Health Consultation

RESPONSIVENESS SUMMARY

CONTINENTAL ALUMINUM EXPOSURE INVESTIGATION:
AIR MONITORING RESULTS

NEW HUDSON, OAKLAND COUNTY, MICHIGAN

EPA FACILITY ID: MI0001941699

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U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

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Prepared by:

Michigan Department of Community Health
Under a Cooperative Agreement with the
U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry

Table of Contents

List of Figures

List of Tables

List of Appendices

Abbreviations and Acronyms

µg	microgram
µm	micron (micrometer)
AEGL	Acute Exposure Guideline Level
ATSDR	Agency for Toxic Substances and Disease Registry
CaREL	California Reference Exposure Level
CCAM	congenital cystic adenomatoid malformation
DNA	deoxyribonucleic acid
EI	exposure investigation
EMEG	Environmental Media Evaluation Guide
EPA	U.S. Environmental Protection Agency
ERPG	Emergency Response Planning Guideline
HCl	hydrochloric acid (hydrogen chloride)
HF	hydrofluoric acid (hydrogen fluoride)
MATES-II	Multiple Air Toxics Exposure Study II
MDCH	Michigan Department of Community Health
MDEQ	Michigan Department of Environmental Quality
mg/m^3	milligrams per cubic meter
NAAQS	National Ambient Air Quality Standard
ng/m^3	nanograms per cubic meter
$PM_{2.5}$	particulate matter less than 2.5 microns diameter
PM_{10}	particulate matter less than 10 microns diameter
ppb	parts per billion
ppm	parts per million
RfC	Reference Concentration
SPM	Single Point Monitor (acid monitor)
TEEL	Temporary Emergency Exposure Limit
TSP	Total Suspended Particulates
VOC	volatile organic compound

Summary

Continental Aluminum is an aluminum recycling smelter in Lyon Township, Oakland County, Michigan. In response to a petition for a public health assessment, the Michigan Department of Community Health (MDCH) conducted a three-month exposure investigation (EI) from March through May 2004, investigating chemicals in the air near the smelter. MDCH investigated the presence of acidic aerosols; concentrations of airborne metal particulates, elemental mercury, and volatile organic compounds (VOCs); and certain meteorological parameters to determine what chemicals were present at what concentrations and if Continental Aluminum could be considered a potential source. The results of the EI indicated the concentrations of chemicals in the air were below health-based comparison values. Assuming that the air samples were representative of current conditions, MDCH and the Agency for Toxic Substances and Disease Registry (ATSDR) conclude that there is no apparent current public health hazard.

Purpose and Health Issues

The purpose of this document is to report and interpret the results obtained from an EI conducted by MDCH in response to a public health assessment petition regarding Continental Aluminum. Residents in Lyon Township, where the aluminum recycling smelter is located (Figure 1), believe that emissions from the plant have caused various adverse health effects. Specific complaints are discussed in the Community Health Concerns section of this document. MDCH sampled the air for the most likely contaminants to be found around secondary aluminum refineries (acidic aerosols, airborne metal particulates, and VOCs), as well as for mercury, to determine which chemicals were present and in what quantities. To determine if there was a scientifically plausible link between exposure and health effects, the agency then compared the findings to established comparison values and to the reported health effects.

Background

In February 2002, the federal Agency for Toxic Substances and Disease Registry (ATSDR) received a letter from two state environmental groups and the supervisor of Lyon Township, in southwest Oakland County, Michigan, petitioning for a public health assessment. The petitioners were concerned that air, water, and soil emissions from the Continental Aluminum plant in New Hudson, in the northern part of the township, were causing the adverse health effects claimed by area residents. ATSDR and MDCH, which conducts public health assessments for the federal agency at sites of environmental contamination in Michigan, conducted a site visit and reviewed stack test and available environmental data. In a public health consultation issued March 12, 2003, the agencies concluded that the health hazard posed by the plant's emissions was indeterminate. ("Indeterminate" means that a conclusion regarding the level of health hazard cannot be made because information critical to such a decision, such as extent of exposure, is lacking or insufficient.) The agencies recommended that an exposure investigation be conducted to better ascertain any current public health impact of emissions from Continental Aluminum (ATSDR 2003).

MDCH and ATSDR developed a protocol for the EI, involving residents, township officials, and plant representatives in the planning process, and released a document outlining the EI to the stakeholders in February 2004 (MDCH 2004a). Appendix A contains the protocol. The EI began March 1, 2004 and ended May 31, 2004 (92 days).

Discussion

Environmental Sampling and Data

The Michigan Department of Environmental Quality (MDEQ), under an agreement with MDCH to provide technical support for the EI, set up two air-monitoring trailers in the parking lot of Dolsen Elementary School, about one-half mile north-northeast of Continental Aluminum, during the week of February 23, 2004. (MDCH received approval from the local school district, South Lyon Community Schools, before placement of the trailers.) One trailer contained a Single Point Monitor acid monitor (SPM), meteorological equipment, and high-volume sampling pumps. The second trailer housed two Tekran Model 2537A Ambient Mercury Vapour Analyzers (Tekran). (The EI protocol did not include air monitoring for mercury. The addition of this parameter had been tentative and only occurred shortly before the investigation began. Mercury emissions from other secondary aluminum smelters have been reported [EPA 1995a].) MDCH chose the Dolsen site for the trailers based on prevailing winds making the school predominantly downwind from Continental Aluminum. This site also presented an ideal scenario to determine rates of exposure of air emissions to sensitive subpopulations (i.e., children).

Along with the stationary air monitoring, the investigation included grab sampling of ambient air when local residents or employees of area businesses reported odor events. MDCH convened a citizen advisory group, which discussed the logistics of who would conduct sampling and under what circumstances a sample would be taken. The advisory group agreed that township fire department personnel, a staff person from the county health department, and two local residents would attend to odor sampling events. The group also agreed upon locations of “control” air sampling sites to be paired with the sampling events (Figure 2). MDCH conducted the training of the samplers and provided them with resource folders. Appendix B contains the list of folder contents and samples of those contents (except for the laminated map, sample chain of custody form, and business card).

Table 1 shows which days yielded results for which parameters of the EI. Shaded rows indicate days that were evaluated in detail due to a parameter being noted that day. In all, 46 of the 92 days were evaluated in detail.

Airborne Metal Particulates Data

MDCH sampled airborne metal particulates (aluminum, barium, beryllium, cadmium, chromium, copper, lead, manganese, selenium, and zinc) every 6 days, adjusting the schedule as necessary for staff needs. MDCH chose this schedule so as not to always sample on the same day of the week. As well, MDEQ collects samples from its air monitoring stations throughout the state every 6 days and compares data collected during the same 24-hour period between different stations. However, the particulate sampling at the EI trailer was not scheduled for the same days as the state-wide sampling. If longer-term sampling had occurred, MDCH would have adjusted the sampling schedule to coincide with that of MDEQ.

Tables 2a and 2b show the airborne metal particulates data by weight (micrograms [µg] per filter) and by concentration (milligrams per cubic meter [mg/m^3] of air), respectively. Note that, upon analysis, the blank filters taken for March 3 and April 26 contained aluminum, barium, chromium, cadmium, manganese, and zinc. (Blank filters were minimally exposed to the air. They were removed from their storage container, immediately enclosed in a resealable plastic bag, and placed in a shipping container.) The other results were not adjusted against this finding. It is likely that some of the metals found in the air samples were due to the presence of these metals in the filter substrate.

Table 2a shows the 24-hour average of each weather parameter measured on sampling days. (Air monitoring agencies use barometric pressure and temperature when determining total air volume that passes through a filter during sampling.) MDCH also recorded meteorological data by the hour and by the minute. Staff used these data when more detailed evaluation of other EI parameters was necessary. More discussion on the meteorological parameters recorded during the EI follows in the appropriate section below.

Acid Monitor Data

Tables 3a and 3b show when acidic aerosol detections occurred and the respective minute or hourly meteorological parameters associated with those detections. Technical difficulties occurred at the air-monitoring trailer at the beginning of the EI. Consequently, MDCH did not consider any recorded acidic aerosol values valid until March 15. Real-time acid monitoring values, checked when staff attended the trailer, appeared valid. MDCH staff, with assistance from the Oakland County Health Department, tested the monitor on March 10, to verify that the monitor was responding to the presence of acidic aerosols. The test involved holding an aqueous solution of sulfuric acid near the air intake tube for the SPM. The monitor readout changed from 0 parts per billion (ppb) to more than 100 ppb, indicating that the machine was responding.

Because Continental Aluminum’s operating permit lists hydrochloric (HCl) and hydrofluoric (HF) acids as plant emissions, MDCH assumed that the acidic aerosols monitored in the EI would be one of those compounds. However, as discussed in the EI protocol, the SPM cannot differentiate between acids. The ChemCassette® tape, the “detector” component of the SPM, which changes color upon exposure to a mineral acid, simply reacts to a change of pH (measure of acidity) in the air. The user must “tell” the SPM, by means of a “key,” what acid is being monitored. The machine does not verify the identity of the substance. For most of the EI, MDCH used the low-level HCl key to determine the presence of acidic aerosols. This key allowed for the longest sampling time (240 seconds) and the second-lowest detection level (30-1,200 ppb). The SPM’s sulfuric acid key has the lowest detection level (26-750 ppb) with a sampling time window of 120 seconds. (MDCH did not purchase that key.)

On the morning of May 17, MDCH changed keys in the SPM so that the machine was interpreting acidic concentrations as being HF aerosols. The sampling time window for the HF key was 30 seconds, with a detection limit of 0.6-9 parts per million (ppm), which equals 600-9,000 ppb. This detection limit significantly exceeded several of the comparison values for the chemical (Appendix A – Table 3). If the acidic aerosol detected was indeed HF, MDCH reasoned, being detected at the SPM's specified limits would indicate that odors should be present and at least transient adverse health effects would be expected. As indicated in Table 1, the acid monitor showed detections for 10 days after the HCl key was replaced with the HF key. However, there was only one odor complaint reported during that time. On the basis of this information, MDCH concluded that the acidic aerosols detected by the SPM likely were not HF. However, it cannot be determined from these data what compound or compounds triggered the detections in the SPM.

Not all detections by the SPM coincided with odor detections at the trailer (Table 1). Occasionally, field staff attending to the air-monitoring trailer reported detecting odors there. Some of the odors were associated with operations at Continental Aluminum; other odors were attributed to other sources. These odors are discussed further in the Confounders/Notes section below.

Mercury Vapor Data

The Tekran Model 2537A Mercury Vapour Analyzer provides continuous analysis of elemental mercury in air at sub-nanogram-per-cubic-meter (ng/m^3) levels. (A nanogram is 1 billionth of a gram or 1 millionth of a milligram.) The instrument samples air and traps mercury vapor into a cartridge containing an ultra-pure gold adsorbent. The trapped mercury is then desorbed and detected using atomic fluorescence spectrometry. A dual cartridge design allows alternate sampling and desorption, resulting in continuous measurements of the air stream. The instrument is able to produce a reading every 5 minutes (MDEQ 2004). Results for a specific sample are produced 10 minutes after the sample is taken. This includes 5 minutes for the collection and 5 minutes for the analysis to be completed (A. Robinson, MDEQ-Detroit District Air Quality Division, personal communication, 2004).

Due to technical difficulties and the time needed to calibrate the equipment, only data collected March 28 through May 31 (65 days) were considered valid. While two Tekrans were used within the mercury-monitoring trailer, one unit (Unit 2, the mobile unit) had operation difficulties and much of the data collected on that unit consequently was not used. Therefore, the average concentration calculated was from the operation of one of the Tekrans (Unit 1, the stationary or "fixed" unit). The average mercury air concentration at the site was 3.6 ± 1.2 ng/m^3 (n = 17,908 samples). There were six days on which concentration spikes greater than 10 ng/m^3 were detected (see Table 4).

There is evidence that suggests that this site is being impacted by a source, as yet unidentified, that is emitting elemental mercury. The evidence is as follows:

1. The average concentration of elemental mercury in the air in New Hudson (3.6 ± 1.2 ng/m3) is higher than the background concentration from areas not impacted by industrial sources (approximately 1.5 ng/m3) (Keeler 2003, Malcolm et al. 2003, Bullock 2004).

2. The average concentration of elemental mercury in the air in New Hudson (3.6 ± 1.2 ng/m3) during the EI (March to May 2004) was higher than concentrations detected during concurrent (January to June 2004: 2.4 ± 1.4 ng/m3, n=1,428) and historical (2001-2002: 2.4 ng/m3) sampling in Detroit, Michigan. Detroit is assumed to be impacted by a source based on comparisons to background data collected from an upwind location in Dexter, Michigan (January to June 2004: 1.5 ± 0.7 ng/m3, n=1,343).

   -Source data are from the "Michigan Mercury Monitoring Network," a partnership between the MDEQ Air Quality Division and the University of Michigan Air Quality Laboratory (Keeler et al. 2004), and from a 2001-2002 ambient air toxics monitoring study conducted by MDEQ (A. Robinson, MDEQ-Detroit District Air Quality Division, personal communication, 2004), respectively.

Therefore, the average value of 3.6 ± 1.2 ng/m^3 reported during the EI, as well as the numerous spikes in elemental mercury concentrations, suggest that the New Hudson area is being impacted. However, the source cannot be determined from these data. It is possible that a source other than Continental Aluminum could be responsible for these elevated levels of elemental mercury in air. MDCH has referred this matter to MDEQ for follow-up.

Odor Complaint Data

There were 18 days for which odors were reported during the EI (Table 5). Sampling events occurred on nine of those days. On two other occasions, samplers went to the odor event site but did not detect an odor and therefore did not sample. The remaining odor complaint reports did not include notification of samplers.

The odors were most often described as "metallic" and "burning wire" or "hot wire". Odor intensity ranged from "just detectable" to "can't smell anything else." The range of descriptor and intensity parameters recorded during the EI was similar to odors reported before and after the investigation. Usually, a person would use the same descriptor and intensity score in subsequent odor complaints. (To protect the identities of complainants, these data are not shown.)

Comparing when (minute) and where the odor was detected and wind direction to the location of Continental Aluminum from the odor usually indicated a potential connection. (It is difficult to compare the hourly average wind direction provided for the last three complaints, as winds can shift substantially over time.) The aluminum smelter cannot be eliminated as a potential source of the odors.

Some complaints, received before the EI, reported that odors were at their worst on “still, heavy” days (days with low wind speeds and high relative humidity). It is difficult to determine from the data in Table 5 if this is necessarily the case. Most of the odor intensity scores were “2” (“can’t smell anything else”), regardless of meteorological parameters. The olfactory organ is the most sensitive system in the body. There are many factors, both subjective and objective, that determine the severity of and reaction to an odor event (Schiffman et al. 2000, Hirsch 2002). One person’s sensitivity to odor stimuli may be affected by meteorological conditions, another person may perceive no difference when the weather changes.

Odor Sampling Data

Figure 3 shows where each of the odor event samples was taken. Figures 4-13 detail individual sampling events. Mileage from Continental Aluminum to each sample site is listed in each figure. Mileage from the plant to each control site (1-8) ranged from 0.34-1.0 mile.

Table 6a shows the list of analytes and their respective detection limits for which odor samples were tested. Not all analytes were detected in the samples. Therefore, only those chemicals detected in at least one sample are shown in Table 6b.

Several chemicals were detected in blank samples. The blanks were not opened in the field. It is unlikely they had leaky valves, otherwise the low detection levels for the VOCs would have resulted in detections of more chemicals. The detections in the blanks may have been anomalies, possibly due to the canisters reaching the limit of their shelf life (J. Swift, Eastern Research Group, personal communication, 2004). Although the EI protocol had indicated that canisters nearing the end of their shelf life would be replaced, Eastern Research Group later informed MDCH that the older canisters would perform just as well so long as the vacuum was holding. Pre-sampling vacuum testing indicated that all canisters maintained a vacuum during storage. On the basis of this information, MDCH chose not to exchange canisters and potentially miss a sampling opportunity. When the elapsed time between cleaning and being brought to atmospheric pressure was compared to the analytical results for each sampling event, “age” of canister did not seem to have an effect on a chemical’s presence or concentration. Low-level laboratory techniques are sensitive and detecting trace amounts of certain analytes is not uncommon in analytical work. In addition, some VOCs are common field blank or laboratory contaminants (e.g., acetone, methyl ethyl ketone, methylene chloride; EPA 1999).

Meteorological Data

At 2 AM on April 4, Eastern Standard Time switched to Daylight Saving Time. The clocks on the air monitoring equipment did not make this change. Therefore, the meteorological parameters recorded after the switch have been adjusted to the appropriate time.

Technical difficulties occurred at the air monitoring trailer during the start-up of the EI. Minute data (data recorded every minute) for all parameters were not reliable until March 15. Hourly data for barometric pressure and relative humidity were not available until March 22. As necessary, MDCH used hourly data from the MDEQ meteorological station in Ypsilanti (about 20 miles south). These instances are noted in the various tables and figures.

Additionally, a power outage occurred May 9. Although the machines in the trailer came back on-line when power was restored and displayed real-time data, minute data on and after this date were unavailable. Hourly data were available only intermittently. Again, as necessary, MDCH used hourly data from the MDEQ Ypsilanti station. These instances are noted in the various tables and figures.

When wind speeds decrease below 3 mph, wind direction becomes less and less reliable (E. Hansen, MDEQ Air Monitoring Unit, personal communication, 2004). As necessary when using minute data, MDCH omitted wind direction when wind speed was 2 mph or less. These instances are noted in the various tables and figures.

The wind direction value indicates from which direction the wind is originating. When the weathervane crosses north, going clockwise, wind direction changes from 359° to 0°. (North is at 0°, or 360°.) As necessary when using minute data, MDCH subtracted 360° from a west-of-north wind direction, or added 360° to an east-of-north wind direction, to indicate when the weathervane crossed north. (Otherwise, it might be assumed that weathervane made a nearly-complete counterclockwise circle going from, for instance, 355° to 5°, when it actually only rotated clockwise 10°.) These instances are noted in the various tables and figures.

Confounders/Notes

"Confounders" are other activities that can cause data to be misrepresentative of an event of interest. Several potentially confounding events occurred during the EI, including structural and brush fires, parking lot cleaning, and septic system off-gassing. Some of these events occurred on days when specific air monitoring parameters were recorded, others occurred on "non-parameter" days. Table 1 notes each event and discusses the likelihood of the EI being affected by it. Other events, not considered potential confounders, are noted below.

The staff person at the trailer the morning of March 24 detected a faint odor associated with Continental Aluminum and notified a sampler. That person was unable to detect an odor upon arrival at the trailer, so they did not take a sample. However, later in the day, another person contacted the sampler regarding an odor event, which resulted in a sample being taken. The acid monitor also recorded detections of acidic aerosols this day, although later than the sampled odor event.

On April 6, field staff noticed a hot wire or metal odor while at the trailer. The staff person chose not to notify a sampler, although she did associate the smell with

Continental Aluminum. She filled out an odor surveillance form (odor complaint) for MDCH and the township files.

As mentioned in the Meteorological Parameters section, a power outage occurred in the area on May 9.

On May 17, MDCH switched keys in the acid monitor, as discussed in the Acid Monitor Data section.

Comparison of Results to Comparison Values

Airborne Metal Particulates

Table 2b lists the concentrations of metals detected in collected air samples. The EI Protocol (see Appendix A - Table 3) shows the lowest comparison value for each metal measured. The analytical results are all below the respective screening levels, in some cases by several orders of magnitude. (An "order of magnitude" is a multiple of 10. For example, "three orders of magnitude" equals 10 x 10 x 10 or 1,000.)

The chemical that came closest to its respective lowest comparison value was chromium. Most of the detections for chromium should be considered estimates. They fell between the limit of detection (when the machine recognizes a chemical and differentiates it from background "noise") and the limit of quantitation (when a machine can reliably determine the amount of the chemical, usually up to five times the detection limit). However, the March 19 chromium concentration approached, though was still less than, the Reference Concentration (RfC) for that metal.

Chromium exists in several valence (physical-chemical) states. The most commonly seen valences are (0), (III), and (VI). Chromium (0), or elemental, is the pure form of the metal. Chromium (III), or trivalent, is an essential micronutrient. Chromium (VI), or hexavalent, is a human carcinogen.

Analytical data are not available to indicate what portion of the chromium detected in the sample is the hexavalent form (P. Pope, DataChem Laboratories Inc., personal communication, 2004). The California Environmental Protection Agency (CalEPA) conducted a comprehensive air-monitoring program called the Multiple Air Toxics Exposure Study (MATES-II). In that study, the agency collected air samples from 10 stationary sites in California for 1 year and 14 temporary sites for 1 month each. Study results showed that total chromium concentrations consisted of 3.7% chromium (VI) (South Coast AQMD 2000). In Michigan, MDEQ conducted an ambient air toxics monitoring study at seven sites in the Detroit area in 2001-2002. The data included analysis of total chromium and hexavalent chromium at four sites. Analytical results indicated that only 1%-2.4% of total chromium was in the hexavalent form (R. Sills, MDEQ Air Quality Division, personal communication, 2004). Judging from the MATES-II and MDEQ's findings, the chromium in the particulate samples taken at Dolsen Elementary School was probably a mixture of valences. In that mixture, the chromium (VI) concentration probably made up less than 10-15% of total chromium. To be protective, MDCH used the comparison values for chromium (VI). MDCH does not expect there to be an increased risk of adverse health effects (cancer or non-cancer) due to exposure to the concentrations of airborne metal particulates found in the EI.

Acid Monitor Data

As discussed earlier in this document and in the EI protocol document (Appendix A), MDCH could not verify the identity of the compound or compounds that triggered the detections on the SPM. The acid monitor can be set up to read for six mineral acids: HCl, HF, sulfuric acid, nitric acid, hydrogen iodide, or hydrogen bromide. Of these, HCl and HF are common emissions from secondary aluminum smelters (EPA 1986, 1995). As concluded earlier in this document, it is unlikely that the acidic aerosol was HF. For this discussion, MDCH is assuming that the acidic aerosol detected by the SPM up to the morning of May 17 was HCl.

Tables 3a and 3b show minute and hourly-average data, respectively, for the assumed-HCl concentrations and meteorological parameters. The maximum assumed-HCl concentration detected exceeded only the RfC for HCl. However, the RfC addresses 24-hour (continuous) exposure. The detections of acidic aerosols at the air-monitoring trailer at Dolsen Elementary School were not continuous. The shortest event during the EI lasted 8 minutes and the longest lasted almost 34 hours. (MDCH considered an acidic-aerosol detection a new event if at least 60 minutes had elapsed since the last detection.) The intermittent nature of these events indicates that exposure to acidic aerosols in the area near Continental Aluminum is sporadic. It is more appropriate to compare the detection results to short-term, or acute, comparison values, such as the California Reference Exposure Level (CaREL) and the Acute Exposure Guideline Levels (AEGLs). The CaREL for HCl is 290 ppb, over a 1-hour averaging time (averaging all readings taken within 1 hour) (CalEPA 1999a). The maximum assumed-HCl minute concentration in Table 3a was 46 ppb. It is likely that the highest 1-hour average of the assumed-HCl concentrations would be less than 46 ppb, which is less than one-fifth the CaREL for HCl. The maximum assumed-HCl hourly concentration in Table 3b was 37 ppb, also well below the CaREL for HCl. MDCH does not expect adverse health effects to occur as a result of exposure to assumed-HCl concentrations recorded during the EI.

Mercury Vapor Data

The inhalation comparison values for mercury vapor are listed in the following table:

Table 7. Mercury vapor inhalation comparison values used for MDCH Exposure Investigation (EI) at Continental Aluminum

Mercury Comparison Value	**Concentration**	**Reference**
CaREL	1.8 μg/m^3 (1,800 ng/m^3)	CalEPA 1999b
AEGL	None reported	Not applicable
ERPG/TEEL		DOE 2004
Level 0	0.025 mg/m^3 (25,000 ng/m^3)	
Level 1	0.1 mg/m^3 (100,000 ng/m^3)	
Level 2	2.05 mg/m^3 (2,050,000 ng/m^3)	
Level 3	4.10 mg/m^3 (4,100,000 ng/m^3)	
EMEG - air		ATSDR 2004a
Acute	None reported	
Intermediate	None reported	
Chronic	0.2 μg/m^3 (200 ng/m^3)	
RfC	0.3 μg/m^3 (300 ng/m^3)	EPA 1995b
CaREL = California Reference Exposure Level; AEGL = Acute Exposure Guideline Level; ERPG = Emergency Response Planning Guideline; TEEL = Temporary Emergency Exposure Limit; EMEG = Environmental Media Evaluation Guide; RfC = Reference Concentration		
Note: Definitions for comparison values are in the EI Protocol (Appendix A).		

The highest concentration detected by the Tekran analyzer was 511 ng/m^3, which exceeded the RfC and chronic EMEG but only in one 5-minute sample. As discussed earlier, the RfC for a chemical addresses 24-hour, lifetime exposure. The chronic EMEG addresses an exposure duration longer than one year. Note that the wind direction at the time of this peak sample, and during the second highest recording measured 20 minutes later, was from the northeast, eliminating Continental Aluminum as a potential source for those two samples.

Elemental mercury vapor, such as that detected by the Tekran, tends to travel greater distances than does particulate mercury. When investigating a potential local source, a second upwind analyzer would provide information on whether detected mercury originated locally or at a distant source (J. Taylor-Morgan, MDEQ Air Quality Division, personal communication, 2004). The second Tekran analyzer was not working properly to deploy it to an upwind site for comparison. Therefore, it is unknown if the mercury detected during the EI was from a local or a distant source. MDCH has referred this matter to MDEQ.

Mercury has no odor. Therefore, any odors detected during the times when the Tekran reported above-normal concentrations were not due to elemental mercury.

Elevated detections of elemental mercury during the Continental Aluminum EI demonstrate that the area is being impacted by a source of elemental mercury. However, the concentrations detected do not pose a health risk through exposure by inhalation. The average concentration detected (3.6 ng/m^3) is more than 50 times below ATSDR's comparison value (200 ng/m^3).

Odor Sampling Data

All of the detected chemicals sampled during odor events fell well below their respective comparison values (Table 6b). The only chemicals that came to within an order of magnitude (one-tenth) of their respective lowest comparison values were 1,3-butadiene, at about one-sixth its RfC, and benzene, not quite one-half its intermediate EMEG. The maximum concentration of 1,3-butadiene detected (0.15 ppb) was from a control sample. The rest of the detections for this chemical occurred only at odor event sampling sites. 1,3-Butadiene is found in petroleum products and engine exhausts and is used in making plastics. The maximum concentration of benzene (1.67 ppb) occurred at an odor event sampling site. Benzene was found in all field samples (control as well as odor samples) and two blank samples. Benzene commonly is found in gasoline and exhaust fumes and is used in the manufacture of rubber and lubricants. While it is possible that the scrap being processed by Continental Aluminum, despite being inspected for impurities, included plastics, rubber, or solvents that contained 1,3-butadiene or benzene, it is also possible that the detections of these chemicals were due to nearby vehicular traffic.

