds, the most common of which contain either chromium III or chromium VI. Chromium III compounds are sparingly soluble in water, while most chromium VI compounds are readily soluble in water.

Thousands of chromium III compounds exist, exhibiting a wide range of colors, structures, and chemical properties. Chromium VI compounds are produced industrially by heating chromium III compounds in the presence of mineral bases (such as soda ash) and atmospheric oxygen. Most chromium VI solutions are powerful oxidizing agents under acidic conditions, but much less oxidizing under basic conditions. Chromium III is the most stable oxidation state, forming coordination complexes which are exclusively octahedral, with ligands such as water, urea, sulfates, ammonia, and organic acids. Stable complexes can thus be formed with anions, acids, peptides, proteins, nucleic acids, and other macromolecules.

Chromium occurs naturally as a trace component of most crude oils, and the concentrations of chromium found in residual and distillate oils have been measured. Available information suggests that the chromium is emitted in the trivalent state from oil combustion, sewer sludge incineration, cement production, municipal waste incinerators, and refractories (ARB, 1986d). Chromium is used for corrosion resistance, steel production, and as protective coating for automotive and equipment accessories. It is a permanent and stable inorganic pigment used for paints, rubber, and plastic products (Howard, 1990). Chromium has also been detected but not quantified in motor vehicle exhaust by the Air Resources Board (ARB) (ARB, 1995c).

Chrome plating is a source of chromium (VI) emissions in the state. Chrome electroplating operations are conducted in baths containing chromic acid and during the plating process, bubbles of gas are emitted through the surface of the bath. These bubbles carry entrained chromium (VI) into the air. Chromium emissions can occur from chromium (VI) firebrick lining of glass furnaces (ARB, 1986d). Although it is a minor source of emissions, the most commonly seen hexavalent chromium is lead chromate. Lead chromate is the pigment in the yellow paint used to mark traffic lanes. In addition, hexavalent chromium in water solution is converted through electroplating (decorative chrome plating) to the bright metallic chromium coating seen on plastic or metal products such as shower heads or car bumpers. Although not commonly seen by the general public, one of the most important uses of chrome plating is to apply a hard, smooth surface to machine parts such as crankshafts and printing rollers. This process is known as "hard" chrome plating. Chromic acid anodizing is another industrial metal finishing process which uses hexavalent chromium.

The primary stationary sources that have reported emissions of chromium compounds in California are lumber and wood products manufacturers, stone, clay, and glass production, and petroleum refining. Reported emissions of chromium (VI) from stationary sources in California are electrical services, aircraft and parts manufacturing, and steam and air conditioning supply services (ARB, 1997b).

**What if Bullseye or Uroboros break the agreements?**

The Air Emissions Compliance Agreements contain penalties (referred to as stipulated damages) of $1,600 for each day that either company violates any compliance requirements and $800 for each violation of any of the usage requirements. Even with the Air Emissions Compliance Agreements signed by Bullseye and Uroboros, DEQ still has the right to take enforcement action against these companies for any past or future violations not addressed in the agreements.

**Why are the penalties so low?**

DEQ calculated the penalties based on DEQ’s enforcement and penalty policies. DEQ also took into consideration that neither of these companies is known to have violated any air quality regulations.

**What happens if they don’t install the emission control devices required by the agreements?**

If the companies do not install the required emission control devices, they would be in violation of the agreement and DEQ would impose the penalties specified in the agreements. If necessary, DEQ would consider other enforcement actions as well. However, DEQ does not expect either company to violate the agreements. In the event that they need additional time for reasons beyond their control, DEQ would be willing to renegotiate the date by which the emission control devices must be installed.

**Why do the agreements distinguish between raw materials and cullet?**

Cullet is recycled glass that is mixed with raw materials and charged to a glass melting furnace to produce glass. Cullet is not considered to be a raw material for the purposes of the agreements. In the emissions profile of glass manufacturing raw materials, metals are emitted from glass furnaces upon the initial melting step. Later remelting of glass, such as cullet and frit, does not re-emit the metal HAP once the glass has been formed or vitrified. Therefore, there are no restrictions on how much cullet can be used.

**How did you come up with the usage levels?**

DEQ requested the 2015 weekly average usage levels of metals by Bullseye and Uroboros. Based on those usage levels, DEQ estimated the usage levels that would result in ambient air impacts that would be less than the Action Levels specified in the agreements.

**How will these companies know when to reduce or stop usage?**

DEQ will notify Bullseye and Uroboros immediately upon receipt of ambient air quality data that shows cadmium, chromium VI, cobalt, lead, manganese or nickel above the reduce or stop usage levels in the Air Emissions Compliance Agreements.

