

## Hartford City Special Study

In response to concerns regarding the Hartford Iron and Metal facility (HI&M) in Hartford City, Indiana, including a letter sent to the Indiana Department of Environmental Management (IDEM) by the Blackford County Concerned Citizens (BCCC), the Office of Air Quality (OAQ) conducted a special monitoring study near the facility from May 2020 through August 2020. The BCCC was concerned that particulates, or more specifically metals emissions, from the HI&M operations were impacting air quality in the surrounding area. IDEM determined that a short-term monitoring project near the facility would help determine what concentrations of metals were in the air.

### Monitoring Project

The monitoring project was designed to collect information regarding ambient metals concentrations over a four-month period. A suitable monitoring location was procured approximately 250 feet to the east of the facility in question. Figure 1 shows the area around the facility and identifies the monitoring location.

Total suspended particulate (TSP) samples were to be collected and analyzed for the metals listed below.

Aluminum	Antimony	Arsenic	Barium	Bromine	Cadmium	Calcium	Cerium
Cesium	Chlorine	Chromium	Cobalt	Copper	Indium	Iron	Lead
Magnesium	Manganese	Nickel	Phosphorus	Potassium	Rubidium	Selenium	Silicon
Silver	Sodium	Strontium	Sulfur	Tin	Titanium	Vanadium	Zinc
Zirconium							

### Hexavalent Chromium

The metals considered Hazardous Air Pollutants (HAPS) by USEPA are marked yellow.

### Sampling Procedure

Two intermittent samplers were used to collect the samples for analysis. A Thermo Partisol 2025b sampler with a TSP inlet head was used to collect a 24 hour sample every six days. These 47mm filters were sent to UC Davis for analysis by X-ray fluorescence spectroscopy (XRF) for 33 metals. UC Davis is contracted by USEPA to analyze the PM2.5 speciation filters collected across the country. A PUF (polyurethane foam) sampler was used to collect the samples to be analyzed by Eastern Research Group (ERG) for Hexavalent Chromium (Cr6+) using their SOP ERG-MOR-063. These 24-hour samples were collected every 12 days. ERG is the lab contracted by USEPA to analyze these types of samples and provide support to various monitoring projects.

Sampling of the 33 metals began on May 3<sup>rd</sup>, 2020 and the Cr6+ sampling began on May 9<sup>th</sup>, 2020. The last samples were collected on August 25<sup>th</sup>, 2020. All samples collected were valid and sent to the appropriate laboratory according to the protocols established by each lab.

## Results

Table 1 lists the raw data values for the individual samples collected at the Hartford City Site. All values were very low, and many samples measured 0.000 ug/m<sup>3</sup> or below the minimum detection limit (MDL) for the individual parameter.

## Past Study Comparisons

In order to put some perspective on the level of the concentrations observed at Hartford City, the data collected during this study was compared to other past monitoring efforts which had collected metals data. The comparison of data is summarized in Table 2.

Typically three different particle sizes can be collected and analyzed; TSP (Total Suspended Particulates, generally all particulate matter less than 100 microns in size), PM<sub>10</sub> (Particulate Matter less than 10 microns in size), and PM<sub>2.5</sub> (Particulate Matter less than 2.5 microns in size, or fine particulate).

Hartford City and Kokomo collected TSP samples. The School Air Toxics Study and the SW Indy Study collected metals in the PM<sub>10</sub> fraction. And PM<sub>2.5</sub> samples are collected and analyzed as part of the PM<sub>2.5</sub> Speciation Trends Network.

The Hartford City and Kokomo monitoring locations were sited very near potential particulate sources. One could expect higher concentrations of specific metals from the source operations. The School Air Toxics Study collected samples at schools which had major sources located from about ¼ mile to several miles away. The sites in the SW Indy Study were located in an area with multiple sources located near the monitoring locations. The PM<sub>2.5</sub> Speciation monitoring sites are generally located in areas not influenced by a specific source or sources.

When comparing the data from the different sites, most of the average values collected at the Hartford City site were close to or below the values collected at other sites and studies. The individual parameter graphs are in Figure 2 through Figure 10.

## Conclusion

The concentrations of the metals collected during the study are very low and do not rise to levels of concern. The values are often below the detection limit of the analytical process for several of the metals. The concentrations were consistent with other values collected across Indiana in a variety monitoring programs.