The only chemical to exceed its odor threshold was toluene, with an odor threshold of 0.27 ppb and a maximum detected concentration of 1.81 ppb. The odor of toluene, a common solvent, is described as "sweet, pungent, benzene-like" (HSDB 2004). (Benzene causes the odor one smells in gasoline.) Toluene is present in paints, lacquers, rubber, and automobile exhaust. While it is possible that the scrap being processed by Continental Aluminum contained rubber (any solvent in paints or lacquers would have evaporated when the paint dried on the new product), it is also possible that the detections of toluene were due to nearby vehicular traffic.

Note that none of the odor descriptions for the chemicals tested for in the odor-sampling portion of the EI (Appendix A – Table 1) matched the most common descriptors for odor events that were sampled: "metallic" or "burning wire" (Table 5). This might lead to the argument that the compounds causing the odors were not tested for in the EI. A metallic odor is to be expected near an operating smelter. Ten metals, including aluminum, were tested for in the airborne-particulate testing. MDCH tested for VOCs during odor events because of the possibility of paint or solvents adhered to scrap entering the furnace, being volatilized, and entering ambient air as odors. Historic odor complaints included "chemical," "plastic," and "paint" as descriptors (Appendix C), suggesting VOCs might have been present.

Because the detected VOCs fell well below their respective comparison values, it is unlikely that these concentrations would cause adverse health effects following acute (short-term) or chronic (long-term) exposure.

Plausibility of Link to Reported Health Effects

Most health complaints reported by residents of Lyon Township were of a respiratory nature. The ATSDR *Toxicological Profile for Aluminum* (1999) discusses lung effects in workers exposed to fine aluminum dust or to alumina (aluminum hydroxide). These effects, also seen in research animals, are suggestive of dust overload. Dust overload occurs when the volume of dust in the lungs markedly impairs pulmonary clearance mechanisms. This condition is not dependent on the toxicity of the compound. Dust overloading has been shown to modify both the dosimetry (what actual dose is delivered) and toxicological effects of the compound. When excessive amounts of widely considered benign dusts are persistently retained in the lungs, the resultant lung effects are similar to those observed following exposure to highly toxic dusts. It is unclear whether the observed respiratory effects might be related to aluminum toxicity or dust overload. It should be noted that complainants in Lyon Township have reported odors, smoke, and noise, but not excess dust in the air.

Particulate matter, or PM, is one of the criteria pollutants listed in the Clean Air Act and its Amendments for which EPA has listed National Ambient Air Quality Standards (NAAQS). Beginning in 1987, EPA restricted the standard from Total Suspended Particulates (TSP) to the mass concentration of inhalable particles less than or equal to 10 microns (micrometers, µm), or PM_{10} (Federal Register, as cited by Bascom et al. 1996). PM_{10} can enter the thoracic airway, whereas some components of TSP might be filtered or expelled earlier along the respiratory tract by the body's protective mechanisms (nostril filtration, coughing).

In a 1996 risk assessment of PM, EPA stated that the pollutant should be split further into a coarse fraction (PM_{10}) and a fine fraction ($PM_{2.5}$, less than 2.5 microns). Particles ranging from 2.5-10 µm in size include resuspended road dust (soil particles, engine oil including metals, tire particles, sulfate, and nitrate), construction and wind-blown dust, silicon, titanium, aluminum, iron, sodium, and chlorine. Particles smaller than 2.5 µm include combustion, condensation, and coagulation products of gases and ultrafine particles; carbon; lead; vanadium; bromine; and sulfur and nitrogen oxides. In studies where coarse fraction particles were the dominant fraction of PM_{10}, major short-term effects observed included aggravation of asthma and increased upper respiratory illness (Bascom et al. 1996). The current NAAQS 24-hour value for PM_{10} is 150 $\mu g/m^3$ and for $PM_{2.5}$ is 65 $\mu g/m^3$. All of the values for PM_{10} in Table 2b are below both criteria. (One milligram [mg] equals 1,000 micrograms [µg].) Although the health effects described by Bascom et al. (1996) have been reported by some Lyon Township residents, adverse health effects related to particle burden toxicity would not be expected following exposure to the levels of PM_{10} found during the EI.

The individual chemical data collected during the EI indicated that the chemicals investigated did not exceed their respective comparison values outlined in the EI protocol. Therefore, it is not likely that exposure to any chemical *by itself* would result in adverse health effects. However, these chemicals did not occur alone but rather as complex mixtures. The science regarding interactions of chemical mixtures is still in its infancy. One chemical might have no effect on another (additive effect) or may act synergistically (one chemical causes the action of another chemical to be greater than expected), or antagonistically (one chemical causes the action of another chemical to be less than expected). The concentrations of the detected chemicals were, for the most part, more than one order of magnitude lower than their respective lowest comparison values. Current exposure-based assessment of joint toxic action of chemical mixtures (ATSDR

2002) suggests that the mixtures presented in the EI data would not be expected to cause adverse health effects.

Schiffman et al. (2000) discuss three paradigms, or examples, in which ambient odors may produce health symptoms in a community. Any or all of these paradigms might be occurring in Lyon Township. In the first paradigm, an odor-producing chemical (or mixture) occurs at a level that also causes irritation or other effects. Therefore, it is the irritation, not the odor itself, causing the effects, with the odor serving as an exposure marker. The irritation generally occurs at a concentration three to 10 times higher than when the odor is first detectable (the odor threshold). Although the concentration of each individual compound identified in the odorous air may not exceed the concentration known to cause irritation, the combined load of the complex mixture can exceed the irritation threshold. As already discussed, the concentrations of the chemicals detected in the air samples from the EI are all below their respective lowest comparison values. It cannot be said with certainty that the combination of these chemicals may be causing health effects, especially since the data do not identify or quantify the same chemicals consistently.

In the second paradigm, health symptoms appear at concentrations that would not be expected to be irritating. Concentrations exceed the odor threshold but fall well below irritant thresholds. Sulfur gases and organic amines can cause such scenarios. Symptoms can include nausea, vomiting, and headaches. The mechanism by which these symptoms are induced, when the potency of the odor far exceeds the potency of its irritancy, is not well understood. The degree of unpleasantness of the odor, the exposure history (previous experience with the odor), doubts about whether or not the odor is safe, and emotional status may play a role in inducing health symptoms. Noxious odors that are neither irritating nor toxic can set up a series of events, such as stress or nutritional problems (from failure to eat if one is feeling nauseous), that can lead to health effects. In Lyon Township, historic odor complaints and anecdotal evidence indicate that experiencing these odors is stressful to many residents. This stress can exacerbate or cause symptoms when people are exposed to the odors.

The third paradigm occurs when the odor-causing chemical is part of a mixture that contains a co-pollutant that is responsible for the reported health effects. Similar to the first example, the odor serves as an exposure marker, however a different chemical or air contaminant (such as dust or an allergen) is causing the effects. The body may become physically conditioned to reacting to the odor, regardless of whether the actual irritant is present in the future. It is difficult to determine if this might be the case in Lyon Township because emotional reaction to the odor, as discussed in the second paradigm, is likely also a factor in how a person reacts to an odor.

Specific concerns voiced by the community are addressed in the Community Health Concerns section.

Adequacy of Environmental Data

Anecdotal evidence from the community reports that the odors associated with Continental Aluminum were much worse when the plant first started operating in 1998. Several complainants reported that children playing outside were ushered indoors during odor events. MDCH reviewed odor complaints submitted to MDEQ and to Lyon Township from 1998 to 2002 (Appendix C). Complaints have diminished over time, but it is unknown whether this reflects a decline in the number of odor events or community members losing interest or becoming apathetic ("burn-out"). It is unknown whether emissions from the plant were higher when it first started operating because air data for that time are unavailable. (Stack-testing at the plant addresses only emissions going through the furnace stacks or the pollution control equipment and not potential fugitive emissions.) However, as discussed in the next paragraph, additional environmental sampling would not likely provide this information with any degree of certainty.

Air samples provide a "snapshot" of conditions happening at a specific time. The samples may or may not be representative of long-term conditions. Extrapolation of air data may not be appropriate for historic exposure assessment. Soil samples might provide information helpful in determining potential sources in non-attainment situations regarding particulate matter (PM). However, it would be difficult, if not impossible, to determine the degree of exposure during past odor events, when people reported health effects (acute events), from soil data. Models for this type of exposure assessment have yet to be developed and validated. Additionally, other components of the air emissions expected from aluminum recycling smelters, such as VOCs and acidic aerosols, would be more likely to undergo chemical reactions while still airborne and might not even deposit locally. Thus, this type of exposure assessment would contain a high degree of uncertainty due to lack of site-specific data. It would not be prudent to attempt to use soil data to estimate past exposure to acute events or chronic exposure.

Several community members have expressed interest in knowing "everything" that is in the air around Continental Aluminum. MDCH and ATSDR limited the chemicals investigated in the EI to those expected to be emitted from secondary aluminum smelters (EPA 1986, 1995). The EI further focused on those chemicals that could cause the reactions noted historically by odor complainants, and those of particular concern to the petitioners. If these "sentinel" chemicals were problematic, then further detailed analyses of the air might be warranted. However, the data indicated that the chemicals did not exceed health-based standards. Therefore, at this time, it is not necessary to investigate the presence of other chemical classes.

ATSDR Child Health Considerations

Children may be at greater risk than adults from exposure to hazardous substances at sites of environmental contamination. Children engage in activities such as playing outdoors and hand-to-mouth behaviors that could increase their intake of hazardous substances. They are shorter than most adults, and therefore breathe dust, soil, and vapors found closer to the ground. Their lower body weight and higher intake rate results in a greater dose of hazardous substance per unit of body weight. The developing body systems of children can sustain permanent damage if toxic exposures are high enough during critical growth stages. Even before birth, children are forming the body organs they need to last a lifetime. Injury during key periods of growth and development could lead to malformation of organs (teratogenesis), disruption of function, and premature death. Exposure of the mother could lead to exposure of the fetus, via the placenta, or affect the fetus because of injury or illness sustained by the mother (ATSDR 1998). The obvious implication for environmental health is that children can experience substantially greater exposures to toxicants in soil, water, or air than adults can.

Children likely have varying rates of exposure to airborne chemicals dependent on their location relative to the source and meteorological conditions. Children attending Dolsen Elementary School, which is about 1/2 mile north-northeast of the plant, could be exposed to airborne chemicals emitted by Continental Aluminum when prevailing winds blow from the southwest. The comparison values used in this EI are based on the most sensitive toxic endpoints determined by laboratory or epidemiological studies. As discussed previously, concentrations of the chemicals investigated in the EI fell well below their respective comparison values. It is not likely that children's health was adversely affected as a result of exposure to airborne chemicals tested for in the EI.

Deposition of airborne chemicals to the earth can lead to exposure via skin contact and ingestion. Continental Aluminum has been in operation in Lyon Township for almost 7 years. This relatively short time span should not have resulted in significant deposition. In 2001, two private citizens had the soil in their respective yards analyzed for various metals and anions (Table 8). The samples were taken 3 years after the plant began operations in the area. No earlier soil data are available for these addresses. These residences are predominantly downwind of Continental Aluminum and closer to the plant than is Dolsen Elementary School. While concentrations of a few metals exceeded the default value for Michigan background (an average value for unimpacted soil), overall results were less than the MDEQ Part 201 Generic Clean-up Criteria for residential soils (MDEQ 2002) and the ATSDR chronic EMEG for children (ATSDR 2004b). It is not likely that concentrations of chemicals associated with emissions from Continental Aluminum in the soil at Dolsen Elementary School, or in the area around the smelter, are at levels that should warrant concern regarding skin contact and ingestion.

Community Health Concerns

General Health Complaints

Residents of Lyon Township, and people who work there, have reported many and diverse health effects that they associate with exposure to emissions from Continental Aluminum. (This information was self-reported. MDCH did not conduct a health survey.) These effects include: irritation of mucous membranes (eyes, nose, throat), nosebleeds, breathing difficulties, asthma attacks, sinus infections, headaches, migraines, and nausea. The township building inspector suffered corneal abrasions when he was investigating a report of smoke and odor coming from the plant. These health effects can occur as a result of exposure to airborne irritants, such as acidic aerosols, or odors. According to the samplers and the citizen who notified them, the May 18 odor event was the strongest odor experienced during the EI and was reminiscent of historical odor events. The analytical data reported for this odor event showed that concentrations of chemicals of interest were below health-based comparison values. Nonetheless, as discussed earlier, health effects from irritating odors could occur below acute and chronic health criteria.

Asthma Incidence

At the request of a Lyon Township resident, an asthma epidemiologist at MDCH reviewed the incidence of asthma hospitalizations (per 10,000 population basis), using the primary discharge diagnosis code, for the years 1990 through 2001 for Oakland County (MDCH 2003). Although inpatient hospitalization and mortality represent the most severe consequences of asthma, MDCH routinely uses this information to explore the impact asthma has on communities. New diagnoses cannot be determined from these data. Also, because the database does not include individual identifiers, calculated hospitalization rates may include multiple admissions by the same person.

The epidemiologist condensed the data for zip code area 48165 (New Hudson) into three equal periods (1990-1993, 1994-1997, and 1998-2001), due to the small number of events. (These data indicate the number of people per 10,000 living in a specific zip code that were hospitalized, regardless of the zip-code location of the hospital.) The asthma hospitalization rate per 10,000 people for these time periods in the area were 3.6, 3.1, and 2.3, respectively. The downward trend was not statistically significant. (The hospitalization rate was calculated for children and adults collectively. The epidemiologist was unable to calculate pediatric asthma hospitalizations separately due to the small number of events for the zip-code areas.) In 2000, the asthma hospitalization rate for New Hudson, South Lyon (zip code 48178), and Milford (zip codes 48380 and 48381) combined was 7.46 per 10,000, according to a database compiled by Wayne State University. As a comparison, for that same year, the asthma hospitalization rates for Oakland County and the state of Michigan were 11.8 and 15.8 per 10,000, respectively (MDCH 2003).

Aluminum Levels in Blood

One set of parents concerned about allegations regarding Continental Aluminum's emissions independently had the blood aluminum level checked in their elementary school-age child. Although they live in the prevailing upwind direction from the plant, the child would be attending Dolsen Elementary School (primarily downwind from the plant) and the parents wanted to establish a baseline to which they could compare future levels. Test results indicated that the child had levels of aluminum in his blood slightly above (well within an order of magnitude of) the laboratory-reported reference levels (data not shown). (The *Merck Manual*, 17th Edition [1999], reports normal adult serum aluminum levels as 3-10 micrograms per liter.) The child was *not* showing symptoms associated with aluminum toxicosis (neurologic, bone, or lung effects). The parents consulted with the Michigan Poison Control Center regarding potential household sources of aluminum (private well water, antacids, soda cans, some cookware), but no likely source could be found. The parents plan to have the child tested annually.

Another set of parents also independently had their children tested for blood aluminum levels. The family moved to the area about 15 years ago and lives a couple of miles east of the plant. One child currently attends Dolsen Elementary School and the other finished attending the school last year. Both children's results were above (well within an order of magnitude of) the laboratory-provided reference range. Neither child was symptomatic. The parents and the pediatrician's office contacted MDCH for guidance on what the levels meant and what actions might be necessary. In response, MDCH researched the subject and compiled information into factsheets for both the public and healthcare providers. (These factsheets have been posted on the MDCH website at http://www.michigan.gov/mdch-toxics, under the "Health assessments and related documents" link for Continental Aluminum.)

MDCH is advising that people *not* have their blood analyzed for aluminum since exposure is common. (Aluminum is present in many foods, over-the-counter medicines, and hygiene products.) The majority of aluminum intake is not absorbed, that which is absorbed being excreted by the kidneys. The primary population of concern, then, is those persons with kidney disorders, such as dialysis patients. MDCH conferred further with the ATSDR Division of Toxicology, the ATSDR Regional Office, the Pediatric Environmental Health Specialty Unit at Chicago's Cook Hospital, and the Michigan Poison Control Center to determine acceptable reference ranges for aluminum in serum or urine (there is little consensus between laboratories). As a result of these discussions, MDCH updated the factsheets, providing the information to stakeholders and posting it on the agency's website. Regarding the three children who were tested, the reported blood aluminum levels are not of clinical concern.

Mutagenicity or Tumorgenicity

Other persons have expressed concerns that emissions from Continental Aluminum could have mutagenic (changing DNA) or tumorigenic (causing benign or malignant tumors) effects. In one family, both children were diagnosed with noncancerous tumors defined as "aneurismal bone cysts." The children were born before the family moved to Lyon Township but were diagnosed after they had lived in the area for 4 years. (They had moved to the township before Continental Aluminum started production there, and diagnoses occurred after the plant had been in operation for at least 1 year.) The family lives in the predominant upwind direction from Continental Aluminum. According to the medical literature, it is not unusual for these cysts to occur randomly, but it is unusual for the cysts to occur in related individuals. The parents report that there is no genetic basis for both children to have these tumors. One child has developed asthma and recently has been diagnosed with Crohn's disease. The results of the EI air testing show no exceedances of comparison values of the detected chemicals. Given this information and the lack of data regarding etiology of aneurismal bone cysts, MDCH cannot conclude that there is any link between the diagnoses and emissions from Continental Aluminum.

In another family, living in the area since 1996 and residing predominantly upwind of Continental Aluminum, the mother exercised daily during her pregnancy by walking along the bike trail (a former railroad) that goes through the community and behind the plant (Figure 1). She claims that on occasion she would smell odors emanating from the plant. She recalls one day when the odor was particularly strong, for which MDEQ subsequently cited Continental Aluminum. (Continental Aluminum received a Letter of

Violation from MDEQ on December 8, 1999 in response to strong odors verified December 3, 1999 [see Significant Date Chronology in ATSDR 2003]). The woman remembers suddenly feeling ill during her walk on that particular day. Following several prenatal tests, doctors diagnosed the unborn child with a "level 3 CCAM," a congenital cystic adenomatoid malformation of the left lung. The woman brought the pregnancy to term. Doctors removed the infant's lung several days after birth. The child has had several surgeries since. Similar to the discussion regarding the bone cysts, MDCH cannot conclude that there is a link between maternal exposure to the emissions of Continental Aluminum and mutagenic or teratogenic (birth deformities) effects.

Another woman contacted MDCH and asked whether her husband's brain tumor could be a result of exposure to emissions from Continental Aluminum. The couple lives outside of the township but has operated a business just south of the plant for more than 20 years. Although predominantly upwind, their business could be affected by fugitive emissions or wind eddies from the plant due to its proximity. The husband was diagnosed with the tumor about 2 or 3 years after Continental Aluminum began operations in the township. It cannot be determined from the EI data whether the tumor could have been caused by something in the air.

Noise

Members of the community also had been concerned about noise, especially at night, coming from Continental Aluminum. In February 2004, the company added mufflers to the baghouse stacks in an attempt to reduce noise and vibration generated by the pollution control equipment. Anecdotal evidence indicates that this step has improved the situation for most residents. Due to the nature of operations at the plant, there continue to be occasional loud sounds, such as metal hoppers being moved about and semi trucks entering and leaving the premises. In the 1978 report *Noise: A Health Problem*, EPA's Office of Noise Abatement and Control concluded that unwanted noise can be more than just an annoyance. Noise can contribute to stress, interfere with learning, and pose a public health hazard (EPA 1978). (The Office of Noise Abatement and Control lost its funding in 1982 and has yet to be reestablished [HR4308 1996]). While MDCH and MDEQ have no authority to regulate noise issues, it is addressed here because, as a stressor, noise might be contributing to the health effects reported by some residents of Lyon Township.

Conclusions

MDCH and ATSDR conclude that the concentrations of chemicals detected in the air during the exposure investigation in Lyon Township posed no apparent health hazard by inhalation. Exposure is occurring but not at levels at which adverse health effects would be expected. Assuming that air samples taken March 1 through May 31, 2004 were representative of average conditions in the township, **air concentrations of the detected chemicals pose no apparent current public health hazard.**

As discussed earlier in this document, further environmental sampling likely will *not* help determine the hazards of past exposures. Soil data from 2001, three years after Continental Aluminum began operations in Lyon Township, indicated that soil concentrations did not exceed health-based comparison values and suggested that emissions from Continental Aluminum were not depositing significantly to area soils.

Because the air data from the EI do not indicate that there are significant emissions and the soil data from 2001 do not show an impact from deposition, there is no scientific evidence supporting further study of this site.

Recommendations

None at this time.

Public Health Action Plan

►MDCH and ATSDR will provide a brief summary of this report to Lyon Township residents, which they can provide to their private physicians when seeking medical care relating to respiratory complaints.

►MDEQ will investigate further mercury concentrations in the area around Continental Aluminum and provide regulatory guidance, as needed, to suspected sources.

If any citizen has additional information or health concerns regarding this health consultation, please contact the Michigan Department of Community Health, Environmental and Occupational Epidemiology Division, at 1-800-648-6942.

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Table 1. MDCH Exposure Investigation Results Matrix for Air Parameters near Continental Aluminum, Lyon Township, Oakland County, March 1 - May 31, 2004. (Shaded rows evaluated in detail in text.)

Month	Day	PM[A] Filter Taken	Acid Monitor Detections	Mercury Peaks	Odor Complaint(s)	Odor Sampled	Met. Station Used[B]	Confounders	Discussion of Confounders
March	1								
March	2	X					Both		
March	3								
March	4								
March	5							Green Oak Township fire	occurred 8.5 miles SW of Dolsen School; unlikely ash/soot affected March 7 sampling
March	6							Green Oak Township fire	
March	7	X					Both		
March	8								
March	9								
March	10								
March	11								
March	12								
March	13								
March	14	X					Both		
March	15							burning leaf odor at trailer	odor not associated with smelter, not sampled; occurred 4 days before PM Filter taken, unlikely that PM Filter was affected
March	16				X	X	Both		
March	17								
March	18								
March	19	X					Both		
March	20								
March	21								
March	22								
March	23				X		Local		
March	24		X		X (2)	X	Local		
March	25	X	X				Local		
March	26		X				Local		
March	27		X				Local		
March	28								
March	29								
March	30			X			Local		
March	31	X			X	X	Local		
April	1								
April	2				X (2)	X (2)	Local		
April	3								
April	4								

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Month	Day	PM[A] Filter Taken	Acid Monitor Detections	Mercury Peaks	Odor Complaint(s)	Odor Sampled	Met. Station Used[B]	Confounders	Discussion of Confounders
April	5		X				Local	burning paper/brush odor	odor not associated with smelter, not sampled; did not occur next day, when PM Filter taken; unlikely that PM Filter was affected
April	6	X			X		Local		
April	7								
April	8								
April	9								
April	10								
April	11								
April	12				X	X	Local		
April	13	X			X		Local	street sweeper at Dolsen	analytical results of PM Filter taken this date indicate that activity did not confound results
April	14				X		Local		
April	15								
April	16				X (2)		Local		
April	17		X	X			Local	burn barrel near trailer	ash/soot may have confounded PM Filter (highest weight and concentration collected April 17)
April	18	X	X				Local	burn barrel near trailer	
April	19							South Hill Road fire	occurred E (predominantly downwind) of Dolsen School, unlikely that PM Filter affected
April	20								
April	21		X	X	X		Local		
April	22				X	X	Local		
April	23								
April	24	X					Local		
April	25		X				Local		
April	26								
April	27				X (2)	X	Local		
April	28				X (4)	X	Local		
April	29								
April	30		X				Local		
May	1		X				Local		
May	2								
May	3								
May	4								
May	5								

Table 1. MDCH Exposure Investigation Results Matrix for Air Parameters near Continental Aluminum, Lyon Township, Oakland County, March 1 - May 31, 2004. (Shaded rows evaluated in detail in text.)

Month	Day	PM[A] Filter Taken	Acid Monitor Detections	Mercury Peaks	Odor Complaint(s)	Odor Sampled	Met. Station Used[B]	Confounders	Discussion of Confounders
May	6		X	X	X		Local		
May	7								
May	8								
May	9		X				Both		
May	10		X		X		Both	septic odor at trailer	may have confounded Acid Monitor Detections
May	11		X		X		Both		
May	12		X				Both		
May	13		X				Both	septic odor at trailer	may have confounded Acid Monitor Detections
May	14		X	X			Both		
May	15								
May	16								
May	17		X				Both	lawn mower at trailer	unlikely that engine exhaust affected Acid Monitor Detections
May	18		X		X	X	Both		
May	19								
May	20		X				Both		
May	21		X				Both		
May	22		X				Local		
May	23		X				Local		
May	24		X				Local		
May	25								
May	26		X				Local		
May	27		X				Local		
May	28								
May	29								
May	30								
May	31		X	X			Local		

Notes:
A. PM = particulate matter
B. When local meteorological data were not available, Ypsilanti meteorological data were used.

Table 2a. MDCH Exposure Investigation at Continental Aluminum: NIOSH Method 7300 (Elements by ICP) Results - Weights

Sample Number	Sample Date	Weight Analysis Date	Weights (ug/filter)[A,B] PM10	Al	Ba	Be	Cd	Cr	Cu	Pb	Mn	Se	Zn	Meteorological Parameters (24-hr avg)[C] WS (mph)	WD (^{o})	PRESS (mm Hg)	HUM (%)	T (^{o}C)	Total Air Volume (m^3)
7370087	3/2/2004	3/9/2004	23,000	590	150	ND	ND	(7)	81	ND	6.4	(20)	43	6	255	741[D]	79	9[D]	1795.2
7370088	(blank)[G]	3/9/2004	ND	530	150	ND	ND	(5)	(3)	ND	1.5	ND	22	(not applicable for blank)					(blank, no sample)
7370089	3/7/2004	3/15/2004	9,300	720	170	ND	ND	(3)	81	ND	3.4	ND	33	7	227	731	81[D]	2	1775.16
7370090	3/14/2004	3/18/2004	26,000	650	170	ND	ND	(7)	14	(9)	8.2	ND	49	8	212	735	73[D]	1	1739.70
7370091	3/19/2004	(not given)	47,000	820	190	ND	(0.4)	9.5	32	(7)	8.4	ND	57	4	199	741	79[D]	1	1730.35
7370092	3/25/2004	4/1/2004	48,000	700	160	ND	ND	(5)	40	(10)	11	ND	84	6	205	739	78	14	1807.03
7370093	3/31/2004	4/6/2004	21,000	840	190	ND	ND	(7)	19	(10)	11[E]	ND	49	8	12	734	76	5	1759.86
7370094	4/6/2004	4/13/2004	55,000	990	180	ND[F]	(2)	(8)	84	20	29	(20)	120	4	222	734	57	7	1796.18
7370095	4/13/2004	4/22/2004	17,000	670	160	ND	ND	(4)	15	(10)	8.5	ND	29	6	69	733	71	5	1787.31
7370096	4/18/2004	4/22/2004	68,000	1,000	160	ND	ND	(7)	21	(20)	21	ND	58	8	163	736	52	22	1891.55
7370097	4/24/2004	5/4/2004	29,000	550	120	ND	(2)	(8)	15	ND	12	ND	47	4	113	740	55	10	1779.38
7370098	(blank)[G]	5/4/2004	ND	400	110	ND	ND	(6)	(2)	ND	1.2	ND	170	(not applicable for blank)					(blank, no sample)
Reporting Limit (ug)			8																
Limit of Detection (LOD; ug)				5	0.6	0.05	2	3	1	8	0.1	20	1						
Limit of Quantitation (LOQ; ug)				20	2	0.2	7	9	4	30	0.4	80	4						

Reference: DataChem Laboratories, Salt Lake City, UT.

