



## Hexavalent Chromium Monitoring in Barrio Logan

### Sampling Results and Preliminary Analysis For the Sampling Period of February 5 - 22, 2002

*The San Diego Air Pollution Control District (SDAPCD) and California Air Resources Board (ARB) are conducting intensive monitoring for hexavalent chromium at selected sites in Barrio Logan. In December 2001, sampling for hexavalent chromium at six sampling locations showed unexpected elevated concentrations of hexavalent chromium. Additional monitoring and source testing are now being done to determine whether the levels of hexavalent chromium detected in the initial assessment near Master Plating and Carlson & Beauloye Machine Shop are continuing, and to assist in the identification of the source of this pollution. This effort includes ambient (outside) air monitoring, testing of air pollution control equipment at one of the chrome platers, and selected indoor monitoring of the air at both the plating facilities. The information contained on this fact sheet summarizes the results obtained during the period of February 5 - 22, 2002. Ambient air quality levels and facility operations are continuing to be monitored.*

#### **SAMPLING RESULTS**

##### **Ambient Air Monitoring Results**

From February 5 - 22, 2002, the outdoor air was monitored at the same six locations where 24-hour samples were taken in December 2001 (including a duplicate sampler at one location for quality assurance purposes). Five additional ambient air samplers were also being used for indoor monitoring and 12-hour sampling during this time. Shown below in Table 1 are the average concentrations and the highest single measured concentration for the six 24-hour sampler locations for both the December 2001 and February 5 - 22, 2002 sampling results.

A total of 124 (24-hour) samples were analyzed for the February sampling period. Of those, 85 samples (69%) had values below the level of detection (LOD) and 39 samples (31%) had readings above the LOD. The LOD is the lowest level that hexavalent chromium can be accurately measured in the air. The average concentration for the 124 samples was 0.22 nanograms per cubic meter ( $\text{ng}/\text{m}^3$ ), with averages at each location ranging from 0.14  $\text{ng}/\text{m}^3$  to 0.60  $\text{ng}/\text{m}^3$ . These measurements were considerably lower than those seen in December.

**Table 1**  
**Summary of Ambient Air Monitoring Results**  
**(24-Hour Samplers)**

Sampling Location	December 3 - 17, 2001			February 5 - 22, 2002		
	No. of samples	Hexavalent Chromium (ng/m <sup>3</sup> ) <sup>1</sup>		No. of samples	Hexavalent Chromium (ng/m <sup>3</sup> )	
		Average <sup>2</sup>	Highest		Average <sup>2</sup>	Highest
Location 1 (between plating facilities)	13	1.44	9.3	18	0.60	3.6
Location 2 (vacant lot)	13	0.37	3.6	18	0.16	0.4
Location 2c (duplicate at vacant lot)	11	0.38	3.2	18	0.14	0.4
Location 3 (across street)	12	0.84	7.9	18	0.15	0.6
Location 4 (across street)	13	0.62	4.8	18	0.16	0.4
Location 5 (alley)	13	2.78	22.0	18	0.19	0.8
Location 6 (Mercado Apt parking lot)	12	0.24	1.0	16	0.14	0.4
Average of all samples <sup>2</sup>						
		0.98			0.22	
Average cancer risk <sup>3</sup> for all locations						
		147			33	

<sup>1</sup> Nanograms per cubic meter

<sup>2</sup> In calculating the average concentrations, it is standard practice to assume that any sample detected below the LOD is half that value. Therefore, in this case, all samples below LOD are assumed to be 0.1 ng/m<sup>3</sup>.

<sup>3</sup> Estimated cancer risk represents the chances of developing cancer assuming a person is continuously exposed to the average concentrations for a 70-year lifetime.

### Estimated Potential Cancer Risk from Measured Ambient Concentrations

The potential risk estimates presented here are based on *very* limited data (about a two week period) and may not accurately represent the annual average concentration that is normally used to estimate cancer risk. In addition, the concentration of air toxics is typically higher during the winter months when the air is often stable. Therefore risk estimates derived from wintertime monitoring are likely to be higher than those that would be calculated from a full year of data.

The estimated chance of developing cancer from a lifetime exposure to the average concentration of all the 24-hour samples in the February sampling period would be 33 in a million, with the average for the individual sampling locations ranging from 21 in a million to 90 in a million. By comparison, the estimated chance for developing cancer from a lifetime exposure to the average concentration of all the samples collected in December 2001 was 147 in a million, with the average for the individual sampling locations ranging from about 36 in a million to 418 in a million. The estimated chances of developing cancer are based on the assumption that a person is continuously exposed to the monitored levels of hexavalent chromium for a lifetime (24 hours a day for 70 years). In calculating the average concentrations from which the risk estimates are derived, it is standard practice to assume that any sample detected below the LOD is half that value.

## Source Test Results of Carlson & Beuloye Machine Shop Inc.

On February 11 and 12, 2002, the outlet stacks of the air pollution control equipment of Carlson & Beuloye were tested. This testing is referred to as a “source test”. The results of the source test showed that all samples were below detectable levels. These results verify that Carlson & Beuloye’s control equipment was operating effectively and was in compliance with air pollution control laws during the time of the testing.