Table 1  
Hartford City Study – Raw Data

		Cr6+	Analysis Periods	Sodium	Magnesium	Aluminum	Silicon	Phosphorous	Sulfur	Chlorine	Potassium	Calcium	Titanium	Vanadium	Chromium	Manganese	Iron	Cobalt	Nickel
	Minimum Detectable	0.0000073	5/3-7/8	0.033	0.015	0.035	0.016	0.002	0.005	0.006	0.017	0.017	0.008	0.005	0.010	0.011	0.024	0.006	0.008
			7/14-8/25	0.002	0.011	0.043	0.013	0.002	0.005	0.008	0.019	0.018	0.009	0.005	0.011	0.010	0.029	0.007	0.016
Day	Sample Date																		
Su	5/3/2020			0.000	0.218	0.324	1.417	0.012	0.308	0.009	0.197	0.798	0.031	0.000	0.001	0.010	0.298	0.001	0.000
Sa	5/9/2020	0.00000378		0.006	0.166	0.266	1.232	0.002	0.155	0.011	0.162	0.453	0.029	0.000	0.000	0.006	0.243	0.000	0.000
Fr	5/15/2020			0.188	0.079	0.149	0.453	0.023	0.364	0.119	0.143	0.328	0.015	0.000	0.000	0.005	0.139	0.000	0.000
Th	5/21/2020	0.00000863		0.200	0.163	0.086	0.325	0.009	0.264	0.060	0.084	0.635	0.012	0.000	0.000	0.003	0.126	0.000	0.000
Wd	5/27/2020			0.054	0.118	0.173	0.735	0.013	0.358	0.020	0.160	0.648	0.023	0.000	0.001	0.005	0.241	0.000	0.000
Tu	6/2/2020	0.0000547		0.000	0.422	0.658	2.868	0.013	0.356	0.141	0.332	2.813	0.089	0.001	0.006	0.025	1.637	0.005	0.002
Mn	6/8/2020			0.006	0.402	0.335	1.682	0.013	0.196	0.033	0.239	1.338	0.045	0.001	0.002	0.006	0.368	0.001	0.000
Su	6/14/2020	0.0000402		0.000	0.083	0.138	0.496	0.003	0.157	0.018	0.107	0.361	0.016	0.000	0.001	0.003	0.133	0.000	0.000
Sa	6/20/2020			0.097	0.295	0.456	2.073	0.003	0.790	0.034	0.363	1.871	0.053	0.000	0.003	0.017	0.635	0.002	0.000
Fr	6/26/2020	0.0000575		0.024	0.162	0.304	1.154	0.012	0.586	0.036	0.218	1.390	0.034	0.000	0.001	0.009	0.430	0.001	0.001
Th	7/2/2020			0.000	0.320	0.226	0.838	0.015	0.626	0.055	0.351	1.414	0.026	0.000	0.001	0.008	0.314	0.000	0.000
Wd	7/8/2020	0.0000316		0.000	0.259	0.236	0.897	0.012	0.726	0.064	0.232	1.422	0.028	0.000	0.001	0.010	0.681	0.001	0.000
Tu	7/14/2020			0.030	0.004	0.000	0.001	0.000	0.000	0.001	0.000	0.003	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Mn	7/20/2020	0.0000126		0.036	0.360	0.251	0.721	0.014	0.275	0.037	0.148	1.218	0.024	0.000	0.002	0.010	0.600	0.000	0.001
Su	7/26/2020			0.139	0.185	0.090	0.339	0.000	0.645	0.013	0.125	0.587	0.011	0.000	0.001	0.006	0.182	0.000	0.001
Sa	8/1/2020	0.00000304		0.049	0.056	0.025	0.165	0.012	0.423	0.007	0.071	0.383	0.005	0.000	0.001	0.002	0.094	0.000	0.001
Fr	8/7/2020			0.073	0.483	0.197	0.777	0.012	0.532	0.029	0.203	1.952	0.023	0.000	0.002	0.008	0.318	0.000	0.000
Th	8/13/2020	0.0000104		0.085	0.395	0.199	0.813	0.011	0.518	0.023	0.238	1.790	0.024	0.000	0.002	0.011	0.369	0.000	0.000
Wd	8/19/2020			0.000	0.488	0.304	1.165	0.030	0.219	0.058	0.371	2.462	0.030	0.000	0.001	0.013	0.404	0.000	0.000
Tu	8/25/2020	0.0000225		0.000	0.588	0.519	1.680	0.015	0.532	0.060	0.330	3.178	0.051	0.000	0.003	0.021	0.948	0.002	0.002
<b>Concentration units of Values = ug/m3</b>																			
<b>Summary of Data Collected at Hartford City (2020)</b>																			
	Maximum	0.0000575		0.200	0.588	0.658	2.868	0.030	0.790	0.141	0.371	3.178	0.089	0.001	0.006	0.025	1.637	0.005	0.002
	Minimum	0.0000030		0.000	0.004	0.000	0.001	0.000	0.000	0.001	0.000	0.003	0.001	0.000	0.000	0.000	0.000	0.000	0.000
	Average	0.0000245		0.049	0.262	0.247	0.992	0.011	0.402	0.041	0.204	1.252	0.029	0.000	0.001	0.009	0.408	0.001	0.000
	Total Sample:	10		20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
	# of Samples <Min Det	2		10	1	2	1	2	1	2	1	1	2	20	20	14	1	20	20