Notes:

A. Elements listed are: PM10 = particulate matter less than 10 microns in diameter, Al = aluminum, Ba = barium, Be = beryllium, Cd = cadmium, Cr = chromium, Cu = copper, Pb = lead, Mn = manganese, Se = selenium, Zn = zinc

B. Values in parentheses fall between the LOD and LOQ and are laboratory estimates. ND = not detected.

C. Meteorological parameters listed are: WS = wind speed, in miles per hour; WD = wind direction, in degrees clockwise from North; PRESS = barometric pressure, in mm mercury; HUM = relative humidity, in percent; T = temperature, in degrees Celsius. (Continental Aluminum position relative to trailer = 190-200^o.) Adjustment for Daylight Saving Time not required here as "24-hr avg" is for when pump ran.

D. These parameters were unavailable from the New Hudson trailer site on that date and, instead, taken from Ypsilanti data.

E. LOD = 0.3 ug and LOQ = 1.0 ug

F. LOD = 0.06 ug and LOQ = 2.0 ug

G. Blank samples were sent for analysis on 3/3/2004 and 4/26/2004, respectively.

Table 2b. MDCH Exposure Investigation at Continental Aluminum: NIOSH Method 7300 (Elements by ICP) Results - Concentrations

Sample Number	Sample Date	Concentration Analysis Date	Concentrations (mg/m³)[A,B,C,D]										
			PM10	**Al**	**Ba**	**Be**	**Cd**	**Cr**	**Cu**	**Pb**	**Mn**	**Se**	**Zn**
7370087	3/2/2004	3/12/2004	0.013	0.00033	0.000084	<0.000000028	<0.0000011	(0.000004)	0.000045	<0.0000045	0.0000036	(0.000012)	0.000024
7370088	(blank)[F]	3/12/2004	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
7370089	3/7/2004	3/16/2004	0.0052	0.00040	0.000097	<0.00000011	<0.0000039	(0.0000019)	0.000046	<0.000017	0.0000019	<0.000045	0.000018
7370090	3/14/2004	3/23/2004	0.015	0.00037	0.000096	<0.000000029	<0.0000011	(0.0000041)	0.0000082	(0.0000053)	0.0000047	<0.000011	0.000028
7370091	3/19/2004	3/30/2004	0.027	0.00047	0.00011	<0.000000023	(0.0000002)	0.0000055	0.000018	(0.0000042)	0.0000048	<0.0000035	0.000033
7370092	3/25/2004	4/2/2004	0.027	0.00039	0.000086	<0.000000028	<0.0000011	(0.0000025)	0.000022	(0.0000068)	0.0000061	<0.000011	0.000047
7370093	3/31/2004	4/8/2004	0.012	0.00048	0.00011	<0.000000028	<0.0000011	(0.0000037)	0.000011	(0.0000057)	0.0000062	<0.000011	0.000028
7370094	4/6/2004	4/16/2004	0.030	0.00055	0.00010	<0.000000033	(0.0000013)	(0.0000044)	0.000047	(0.000013)	0.000016	(0.000012)	0.000064
7370095	4/13/2004	4/26/2004	0.0096	0.00038	0.000089	<0.000000028	<0.0000011	(0.0000021)	0.0000083	(0.0000068)	0.0000047	<0.000011	0.000016
7370096	4/18/2004	4/26/2004	0.036	0.00055	0.000086	<0.000000026	<0.0000011	(0.0000035)	0.000011	(0.00001)	0.000011	<0.000011	0.000031
7370097	4/24/2004	5/5/2004	0.016	0.00031	0.000070	<0.000000028	(0.0000012)	(0.0000042)	0.0000083	<0.0000045	0.0000067	<0.000011	0.000026
7370098	(blank)[F]	5/5/2004	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Lowest Comparison Value			0.15	15	0.5	0.002	0.005	0.000006	100 (1 hr)	0.05	0.00004	0.2	10
Source of Comparison Value[E]			NAAQS	TEEL-0	TEEL-0	TEEL-0	TEEL-0	EPA RfC	CaREL	TEEL-0	EMEGc	TEEL-0	TEEL-0

Reference: DataChem Laboratories, Salt Lake City, UT.

Acronyms:

ICP Inductively Coupled Plasma

NIOSH National Institute of Occupational Safety and Health

Notes:

A. Elements listed are: PM10 = particulate matter less than 10 microns in diameter, Al = aluminum, Ba = barium, Be = beryllium, Cd = cadmium, Cr = chromium, Cu = copper, Pb = lead, Mn = manganese, Se = selenium, Zn = zinc

B. Values preceeded by "<" were not detected (see Table 2a). The value is the limit of detection for that element divided by the total air volume of the sample.

C. Values in parentheses fall between the LOD and LOQ and are laboratory estimates.

D. NR = not reportable (field blank, zero air volume).

E. Comparison Values listed are: NAAQS = US EPA National Ambient Air Quality Standard (24-hr avg), TEEL-0 = Temporary Emergency Exposure Level - threshold concentration, EPA RfC = US EPA Reference Concentration, CaREL = California Reference Exposure Level, EMEGc = ATSDR chronic Environmental Media Evaluation Guide

F. Blank samples were sent for analysis on 3/3/2004 and 4/26/2004, respectively.

Table 3a. MDCH Exposure Investigation at Continental Aluminum: Detections of Acidic Aerosols - Minute Data

Start Date	Time Started	End Date	Time Ended	Elapsed Time	No. Data Pts (No. Zeros)	Concentration Range, ppb	Meteorological Parameters[A]				
							WS	WD	PRESS	HUM	T
3/24/2004	23:49	3/25/2004	1:43	1:54	115 (19)	0-27	4-9	169-211	737.8-738.3	91-96	9-10
3/25/2004	18:08	3/27/2004	3:55	33:47	2,028 (144)	0-32	3-12	143-434[B]	737.5-740.2	79-97	11-16
4/5/2004	16:07	4/5/2004	16:16	0:09	10 (0)	3-37	3-7	268-372[B]	737.4-737.5	21-25	5-6
4/17/2004	9:46	4/17/2004	9:54	0:08	9 (0)	6-27	0-2	NR[C]	735.3	74-77	16
4/17/2004	11:49	4/17/2004	15:58	4:09	250 (146)	0-46	3-12	225-338	736.4-737	48-71	18-23
4/18/2004	10:18	4/18/2004	12:42	2:24	145 (21)	0-27	3-13	135-231	736.3-737.1	52-74	18-24
4/21/2004	4:37	4/21/2004	7:05	2:28	149 (67)	0-27	3-9	152-202	727.5-728.3	76-92	11-15
4/21/2004	9:37	4/21/2004	9:49	0:12	13 (3)	0-27	10-17	194-222	727.7-727.8	68-70	17-18
4/25/2004	12:01	4/25/2004	17:01	5:00	301 (31)	0-32	3-13	146-235	730-732	63-95	10-21
5/1/2004	0:57	5/1/2004	5:53	4:56	297 (4)	0-27	3-8	122-320	731.8-733	91-96	12-16
5/6/2004	19:35	5/6/2004	21:59	2:24	145 (19)	0-27	3-5	339-365[B]	733-734.2	54-72	21-25

A. Meteorological parameters listed are: WS = wind speed, in miles per hour; WD = wind direction, in degrees clockwise from North; PRESS = barometric pressure, in mm mercury; HUM = relative humidity, in percent; T = temperature, in degrees Celsius. (Continental Aluminum position relative to trailer = 190-200^{o}.)

B. The weathervane crossed North during the elapsed time. When crossing North clockwise, compass direction changes from 359 to 0 (versus 360). To indicate this, MDCH added 360 to compass readings that were east of north.

C. Wind speeds were less than 3 mph, making wind direction unreliable. Therefore, wind direction is not reported here.

Table 3b. MDCH Exposure Investigation at Continental Aluminum: Detections of Acidic Aerosols - Hourly Data

Start Date	Start Hour	End Date	End Hour	Elapsed Hours	Concentration Range, ppb	Meteorological Parameters[A,B] WS	WD	PRESS	HUM	T
5/9/2004	10	5/9/2004	10	1	2	4	140	NA	NA	17
5/9/2004	17	5/9/2004	17	1	20	4	101	NA	NA	21
5/9/2004	19	5/10/2004	12	18	11-33	6	94-237	NA	NA	16-27
5/10/2004	18	5/11/2004	5	12	16-33	1-4	11-305	NA	NA	14-20
5/11/2004	20	5/12/2004	17	22	2-33	2-8	144-204	NA	NA	16-28
5/12/2004	19	5/14/2004	22	52	12-37	0-11	24-286	NA	NA	16-26
5/17/2004	7	5/17/2004	9	3	1-11	3-6	174-183	NA	NA	13-17

A. Meteorological parameters listed are: WS = wind speed, in miles per hour; WD = wind direction, in degrees clockwise from North; PRESS = barometric pressure, in mm mercury; HUM = relative humidity, in percent; T = temperature, in degrees Celsius. (Continental Aluminum position relative to trailer = 190-200^{o}.)

B. Local barometric pressure and relative humidity were not available for these dates.

Table 4. MDCH Exposure Investigation at Continental Aluminum - Highest Five-Minute Values

Date	Reporting Time	Sampling Time	Concentration (ng/m^3)	WS	WD	PRESS	HUM	T
				Meteorological Parameters[A,B,C]				
3/30/2004	15:35	15:25	511.828	6	54	734.6	88	8
3/30/2004	15:55	15:45	120.279	4	52	734.6	90	8
4/17/2004	12:35	12:25	12.554	5	274	736.6	66	20
4/17/2004	12:40	12:30	12.436	7	286	736.5	65	20
4/17/2004	12:55	12:45	10.003	7	258	736.5	65	20
4/21/2004	18:15	18:05	14.159	7	202	728.2	74	18
5/6/2004	21:10	21:00	10.255	1	NR[D]	733.5	68	22
5/14/2004	10:05	9:55	25.902	5	194	762.3	87	21
5/14/2004	10:10	10:00	34.234	5	194	762.3	87	21
5/31/2004	23:05	22:55	13.979	4	204	728	80	15
5/31/2004	23:10	23:00	14.160	4	204	728	80	15
5/31/2004	23:25	23:15	10.026	4	204	728	80	15
5/31/2004	23:30	23:20	12.426	4	204	728	80	15

Reference: MDEQ 2004

Notes:

A. Meteorological parameters listed are: WS = wind speed, in miles per hour; WD = wind direction, in degrees clockwise from North; PRESS = barometric pressure, in mm mercury; HUM = relative humidity, in percent; T = temperature, in degrees Celsius. (Continental Aluminum position relative to trailer = 190-200^o.)

B. Values shown are 5-minute averages except for 5/14 and 5/31 values, which are hourly averages, due to technical difficulties at the air monitoring trailer.

C. Local barometric pressure and relative humidity data were unavailable for 5/14 and therefore were taken from the MDEQ Ypsilanti air monitoring station.

D. Wind speeds were less than 3 mph, making wind direction unreliable. Therefore, wind direction is not reported here.

Table 5. MDCH Exposure Investigation at Continental Aluminum - Odor Complaint Information

Date of Complaint	Time Odor Noticed[E]	Odor Descriptor	Odor Intensity[F]	CA Location from Odor (approx. degrees, N=0)[A]	Meteorological Parameters[B,C] WS	WD	PRESS	HUM	T	Sample Taken
3/16/2004	18:45	plastic, burning leaves/brush, metallic	2	0	6	20	NA	NA	-3	X
3/23/2004[D]	6:30	plastic, cleaning agent, burning wire	2	180	4	210	738.9	60	-1	
3/23/2004[D]	11:30-14:00	plastic, cleaning agent, burning wire	2	180	3-14	193-275	738.3-739	30-34	6-10	
3/23/2004[D]	20:30	plastic, cleaning agent, burning wire	2	180	0	209	739.1	52	4	
3/24/2004	9:05	metallic, hot wire	0	202.5	5	191	738.5	95	5	
3/24/2004	10:40	metallic	NR	180	7	202	738.2	92	6	X
3/31/2004	15:30	metallic, plastic	1	0	8	17	734	70	6	X
4/2/2004	8:50	metallic, chemical	2	0	7	1	733.6	76	4	X
4/2/2004	13:30	metallic, chemical	1-2[G]	0	9	358	733.6	59	9	X
4/6/2004	11:45	metallic, hot wire	1	202.5	4	179	734.6	44	8	
4/12/2004	13:45	metallic	1	180	10	41	737.6	35	8	
4/12/2004	14:00	metallic, chemical	NR	90	9	43	737.5	34	8	X
4/13/2004	10:30	metallic	1	0	8	2	733.3	82	3	
4/14/2004	15:50	sharp, pungent	NR	0	5	314	735.7	29	13	
4/16/2004	8:00	burnt wire	2	180	4	150	737.2	63	9	
4/16/2004	9:50	metallic	NR	180	7	191	736.9	51	13	
4/21/2004	16:00	metallic, swimming pool	2	180	6	199	727.6	67	20	
4/22/2004	14:00	metallic	NR	67.5	4	81	737.4	48	13	X
4/27/2004	9:00	burning styrene/vinyl	2	0	6	310	733	85	0	
4/27/2004	15:25	metallic	NR	0	9	311	734.3	52	3	X
4/28/2004	16:05	metallic, burning plastic/paint	1	157.5	12	187	733	30	20	X
4/28/2004	19:50	paint thinner, burning hair	1	202.5	9	198	732.3	31	21	
4/28/2004	21:00	chlorine, pungent	2	180	6	199	732.7	33	20	
5/6/2004	6:30-11:15	burning wire	2	180	0-10	165-222	733.3-734.8	43-59	10-21	
5/10/2004	15:35	NR[G]	1	0	10	242	NA	NA	28	
5/11/2004	17:00	acid	2	157.5	4	159	NA	NA	23	
5/18/2004	1:50	metallic	2	180	3	199	NA	NA	19	X

Acronyms:

CA	Continental Aluminum
NA	not available
NR	not reported

Notes:

A. To determine whether Continental Aluminum was a potential source of the odor, MDCH drew a vector from the odor site to the smelter and determined approximate direction to the smelter (in degrees, with North = 0, proceeding clockwise). This value was then compared to wind direction. (Continental Aluminum position relative to trailer = 190-200^{o}.)

B. Meteorological parameters listed are: WS = wind speed, in miles per hour; WD = wind direction, in degrees clockwise from North; PRESS = barometric pressure, in mm mercury; HUM = relative humidity, in percent; T = temperature, in degrees Celsius

C. Local minute data were not available for 5/10, 5/11, and 5/18. Available local hourly data are shown.

D. The 3/23 complaints were submitted by the same complainant on one form. It is not clear whether the descriptors applied to all instances of odor or to certain times.

E. The majority of odor complaints only indicated when the odor was noticed or first detected and did not indicate duration of odor.

F. Odor intensity scores: 0 = just detectable; 1 = easily noticed but can detect other smells/odors; 2 = can't smell anything else

G. Two separate reports received for this date and time.

Table 6a. MDCH Exposure Investigation at Continental Aluminum - Analytes screened for in EPA Method TO-15 and respective detection limits (DLs) at ERG[A] lab.

Analyte	DL (ppbv)[B]	Analyte	DL (ppbv)
1,1,1-Trichloroethane	0.05	Dibromochloromethane	0.07
1,1,2,2-Tetrachloroethane	0.05	Dichlorodifluoromethane	0.03
1,1,2-Trichloroethane	0.08	Dichloromethane	0.08
1,1-Dichloroethane	0.05	Dichlorotetrafluoroethane	0.03
1,1-Dichloroethene	0.05	Ethyl acrylate	0.06
1,2,4-Trichlorobenzene	0.18	Ethyl tert-butyl ether	0.05
1,2,4-Trimethylbenzene	0.06	Ethylbenzene	0.04
1,2-Dibromoethane	0.05	Hexachloro-1,3-butadiene	0.16
1,2-Dichloroethane	0.06	m,p-Xylene	0.05
1,2-Dichloropropane	0.07	m-Dichlorobenzene	0.07
1,3,5-Trimethylbenzene	0.04	Methyl ethyl ketone	0.15
1,3-Butadiene	0.06	Methyl isobutyl ketone	0.08
Acetonitrile	0.13	Methyl methacrylate	0.11
Acetylene	0.05	Methyl tert-butyl ether	0.07
Acrylonitrile	0.08	n-Octane	0.06
Benzene	0.05	o-Dichlorobenzene	0.04
Bromochloromethane	0.09	o-Xylene	0.04
Bromodichloromethane	0.04	p-Dichlorobenzene	0.06
Bromoform	0.06	Propylene	0.07
Bromomethane	0.05	Styrene	0.04
Carbon tetrachloride	0.06	tert-Amyl methyl ether	0.07
Chlorobenzene	0.04	Tetrachloroethylene	0.05
Chloroethane	0.1	Toluene	0.05
Chloroform	0.04	trans-1,2-Dichloroethylene	0.05
Chloromethane	0.05	trans-1,3-Dichloropropene	0.05
Chloromethylbenzene	0.05	Trichloroethylene	0.05
Chloroprene	0.05	Trichlorofluoromethane	0.04
cis-1,2-Dichloroethylene	0.06	Trichlorotrifluoroethane	0.04
cis-1,3-Dichloropropene	0.05	Vinyl chloride	0.04

Notes:

A. ERG = Eastern Research Group

B. ppbv = parts per billion by volume

Table 6b. MDCH Exposure Investigation at Continental Aluminum - Concentrations of chemicals detected in TO-15 tests (Summa canister sampling). All values in ppbv.

Sample ID (MDCH):				Field Blank 1	Field Blank 2	Field Blank 3	Field Blank 4	Travis Rd 1	Control SQ3	Milford Rd 1	Control SQ6
Sample ID (Lab):				Field Blank	4040714-01	4041408-01	4061605-01	4031801-02	4031801-01	4032605-01	4032505-01
Date sampled:				not sampled	not sampled	not sampled	not sampled	3/16/2004	3/16/2004	3/24/2004	3/24/2004
Date analyzed:				3/18/2004	4/14/2004	4/21/2004	7/14/2004	3/30/2004	3/30/2004	4/1/2004	3/31/2004
Days from cleaning to pressurization:				50	85	15	128	74	74	55	56
Analyte	**Lowest Comparison Value (CV)**	**Source of Lowest CV**	**ERG DL**								
1,1,1-Trichloroethane	700	EMEGi	0.05								
1,2,4-Trimethylbenzene	25,000	TEEL-0	0.06					0.05 U	0.04 U		
1,3,5-Trimethylbenzene	25,000	TEEL-0	0.04					0.02 U			
1,3-Butadiene	0.89	EPA RfC	0.06								
Acetonitrile	36	EPA RfC	0.13								
Acetylene	2,500,000	TEEL-0	0.05					0.54	0.7	1.07	0.61
Benzene	4	EMEGi	0.05	0.04 U			0.05	0.36	0.27	0.42	0.24
Carbon tetrachloride	50	EMEGi	0.06					0.08	0.09	0.11	0.09
Chloromethane	44	EPA RfC	0.05					0.47	0.46	0.53	0.48
Dichlorodifluoromethane	1,000,000	TEEL-0	0.03					0.49	0.48	0.59	0.49
Dichloromethane (Methylene chloride)	300	EMEGi,c	0.08							0.16	0.13
Ethylbenzene	230	EPA RfC	0.04				0.01 U	0.06	0.06	0.05	0.05
m,p-Xylene	100 (total)	EMEGc	0.05				0.01 U	0.12	0.13	0.1	0.1
m-Dichlorobenzene (1,3-dichlorobenzene)	750	TEEL-0	0.07								
Methyl ethyl ketone	340	EPA RfC	0.15	0.11 U			0.58	0.47	0.53	0.43	0.59
Methyl isobutyl ketone	75,000	TEEL-0	0.08								
Methyl methacrylate	100,000	TEEL-0	0.11		0.17	0.17					
Methyl tert-butyl ether	700	EMEGi,c	0.07								
o-Xylene	100 (total)	EMEGc	0.04					0.06	0.05	0.05	0.05
p-Dichlorobenzene (1,4-dichlorobenzene)	100	EMEGc	0.06	0.19	0.07	0.05 U					0.26
Propylene	24,000,000	TEEL-0	0.07				0.21	0.16	0.25	0.24	0.25
Styrene	60	EMEGc	0.04				0.06	0.05			
Toluene	80	EMEGc	0.05	0.05	0.06		0.07	0.26	0.33	1.14	0.24
Trichlorofluoromethane	500,000	TEEL-0	0.04		0.07		0.07	0.22	0.22	0.82	0.24
Trichlorotrifluoroethane	1,000,000	TEEL-0	0.04		0.03 U			0.11	0.1	0.11	0.1

Reference: Eastern Research Group (ERG), Morrisville, NC.

Acronyms:

DL detection limit; ppbv parts per billion by volume

Notes:

Table 6b. MDCH Exposure Investigation at Continental Aluminum - Concentrations of chemicals detected in TO-15 tests (Summa canister sampling). All values in ppbv.

Sample ID (MDCH):				Field Blank 1	Field Blank 2	Field Blank 3	Field Blank 4	Travis Rd 1	Control SQ3	Milford Rd 1	Control SQ6
Sample ID (Lab):				Field Blank	4040714-01	4041408-01	4061605-01	4031801-02	4031801-01	4032605-01	4032505-01
Date sampled:				not sampled	not sampled	not sampled	not sampled	3/16/2004	3/16/2004	3/24/2004	3/24/2004
Date analyzed:				3/18/2004	4/14/2004	4/21/2004	7/14/2004	3/30/2004	3/30/2004	4/1/2004	3/31/2004
Days from cleaning to pressurization:				50	85	15	128	74	74	55	56
	Lowest	**Source of**									
	Comparison	**Lowest**	**ERG**								
Analyte	**Value (CV)**	**CV**	**DL**								
U = value reported is less than the detection limit											

Table 6b. MDCH Exposure Investigation at Continental Aluminum - C

Sample ID (MDCH):		Travis Rd 2	Control SQ4	Travis Rd 3	Control SQ3	Travis Rd 4	Control SQ3	Tyrrell Ln	Control SQ4	Travis Rd 6	Control SQ4
Sample ID (Lab):		4040204-01	4040204-02	4040503-01	4040503-03	4040503-02	4040503-04	4041304-02	4041304-01	4042306-01	4042306-02
Date sampled:		3/31/2004	3/31/2004	4/2/2004	4/2/2004	4/2/2004	4/2/2004	4/12/2004	4/12/2004	4/22/2004	4/22/2004
Date analyzed:		4/6/2004	4/7/2004	4/8/2004	4/8/2004	4/8/2004	4/7/2004	4/15/2004	4/14/2004	4/24/2004	4/24/2004
Days from cleaning to pressurization:		42	42	65	64	36	21	6	35	16	16
<u>Analyte</u>	**Lowest Comparison Value (CV)**										
1,1,1-Trichloroethane	700										
1,2,4-Trimethylbenzene	25,000	0.04 U	0.04 U	0.03 U	0.1	0.1	0.08	0.03 U	0.03 U	0.03 U	0.04 U
1,3,5-Trimethylbenzene	25,000	0.02 U			0.04	0.04	0.03 U				
1,3-Butadiene	0.89	0.14				0.13					
Acetonitrile	36	0.18									
Acetylene	2,500,000	1.23	0.41	2.07	0.36	0.11	0.75	0.7	0.48	0.33	0.39
Benzene	4	0.31	0.17	0.49	0.33	0.48	0.29	0.18	0.15	0.12	0.14
Carbon tetrachloride	50	0.1	0.08	0.08	0.1	0.09	0.09	0.08	0.08	0.08	0.11
Chloromethane	44	0.62	0.51	0.61	0.52	0.56	0.5	0.49	0.47	0.52	0.53
Dichlorodifluoromethane	1,000,000	0.6	0.48	0.49	0.5	0.48	0.49	0.49	0.55	0.49	0.51
Dichloromethane (Methylene chloride)	300	0.05 U		0.05 U		0.21	0.05 U	0.05 U	0.11	0.05 U	
Ethylbenzene	230	0.04	0.03 U	0.05	0.08	0.19	0.06		0.04	0.03 U	0.06
m,p-Xylene	100 (total)	0.08	0.08	0.06	0.23	0.49	0.18	0.04 U	0.07	0.06	0.11
m-Dichlorobenzene (1,3-dichlorobenzene)	750						0.25				
Methyl ethyl ketone	340	0.54	0.37	0.82	0.62	0.55	0.31	0.53	0.41	0.34	0.52
Methyl isobutyl ketone	75,000					0.09					
Methyl methacrylate	100,000										
Methyl tert-butyl ether	700										
o-Xylene	100 (total)	0.03 U	0.04	0.03 U	0.1	0.22	0.07		0.04	0.03 U	0.05
p-Dichlorobenzene (1,4-dichlorobenzene)	100	0.08	0.04 U	0.04 U	0.08	0.07		0.14		0.03 U	0.1
Propylene	24,000,000	1.19	0.17	0.42	0.32	2.82	0.3	0.26		0.07	0.13
Styrene	60	0.03 U		0.09		0.19					
Toluene	80	0.19	0.14	0.18	0.49	1.81	0.48	0.14	0.79	0.16	0.45
Trichlorofluoromethane	500,000	0.25	0.24	0.23	0.23	0.21	0.25	0.22	0.82	0.23	0.28
Trichlorotrifluoroethane	1,000,000	0.1	0.12	0.1	0.12	0.12	0.12	0.1	0.08	0.1	0.11

Reference: Eastern Research Group (ERG), Morrisville, NC.