**And how long will it take for them to reduce or stop usage?**

The requirement to reduce or stop usage applies to the calendar week following the Friday in which notification was given to Bullseye or Uroboros and all following calendar weeks until DEQ provides further notification.

**Why do you have so many steps to reduce usage?**

DEQ’s goal is to protect public health while allowing these companies to operate at a limited level until the emission control systems are installed. DEQ assumes that there is a relationship between the amounts of metals the facilities use and the monitored ambient concentrations, and that a reduction in usage will result in a reduction in the ambient monitored concentrations. This assumes that the ambient monitored concentrations are affected largely by Bullseye’s or Uroboros’ emissions. However, there are other sources of metals that may affect ambient concentrations to an unknown degree. If ambient monitored concentrations are elevated even after Bullseye and Uroboros install emission control devices, DEQ will have to investigate other sources of metals emissions.

Assuming that the ambient monitored concentrations are affected largely by Bullseye’s or Uroboros’ emissions, the usage reductions required by the agreements are intended to prevent ambient monitored concentrations from reaching the stop usage levels. The stop usage levels are considered to be protective of human health, but DEQ believes action should be taken before the stop usage levels are reached. For this reason, the reduce usage levels have also been included in the agreements, with the intent of requiring reductions to minimize the possibility of reaching the stop usage levels.

**Why are the companies allowed to resume usage after being required to stop usage?**

The companies will be required to stop usage if the two-week average ambient concentration reaches or exceed the stop usage level. The companies are allowed to resume usage only after the ambient concentrations return to below the reduce usage level. The stop usage level is protective of human health and the reduce usage level is lower to provide an additional safety factor.

**Why are the companies allowed to stop usage and then resume usage three times before you make them stop usage completely until the emission control system is installed?**

There are other possible sources of metals that could cause ambient concentrations to go above the stop usage level in the agreements, and DEQ cannot be confident that the facilities are the only reason for ambient concentrations that exceed the stop usage level. However, the more often the stop usage ambient concentration is exceeded, the more likely it is that the companies are causing the exceedance. Therefore, if the stop usage ambient concentration is exceeded three times, they must stop usage completely until the emission control system is installed.

**Why don’t you make them start out at really low production and metal usage rates and work their way up?**

For all of the metals except chromium VI, DEQ believes the maximum usage levels allowed are likely to keep the ambient monitored concentrations below the reduce usage level, and there is no need to make the companies start out at low usage levels.

The situation is different for chromium VI, because DEQ has no data for ambient chromium VI concentrations while the companies were operating normally. In this case, DEQ believes it is appropriate for the companies to start out at a lower level of usage and then allow the usage to increase if the ambient monitored concentration of chromium VI for the first two weeks is ten percent or more below the Reduce Use Level. Ten percent or more below the Reduce Use Level is intended to provide an additional safety factor to help keep ambient concentrations below the reduce use level.

**Why are you calculating a rolling two-calendar week average?**

The reduce usage and stop usage action levels are based on exposure levels applicable to two-week periods. ?????????????need someone else, Sarah or OHA?

**Why aren’t you making these companies perform ambient monitoring?**

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DEQ has the regulatory authority to require continuous monitoring of specified air contaminant emissions or parameters. DEQ can only require ambient air quality monitoring for businesses that trigger the Prevention of Significant Deterioration permitting program and that monitoring would be for “regulated air pollutants” such as nitrogen oxides, particulate matter, sulfur dioxide, carbon monoxide, and lead; not for metals. The ambient monitoring network that DEQ operates measures impacts from a variety of sources that usually cannot be assigned to a single business.

**How long will DEQ monitor air quality near these companies?**

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**What will happen when you take down those monitors?**

DEQ will have data from the ambient monitors while Bullseye and Uroboros were using cadmium and chromium III in the stained glass furnaces along with the corresponding production data. This data will help determine if any type of production or usage limits are needed to ensure ambient metal concentrations remain below the Ambient Benchmark Concentrations. If such limits are needed, DEQ will modify Bullseye’s Air Contaminant Discharge Permit and will require that Uroboros obtain a permit that contains any production or usage limits.

**How will we know the air is safe if there aren’t any monitors?**

Bullseye and Uroboros will be required to monitor operation of the emission control devices (i.e., pressure drop and inlet temperature) to ensure optimum operation. The data from the ambient monitors while Bullseye and Uroboros were using cadmium and chromium III in the controlled stained glass furnaces should show that optimum performance of the control devices is adequate to ensure ambient levels of metals are safe. Monitoring of the emission control devices will ensure optimum performance. DEQ may also require periodic source tests of metals emissions from the emission control devices.

**Why don’t you make Uroboros get a permit?**

Urobos may be required to obtain an air permit under the health based air toxics program that is currently under development.