Table 2  
Comparison of Data from Different Studies

Concentrations are ug/m3

Study	TSP Metals		PM10 Metals			PM2.5 Metals						
	Hartford City Metals Study	Kokomo Opalescent Glass	SW Indy Study	School Air Toxics		PM2.5 Speciation Monitoring						
	Site	Hartford City	Kokomo- KOG	Stout Field and Harding St	Pittsboro	Warsaw	Jasper	Mechanicsburg	Indpls	Gary	Evansville	Jeffersonville
Time Period	2020	2016 - 2017	2006 - 2007	2009		2018						
<b>Hexavalent Chromium (Cr6+)</b>												
Maximum	0.000575	0.0008830	0.0001400									
Minimum	0.0000030	0.0000047	0.0000000									
Average	0.0000245	0.0001539	0.0000274									
<b>Chromium</b>												
Maximum	0.006	0.043	0.01220	0.00510	0.00430							
Minimum	0.000	0.001	0.00000	0.00200	0.00230							
Average	0.001	0.004	0.00264	0.00359	0.00326	0.00129	0.00110	0.00221	0.00148	0.00175	0.00267	
<b>Manganese</b>												
Maximum	0.025	0.060	0.02360	0.02930	0.04830							
Minimum	0.000	0.001	0.00073	0.00090	0.00060							
Average	0.009	0.010	0.00575	0.00721	0.00913	0.00171	0.00095	0.00260	0.00809	0.00174	0.00209	
<b>Cobalt</b>												
Maximum	0.005	0.048	0.02920	0.00020	0.00010							
Minimum	0.000	0.000	0.00000	0.00000	0.00000							
Average	0.001	0.001	0.00049	0.00004	0.00006	0.00057	0.00032	0.00045	0.00038	0.00044	0.00045	
<b>Nickel</b>												
Maximum	0.002	0.066	0.02470	0.00110	0.00060							
Minimum	0.000	0.000	0.00030	0.00020	0.00010							
Average	0.000	0.002	0.00101	0.00055	0.00036	0.00033	0.00052	0.00090	0.00059	0.00082	0.00095	
<b>Arsenic</b>												
Maximum	0.000	0.006	0.00640	0.00100	0.00230							
Minimum	0.000	0.000	0.00008	0.00020	0.00020							
Average	0.000	0.001	0.00106	0.00059	0.00091	0.00060	0.00048	0.00022	0.00033	0.00030	0.00027	
<b>Selenium</b>												
Maximum	0.003	0.464	0.01190	0.00210	0.00160							
Minimum	0.000	0.000	0.00014	0.00020	0.00010							
Average	0.001	0.014	0.00154	0.00089	0.00059	0.00036	0.00105	0.00087	0.00091	0.00107	0.00124	
<b>Cadmium</b>												
Maximum	0.004	0.237	0.00100	0.00030	0.00060							
Minimum	0.000	0.000	0.00003	0.00000	0.00000							
Average	0.000	0.008	0.00025	0.00013	0.00015	0.00316	0.00365	0.00309	0.00395	0.00330	0.00252	
<b>Antimony</b>												
Maximum	0.000	0.017	0.04760	0.00160	0.00150							
Minimum	0.000	0.000	0.07000	0.00020	0.00020							
Average	0.000	0.002	0.00139	0.00060	0.00077	0.00045	0.00550	0.00781	0.00666	0.00646	0.00600	
<b>Lead</b>												
Maximum	0.028	0.012	0.05730	0.01500	0.02760							
Minimum	0.000	0.001	0.00050	0.00130	0.00110							
Average	0.008	0.003	0.00600	0.00390	0.00477	0.00437	0.00137	0.00466	0.00452	0.00316	0.00372	