Acronyms:

DL detection limit

ppbv parts

Notes:

Table 6b. MDCH Exposure Investigation at Continental Aluminum - C											
Sample ID (MDCH):		Travis Rd 2	Control SQ4	Travis Rd 3	Control SQ3	Travis Rd 4	Control SQ3	Tyrrell Ln	Control SQ4	Travis Rd 6	Control SQ4
Sample ID (Lab):		4040204-01	4040204-02	4040503-01	4040503-03	4040503-02	4040503-04	4041304-02	4041304-01	4042306-01	4042306-02
Date sampled:		3/31/2004	3/31/2004	4/2/2004	4/2/2004	4/2/2004	4/2/2004	4/12/2004	4/12/2004	4/22/2004	4/22/2004
Date analyzed:		4/6/2004	4/7/2004	4/8/2004	4/8/2004	4/8/2004	4/7/2004	4/15/2004	4/14/2004	4/24/2004	4/24/2004
Days from cleaning to pressurization:		42	42	65	64	36	21	6	35	16	16
	Lowest										
	Comparison										
Analyte	**Value (CV)**										
U = value reported is less than the detection limit											

Table 6b. MDCH Exposure Investigation at Continental Aluminum - C

Sample ID (MDCH):		Milford Rd 2		Control SQ3		Cash St		Control SQ6		Milford Rd 3		Control SQ6				
Sample ID (Lab):		4042902-01		4042902-02		4043004-02		4043004-01		4051902-02		4051902-01				
Date sampled:		4/27/2004		4/27/2004		4/28/2004		4/28/2004		5/18/2004		5/18/2004				
Date analyzed:		5/18/2004		5/18/2004		5/7/2004		5/4/2004		5/26/2004		5/26/2004				
Days from cleaning to pressurization:		116		133		91		90		13		13				
	Lowest Comparison Value (CV)													**All Samples except blanks**		
Analyte														**MIN**	**MAX**	**MAX as % of CV**
1,1,1-Trichloroethane	700							0.02	U					0.02	0.02	0.00286
1,2,4-Trimethylbenzene	25,000	0.03	U	0.07		0.02	U			0.05	U	0.05	U	0.02	0.1	0.00040
1,3,5-Trimethylbenzene	25,000			0.03	U									0.02	0.04	0.00016
1,3-Butadiene	0.89	0.07		0.15		0.06								0.06	0.15	16.85393
Acetonitrile	36					0.27								0.18	0.27	0.75000
Acetylene	2,500,000	0.9		8.25		3.07		0.56		3.35		0.32		0.11	8.25	0.00033
Benzene	4	0.36		0.52		0.94		0.12		1.67		0.14		0.12	1.67	41.75000
Carbon tetrachloride	50	0.02	U	0.09		0.08		0.08		0.08		0.09		0.02	0.11	0.22000
Chloromethane	44	0.56		0.52		0.57		0.61		0.62		0.56		0.46	0.62	1.40909
Dichlorodifluoromethane	1,000,000	0.54		0.53		0.5		0.54		0.52		0.53		0.48	0.6	0.00006
Dichloromethane (Methylene chloride)	300	0.08		0.1		0.05	U	0.03	U	0.07	U			0.03	0.21	0.07000
Ethylbenzene	230	0.04		0.09		0.03	U	0.02	U	0.05		0.04		0.02	0.19	0.08261
m,p-Xylene	100 (total)	0.04	U	0.23		0.05		0.04	U	0.11		0.09		0.04	0.49	0.49000
m-Dichlorobenzene (1,3-dichlorobenzene)	750													0.25	0.25	0.03333
Methyl ethyl ketone	340	2.77		1.06		0.59		0.26				0.65		0.26	2.77	0.81471
Methyl isobutyl ketone	75,000			0.11										0.09	0.11	0.00015
Methyl methacrylate	100,000													0	0	0.00000
Methyl tert-butyl ether	700									0.23				0.23	0.23	0.03286
o-Xylene	100 (total)			0.11				0.02	U	0.05		0.04		0.02	0.22	0.22000
p-Dichlorobenzene (1,4-dichlorobenzene)	100			0.04						0.05	U	0.05	U	0.03	0.26	0.26000
Propylene	24,000,000	0.91		1.84		0.66		0.1		0.45		0.46		0.07	2.82	0.00001
Styrene	60	0.05		0.03	U	0.04				0.07		0.05		0.03	0.19	0.31667
Toluene	80	0.13		0.7		0.21		0.1		0.29		0.26		0.1	1.81	2.26250
Trichlorofluoromethane	500,000	0.24		0.26		0.23		0.27		0.25		0.43		0.21	0.82	0.00016
Trichlorotrifluoroethane	1,000,000	0.11		0.11		0.11		0.09		0.11		0.1		0.08	0.12	0.00001

Reference: Eastern Research Group (ERG), Morrisville, NC.

Acronyms:

DL detection limit

ppbv parts

Notes:

Table 6b. MDCH Exposure Investigation at Continental Aluminum - C

Sample ID (MDCH):		Milford Rd 2	Control SQ3	Cash St	Control SQ6	Milford Rd 3	Control SQ6			
Sample ID (Lab):		4042902-01	4042902-02	4043004-02	4043004-01	4051902-02	4051902-01			
Date sampled:		4/27/2004	4/27/2004	4/28/2004	4/28/2004	5/18/2004	5/18/2004			
Date analyzed:		5/18/2004	5/18/2004	5/7/2004	5/4/2004	5/26/2004	5/26/2004			
Days from cleaning to pressurization:		116	133	91	90	13	13			
	Lowest									
	Comparison							**All Samples except blanks**		
Analyte	**Value (CV)**							**MIN**	**MAX**	**MAX as % of CV**
U = value reported is less than the detection limit										

Table 8. MDCH Exposure investigation at Continental Aluminum: 2001 Soil Data from Two Private Residences in the Predominantly Downwind Direction from and within 1/4 Mile of Continental Aluminum[A,B,C]

Chemical	0-6" Sampling Results	6-12" Sampling Results	Michigan Default Background	Michigan Background Range	MDEQ R/C1 DCC	ATSDR Child Chronic EMEG
Ammonia - Nitrogen	70 - 170	38 - 130	NA	NA	ID	NA
Chloride	11 - 28	8 - 15	NA	NA	500	NA
Fluoride	6.2 - 10	6.9 - 9.6	NA	NA	9,000	NA
Sulfate	7 - 14	5 - 6	NA	NA	ID	NA
Aluminum	4,700 - 8,500	4,400 - 8,000	6,900	2,603 - 16,324	50,000	NA
Antimony	< 0.05	< 0.05	NA	NA	180	NA
Arsenic	5.1 - 5.4	4.1 - 4.5	5.8	NA	7.6	20
Beryllium	0.36 - 0.42	0.34 - 0.42	NA	0.2 - 1.8	410	100
Cadmium	< 0.05 - 0.6	< 0.05 - 0.47	1.2	0.5 - 2.5	550	10
Copper	9.8 - 21	7.9 - 19	32	1 - 58	20,000	NA
Chromium[D]	12 - 14	12 - 14	NA	NA	2,500	NA
Cobalt	2.9 - 4.2	2.6 - 4.2	6.8	NA	2,600	NA
Lead	17 - 43	6.7 - 35	21	1 - 45	400	NA
Manganese	160 - 580	160 - 450	440	14 - 1,391	25,000	NA
Mercury	< 0.1 - 0.1	< 0.1	0.13	NA	160	NA
Molybdenum	1.3 - 2.6	0.82 - 1.7	NA	NA	2,600	NA
Nickel	9 - 11	8.8 - 13	20	NA	40,000	NA
Selenium	0.22 - 0.58	0.19 - 0.48	0.41	0.05 - 1.2	2,600	300
Silver	< 0.05 - 0.15	< 0.05 - 0.12	1	NA	2,500	NA
Zinc	65 - 150	41- 120	47	2.5 - 75	170,000	20,000

Acronyms/Abbreviations:

R/C1 DCC	Residential/Commercial 1 Direct Contact Criteria
EMEG	Environmental Media Evaluation Guide
NA	not available (criterion not established)
ID	insufficient data to determine criterion

Notes:

A. Analysis performed by Ann Arbor Technical Services Inc., Ann Arbor, Michigan. Data obtained through Wayne County Court public records.

B. All values given in parts per million (ppm).

C. Values preceeded by "<" indicate the sample result was below the detection limit. The detection limit is the value following "<".

D. Samples were not speciated. Therefore, sampling resulsts represent total chromium. To be protective, the criteria for hexavalent chromium were used.

CONTINENTAL ALUMINUM

Oakland County, Michigan

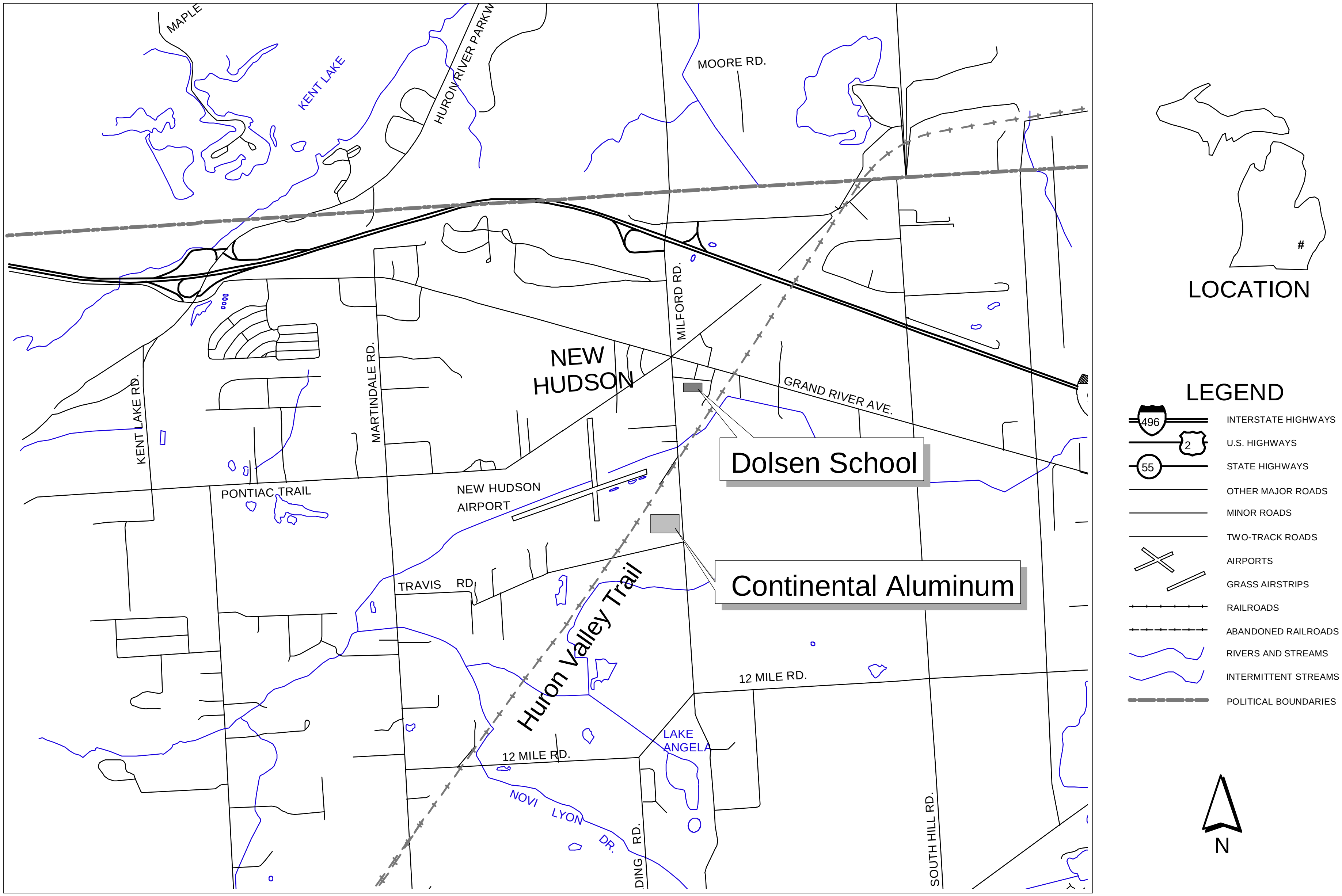


Figure 1.

Figure 2. Semiquadrant Numbering and Control Sample Locations (●) for MDCH/ATSDR Exposure Investigation at Continental Aluminum

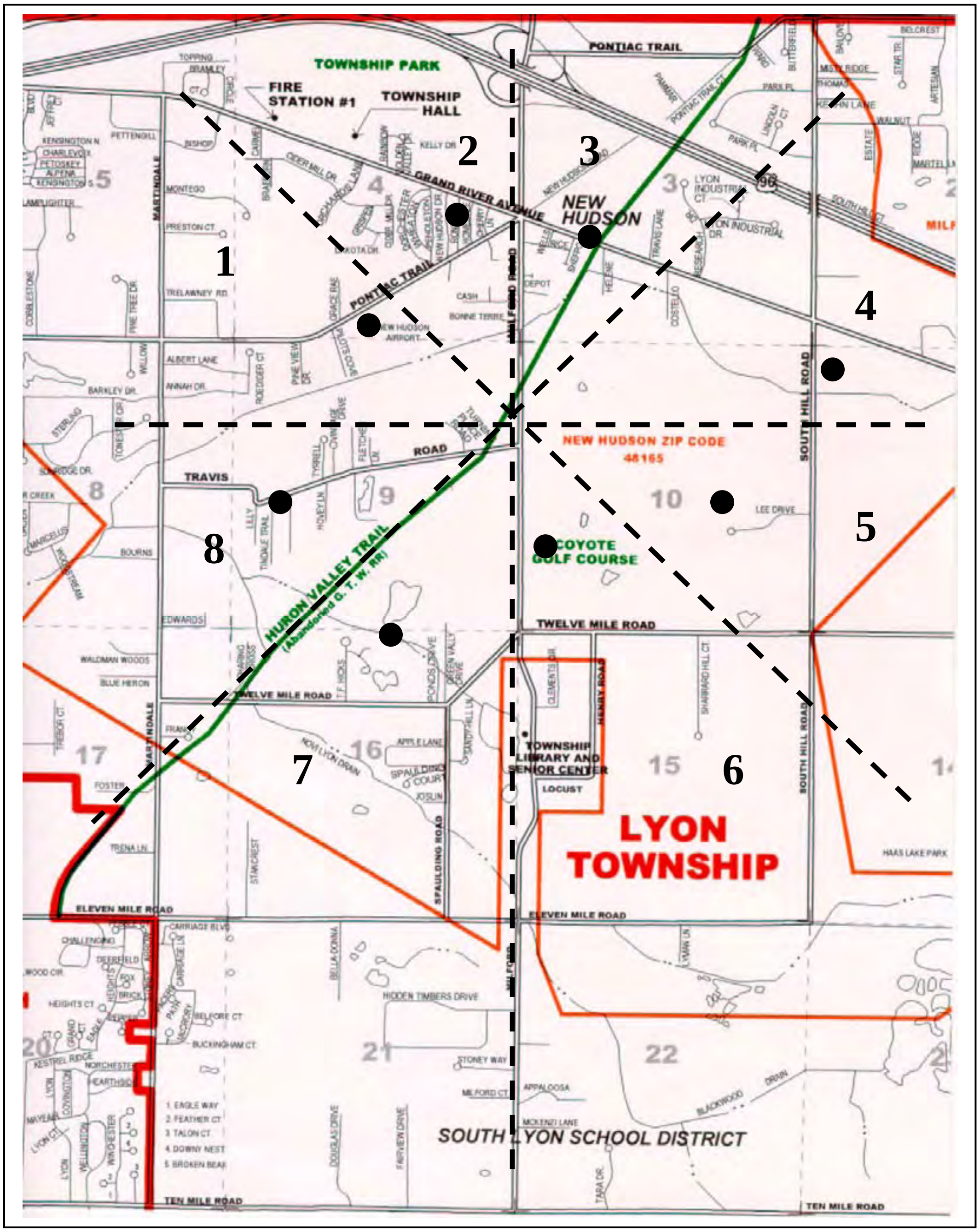


Figure 3. Odor Event Sampling Locations (▲) for MDCH/ATSDR Exposure Investigation at Continental Aluminum (☆)

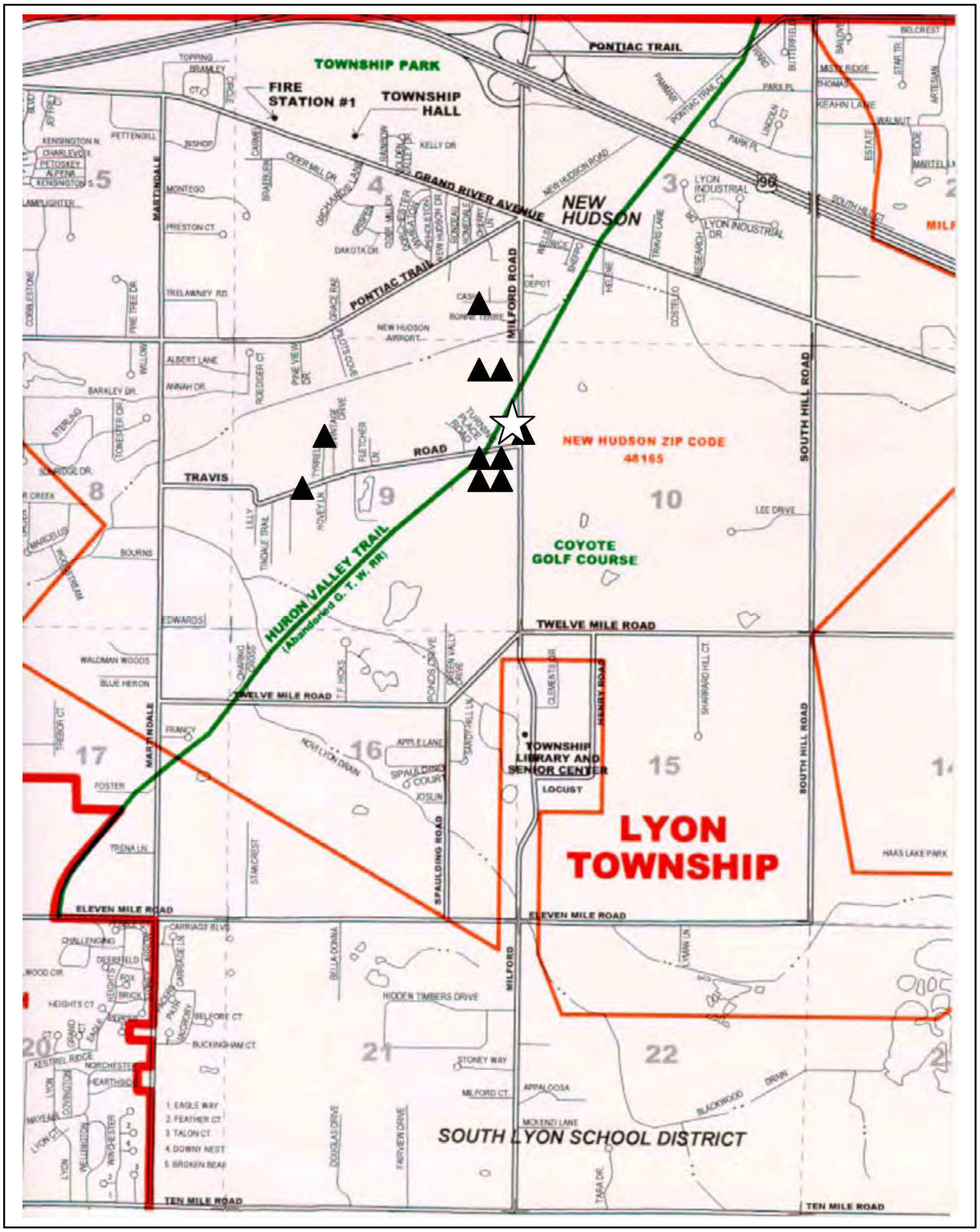
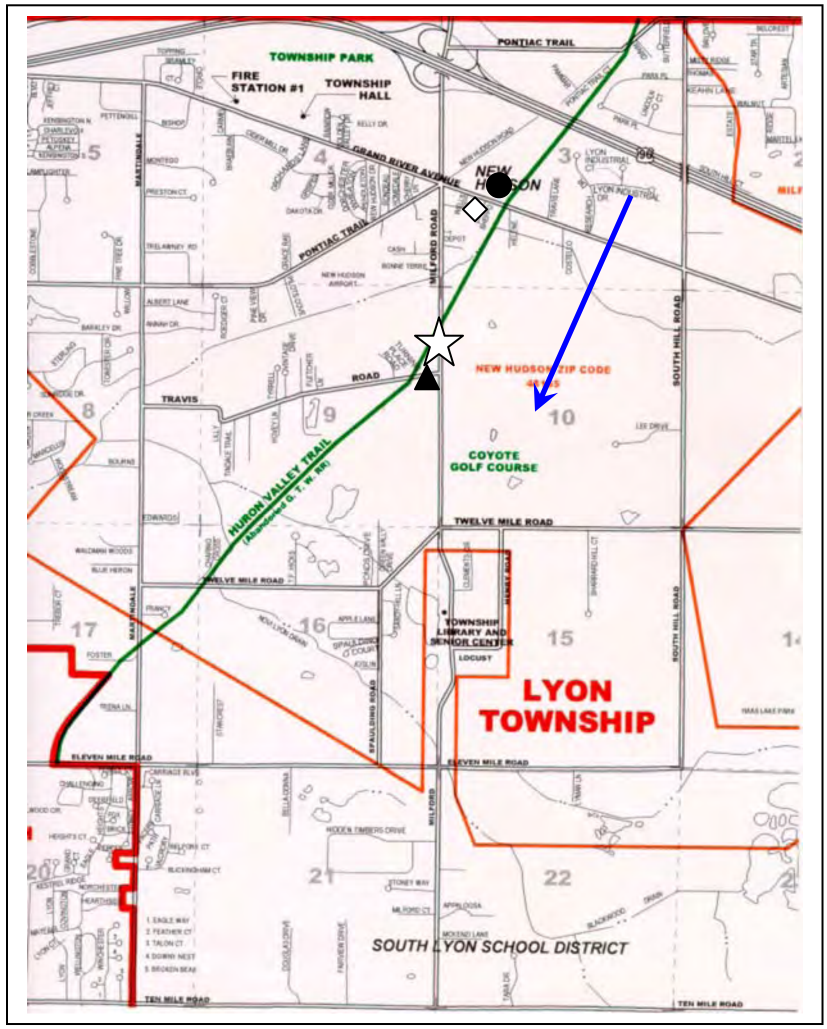


Figure 4. Details of Summa canister sampling conducted 3/16/2004 for MDCH/ATSDR Exposure Investigation at Continental Aluminum, Lyon Township, Oakland County, Michigan.

Sample ID (MDCH): Travis Rd 1
0.23 mi from Continental Aluminum
Sample Date: 3/16/2004
Sample Times (military):
Odor = 18:50
Control = 18:57
Meteorological Parameters
(from 5 minutes before odor sample to time of control sample):
Wind Speed (mph) = 5-12
Wind Direction (°) = 13-27
Pressure (mm Hg) = NA (see note)
Humidity (%) = NA (see note)
Temperature (°C) = -3

Odor Semiquadrant = 7
Control Semiquadrant = 3
(refer to Figure 2 for semiquadrant layout)

Was air-monitoring trailer downwind from odor event?
No.
If yes, did SPM detect any acidic aerosols?
(not applicable)



Odor sample location = ▲; control sample location = ●; Continental Aluminum = ☆; air monitoring trailer = ◇; approximate wind direction = →

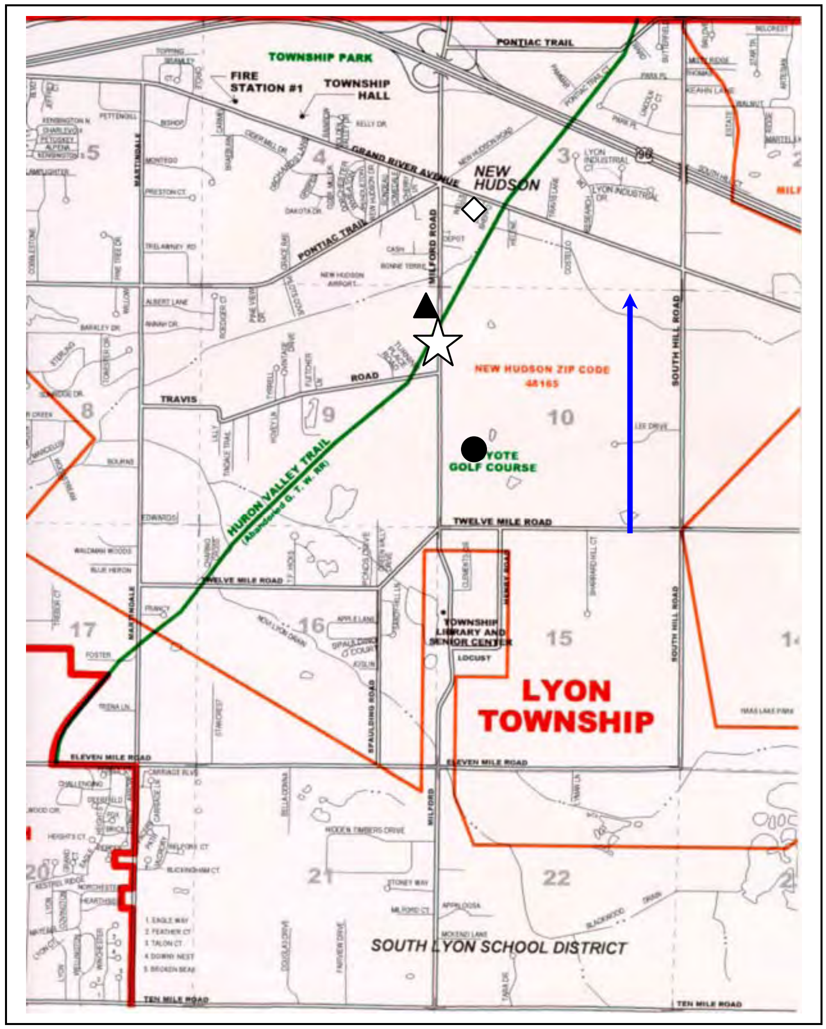
Notes:
Due to mechanical difficulties, barometric pressure and relative humidity were not available from the air-monitoring trailer at Dolsen Elementary School in New Hudson for this date. The 18:00-19:00 averages for those parameters at the MDEQ Ypsilanti monitoring station on this date were 762.76 and 83, respectively. (In general, pressure at Ypsilanti ran about 30 mm Hg greater than that at New Hudson.)