Standard “source tests” were not conducted at Master Plating because that facility is not required to have the same type of control equipment as Carlson & Beuloye due to the nature of it’s operations and because it does not have outlet stacks. The absence of an outlet stack at Master Plating also made the same type of testing impractical. Instead, the indoor air was monitored at Master Plating near the exhaust fan where emissions are expected to exit the building. These results are discussed below.

## Indoor Air Sampling Results at Master Plating and Carlson & Beuloye

During the time of February 5 - 22, 2002, indoor air was also monitored as part of the evaluation of the emissions testing inside of buildings at Master Plating and Carlson & Beuloye. A total of nine samples were taken at Master Plating and four samples were taken at Carlson & Beuloye. All 13 samples had readings above the LOD. A summary of the indoor testing results is shown in Table 2.

**Table 2**  
**Summary of Indoor Sampling Results**

	<b>Master Plating</b>	<b>Carlson &amp; Beuloye</b>
Number of Samples	9	4
Lowest Concentration	6.0 ng/m <sup>3</sup>	12.0 ng/m <sup>3</sup>
Highest Concentration	521.0 ng/m <sup>3</sup>	30.0 ng/m <sup>3</sup>
Average Concentration	271.0 ng/m <sup>3</sup>	21.75 ng/m <sup>3</sup>

While the concentrations presented in the table above would be considered high if measured outdoors, they are well below workplace safety standards set by the California Occupational Safety and Health Administration, designed to protect workers from short-term exposure to hexavalent chromium. Because there is rapid dilution of the air exiting the buildings, indoor levels usually will not impact outdoor concentrations unless they are substantially higher than the outdoor levels. The indoor concentrations of hexavalent chromium monitored at Carlson & Beuloye appear to be low enough to be an unlikely significant contributor to nearby ambient levels. In addition, the indoor air at Carlson & Beuloye is under negative pressure; meaning outside air is being drawn into the building. Therefore the contaminated indoor air would likely be directed through the control system before being exhausted into the outside air. However, it is reasonable to assume that the concentration of hexavalent chromium measured indoors at the exhaust fan in Master Plating could influence the outdoor concentrations measured closest to the chrome plating facilities.

## **PRELIMINARY ANALYSIS**

The SDAPCD and ARB staff conducted a variety of analyses on the preliminary data to determine if a pattern of emissions could be determined, and, if so, linked to the results of the ambient monitoring. The analyses are described below.

### **Observations Regarding Outdoor Concentrations**

The monitoring locations where the highest outdoor concentrations were measured and the greatest percentage of time when hexavalent chromium was detected was Location 1 (between the two chrome plating facilities) and in Location 5 (the alley behind the facilities). In addition, the highest concentrations were usually measured toward the end of the week, when both Master Plating and Carlson & Beauloye were actively chrome plating. Master Plating usually conducts plating on Wednesday, Thursday, and Friday; while Carlson & Beauloye normally plates every day of the work week, including overnight.

### **Meteorological Analysis**

Meteorological data were also collected and analyzed for the time period when ambient hexavalent chromium sampling was conducted. In general, atmospheric stability, temperature, and wind all affect pollution levels. On most of the days when elevated hexavalent chromium levels were found, both atmospheric pressure and temperature were high, and the sky was clear. Such meteorological conditions make it very difficult for pollutants to quickly disperse and become diluted in the atmosphere. This would suggest that the hexavalent chromium levels observed were predominantly influenced by sources close to the air monitoring locations.

### **Analysis of Source Test Data**

As stated above, the source test data on the outlet stacks at Carlson & Beauloye were all below detectable levels. This does not mean that no hexavalent chromium is emitted. However, it is unlikely that the very low emissions from the stacks of Carlson & Beauloye control equipment are contributing significantly to the elevated ambient concentrations seen at the monitoring locations. However, additional analysis is being conducted to ensure that Carlson & Beauloye is not contributing to ambient levels observed.

### **Survey of Other Potential Sources**

On February 13, 2002, the staffs of the SDAPCD and ARB conducted a walk-through inspection of the neighborhood surrounding the monitoring locations. Some potential sources of hexavalent chromium were found, such as stainless steel welding. However, none of these sources emit hexavalent chromium on a regular basis or operate in the immediate area or in a manner that is expected to impact the ambient concentrations that were measured.

## **PRELIMINARY FINDINGS**

The elevated levels of hexavalent chromium measured in this sampling study are of concern, if experienced over a long term. While no immediate acute health impacts are expected, long-term exposures should be reduced to decrease the potential risk of developing cancer.

- Levels of exposure to hexavalent chromium were much lower in February, as compared to December. This reduction may be a result of:
  - Improved dispersion due to meteorological conditions
  - Changes in emissions from local sources
- The emissions from Master Plating appear to be a significant contributor to elevated ambient levels of hexavalent chromium measured for at least one site between the facilities.
- Proper operation and maintenance of the emission control system and good housekeeping practices were observed at Carlson & Beuloye. Additional analysis is being conducted to evaluate whether Carlson & Beuloye is contributing to elevated ambient levels.

The SDAPCD and ARB will continue to monitor ambient air quality levels and facility operations, and to further investigate for other potential sources of elevated hexavalent chromium ambient levels.

**For more information, please contact:**  
San Diego Air Pollution Control District  
Public Information Office  
(858) 650-4707