	TSP Metals		PM10 Metals		PM2.5 Metals							
Study	Hartford City Metals Study	Kokomo Opalescent Glass	SW Indy Study	School Air Toxics		PM2.5 Speciation Monitoring						
	Site	Hartford City	Kokomo- KOG	Stout Field and Harding St	Pittsboro	Warsaw	Jasper	Mechanicsburg	Indpls	Gary	Evansville	Jeffersonville
Time Period	2020	2016 - 2017	2006 - 2007	2009		2018						
<b>Magnesium</b>												
Maximum	0.588	0.417										
Minimum	0.004	0.000										
Average	0.262	0.109				0.01828	0.01448	0.01820	0.02428	0.01266	0.01660	
<b>Aluminum</b>												
Maximum	0.658	1.537										
Minimum	0.000	0.007										
Average	0.247	0.193				0.04109	0.00213	0.03472	0.02695	0.03419	0.05015	
<b>Titanium</b>												
Maximum	0.089	0.107										
Minimum	0.001	0.002										
Average	0.029	0.019				0.00395	0.00222	0.00332	0.00298	0.00034	0.00419	
<b>Iron</b>												
Maximum	1.637	0.947										
Minimum	0.000	0.049										
Average	0.408	0.217				0.00472	0.03153	0.05960	0.24719	0.05437	0.07120	
<b>Copper</b>												
Maximum	0.026	0.066										
Minimum	0.000	0.000										
Average	0.006	0.007				0.00305	0.00265	0.00634	0.00288	0.00330	0.00414	
<b>Zinc</b>												
Maximum	0.146	0.054										
Minimum	0.000	0.004										
Average	0.033	0.016				0.01126	0.00995	0.01138	0.03237	0.00977	0.00088	
<b>Tin</b>												
Maximum	0.007	0.021										
Minimum	0.000	0.000										
Average	0.001	0.001				0.00831	0.00612	0.00707	0.00538	0.00786	0.00669	