Figure 5. Details of Summa canister sampling conducted 3/24/2004 for MDCH/ATSDR Exposure Investigation at Continental Aluminum, Lyon Township, Oakland County, Michigan.

Sample ID (MDCH): Milford Rd 1
0.15 mi from Continental Aluminum
Sample Date: 3/24/2004
Sample Times (military):
Odor = 11:03
Control = 11:06
Meteorological Parameters
(from 5 minutes before odor sample to time of control sample):
Wind Speed (mph) = 4-8
Wind Direction (°) = 177-193
Pressure (mm Hg) = 738.0-738.1
Humidity (%) = 92-93
Temperature (°C) = 6

Odor Semiquadrant = 2
Control Semiquadrant = 6
(refer to Figure 2 for semiquadrant layout)

Was air-monitoring trailer downwind from odor event?
Somewhat.
If yes, did SPM detect any acidic aerosols?
No.



Odor sample location = ▲; control sample location = ●;
Continental Aluminum = ☆; air monitoring trailer = ◇;
approximate wind direction = →

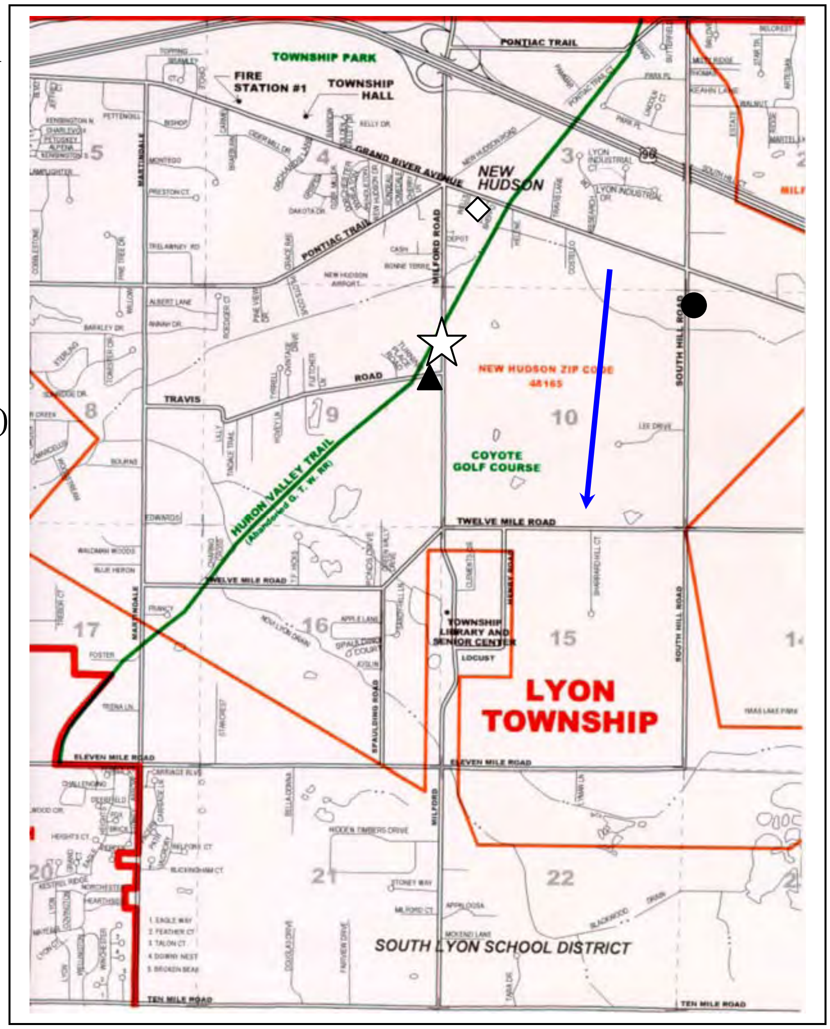
Notes:
None.

Figure 6. Details of Summa canister sampling conducted 3/31/2004 for MDCH/ATSDR Exposure Investigation at Continental Aluminum, Lyon Township, Oakland County, Michigan.

Sample ID (MDCH): Travis Rd 2
0.24 mi from Continental Aluminum
Sample Date: 3/31/2004
Sample Times (military):
Odor = 16:09
Control = 16:20
Meteorological Parameters
(from 5 minutes before odor sample to time of control sample):
Wind Speed (mph) = 7-12
Wind Direction (°) = -6-18 (see note)
Pressure (mm Hg) = 734.1-734.2
Humidity (%) = 69-71
Temperature (°C) = 5

Odor Semiquadrant = 8 (see note)
Control Semiquadrant = 4 (see note)
(refer to Figure 2 for semiquadrant layout)

Was air-monitoring trailer downwind from odor event?
No.
If yes, did SPM detect any acidic aerosols?
(not applicable)



Odor sample location = ▲; control sample location = ●; Continental Aluminum = ☆; air monitoring trailer = ◇; approximate wind direction = ⟶

Notes:
The weathervane crossed north during the elapsed time. When crossing north clockwise, compass direction changes from 359° to 0° (versus 360°). Most of the wind direction readings during the elapsed time for this sampling event were east of north (in the teens). Therefore, for the single west-of-north direction, MDCH subtracted 360° from the reading, 354° (= -6°), to indicate that the weathervane rotated only a few degrees in a minute's time.

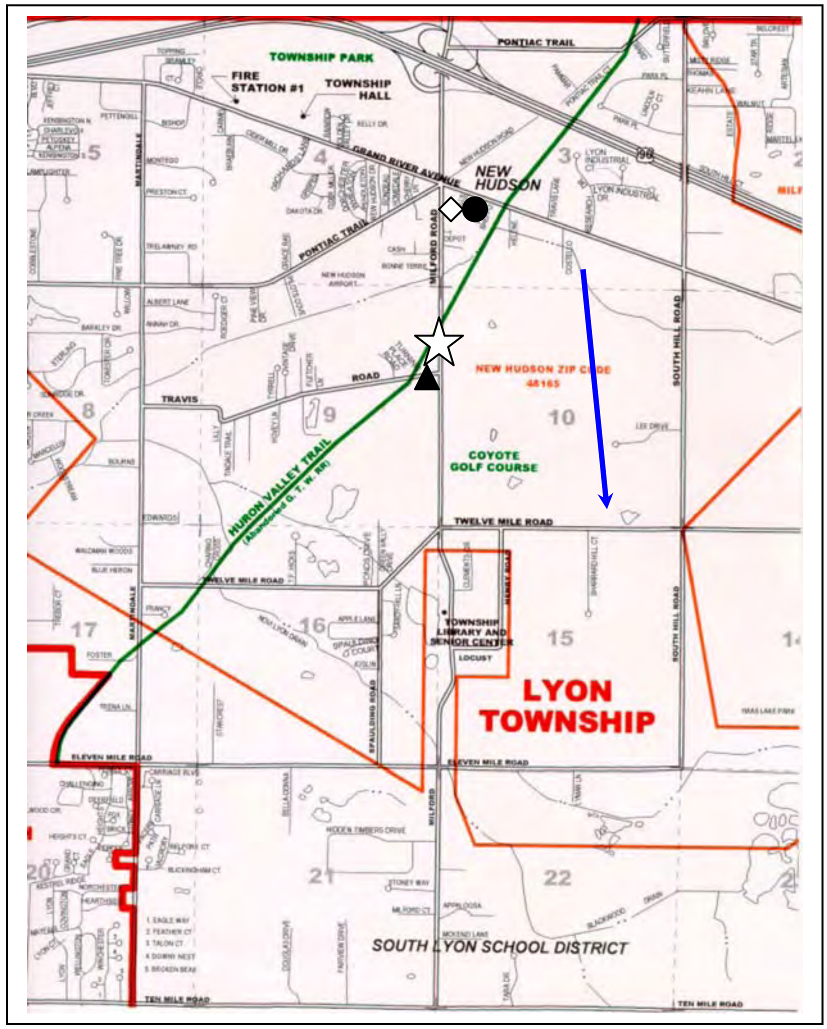
Odor Semiquadrant should have been recorded 7 (and the Control, therefore, 3), to match the delineations in Figure 2. However, the odor event site was located near the division between semiquadrants 7 and 8. MDCH considers the data still to be valid.

Figure 7. Details of first Summa canister sampling conducted 4/2/2004 for MDCH/ATSDR Exposure Investigation at Continental Aluminum, Lyon Township, Oakland County, Michigan.

Sample ID (MDCH): Travis Rd 3
0.24 mi from Continental Aluminum
Sample Date: 4/2/2004
Sample Times (military):
Odor = 9:06
Control = 9:17
Meteorological Parameters
(from 5 minutes before odor sample to time of control sample):
Wind Speed (mph) = 3-11
Wind Direction (°) = 342-361 (see note)
Pressure (mm Hg) = 733.6-733.7
Humidity (%) = 77-79
Temperature (°C) = 3-4

Odor Semiquadrant = 7
Control Semiquadrant = 3 (see note)
(refer to Figure 2 for semiquadrant layout)

Was air-monitoring trailer downwind from odor event?
No.
If yes, did SPM detect any acidic aerosols?
(not applicable)



Odor sample location = ▲; control sample location = ●; Continental Aluminum = ☆; air monitoring trailer = ◇; approximate wind direction = ⟶

Notes:
The weathervane crossed north during the elapsed time. When crossing north clockwise, compass direction changes from 359° to 0° (versus 360°). Most of the wind direction readings during the elapsed time for this sampling event were west of north (340°s-350°s). Therefore, for the single east-of-north direction, MDCH added the reading, 1°, to 360° (= 361°), to indicate that the weathervane rotated only a few degrees in a minute's time.

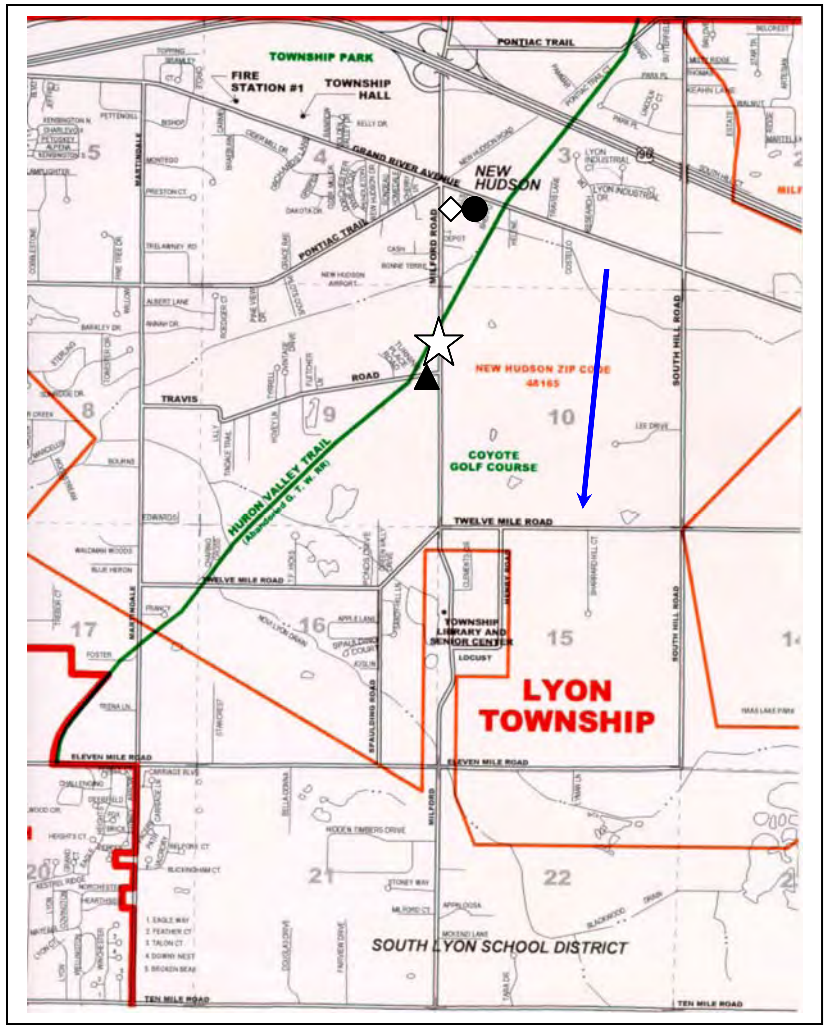
The Control Semiquadrant 3 sampling location was at the parking area on the north side of Grand River Avenue where the Huron Valley Trail crosses the road. The samplers mistakenly took the control sample for this event at Dolsen Elementary School, nearby and in the same semiquadrant. MDCH considers the data still to be valid.

Figure 8. Details of second Summa canister sampling conducted 4/2/2004 for MDCH/ATSDR Exposure Investigation at Continental Aluminum, Lyon Township, Oakland County, Michigan.

Sample ID (MDCH): Travis Rd 4
0.24 mi from Continental Aluminum
Sample Date: 4/2/2004
Sample Times (military):
Odor = 13:41
Control = 13:44
Meteorological Parameters
(from 5 minutes before odor sample to time of control sample):
Wind Speed (mph) = 5-10
Wind Direction (°) = 330-378 (see note)
Pressure (mm Hg) = 733.5-733.6
Humidity (%) = 58-59
Temperature (°C) = 9-10

Odor Semiquadrant = 7
Control Semiquadrant = 3 (see note)
(refer to Figure 2 for semiquadrant layout)

Was air-monitoring trailer downwind from odor event?
No.
If yes, did SPM detect any acidic aerosols?
(not applicable)



Odor sample location = ▲; control sample location = ●; Continental Aluminum = ☆; air monitoring trailer = ◇; approximate wind direction = ⟶

Notes:
The weathervane crossed north during the elapsed time. When crossing north clockwise, compass direction changes from 359° to 0° (versus 360°). Most of the wind direction readings during the elapsed time for this sampling event were west of north (330°s-340°s). Therefore, for the highest east-of-north direction, MDCH added the reading, 18° degrees, to 360° (= 378°), to indicate that the weathervane rotated only a few degrees in a minute's time.

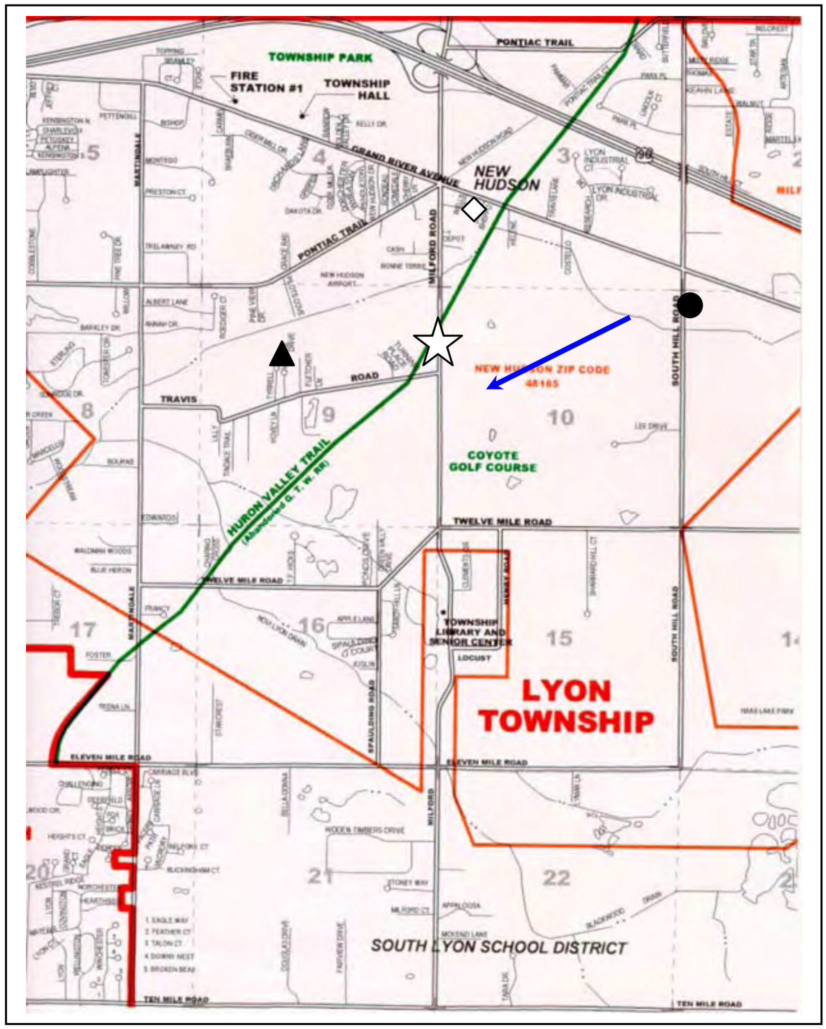
The Control Semiquadrant 3 sampling location was at the parking area on the north side of Grand River Avenue where the Huron Valley Trail crosses the road. The samplers mistakenly took the control sample for this event at Dolsen Elementary School, nearby and in the same semiquadrant. MDCH considers the data still to be valid.

Figure 9. Details of Summa canister sampling conducted 4/12/2004 for MDCH/ATSDR Exposure Investigation at Continental Aluminum, Lyon Township, Oakland County, Michigan.

Sample ID (MDCH): Tyrrell Ln
0.67 mi from Continental Aluminum
Sample Date: 4/12/2004
Sample Times (military):
Odor = 13:20
Control = 13:31
Meteorological Parameters
(from 5 minutes before odor sample to time of control sample):
Wind Speed (mph) = 5-10
Wind Direction (°) = 46-73
Pressure (mm Hg) = 737.5-737.7
Humidity (%) = 35-37
Temperature (°C) = 7-9

Odor Semiquadrant = 8
Control Semiquadrant = 4
(refer to Figure 2 for semiquadrant layout)

Was air-monitoring trailer downwind from odor event?
No.
If yes, did SPM detect any acidic aerosols?
(not applicable)



Odor sample location = ▲; control sample location = ●; Continental Aluminum = ☆; air monitoring trailer = ◇; approximate wind direction = ⟶

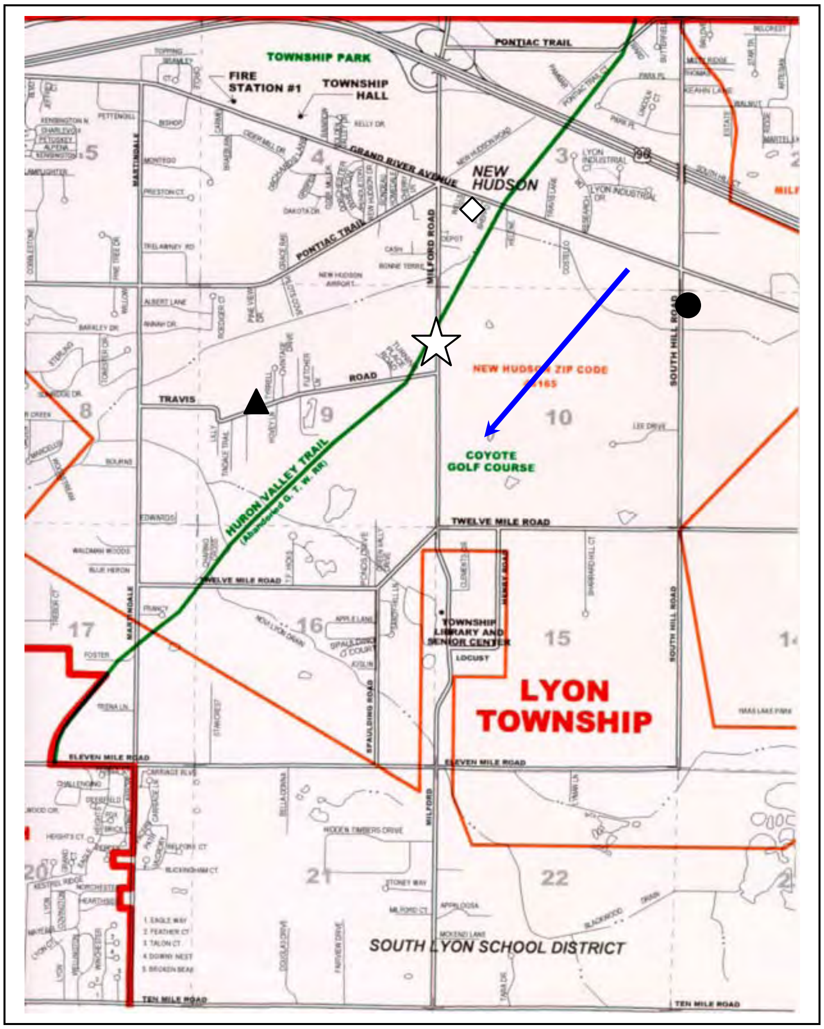
Notes:
None.

Figure 10. Details of Summa canister sampling conducted 4/22/2004 for MDCH/ATSDR Exposure Investigation at Continental Aluminum, Lyon Township, Oakland County, Michigan.

Sample ID (MDCH): Travis Rd 6
0.71 mi from Continental Aluminum
Sample Date: 4/22/2004
Sample Times (military):
Odor = 14:07
Control = 14:15
Meteorological Parameters
(from 5 minutes before odor sample to time of control sample):
Wind Speed (mph) = 3-6
Wind Direction (°) = -28-73
(see note)
Pressure (mm Hg) = 737.4
Humidity (%) = 47-50
Temperature (°C) = 13

Odor Semiquadrant = 8
Control Semiquadrant = 4
(refer to Figure 2 for semiquadrant layout)

Was air-monitoring trailer downwind from odor event?
No.
If yes, did SPM detect any acidic aerosols?
(not applicable)



Odor sample location = ▲; control sample location = ●; Continental Aluminum = ☆; air monitoring trailer = ◇; approximate wind direction = ⟶

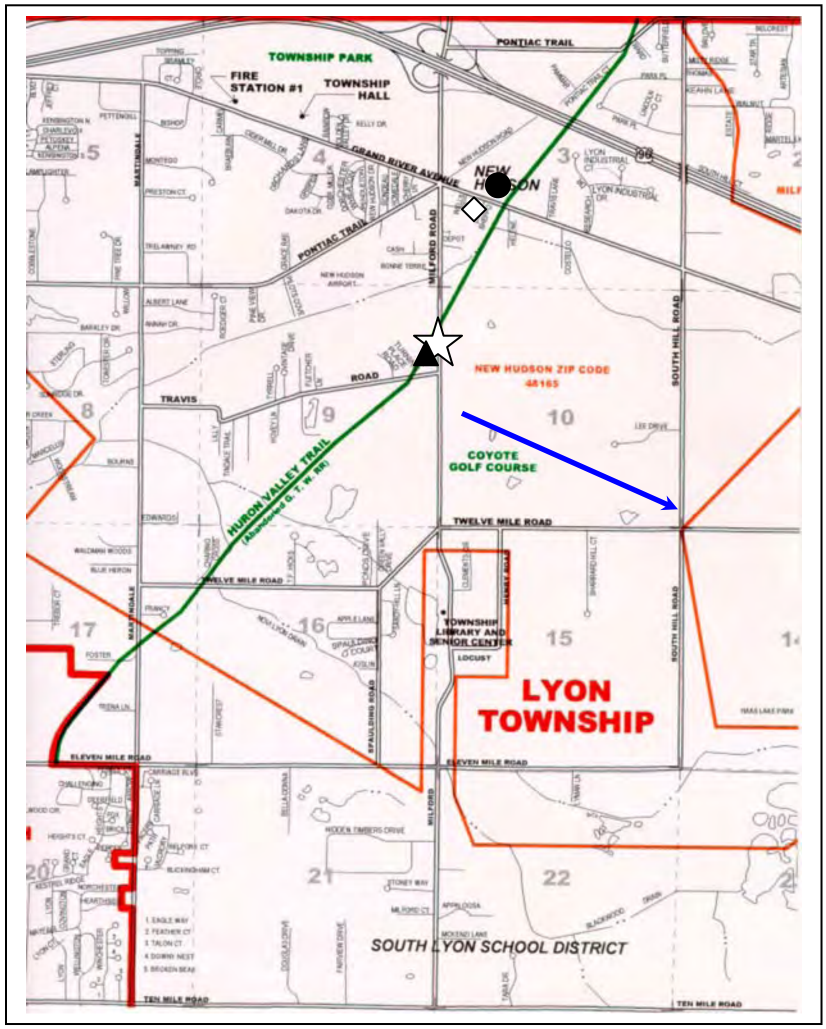
Notes:
The weathervane crossed north during the elapsed time. When crossing north clockwise, compass direction changes from 359° to 0° (versus 360°). Most of the wind direction readings during the elapsed time for this sampling event were east of north. Therefore, for the west-of-north directions, MDCH subtracted 360° from the westernmost reading, 332° (= -28°), to indicate that the weathervane rotated only a few degrees in a minute's time.

Figure 11. Details of Summa canister sampling conducted 4/27/2004 for MDCH/ATSDR Exposure Investigation at Continental Aluminum, Lyon Township, Oakland County, Michigan.

Sample ID (MDCH): Milford Rd 2
0.13 mi from Continental Aluminum
Sample Date: 4/27/2004
Sample Times (military):
Odor = 15:25
Control = 15:35
Meteorological Parameters
(from 5 minutes before odor sample to time of control sample):
Wind Speed (mph) = 4-13
Wind Direction (°) = 284-318
Pressure (mm Hg) = 734.3-734.4
Humidity (%) = 51-52
Temperature (°C) = 2-3

Odor Semiquadrant = 7
Control Semiquadrant = 3
(refer to Figure 2 for semiquadrant layout)

Was air-monitoring trailer downwind from odor event?
No.
If yes, did SPM detect any acidic aerosols?
(not applicable)



Odor sample location = ▲; control sample location = ●; Continental Aluminum = ☆; air monitoring trailer = ◇; approximate wind direction = ⟶

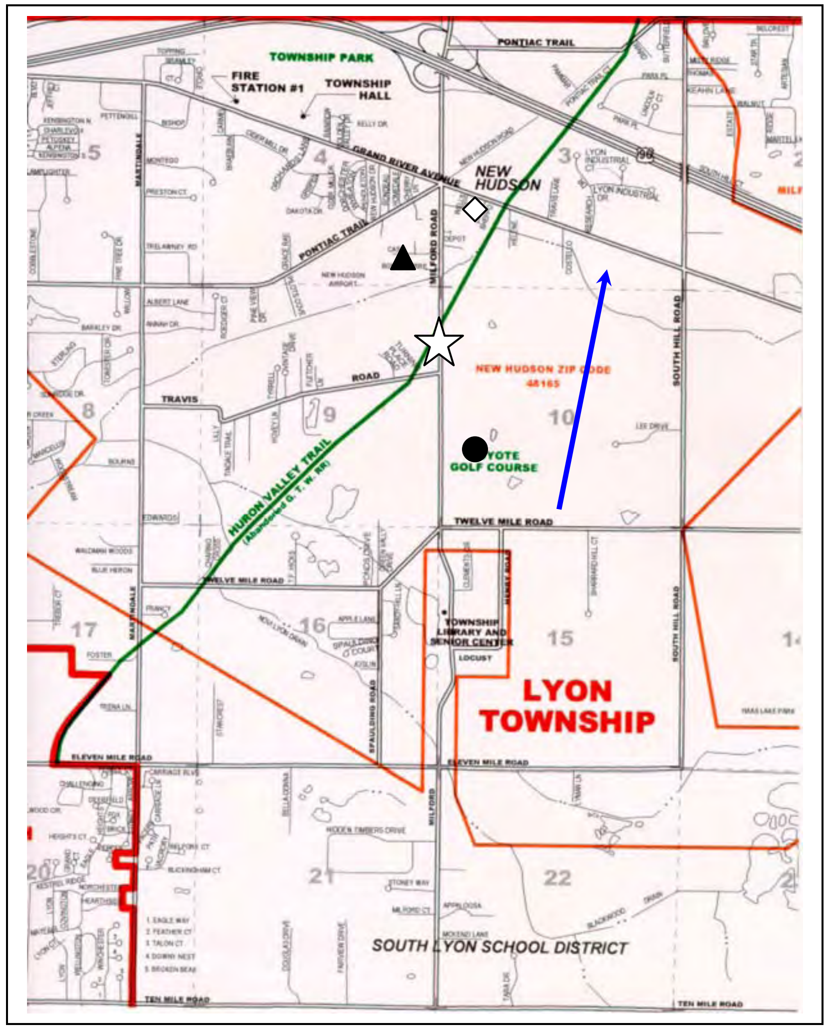
Notes:
None.

Figure 12. Details of Summa canister sampling conducted 4/28/2004 for MDCH/ATSDR Exposure Investigation at Continental Aluminum, Lyon Township, Oakland County, Michigan.

Sample ID (MDCH): Cash St
0.31 mi from Continental Aluminum
Sample Date: 4/28/2004
Sample Times (military):
Odor = 16:20
Control = 16:35
Meteorological Parameters
(from 5 minutes before odor sample to time of control sample):
Wind Speed (mph) = 9-17
Wind Direction (°) = 179-201
Pressure (mm Hg) = 732.7-732.9
Humidity (%) = 29-30
Temperature (°C) = 20

Odor Semiquadrant = 2
Control Semiquadrant = 6
(refer to Figure 2 for semiquadrant layout)

Was air-monitoring trailer downwind from odor event?
Yes.
If yes, did SPM detect any acidic aerosols?
No.



Odor sample location = ▲; control sample location = ●;
Continental Aluminum = ☆; air monitoring trailer = ◇;
approximate wind direction = ⟶

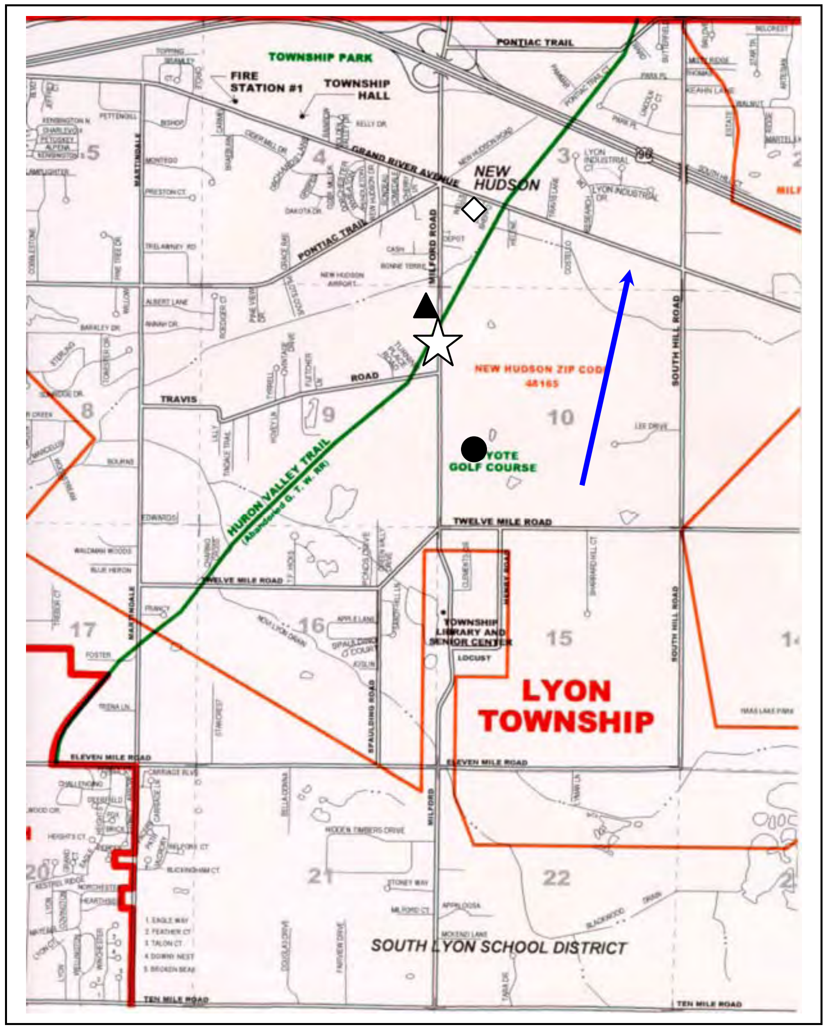
Notes:
None.

Figure 13. Details of Summa canister sampling conducted 5/18/2004 for MDCH/ATSDR Exposure Investigation at Continental Aluminum, Lyon Township, Oakland County, Michigan.

Sample ID (MDCH): Milford Rd 3
0.15 mi from Continental Aluminum
Sample Date: 5/18/2004
Sample Times (military):
Odor = 2:07
Control = 2:11
Meteorological Parameters
(see note):
Wind Speed (mph) = 3-4
Wind Direction (°) = 199-205
Pressure (mm Hg) = NA (see note)
Humidity (%) = NA (see note)
Temperature (°C) = 19

Odor Semiquadrant = 2
Control Semiquadrant = 6
(refer to Figure 2 for semiquadrant layout)

Was air-monitoring trailer downwind from odor event?
Yes.
If yes, did SPM detect any acidic aerosols?
Yes (see text).



Odor sample location = ▲; control sample location = ●;
Continental Aluminum = ☆; air monitoring trailer = ◇;
approximate wind direction = ⟶

Notes:
The minute data for the meteorological parameters were not available from the air monitoring trailer at Dolsen Elementary School for this event, due to an overloaded database. Hourly averages for 1:00-3:00 are shown for wind speed, wind direction, and temperature. Local pressure and humidity were not available, likely for the same reason. The 2:00-3:00 averages for those parameters at the MDEQ Ypsilanti monitoring station on this date were 762.5 mm Hg and 90%, respectively. (In general, pressure at Ypsilanti ran about 30 mm Hg greater than that at New Hudson.)

Certification

This **Continental Aluminum Exposure Investigation: Air Monitoring Results** Health Consultation was prepared by the Michigan Department of Community Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the health consultation was begun. Editorial review was completed by the cooperative agreement partner.

Technical Project Officer, CAT, SPAB, DHAC, ATSDR

The Division of Health Assessment and Consultation, ATSDR, has reviewed this public health consultation and concurs with the findings.

Team Lead, CAT, SPAB, DHAC, ATSDR

APPENDIX A

Exposure Investigation Protocol:
The Identification of Air Contaminants Around the Continental Aluminum Plant in New Hudson, Michigan

Conducted by ATSDR and MDCH

TABLE OF CONTENTS

Acronyms and Abbreviations

AEGL	Acute Exposure Guideline Level
ATSDR	Agency for Toxic Substances and Disease Registry
CalEPA	California Environmental Protection Agency
CaREL	California Reference Exposure Level
CASRN	Chemical Abstract Service Registration Number
DOE	Department of Energy
EMEG	Environmental Media Evaluation Guide
ERG	Eastern Research Group
ERPG	Emergency Response Planning Guideline
ICP	Inductively Coupled Plasma
LOAEL	Lowest Observed Adverse Effect Level
MDCH	Michigan Department of Community Health
MDEQ	Michigan Department of Environmental Quality
mg	milligrams
mg/m^3	milligrams per cubic meter
NIOSH	National Institute of Occupational Safety and Health
NOAEL	No Observed Adverse Effect Level
ppb	parts per billion
ppbv	parts per billion of volume
RfC	Reference Concentration
SOP	Standard Operating Procedure
SPM	Single Point Monitor
TEEL	Temporary Emergency Exposure Limit
TSP	Total Suspended Particulates
U.S. EPA	U.S. Environmental Protection Agency
VOC	volatile organic compound

OBJECTIVE/PURPOSE

The Michigan Department of Community Health (MDCH), under a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry (ATSDR), will monitor ambient concentrations of selected volatile organic compounds (VOCs), mineral acids, and metals in Lyon Township, Michigan. Analytical results will be compared to meteorological data and odor complaint information to determine if there is a scientifically plausible link between community health concerns and concentrations of certain air contaminants. Results and interpretations will be shared with residents, governmental, and industrial stakeholders.

The primary objective of this Investigation is to determine what chemicals at what concentrations are in the air when odor events are reported. The questions to be answered are:

1. What VOCs, at what concentrations, are detected in the air during odor events? Are the concentrations above background, or control, levels?
2. Is hydrogen chloride or hydrogen fluoride detectable in the air during odor events? Is there a temporal (time) trend to the detection of these acids?
3. What metals (airborne particulates), at what concentrations, are in the air?
4. Is it plausible that the earlier reported health effects are associated with detected chemicals and concentrations?
5. When an odor event occurs, do meteorological data indicate that the Continental Aluminum plant is upwind of the odor detection (i.e., is it plausible that Continental Aluminum is the source of the odor)?

ATSDR and MDCH reserve the right to amend this Protocol if the agencies deem such action necessary in order to complete this Exposure Investigation. Any modification is not expected to change the protocol significantly.

RATIONALE

This Exposure Investigation is being conducted in response to a petition to ATSDR for a public health assessment of the emissions from Continental Aluminum, a secondary aluminum refinery located in New Hudson in Lyon Township, Michigan. Local residents and off-site workers have complained of odors from the facility and of various health effects which they associate with the plant's emissions. Although stack test data are available for hydrogen chloride, hydrogen fluoride, chlorine, particulate matter, dioxins, furans, and total VOCs, there are no data available for ambient air concentrations of any chemicals during odor events. Stack test data and air dispersion modeling indicate that off-site concentrations of the chemicals mentioned would be below state action levels. However, there is concern that there may be a significant amount of fugitive emissions, which would not be represented by stack test data. Also, air modeling of the stack emissions may underestimate actual conditions if fugitive emissions are indeed present. Therefore, MDCH and ATSDR will conduct ambient air sampling and monitoring to evaluate the public health impact of the air quality.

BACKGROUND

A. Site Description

Continental Aluminum recycles scrap aluminum, providing alloys for the automotive industry and deoxidizing products to the steel industry. Scrap is visually inspected when it arrives at the plant and may be shredded. Iron scrap and non-metallics are separated out before the scrap is placed in the furnace. Emissions from the charge wells of each reverberatory furnace and from the rotary furnace are routed through lime-injected baghouses before being released to the atmosphere. Emissions from the main combustion chambers of the furnaces are released directly to the atmosphere (ATSDR 2002, 2003).

Residential communities are located north, northeast, and southwest of the plant. The Oakland Southwest Airport is northwest of the site, and several businesses and light industry are immediately to the south. Dolson Elementary School is located one-half mile northeast of the site. To the east, southeast, and west of the plant is agricultural/open land.

B. Reported Health Effects

The most frequently reported health effects are irritation to the mucous membranes: nose bleeds, sore throat, coughing, difficulty in breathing, and burning eyes. During odor events attributed to the facility, a “tin can” or “varnish” taste in the mouth and a “burnt plastic” odor have been reported. Many residents reported that they would leave their homes in order to avoid the ill effects associated with the odors. Noise and odor are especially bothersome at night (ATSDR 2002, 2003).

C. Public Health Assessment Activities

In December 2001, ATSDR received a petition requesting a public health assessment for Lyon Township, focusing on air, water, and soil contamination. The source of the alleged contamination was thought to be Continental Aluminum. In March 2002, ATSDR and MDCH staff traveled to New Hudson to conduct a site visit at the facility and to meet informally with several community members. After reviewing stack testing data and air dispersion modeling results, ATSDR and MDCH concluded in a Health Consultation that the health hazard presented by emissions from Continental Aluminum was indeterminate and that an Exposure Investigation might provide more information (ATSDR 2002, 2003). A public meeting was held in November 2002 to gather and respond to public comments on the Health Consultation.

AGENCY ROLES

MDCH is the lead agency for this Investigation and is responsible for:

•defining what constitutes an “odor event” so that a grab air sample may be taken;

•choosing or establishing health-based comparison values to which environmental data will be compared;

•acquiring the monitoring and meteorological equipment needed through the Michigan Department of Environmental Quality (MDEQ), Michigan District Health Department #4, Eastern Research Group, Zellweger Analytics, and DataChem Laboratories, Inc.;

•coordinating the location of monitoring and meteorological equipment with MDEQ, Lyon Township, property owners or managers, and any necessary utility companies;

•arranging for training of samplers in taking a grab sample with a Summa canister;

•coordinating monitoring/sampling activities between MDCH, the Lyon Township Fire Department, the Oakland County Sheriff’s Department, and the Oakland County Health Department;

•collecting odor complaint information submitted to Lyon Township;

•comparing analytical results to meteorological data and odor complaint information, interpreting the findings and reporting them to the stakeholders;

•addressing stakeholder comments and questions.

ESTABLISHING CRITERIA

"Odor Events"

The Michigan Department of Environmental Quality (MDEQ) Air Division investigates odor complaints to determine if a Rule 901(b) violation is occurring. This rule falls under R336.1901 of the Air Pollution Control Rules, Part 9, Emission Limitations and Prohibitions – Miscellaneous, as amended May 28, 2002, and states:

> "….A person shall not cause or permit the emission of an air contaminant or water vapor in quantities that cause, alone or in reaction with other air contaminants ... (b) Unreasonable interference with the comfortable enjoyment of life and property."

As phrased, it is difficult to ascertain what would be generally recognized or defined as an "unreasonable interference." Both terms are subjective.

For the purposes of this Investigation, an "odor event" will be defined as "the occurrence or detection of an odor that is associated, by the person(s) detecting and reporting it, with emissions from Continental Aluminum." According to MDEQ compliance personnel who investigate odor complaints, the criteria they consider when determining if a Rule 901(b) violation is occurring are **frequency, duration, and intensity** of the odor (2003, R. Pinga, MDEQ-Southeast District Air Division, personal communication). Regarding the **frequency** of an "odor event", if odors occur sporadically, it would likely be ineffective to alert sampling personnel to the event. Therefore, the **duration** of an "odor event" should be such that the odor would likely still be present if sampling personnel were to arrive at least 15 minutes after the odor is detected. It is understood that this is a subjective determination and involves guesswork on the part of the person who detects the odor and reports it. It will be required, prior to a sample being taken, that the person taking the air sample can detect the odor, at the sampling location for the odor event, as well. (If a representative for Continental Aluminum is present at the sampling event, it is not required that the plant's designee be able to detect an odor for a sample to be taken.) Thus, the **intensity** of the odor should be such that more than one person can detect the odor. It is not necessary that those detecting the odor have the same reaction to it (e.g., mucous membrane irritation, nausea, no reaction).

A Sampling Event Documentation form (Appendix A) will be filled out each time a sampler attends to an odor event, regardless of whether a sample is ultimately taken. A detailed description of the sampling protocol is listed in the Methods section.

Comparison Values

The Comparison (Screening Level) Values to be used in the Exposure Investigation for Continental Aluminum are described below and listed in order of preference. The values for Volatile Organic Compounds (VOCs) detected by U.S. EPA Method TO-15, mineral acids that can be monitored by the Single Point Monitor, and selected metals detected by

NIOSH Method 7300 are listed in Tables 1, 2, and 3, respectively. Sampling protocols are described in the Methods section.

California Reference Exposure Levels (CaRELs), as developed by the California Environmental Protection Agency (CalEPA), are based on the most appropriate and sensitive adverse health effects. CalEPA places a heavy emphasis on available human data when developing these values, as evidenced by 34 of the 51 CaRELs developed being based on observed human health outcomes. The agency adjusts traditional 10-fold default values for uncertainty factors in specific cases due to scientific improvements in considering the extrapolation of the LOAEL (lowest observed adverse effect level) to a NOAEL (no observed adverse effect level). The agency considers the severity of the health effects involved as well (CalEPA 1999).

These health-based values are applicable to risk characterization of air releases, defined in California's Health and Safety Code Section 44303, as "including actual or potential spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing of a substance into the ambient air and that results from routine operation of a facility or that is predictable, including, but not limited to continuous and intermittent releases and predictable process upsets or leaks" (CalEPA 1999). This differentiates the CaRELs from AEGLs and ERPGs/TEELs (discussed below), which pertain to emergency releases. ATSDR/MDCH chose to use the CaRELs as the primary Screening Level in this Investigation because MDEQ odor complaint investigation reports did not indicate any emergency releases from the Continental Aluminum plant. Therefore, it is assumed that the odors reported by the community are occurring during routine operation of the facility.

CaRELs are based on a one-hour averaging time for most chemicals. Values with longer averaging times are derived from studies with a reproductive/developmental endpoint. CaRELs are designed to protect the general public, including sensitive subgroups. Exposure to a specific chemical should not exceed its CaREL more than once every two weeks over the course of a year (CalEPA 1999).

If a detected chemical does not have a corresponding CaREL, ATSDR/MDCH will compare the detected concentration to the Acute Exposure Guideline Level for that chemical. The U.S. EPA **Acute Exposure Guideline Levels** (AEGLs) are developed by the National Advisory Committee for Acute Exposure Guideline Levels for Hazardous Substances. The committee has members from government, industrial, academic, and private organizations. The primary use of AEGLs is to assist organizations with emergency planning, response, and prevention programs. The values in the attached tables are not yet considered final, pending review by the National Academy of Sciences review committee (NRC 2002).

There are three levels of guidelines:

•AEGL-1 is the airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic nonsensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure. Airborne concentrations below AEGL-1 represent exposure levels that can produce mild and progressively increasing but transient and nondisabling odor, taste, and sensory irritation or certain asymptomatic, nonsensory adverse effects.

•AEGL-2 represents the airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.

•AEGL-3 is the airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience life-threatening health effects or death.

With increasing airborne concentrations above each AEGL, there is a progressive increase in the likelihood of occurrence and the severity of effects described for that level. Although the AEGL values represent threshold levels for the general public, including susceptible subpopulations, such as infants, children, the elderly, persons with asthma, and those with other illnesses, U.S. EPA recognizes that individuals, subject to unique or idiosyncratic responses, could experience the effects described at concentrations below the corresponding AEGL (NRC 2002).

Several averaging times are possible for all three levels: 5, 10, 30, and 60 minutes, and 4 and 8 hours (NRC 2002). Most of the chemicals to be tested for in this Investigation do not have AEGLs for the 5-minute averaging time. Therefore, the minimum averaging time for AEGLs used in this Investigation will be 10 minutes.

If a detected chemical does not have a corresponding CaREL or AEGL, ATSDR/MDCH will compare the detected concentration to the Emergency Response Planning Guideline or Temporary Emergency Exposure Level for that chemical. The American Industrial Hygiene Association developed the **Emergency Response Planning Guidelines** (ERPGs) and **Temporary Emergency Exposure Limits** (TEELs) for the U.S. Department of Energy (DOE) for use in evaluating the effects of accidental chemical releases on the general public. ERPGs and TEELs are estimates of concentration ranges for specific chemicals above which acute exposure would be expected to lead to adverse health effects of increasing severity for each hierarchal step. Because many chemicals of interest lack ERPGs, TEELs are used for those chemicals until ERPGs are established (Craig and Lux 1998).

Human data are given primary consideration, and rat data are preferred over that for other animal species, in deriving ERPGs and TEELS. Inhalation data are preferred over data from other routes of uptake. Approximately 754 chemicals have been evaluated, 77 of which now have official ERPGs, the remainder having TEELs (Craig and Lux 1998).

There are 3 levels of ERPGs:

•ERPG-1 represents the maximum concentration in air below which it is believed nearly all individuals could be exposed for up to one hour without experiencing other than mild transient adverse health effects or perceiving a clearly defined objectionable odor.

•ERPG-2 is the maximum concentration in air below which it is believed nearly all individuals could be exposed for up to one hour without experiencing or developing irreversible or other serous health effects or symptoms that could impair their abilities to take protective action.

•ERPG-3 represents the maximum concentration in air below which it is believed nearly all individuals could be exposed for up to one hour without experiencing or developing life-threatening health effects.

There are 4 levels of TEELs:

•TEEL-0 is the threshold concentration below which most people will experience no appreciable risk of health effects.

•TEEL-1 is the maximum concentration in air below which it is believed nearly all individuals could be exposed without experiencing other than mild transient adverse health effects or perceiving a clearly defined objectionable odor.

•TEEL-2 represents the maximum concentration in air below which it is believed nearly all individuals could be exposed without experiencing or developing irreversible or other serious health effects or symptoms that could impair their abilities to take protective action.

•TEEL-3 is the maximum concentration in air below which it is believed nearly all individuals could be exposed without experiencing or developing life-threatening health effects.

The DOE recommends that, for application of TEELs, the concentration at the receptor point of interest be calculated as the peak 15-minutes time-weighted average concentration (Craig and Lux 1998).

Detected chemicals will also be compared to their respective ATSDR air Comparison Values. **ATSDR Environmental Media Evaluation Guides** (EMEGs) represent concentrations of substances in an environmental medium to which humans may be exposed during a specified period of time (acute, intermediate, or chronic) without experiencing adverse health effects. Acute exposures are defined as 14 days or less. Intermediate exposures are those lasting 15 days to 1 year. Chronic exposures last more than 1 year. For exposures to substances in soil or water, EMEGs consider dose per body weight and differ between adults and children. For exposure to substances in air, EMEGs are expressed as air concentrations and are the same for adults and children (ATSDR 2002).

EMEGs are based on toxicity information that considers noncarcinogenic toxic effects of chemicals, including their developmental and reproductive toxicity. An air EMEG is derived only from inhalation data and does not try to extrapolate data from different exposure routes (ATSDR 2002).

EMEGs are used as screening tools. Substances found at concentrations below EMEGs are not expected to pose public health hazards. Substances found at concentrations above

EMEGs require further evaluation before a public health conclusion can be drawn (ATSDR 2002).

Lastly, detected chemicals will be compared to their respective **EPA Reference Concentrations** (RfCs). An RfC is an estimate of a daily exposure to a substance in air that is likely to be without a discernable risk of adverse effects to the general human population, including sensitive subgroups, during a lifetime of exposure. RfCs are derived from the NOAEL or LOAEL of a study by application of uncertainty factors. By allowing for potential orders of magnitude of uncertainty, a protective value is derived. The EPA assumes that a threshold exists for noncarcinogens, that levels below a chemical's threshold will have no adverse effects (EPA 1989).

Of the 58 VOCs listed in Table 1, tert-amyl methyl ether (CASRN 994-05-8) and ethyl tert-butyl ether (CASRN 637-92-3) do not have any of the corresponding Screening Levels used in this Investigation. Both of these compounds are gasoline oxygenates, fuel additives that decrease carbon monoxide emissions. We do not expect to find these compounds in the aluminum scrap. Therefore, for this Investigation, we will not consider tert-amyl methyl ether and ethyl tert-butyl ether chemicals of interest unless the data indicate a concentration of greater than 50,000 ppb, the TEEL-0 for methyl tert-butyl ether, a more well-known and -characterized gasoline oxygenate.

Of the 6 mineral acids listed in Table 2, hydrogen iodide (CASRN 10034-85-2) does not have any of the corresponding Screening Levels used in this Investigation. Only recently has the U.S. EPA begun discussions on the development of AEGLs for hydrogen iodide (EPA 2003). Hydrogen iodide, along with hydrogen bromide, nitric acid, and sulfuric acid, is not listed as an expected emission from an aluminum recycling smelter such as Continental Aluminum (EPA 1986, 1995). Therefore, a Screening Level for hydrogen iodide is not necessary for this Investigation.

METHODS

(Note: Mention of trade names or commercial products does not constitute MDCH or ATSDR endorsement or recommendation for use.)

Instantaneous ("Grab") Air Sampling

The Standard Operating Procedure (SOP) for instantaneous air sampling during this Investigation is based upon the U.S. EPA Environmental Response Team Standard Operating Procedures for Field Analytical Procedures, SOP #1704, Summa Canister Sampling (EPA 1995) and the State of Nevada Division of Environmental Protection Summa Canister Sampling SOP for the Fallon site (State of Nevada 2001).

1.0 Scope and Application

The purpose of this SOP is to describe a procedure for sampling of volatile organic compounds (VOCs) in ambient air. The method is based on samples collected as whole air samples in Summa stainless steel canisters. The VOCs are subsequently separated by gas chromatography (GC) and measured by mass-selective detector or multidetector techniques (EPA 1999).

This method is applicable to specific VOCs that have been tested and determined to be stable when stored in pressurized and subatmospheric pressure canisters. These compounds have been measured at the parts per billion by volume (ppbv) level. Eastern Research Group (ERG), the laboratory responsible for analysis, reports detection limits for VOCs ranging from 0.05 to 1.24 ppbv using EPA Method TO-15.

2.0 Method Overview

(A detailed procedure is listed in Section 8.0.)

ERG will prepare the Summa canisters and ship them to MDCH. MDCH will arrange for training of samplers in appropriate air sampling techniques and the proper handling and shipping of samples taken. After training is completed, the canisters will be placed in the custody of the samplers.