Figure 1  
Hartford City Monitoring Location

## Site Parameter Comparisons

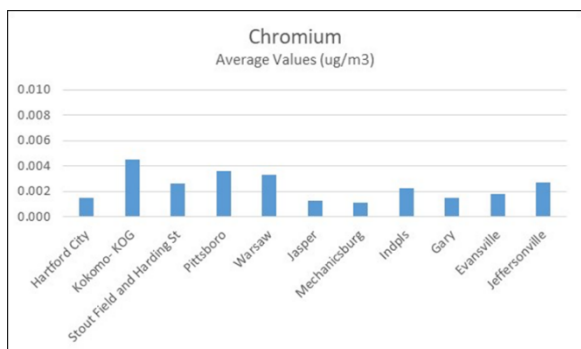


Figure 2 – Chromium

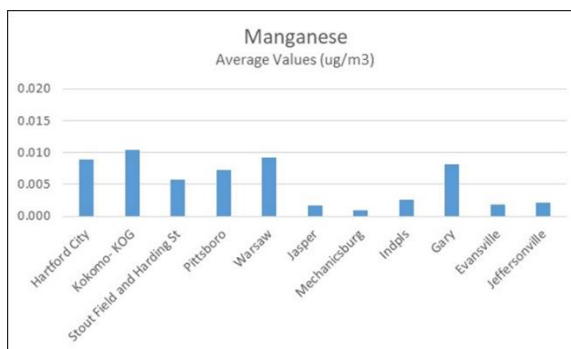


Figure 3 – Manganese

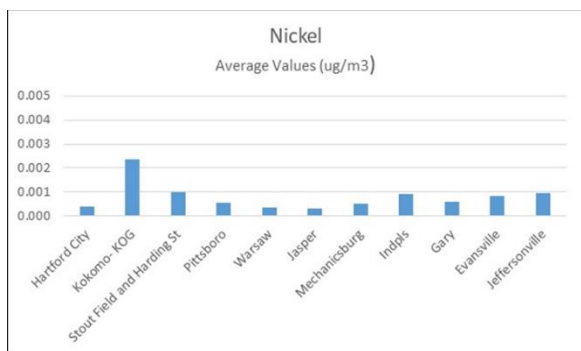


Figure 4 – Nickel

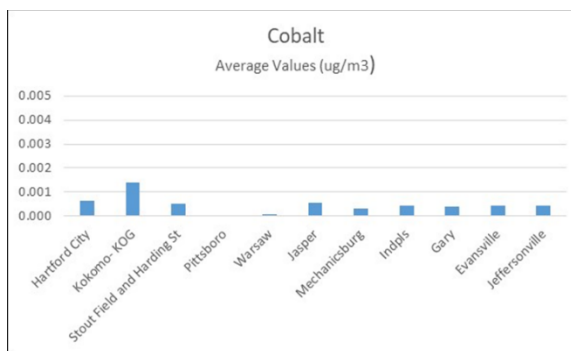


Figure 5 - Cobalt

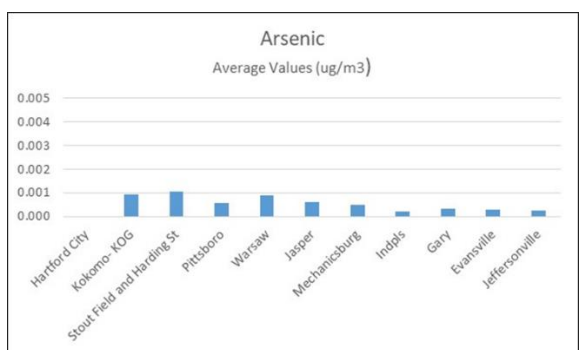


Figure 6 – Arsenic

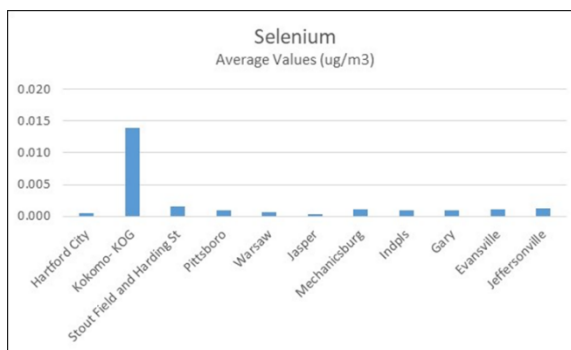


Figure 7 – Selenium



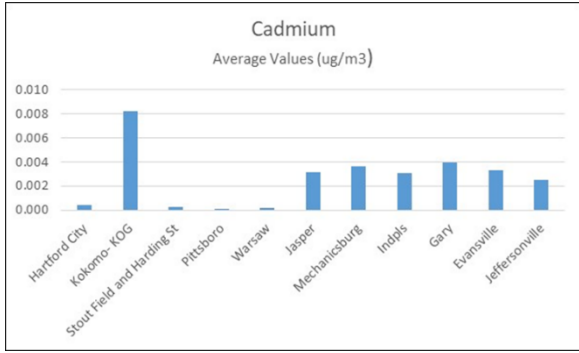


Figure 8 – Cadmium

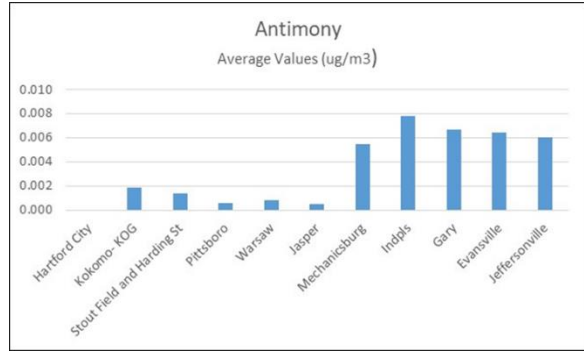


Figure 9 - Antimony

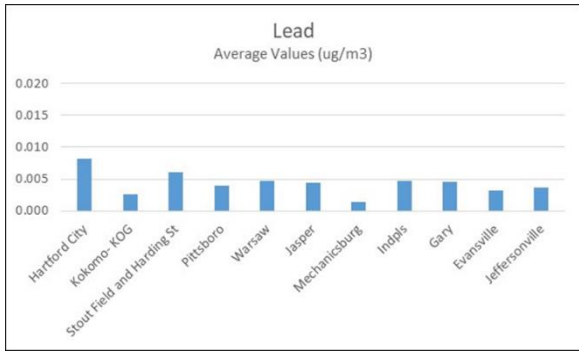


Figure 10 - Lead