When an "odor event," as defined earlier in this document, occurs, the person detecting the odor will call the appropriate telephone number to notify samplers. Dependent on the time of day, either fire or police personnel, if not currently engaged in another call, will be dispatched to the address where the odor event is occurring and collect an air sample. If emergency personnel are attending an emergency, then a designated alternate sampler may be notified. If sampling personnel are available to proceed immediately to the scene, a representative from Continental Aluminum may be contacted so that the company can witness the sampling event. (This courtesy will be extended for half of the events.)

Subatmospheric-pressure sampling uses an initially evacuated canister. The canister has a hand valve and may have a fixed orifice to regulate flow. Alternatively, airflow into the canister can be grossly controlled by the degree to which the sampler rotates the hand valve. For this Investigation, the samples will be grab (instantaneous) samples; therefore, a fixed orifice on the canister or gross timing of the samples is not necessary.

When taking the sample, the sampler will stand on public property (e.g., sidewalk, shoulder of road) as close to the address of the scene as possible. (Private property testing would require that the property owner sign a release form. Public property testing would not require this. Also, private property testing might be considered "human research" and be subject to agency internal review processes.) The sampler will hold the canister at the approximate breathing height of an adult, about 5 feet, open the hand valve a quarter turn until the sound changes as the vacuum diminishes, and then close the valve.

Following the sampling at the address where the odor was reported, sampling personnel will proceed to the designated control site to obtain a "control" air sample in another canister. Eight control sites will be selected before the Investigation begins. These sites will be located in separate semi-quadrants of a circle, with the Continental Aluminum property as the center of that circle. If an odor event is sampled in one semi-quadrant, samplers will take the control air sample in the semi-quadrant opposite. It is understood that the control air sample may be down-, up-, or crosswind to Continental Aluminum. The analytical data will be compared to meteorological data to determine if the plant is a potential source of the odor.

No more than one odor-sampling event will occur per 6-hour period, bounded by 6 o'clock AM, 12 noon, 6 o'clock PM, and 12 midnight, per day. This will allow for efficient use of the canisters while allowing additional data collection on especially odorous days. This Investigation allows a maximum of 10 sampling events (10 odor samples and 10 control samples, plus 1 field blank for every 6 canisters).

3.0 Equipment/Materials Provided

The sampling equipment provided is a VOC canister sampler – a whole-air sampler capable of filling an initially evacuated canister, by action of the hand valve, from vacuum to near atmospheric pressure. Other materials provided are the Sampling Event Documentation sheet (Appendix A), Chain of Custody form (Appendix A), and shipping containers.

4.0 Sample Preservation, Containers, Handling, and Storage

The sampler will complete the Sampling Event Documentation sheet, Chain of Custody form, and the sealing and packaging of the sample before leaving the scene. The sampler will then return these items to the Lyon Township offices. The Township will fax the Sampling Event Documentation sheet to MDCH and will mail the sample and Chain of Custody form to ERG (postage covered by ATSDR/MDCH).

ERG will acknowledge receipt of the canister by faxing a copy of the completed Chain of Custody form to MDCH. The sample will be analyzed in the order it was received, with expedited turnaround time being no longer than 10 business days. ERG will send the analytical results to MDCH who will interpret the results.

Canisters should be stored in a cool dry place. If a canister is in storage past its shelf-life of 30 days, it should be replaced. Canisters should not be dented or punctured. Care must be taken not to exceed 40 psi in the canister (do not heat canister above 140°F). Therefore, if the sampling takes place on a sunny or hot day, the canister should not be placed in a vehicle for an extended time but should be transported to the Lyon Township offices as soon as possible after the sample is taken.

5.0 Health and Safety
It is not expected that any chemical exposure occurring during odor sampling will result in long-term health effects. It is possible that sampling personnel will experience short-term irritant effects, according to past odor complaint documents submitted by local residents and businesses.

6.0 Interferences and Potential Problems
Contamination could occur in the sampling system if canisters are not properly cleaned before use. During this Investigation, pre-certified and clean canisters are being supplied by ERG. No cleaning of the exterior is required.

Sampling personnel should be aware of other sources of odors or VOC emissions in the immediate testing area or nearby. Examples of other sources would be an engine running (car, truck, lawn mower), smoke (cigarette, burning leaves), painting or tarring work, lawn treatments being applied. MDCH will train the samplers in recognizing these confounders. If the sampler believes that the detected odor is *not* attributable to a confounder, then the sampler should proceed with sampling and document the potential confounders. If the sampler believes that the detected odor *is* attributable to one of these confounders, the sampler should not take a sample. The decision criteria are listed on the Sampling Event Documentation sheet. It is understood that sampling personnel cannot render an expert opinion regarding confounding odors, however, for purposes of this Investigation, ATSDR and MDCH will allow this area of uncertainty.

7.0 Quality Assurance/Quality Control
The following quality assurance procedures apply:

7.1 All sampling information must be documented on Chain of Custody forms and Sampling Event Documentation sheets.

7.2 All equipment and materials must be used in accordance with instructions as supplied by the manufacturer, ERG, or ATSDR/MDCH.

7.3 One canister out of every six will not be used to collect an air sample. Instead, the canister will be shipped to ERG for analysis as a field blank.

7.4 Continental Aluminum is welcome and encouraged to take their own sample during odor events and to share the analytical results with ATSDR/MDCH.

8.0 Procedure

8.1 Upon verification of the odor event, determine if confounding odors are present and enter appropriate notes on the Sampling Event Documentation sheet. If the decision is made to take a sample, continue with the procedure, filling in the sheet appropriately.

8.2 Before sample collection, verify vacuum condition of canister with gauge.

8.3 Standing on public property as close as possible to the address where the odor was reported, place canister at the approximate breathing height of an adult, about 5 feet.

8.4 Open the hand valve a quarter turn. Pressure will be audibly released.

8.5 As the pressure in the canister approaches atmospheric, a change in pitch or sound level is heard. Turn hand valve to shut valve. Check pressure with gauge.

8.5 Re-cap the canister, tightening slightly to seal the vacuum.

8.6 Complete the remaining information on the Sampling Event Documentation sheet for this site.

8.7 Proceed to the designated control site and take a control air sample following the previous steps (8.2-8.7).

8.8 Enter the appropriate information on the Chain of Custody form.

8.9 Place the canister and the Chain of Custody form into the box supplied for shipping and seal the box. Bring box and Sampling Event Documentation sheet to Lyon Township offices for shipping.

8.10 ERG will analyze the sample using U.S. EPA Method TO-15 and will send the results to MDCH. Expedited turnaround time is 1-2 weeks; normal turnaround time is 30 days.

8.11 ERG will ship replacement canisters for additional sampling to MDCH, who will then deliver them to the samplers.

Continuous Air Monitoring

1.0 Scope and Application

This portion of the Investigation will provide only qualitative, not quantitative, information.

The purpose of this SOP is to describe a procedure for monitoring acidic emissions in ambient air. The method is based on ambient air passing over a white tape impregnated with chemicals known to specifically darken upon exposure to mineral acids (e.g., hydrogen chloride, hydrogen fluoride). At the end of each pre-determined sampling period, the monitor, equipped with a chemical-specific “key,” calculates air concentrations of the chemical of interest by detecting changes in darkness on the reactive tape. The concentrations are then recorded onto a datalogger. The tape is highly selective for mineral acids, responding quickly to recent releases.

This method was used by ATSDR and MDCH in the Exposure Investigation and Exposure Evaluation for the Lafarge Corporation in Alpena, Michigan (ATSDR 2000, 2001). The chemical of interest at Lafarge was hydrogen chloride, emitted by a cement-making plant.

2.0 Method Overview
(A detailed procedure is listed in Section 10.0.)

Before the beginning of the Investigation, MDCH will obtain the acid monitor and order five 30-day cassettes of the reactive tape. MDCH and MDEQ will test the monitor to ensure its ability to detect the chemicals of interest. Oakland County Health Department and MDCH personnel will receive training from MDEQ in use of and maintenance checks on the monitor.

The monitor will run continuously and log data at predetermined intervals. Oakland County Health Department and MDCH personnel will be responsible for maintenance checks and tape change-outs. MDCH will download the data on a weekly basis.

3.0 Equipment/Materials Provided
The SPM Single Point Monitor, manufactured by Zellweger Analytics, Inc. will be used for the continuous air monitoring portion of the Exposure Investigation. The specific machine to be used is on loan from the Michigan District Health Department #4.

The features of the SPM are discussed at the company's website http://www.zelana.com/product/SPM/features_benefits.html. The detection limit ranges for hydrogen chloride and hydrogen fluoride, the chemicals of interest in this portion of the Investigation, are 30-1,200 ppb and 600-9,000 ppb, respectively. The accuracy is reported to be ± 20%. While the degree of accuracy is not ideal, the data should at least give an indication as to whether there are mineral acids present at levels of potential concern.

Other materials provided are the SPM Quality Assurance/Quality Control Checklist (Appendix A), Chemcassette® detection tapes, Chemcassette® Use Record forms (Appendix A), and the trailer in which the SPM will be housed (provided by MDEQ). Lyon Township will arrange for electrical hook-up.

4.0 Siting of Monitor
Before the beginning of the Investigation, MDEQ and ATSDR/MDCH will determine, based on air dispersion modeling and on site-specific data, the most appropriate location to place the monitoring station. Site-specific information (proximity to a power supply and to confounding influences such as buildings) will ultimately determine where the monitor will be placed. Also, logistics prevent the equipment from easily being moved site to site, therefore only one location will be used.

MDEQ will be responsible for transporting equipment and assembling the monitoring station. The station will house the monitor and a datalogger (computer) as well as meteorological equipment in a locked trailer. MDEQ and ATSDR will train MDCH and Oakland County Health Department personnel in proper equipment maintenance techniques.

5.0 Sample Preservation, Containers, Handling, and Storage

Under normal conditions, Chemcassettes® have a shelf life of three to four months. At time of manufacture, each cassette is stamped with an expiration date. A Chemcassette® should not be used after its expiration date (Zellweger Analytics 1997).

The cassettes should be stored in a cool atmosphere and kept out of direct sunlight. Although most Chemcassettes® maintain optimum sensitivity when stored at room temperature, Zellweger Analytics recommends that all cassettes be stored in a freezer (Zellweger Analytics 1997).

Chemcassettes® should not be removed from their protective packaging until ready to install. Exposure to light, ambient air, and body oils may cause the cassette to lose some of its sensitivity (Zellweger Analytics 1997).

The SPM should not be operated in direct sunlight or at elevated temperatures unless equipped with appropriate options. The operating temperature range is 0-40° C (32-104° F) (Zellweger Analytics 1997). Ideal humidity conditions are below 70% (2003, G. Franz, Zellweger Analytics, Inc., personal communication).

When a used Chemcassette® is replaced with a fresh cassette, the used cassette will be placed in a ziplocking plastic baggie and stored at the trailer until a staff person from MDCH collects it. The baggie will also contain the Chemcassette® Use Record form (Appendix A), appropriately filled out by the person(s) handling the cassette. MDCH will retain all used Chemcassettes® until the Public Health Assessment at Continental Aluminum is completed, and then discard them. (The cassettes cannot be re-used or re-analyzed.) The Chemcassette® Use Record forms will remain on-file with MDCH.

6.0 Health and Safety

It is not expected that any chemical exposure occurring during maintenance checks and Chemcassette® change-outs will result in long-term health effects.

7.0 Security of Monitor

The only persons authorized to have access to the trailer and monitor will be MDCH, MDEQ, or Oakland County Health Department personnel. There will be a temporary fence installed around the trailer to enhance security. There will be a sheet-metal lockout attached to the ladder that accesses the roof of the trailer.

If there appears to be a problem with the electrical connections, the SPM monitor, or the datalogger, MDCH will contact the appropriate agencies for assistance. Persons living or working in the area where the trailer/monitor is placed will be asked to contact MDCH with any non-emergency questions or concerns. If the trailer requires immediate attention due to an apparent emergency, local emergency responders should be alerted by dialing 9-1-1. The responders will attend to the scene and then contact MDEQ and MDCH.

8.0 Interferences and Potential Problems

Exposure to light, ambient air, and body oils may cause the cassette to lose some of its sensitivity. Therefore, Chemcassettes® should not be removed from their protective packaging until ready to install. (Zellweger Analytics 1997).

The SPM should not be operated in direct sunlight or at elevated temperatures unless equipped with appropriate options. The operating temperature range is 0-40° C (32-104° F) (Zellweger Analytics 1997). Ideal humidity conditions are below 70% (2003, G. Franz, Zellweger Analytics, Inc., personal communication).

The Chemcassette® for mineral acids detects hydrogen bromide, hydrogen chloride, hydrogen fluoride, hydrogen iodide, nitric acid, and sulfuric acid. The cassette does not differentiate between these individual chemicals. The chemical-specific "key" adjusts the optics of the monitor and accounts for the sampling time when calculating a concentration from the tape color. Thus, a color change on the tape will only indicate the presence of one or more mineral acids and cannot be used to determine definitively which acid is present or the concentration. Hydrogen bromide, hydrogen iodide, nitric acid, and sulfuric acid are not listed as expected emissions from an aluminum recycling smelter such as Continental Aluminum (EPA 1986, 1995). If mineral acids are determined to be in the air, then further evaluation would be necessary to verify the identity of the acids (e.g., using NIOSH Method 7903).

Proximity to buildings and trees is an important consideration when siting a monitor, as man-made and natural structures can cause wind eddies, leading to inaccurate characterization of air quality. MDCH and MDEQ will place the trailer the recommended distance (2.5 times building height), at the least, from surrounding structures.

9.0 Quality Assurance/Quality Control

The following quality assurance procedures apply:

- 9.1 All sampling information must be documented on Chemcassette® Use Record forms.
- 9.2 All equipment and materials must be used in accordance with instructions as supplied by the manufacturer, MDEQ, or ATSDR/MDCH.
- 9.3 The routine maintenance schedule is shown in Appendix B. A copy of the Maintenance Checklist form is provided in Appendix A.

10.0 Monitor Operation

- 10.1 The monitor will operate continuously for the duration of the Exposure Investigation. This will be a minimum of 30 days and projected maximum of 90 days.
- 10.2 The monitor will take measurements at 4-minute intervals for hydrogen chloride or at 30-second intervals for hydrogen fluoride. These sampling times are predetermined by the manufacturer. If an acid is detected, the tape will advance before the sampling window is complete, time-stamping when the detection was made.

10.3 Oakland County Health Department and MDCH personnel will be responsible for the change-out of the Chemcassette® detection tapes. Tapes will be checked a minimum 3 days per week. If county personnel perform the cassette change-out, they will leave the tape and its Chemcassette® Use Record form in the trailer for future pick-up by MDCH. If MDCH carries out the cassette change-out, they will bring the cassette and form back to Lansing with them.

10.4 Oakland County Health Department and MDCH personnel will be responsible for maintenance checks on the monitor, as instructed by the manufacturer. They will also conduct maintenance checks on the datalogger and meteorological equipment, as instructed by MDEQ. MDCH will retain copies of the completed SPM Quality Assurance/Quality Control Checklist and MDEQ Equipment Maintenance Checklist (Appendix A) forms.

10.5 MDCH will be responsible for downloading the data from the datalogger on a weekly basis.

Metals (Airborne Particulates) Analysis

1.0 Scope and Application

The purpose of this SOP is to describe a procedure for monitoring airborne particulates in ambient air. The method is based on ambient air being drawn through a PM10 (particulate matter less than 10 microns in diameter) high-volume sampling pump and onto a pre-weighed filter. After the specified air volume has passed through the filter, the filter is removed, weighed, and analyzed using NIOSH Method 7300. This method reduces all analytes to their elemental state, thus no speciation of the elements will occur.

The estimated limit of detection is 0.001 mg per sample. The working range of this method is 0.005 to 2.0 mg/m^3 for each element in a 500-liter air sample. DataChem Laboratories, Inc. (DataChem) is the laboratory responsible for analysis. Elements to be analyzed in this Investigation are aluminum, barium, beryllium, cadmium, chromium, copper, lead, manganese, selenium, and zinc.

2.0 Method Overview

(A detailed procedure is listed in Section 10.0.)

Before the beginning of the Investigation, DataChem will pre-weigh and ship 12 filters to MDCH, who will retain the filters until use. MDCH and the Oakland County Health Department will be responsible for placing the filters into the sampling pump, removing them after the sampling period, and shipping them to DataChem for analysis.

Air is drawn through the eaves of the sampling head of a high-volume PM10 sampling pump. The total volume of air is estimated by calibrating the pump to supply a known pressure for a given volume, recording the pressure of the pump for the duration of sampling (usually 24 hours), then multiplying the flow rate (about 40 cubic feet per minute) by the duration. Pressure to volume is checked before and after sampling.

The air passes through a pre-weighed filter, approximately 8 inches by 10 inches in size. Particulates greater than 0.8 microns in size are retained on the filter. The filter is then removed and weighed. The difference between the weights before and after sampling is the weight of PM10. The average airborne particulate concentration (all particulates captured) is determined by dividing the total loading of particulates on the filter (micrograms) by the total volume of air (liters). The filter is then analyzed according to NIOSH Method 7300, "Elements by ICP" (NIOSH 1994). Results are reported as total mass and mass fraction.

The sampling pump will be located on top of the MDEQ equipment trailer, which also will house the acid monitor and meteorological equipment.

3.0 Equipment/Materials Provided

MDEQ will provide the high-volume PM10 sampling pumps. DataChem will provide the pre-weighed filters, Field Data Collection/Chain of Custody Record form (Appendix A), and the High-Volume Data Record (Appendix A).

4.0 Sample Preservation, Containers, Handling, and Storage

Sample stability is stable for all elements. It is important that dirt and oils do not come in contact with the filter, otherwise the post-sampling weight will not represent the retained particulates accurately. Therefore, handling should occur only when necessary (inserting/removing the filter from the pump, re-packing it for shipping). The use of forceps or disposable gloves is encouraged.

The filters will remain in their shipping containers (individual envelopes in a packing box) until use. Unused filters will be stored at MDCH in Lansing until the Investigation starts, at which time they will be stored, in their containers, in the MDEQ trailer, which will have limited access. Used filters will be shipped as soon as possible to DataChem in their individual envelopes (postage covered by ATSDR/MDCH).

5.0 Siting of Equipment

The PM10 pump will be located on top of the MDEQ trailer, which also will house the acid monitor and meteorological equipment. Air modeling data provided by MDEQ and by ATSDR will help determine where the trailer should be placed. However, siting logistics (proximity to a power supply and to confounding influences such as buildings) will ultimately determine where the trailer will be placed.

6.0 Health and Safety

It is not expected that any chemical exposure occurring during the sampling will result in long-term health effects.

The sampling pump will be located on top of the MDEQ trailer, which is approximately 10.5 feet high with a railing adding an additional 3.5 feet. Staff should use every precaution when climbing the ladder to the top of the trailer and when working on top of the trailer. Ideally, at least two persons will attend filter change-outs.

7.0 Security of Equipment

The only persons authorized to have access to the trailer and the equipment will be MDCH, MDEQ, or Oakland County Health Department personnel. There will be a temporary fence installed around the trailer to enhance security. There will be a sheet-metal lockout attached to the ladder that accesses the roof of the trailer.

If there appears to be a problem with the electrical connections or any of the equipment, MDCH should be notified so that they can contact the appropriate agencies for assistance. Persons living or working in the area where the trailer is placed will be asked to contact MDCH with any non-emergency questions or concerns. If the trailer requires immediate attention due to an apparent emergency, local emergency responders should be alerted by dialing 9-1-1. The responders will attend to the scene and then contact MDEQ and MDCH.

8.0 Interferences and Potential Problems

Exposure to body oils or handling with soiled hands may cause the filter to retain unwanted and confounding compounds. Therefore, staff should exercise care when handling the filters, using forceps or disposable gloves.

Proximity to buildings and trees is an important consideration when siting a monitor, as man-made and natural structures can cause wind eddies, leading to inaccurate characterization of air quality. MDCH and MDEQ will place the trailer the recommended distance (2.5 times building height), at the least, from surrounding structures.

9.0 Quality Assurance/Quality Control

The following quality assurance procedures apply:

9.1 All sampling information must be documented on Field Data Collection/Chain of Custody Record forms and High-Volume Data Record forms.

9.2 All equipment and materials must be used in accordance with instructions as supplied by DataChem, MDEQ, and ATSDR/MDCH.

9.3 Two filters will be used as field blanks. They will be brought to the sampling location but not be placed in the sampling pumps. They will not be removed from their envelopes. Instead, the envelopes will be sealed and the filters shipped to DataChem for analysis.

10.0 Procedure

10.1 Airborne particulates will be sampled every 6 days during the Exposure Investigation. This will be a minimum of 30 days (5 samples) and projected maximum of 90 days (no more than 10 samples). This is the sampling schedule followed by MDEQ.

10.2 Oakland County Health Department and MDCH personnel will be responsible for inserting and removing the filters, completion of the Field Data Collection/Chain of Custody Record forms, and shipping the forms and filters to DataChem for analysis.

10.3 Oakland County Health Department and MDCH personnel will be responsible for maintenance checks on the sampling pump, as instructed by MDEQ, and for completion of the High-Volume Data Record forms.

10.4 Fill in the appropriate information on the High-Volume Data Record form before the sampling begins.

10.5 Load the filter into the filter cassette and insert the cassette into the holder in the pump, clamping it in place.

10.6 Allow sampler to run for at least 5 minutes and take a flow-rate reading with the magnehelic gauge.

10.7 Set timer to chosen start time.

10.8 After the sampling period is finished, allow the sampler to run for at least 5 minutes and take a flow-rate reading with the magnehelic gauge.

10.9 Remove the cassette from the holder and remove the filter. Place the filter in a manila folder, seal in the filter's dedicated envelope, complete the Field Data Collection/Chain of Custody Record, and ship to DataChem for analysis. Complete the High-Volume Data Record form and ship to MDCH.

10.10 DataChem will acknowledge receipt of the filter by faxing a copy of the Field Data Collection/Chain of Custody Record form to MDCH.

10.11 DataChem will analyze the sample using NIOSH Method 7300 and will send the results to MDCH.

Meteorological Data

In order to help determine if the odors experienced by individuals are coming from the direction of Continental Aluminum or if there are certain meteorological conditions under which odors seem to be more prevalent, MDEQ will provide meteorological measuring equipment and a trailer to house it in for this Investigation. MDEQ and MDCH will establish the site for the trailer based on access and surrounding vegetation and topography. Parameters to be measured include: temperature, wind speed, wind direction, relative humidity, and barometric pressure. Parameters will be measured every 15 minutes.

Oakland County Health Department and MDCH personnel will be responsible for maintenance checks on the meteorological equipment, as instructed by MDEQ. MDCH will retain copies of the completed MDEQ Equipment Maintenance Checklist (Appendix A) forms.

Odor Complaint Information

MDCH will copy odor complaint forms submitted by citizens to Lyon Township during the Exposure Investigation. Neither MDCH nor ATSDR will prepare or distribute a formal odor “diary” form nor will either agency conduct an odor survey. Instead, the Investigation will rely on citizens who believe they detect an objectionable odor to report the odor to the Township. The community has been using forms supplied by MDEQ or individually-designed forms. Ideally, for purposes of this Investigation, the format of the forms will be consistent. Useful information would include:

- address where the odor was detected;
- time when odor was first detected;
- duration of odor;
- description of the odor, perhaps taken from a list of possible descriptors;
- intensity of the odor, rated on a 1-2-3 scale rather than a 0-to-5 scale, without fractions;
- any additional information the citizen wishes to share.

Personal identifying information on the odor complaint forms will be protected to the extent allowable by law. If any party other than MDCH or ATSDR wishes to obtain copies of submitted odor complaints through the Freedom of Information Act, MDCH will first black out identifying information such as name, address, and telephone number, to protect privacy rights.

REPORTING OF RESULTS

MDCH will review the raw data and present a written report to the stakeholders, discussing the data, the interpretation of the results, and any health implications. The report shall address the questions posed at the beginning of this protocol document:

1. What VOCs, at what concentrations, are detected in the air during odor events? Are the concentrations above background, or control, levels?
2. Is hydrogen chloride or hydrogen fluoride detectable in the air during odor events? Is there a temporal (time) trend to the detection of these acids?
3. What metals (airborne particulates), at what concentrations, are in the air?
4. Is it plausible that the earlier reported health effects are associated with detected chemicals and concentrations?
5. When an odor event occurs, do meteorological data indicate that the Continental Aluminum plant is upwind of the odor detection (i.e., is it plausible that Continental Aluminum is the source of the odor)?

Analytical results from the Instantaneous Air Samplings will be presented as odor-event data versus control data (per event) and will be time-matched with meteorological data. Because of the nature of grab sampling, an averaging time cannot be calculated for the concentration of a detected chemical. (The concentration represents a "snapshot" in time.) Therefore, analytical results will be compared to the respective Screening Level values, which do have averaging times, and that comparison discussed as far as potential implications.

Results from the Continuous Air Monitoring will be presented as number of detections per day. Continuous Air Monitoring results for days during which Instantaneous Air Samplings occurred, or odor complaints were received, will be analyzed in more detail, comparing timing of detections and meteorological data with the findings.

Results from the Metals Analysis will be presented as per-sample data. Chemicals above their respective Screening Levels will be evaluated further and any public health implications determined.

Odor complaints and the Sampling Event Documentation sheets (from Instantaneous Air Samplings) will be reviewed and compared to meteorological data to determine if occurrences of odor events happened downwind of Continental Aluminum. Meteorological data for odor event days will be compared to determine if there are certain atmospheric conditions that could increase the likelihood of odors occurring.

Statistical analysis of the findings cannot be conducted with any assurance of statistical power. Therefore, findings will be interpreted without this analysis.

CONFIDENTIALITY

Monitoring data and analytical results are not confidential. This information will be shared with other federal, state, and local agencies, as well as with the stakeholders.

The Sampling Event Documentation form (for Summa canister sampling) contains lines for the address of the reported odor event and the control sample location as well as for the name of the person reporting the odor. Although the sample is to be taken on public property, the rights of individuals who live or work near that location should be protected. In report documents, rather than identify the address, MDCH will indicate approximate distance and direction from Continental Aluminum. Identifying information will be protected to the extent allowable by law.

As mentioned previously, if any party other than MDCH or ATSDR wishes to obtain copies of submitted odor complaints through the Freedom of Information Act, MDCH will first black out identifying information such as name and address.

FOLLOW-UP ACTIVITIES

MDCH may provide periodic updates during the Exposure Investigation. Raw data (data not yet validated or interpreted) will not be released to the public. When the Investigation is complete, MDCH and ATSDR will present validated data and the agencies' interpretations, conclusions regarding any health-related impacts, and follow-up recommendations to the stakeholders, other agencies, and the community in the form of a health consultation or health assessment document. If necessary, MDCH will host a public meeting to discuss the results of this Investigation and what any next steps might be.

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TABLES

Table 1. US EPA Method TO-15 VOCs - Comparison Values

Chemical	CASRN	Odor description	Odor Threshold		California REL		AEGL-1				
							10 min	30 min	60 min	4 hrs	8 hrs
			ppb	Ref.	ppb	Avg. time (hr)	ppb	ppb	ppb	ppb	ppb
acetone	67-64-1	Mildly pungent and aromatic; fragrant, mint-like odor; fruity	37	1							
acetonitrile	75-05-8	Aromatic, ether-like	170,000	2							
acetylene	74-86-2	Faint, ethereal odor. [Commercial grade has a garlic-like odor.]									
acrylonitrile	107-13-1	Pungent (onion, garlic); unpleasant odor.	3,700	3							
tert-amyl methyl ether	994-05-8										
benzene	71-43-2	Aromatic, gasoline-like	160	4	410	6					
benzyl chloride	100-44-7	Pungent, aromatic odor	41	3	46	1					
bromochloromethane	74-97-5	Sweet, chloroform-like odor	400,000	3							
bromodichloromethane	75-27-4		250,000	3							
bromoform	75-25-2	Sweet, similar to chloroform	1,300	5							
bromomethane	74-83-9	Chloroform-like	20000	5	1,000	1					
1,3-butadiene	106-99-0	Mildly aromatic or gasoline-like odor	25	5							
2-butanone	78-93-3	Acetone-like; moderately sharp; fragrant, mint	250	3	4,400	1	100,000	100,000	100,000	100,000	100,000
carbon tetrachloride	56-23-5	Aromatic, sweet; characteristic ether-like odor	1,600	5	300	7	25,000	16,000	12,000	6,900	5,200
chlorobenzene	108-90-7	Aromatic, almond-like	220	5							
chlorodibromomethane	124-48-1	Sweet, similar to chloroform	1300	5							
chloroethane	75-00-3	Ethereal, pungent	3,800	3							
chloroform	67-66-3	Pleasant, ethereal, nonirritating, sweet	51,000	3	31	7					
chloromethane	74-87-3	Ethereal, nonirritating; faint, sweet	10,000	5							
chloroprene beta-	126-99-8	Pungent, ether-like odor	15,000	2							
dibromoethane 1,2-	106-93-4	Mild sweet odor, like chloroform	10000	3							
dichlorobenzene 1,2-	95-50-1	Pleasant, aromatic odor	2000	3							
dichlorobenzene 1,3-	541-73-1		20	6							
dichlorobenzene 1,4-	106-46-7	Aromatic, mothball-like odor	180	5							
dichlorodifluoromethane	75-71-8	Ether-like odor									
dichloroethane 1,1-	75-34-3	Aromatic ethereal; chloroform-like	110,000	3							
dichloroethane 1,2-	107-06-2	Pleasant, chloroform-like odor	3,000	3							
dichloroethylene 1,1-	75-35-4	Mild sweet odor resembling that of chloroform	500,000	5							
dichloroethylene 1,2- cis-	156-59-2	Ethereal, slightly acrid; Sweet, pleasant; chloroform-like odor					140,000	140,000	140,000	140,000	140,000
dichloroethylene 1,2- trans-	156-60-5	Ethereal, slightly acrid; Sweet, pleasant; chloroform-like odor	84	5			280,000	280,000	280,000	280,000	280,000
dichloropropane 1,2-	78-87-5	Chloroform-like, sweet	250	5							
dichloropropene 1,3- cis-	10061-01-5	Chloroform-like; sharp; sweet; penetrating, irritating	1,000	5							
dichloropropene 1,3- trans-	10061-02-6	Chloroform-like; sharp; sweet; penetrating, irritating	1000	5							
dichlorotetrafluoroethane 1,2-	76-14-2	Very slight ethereal odor									
ethyl acrylate	140-88-5	Acrid odor; sour, pungent; hot plastic	0.2	3							
ethylbenzene	100-41-4	Sweet, gasoline-like; aromatic; pungent	92	3							
ethyl tert-butyl ether	637-92-3										
hexachlorobutadiene	87-68-3	Mild to pungent; turpentine-like	1,100	3							
methyl methacrylate	80-62-6	Acrid, fruity odor sulfur-like; sweet; sharp	50	3							
methyl-2-pentanone 4-	108-10-1	Pleasant odor ketonic camphor odor	0.68	3							

	AEGL-2					AEGL-3					TEELs or ERPGs (ppb)				ATSDR Air EMEG			EPA RfC
	10 min	30 min	60 min	4 hrs	8 hrs	10 min	30 min	60 min	4 hrs	8 hrs	TEEL-0	TEEL-1	TEEL-2	TEEL-3	Acute	Intermediate	Chronic	
Chemical	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	(NA)	ERPG-1	ERPG-2	ERPG-3	ppb	ppb	ppb	ppb
acetone											1,000,000	1,000,000	8,500,000	8,500,000	26,000	13,000	13,000	
acetonitrile											40,000	40,000	60,000	500,000				36
acetylene											2,500,000	2,500,000	2,500,000	6,000,000				
acrylonitrile											2,000	10,000	35,000	75,000	100			0.92
tert-amyl methyl ether																		
benzene											1,000	50,000	150,000	1,000,000	50	4		
benzyl chloride											1,000	1,000	10,000	25,000				
bromochloromethane											200,000	600,000	1,000,000	6,000,000				
bromodichloromethane											1,500	4,000	30,000	150,000				
bromoform											500	500	1,500	850,000				
bromomethane											1,000	20,000	50,000	200,000	50	50	5	1.3
1,3-butadiene											2,000	10,000	200,000	5,000,000				0.89
2-butanone	1,700,000	1,700,000	1,700,000	1,700,000	1,700,000	10,000,000	10,000,000	4,000,000	2,500,000	2,500,000	200,000	300,000	300,000	3,000,000				340
carbon tetrachloride	114,000	74,000	56,000	32,000	24,000	350,000	230,000	170,000	99,000	75,000	10,000	20,000	100,000	750,000	200	50		
chlorobenzene											30,000	30,000	500,000	1,000,000				
chlorodibromomethane											2,000	6,000	40,000	150,000				
chloroethane											1,000,000	1,000,000	1,000,000	3,800,000	15,000			3,800
chloroform		120,000	88,000	44,000	31,000		920,000	650,000	330,000	230,000	2,000	2,000	50,000	5,000,000	100	50	20	
chloromethane											100,000	100,000	400,000	1,000,000	500	200	50	44
chloroprene beta-											1,000	1,000	1,000	300,000				
dibromoethane 1,2-											20,000	30,000	30,000	100,000				
dichlorobenzene 1,2-											25,000	50,000	50,000	200,000				
dichlorobenzene 1,3-											750	2,000	15,000	75,000				
dichlorobenzene 1,4-											75,000	110,000	110,000	150,000	800	200	100	130
dichlorodifluoromethane											1,000,000	3,000,000	10,000,000	15,000,000				
dichloroethane 1,1-											100,000	300,000	3,000,000	3,000,000				
dichloroethane 1,2-											50,000	50,000	200,000	300,000			600	
dichloroethylene 1,1-											5,000	20,000	20,000	600,000		20		50
dichloroethylene 1,2- cis-	500,000	500,000	500,000	340,000	230,000	850,000	850,000	850,000	620,000	310,000	200,000	200,000	400,000	2,000,000				
dichloroethylene 1,2- trans-	1,000,000	1,000,000	1,000,000	690,000	450,000	1,700,000	1,700,000	1,700,000	1,200,000	620,000	4,000	12,500	100,000	2,500,000	200	200		
dichloropropane 1,2-											75,000	110,000	110,000	400,000	50	7		0.87
dichloropropene 1,3- cis-											1,000	2,500	5,000	12,500		3	2	4.4
dichloropropene 1,3- trans-											1,000	3,000	5,000	25,000		3	2	4.4
dichlorotetrafluoroethane 1,2-											1,000,000	3,000,000	10,000,000	15,000,000				
ethyl acrylate											15,000	15,000	30,000	300,000				
ethylbenzene											100,000	125,000	125,000	800,000		1,000		230
ethyl tert-butyl ether																		
hexachlorobutadiene											20	3,000	10,000	30,000				
methyl methacrylate											100,000	100,000	100,000	1,000,000				
methyl-2-pentanone 4-											75,000	75,000	250,000	500,000				

Table 1. US EPA Method TO-15 VOCs - Comparison Values

			Odor Threshold		California REL		AEGL-1				
							10 min	30 min	60 min	4 hrs	8 hrs
Chemical	**CASRN**	**Odor description**	ppb	Ref.	ppb	Avg. time (hr)	ppb	ppb	ppb	ppb	ppb
methylene chloride	75-09-2	Sweet, pleasant; chloroform-like	155,000	3	4,000	1					
methyl-tert-butyl ether	1634-04-4	Terpene-like									
octane n-	111-65-9	Gasoline-like odor	4000	3							
propylene	115-07-1	Practically odorless	5800	3							
styrene	100-42-5	Sweet, sharp; floral	4.7	1	4,900	1					
tetrachloroethane 1,1,2,2-	79-34-5	Sweetish, suffocating, chloroform-like, pungent	1,500	5							
tetrachloroethylene	127-18-4	Ethereal; mild, chloroform-like; sweet; chlorinated solvent odor	1,000	5	2,900	1	35,000	35,000	35,000	35,000	35,000
toluene	108-88-3	Sweet, pungent, Benzene-like	0.27	3	9,800	1	260,000	120,000	82,000	41,000	29,000
trichloro-1,2,2-trifluoroethane 1,1,2-	76-13-1	Faint but like carbon tetrachloride at high concentrations	45000	3							
trichlorobenzene 1,2,4-	120-82-1	Aromatic odor	3200	3							
trichloroethane 1,1,1-	71-55-6	Ethereal, chloroform-like	44,000	3	12,000	1	230,000	230,000	230,000	230,000	230,000
trichloroethane 1,1,2-	79-00-5	Sweet. chloroform									
trichloroethylene	79-01-6	Ethereal, chloroform-like, sweet	21,000	3			260,000	180,000	130,000	84,000	77,000
trichlorofluoromethane	75-69-4	Nearly odorless; sweet	5000	3							
trimethylbenzene 1,2,4-	95-63-6	Distinctive, aromatic odor									
trimethylbenzene 1,3,5-	108-67-8	Distinctive, peculiar aromatic odor									
vinyl chloride	75-01-4	Sweet; pleasant	260,000	4	70,000	1					
total xylenes	1330-20-7	Sweet	-	7	1,700	1	130,000	130,000	130,000	130,000	130,000
	1 = American Industrial Hygiene Association. Taken from http://response.restoration.noaa.gov/cameo/dr_aloha/odor/odor.html										
	2 = US EPA TTN Air Toxics website - http://www.epa.gov/ttn/atw/index.html										
	3 = Hazardous Substances Data Bank website - http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB										
	4 = American Association of Railroads. Taken from http://response.restoration.noaa.gov/cameo/dr_aloha/odor/odor.html										
	5 = ATSDR Toxicological Profiles website - http://www.atsdr.cdc.gov/toxpro2.html										
	6 = National Toxicology Program Chemical Respository website - http://ntp-db.niehs.nih.gov/NTP_Reports/NTP_Chem_H&S/NTP_Chem5/Radian541-73-1.txt										
	7 = o-xylene odor threshold = 50 ppb (ref. 3); m-xylene = 3,700 ppb (ref. 5); p-xylene = 470 ppb (ref. 5)										

Table 1. US EPA Method TO-15 VOCs - Comparison Values

	AEGL-2					AEGL-3					TEELs or ERPGs (ppb)				ATSDR Air EMEG			EPA RfC
	10 min	30 min	60 min	4 hrs	8 hrs	10 min	30 min	60 min	4 hrs	8 hrs	TEEL-0	TEEL-1	TEEL-2	TEEL-3	**Acute**	**Intermediate**	**Chronic**	
Chemical	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	(NA)	ERPG-1	ERPG-2	ERPG-3	ppb	ppb	ppb	ppb
methylene chloride											25,000	250,000	750,000	4,000,000	600	300	300	
methyl-tert-butyl ether											50,000	150,000	250,000	10,000,000	2000	700	700	830
octane n-											300,000	300,000	400,000	1,000,000				
propylene											24,000,000	24,000,000	24,000,000	24,000,000				
styrene											50,000	50,000	250,000	1,000,000			60	230
tetrachloroethane 1,1,2,2-											3,000	3,000	5,000	100,000		400		
tetrachloroethylene	230,000	230,000	230,000	120,000	81,000	1,600,000	1,600,000	1,200,000	580,000	410,000	25,000	100,000	200,000	1,000,000	200		40	
toluene	600,000	270,000	190,000	94,000	67,000	1,600,000	900,000	630,000	320,000	220,000	50,000	50,000	300,000	1,000,000	1,000		80	110
trichloro-1,2,2-trifluoroethane 1,1,2-											1,000,000	1,250,000	1,500,000	2,000,000				
trichlorobenzene 1,2,4-											5,000	5,000	5,000	40,000				
trichloroethane 1,1,1-	930,000	670,000	600,000	380,000	310,000	4,800,000	4,800,000	3,800,000	2,400,000	1,900,000	350,000	350,000	700,000	3,500,000	2,000	700		
trichloroethane 1,1,2-											10,000	10,000	20,000	100,000				
trichloroethylene	960,000	620,000	450,000	270,000	240,000	10,000,000	6,100,000	3,800,000	1,500,000	970,000	100,000	100,000	500,000	5,000,000	2,000	100		7.4
trichlorofluoromethane											500,000	500,000	1,500,000	2,000,000				
trimethylbenzene 1,2,4-											25,000	36,600	36,600	1,500,000				
trimethylbenzene 1,3,5-											25,000	25,000	25,000	500,000				
vinyl chloride											1,000	5,000	5,000	75,000	500	30		39
total xylenes	990,000	480,000	430,000	430,000	430,000	2,100,000	1,000,000	930,000	930,000	930,000	100,000	150,000	200,000	900,000	1,000	700	100	

Table 2. Single Point Monitor Mineral Acids - Comparison Values

Chemical	CASRN	Odor description	Odor Threshold		California REL	
			ppb	Ref.	ppb	Avg. time (hr)
Hydrogen bromide	10035-10-6	Sharp, irritating; stinging	2,000	2		
Hydrogen chloride	7647-01-0	Pungent, irritating; sharp	260	1	1,400	1
Hydrogen fluoride	7664-39-3	Strong, irritating	40	1	290	1
Hydrogen iodide	10034-85-2	Pungent				
Nitric acid	7697-37-2	Sweet to acrid, suffocating, choking	270	3	33	1
Sulfuric acid	7664-93-9	Odorless as liquid; fumes are irritating	245	3	29	1

1 = Hazardous Substances Data Bank website - http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB

2 = Occupational Safety and Health Administration

3 = California Office of Environmental Health Hazard Assessment - http://www.oehha.org/air/acute_rels/pdf/7697372A.pdf

Table 2. Single Point Monitor Mineral Acids - Comparison Values

	AEGL-1					**AEGL-2**					**AEGL-3**					**TEELs or ERPGs (ppb)**				**ATSDR Air EMEG**			**EPA RfC**
	10 min	30 min	60 min	4 hrs	8 hrs	10 min	30 min	60 min	4 hrs	8 hrs	10 min	30 min	60 min	4 hrs	8 hrs	TEEL-0	TEEL-1	TEEL-2	TEEL-3	**Acute**	**Intermediate**	**Chronic**	
Chemical	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	(NA)	ERPG-1	ERPG-2	ERPG-3	ppb	ppb	ppb	ppb
Hydrogen bromide																3,000	3,000	3,000	30,000				
Hydrogen chloride	1,800	1,800	1,800	1,800	1,800	100,000	43,000	22,000	11,000	11,000	620,000	210,000	100,000	26,000	26,000	500	3,000	20,000	150,000				13
Hydrogen fluoride	1,000	1,000	1,000	1,000	1,000	95,000	34,000	24,000	12,000	12,000	170,000	62,000	44,000	22,000	22,000	2,000	2,000	20,000	50,000	30	20		
Hydrogen iodide																							
Nitric acid		500	500	500	500		4.9	4	2.7	2.2		27	22	15	12	1,000	1,000	6,000	78,000				
Sulfuric acid																0.2	0.5	2	7				

Table 3. NIOSH 7300 Selected Metals - Comparison Values

Chemical	CASRN	Odor description	Odor Threshold mg/m3 *	Odor Threshold Ref.	California REL mg/m3	California REL Avg. time (hr)
aluminum	7429-90-5	Metallic				
barium	7440-39-3					
beryllium	7440-41-7					
cadmium	7440-43-9					
chromium (VI), particulates	18540-29-9					
copper	7440-50-8				100	1
lead	7439-92-1					
manganese	7439-96-5					
selenium	7782-79-2	Upon combustion, like rotten horseradish				
zinc	7440-66-6					
	* These exist in the particulate state in the atmosphere and therefore are expressed as mg/m^3.					

Table 3. NIOSH 7300 Selected Metals - Comparison Values

AEGL-1					**AEGL-2**					**AEGL-3**					**TEELs or ERPGs (mg/m^3)**				**ATSDR Air EMEG**			**EPA RfC**
10 min	30 min	60 min	4 hrs	8 hrs	10 min	30 min	60 min	4 hrs	8 hrs	10 min	30 min	60 min	4 hrs	8 hrs	TEEL-0	TEEL-1	TEEL-2	TEEL-3	**Acute**	**Intermediate**	**Chronic**	
mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	mg/m^3	(NA)	ERPG-1	ERPG-2	ERPG-3	mg/m^3	mg/m^3	mg/m^3	mg/m^3
															15	30	50	250				
															0.5	1.5	25	125				
															0.002	0.005	0.025	0.1				0.00002
															0.005	0.03	0.5	7.5				
																			0.001			0.000006
															1	3	5	100				
															0.05	0.15	0.25	100				
															0.2	3	5	500			0.00004	0.00005
															0.2	0.6	1	1				
															10	30	50	250				

APPENDICES

A. Air Sampling Forms
   1. Sampling Event Documentation (for Summa canister sampling)
   2. Chain of Custody (for Summa canister sampling)
   3. SPM Quality Assurance/Quality Control Checklist
   4. Chemcassette® Use Record
   5. MDEQ Equipment Maintenance Checklist
   6. Field Data Collection/Chain of Custody Record form (for metals sampling)
   7. High-Volume Data Record

B. Maintenance Schedule for SPM Machine

1. Sampling Event Documentation (for Summa canister sampling)

Sampling Event Documentation (for Summa canister sampling)

Date of Event:____________________

Address of Event:____ (Semi-Quadrant ____)

ODOR EVENT SAMPLING

Time Odor Event first noticed (per caller):
Time Odor Event reported (per dispatch or sampler):
Time sampler arrived on-scene (per sampler):

1. Can you verify odor at the sampling location? Yes / No
If No, please wait a minimum of 5 minutes (unless emergency personnel are required elsewhere.) If no odor is detected, do not take a sample. Call is concluded.
If Yes, continue.

2. Are confounders present? Yes / No
If No, proceed to pre-sample vacuum reading.
If Yes, continue.

3. What are the confounders? (See sampler folder for list for activities that can cause odors that could confound analytical results.)

4. Could odor be attributable to confounders? Yes / No
If Yes, do not take sample. Call is concluded.
If No, continue.

Gauge reading of canister before taking sample:_________________

Take sample. Record time:___________________ Record canister ID:_______________

Gauge reading of canister after taking sample:___________________

FOLLOW-UP NOTES

Caller's description of odor:

Sampler's description of odor:

Was a representative from Continental Aluminum present during the sampling? Yes / No
If yes, did the representative take an air sample? Yes / No

If you took a sample at the odor event site, proceed to the designated control site for this semi-quadrant and take a control sample. (OVER)

CONTROL AIR SAMPLING

Note: Take a control sample only if an odor-event sample was taken.

Control sample semi-quadrant:________

Proceed with taking control sample, then answer follow-up questions.

Gauge reading of canister before taking sample:__________________

Take sample. Record time:____________________ Record canister ID:________________

Gauge reading of canister after taking sample:____________________

FOLLOW-UP QUESTIONS

1. Can you detect any odor at the control location? Yes / No
   If Yes, please describe odor.

2. Are confounders present? Yes / No
   If No, skip to Question 5.
   If Yes, continue.

3. What are the confounders? (See attached list for activities that can cause odors that might confound analytical results.)

4. Can odor be attributable to confounders? Yes / No
   Regardless of answer, a control sample must be taken if a sample was taken at the odor event site.

5. Was a representative from Continental Aluminum present during the sampling? Yes / No
   If yes, did the representative take an air sample? Yes / No

Please complete forms and handle them and canisters as instructed.

NAME OF RESPONDER(S):____

AGENCY:____

SIGNATURE(S):____

Thank you for your time and effort in this Exposure Investigation.

Odor-Causing Activities that can Potentially Confound Analytical Results of Odor Event Sample:

Odor	Activity
Gasoline-engine exhaust	Idling car Traffic jam Lawncare equipment in use
Diesel-engine exhaust	Idling semi-truck Heavy-duty or agricultural equipment School bus
Fuel smell	Tanker refilling fuel tanks (gas station, airport)
Natural gas	Oil or gas pump/flare
General smokiness	Burning leaves, brush Outdoor cooking (barbeque, smoker) Wood-burner
Tar	Road-surface work Roofing work
“Chemical” smell	Pesticide application (yard, golf course, crop field) Exterior painting/staining work
“Waste” smell	Septic or sewer gas Livestock manure

2. Chain of Custody (for Summa canister sampling)

EASTERN RESEARCH GROUP, INC.

ERG Lab ID #: ________________

Toxics/SNMOC Sample Data Sheet

LAB PRE SAMPLING

Site Code: ____________________________

City / State: ____________________________

AIRS Code: ____________________________

Collection Date: ________________________

Options

SNMOC (Y/N): __________________

TOXICS (Y/N): __________________

Canister Number: __________________

Lab Initial Can. Press. ("Hg): _________

Duplicate Event (Y/N): ______________

Duplicate Can #: __________________

Date Can. Cleaned: _______________

Cleaning Batch #: _________________

FIELD SETUP

Operator: ________________ Sys. #: _______

Setup Date: ____________________________

Field Initial Can. Press. ("Hg): ______________

MFC Setting: _____________________

Elapsed Timer Reset (Y/N): _________

Canister Valve Opened (Y/N): ________

FIELD RECOVERY

Recovery Date: __________________________

Field Final Can. Press. ("Hg): _______________

Sample Duration (3 or 24 hr): ________

Elapsed Time: _____________________

Canister Valve Closed (Y/N): _________

LAB RECOVERY

Received by: ________ Date: ___________

Sample Login Date: _____________________

Lab Final Can. Press. ("Hg): ________

Status (valid/void): _________________

If void, why: ____

SNMOC

Analyst: Date: __

Data File Name: _____________ Dup. File Name: _____________ Rep. File Name: _____________

TOXICS

Analyst: Date: __

Data File Name: _____________ Dup. File Name: _____________ Rep. File Name: _____________

Comments:

White: Sample File Copy Yellow: Receiving Copy Pink: Field Copy

ERG Lab ID #: ________________

EASTERN RESEARCH GROUP, INC.

SVOC Sample Data Sheet

Sampler I.D. No.:
Lab XAD Sample No.:
Date Sampled:
Sample Location:

Operator:
Other:

XAD Cartridge Certification Date:
Date/Time XAD Cartridge Installed:

Collection System Information:

	Elapsed Time	Temp (EC)	Barometric ("Hg)	Magnehelic ("H_2O)	Flowrate (std. m^3/min)
Start					
End					
Average					

Total Collection Time (Minutes) ________________ Total Collection Volume (std. m^3) ___________

Interim Flow Check Information:

Time	Temp	Barometric Pressure	Magnehelic Reading	Calculated Flow Rate (std. m^3)	Operator
Average					

Comments:

White: Sample File Copy Yellow: Receiving Copy Pink: Field Copy

3. SPM Quality Assurance/Quality Control Checklist (for continuous air monitoring)

SPM Quality Assurance/Quality Control Checklist

Date:__________________________

Time:__________________________

Name:__________________________

Agency:_________________________

Is a Chemcassette® in place? Yes / No
If No, contact MDCH to report and receive instructions.
If Yes, continue.

Is the tape load lever closed? Yes / No
If No, close tape load lever.
If Yes, continue.

Is the power switch on? Yes / No
If No, contact MDCH to report and receive instructions.
If Yes, continue.

Is green system status LED lighted? Yes / No
If No, check cable connections. Also, contact MDCH to report and receive any further instructions.
If Yes, continue.

Are you switching out a Chemcassette® today? Yes / No

4. Chemcassette® Use Record

Chemcassette® Use Record (for continuous air monitoring)

Date and time cassette inserted in SPM Monitor:________________________________

Name of person changing tape:____

Agency:____

Signature:____

Date and time cassette removed from SPM Monitor:_____________________________

Name of person changing tape:____

Agency:____

Signature:____

Place used cassette in ziplocking baggie and seal. Place that baggie and this completed form into a second baggie and seal. Store in trailer for MDCH pick-up.

5. MDEQ Equipment Maintenance Checklist

MDEQ Equipment Maintenance Checklist

Date:____________________________

Time:___________________________

Name:___________________________

Agency:__________________________

ODORS: Can you detect any odors while at the trailer today? Yes / No

DATALOGGER:

Is datalogger light on? Yes / No

(Log on to computer to check real-time measurements.)

Are there are Flags showing in the computer program? Yes / No

If No, continue.

If Yes, list which Flags are showing and corrective action taken:

ACID MONITOR

(See SPM Quality Assurance/Quality Control Checklist for acid monitor)

METEOROLOGICAL EQUIPMENT:

Is antenna tower on the front of the trailer upright? Yes / No

If No, call MDCH to report and MDEQ to request assistance.

If Yes, continue.

(Log on to computer to check real-time measurements.)

Are real-time measurements showing in the computer program? Yes / No

If No, call MDCH to report and MDEQ to request assistance.

If Yes, continue.

(over)

DOWNLOADING DATA:

Are you downloading data today?   Yes / No

HIGH-VOLUME PUMPS:

Are you installing or removing a filter from the high-volume pumps today?
Yes / No

If No, you are done with this sheet.
If Yes, continue.

Please circle whether you are **installing** or **removing** the filter.

Reading of magnehelic gauge:_________________________

Time pump is set to start and stop:_________________________

Check any of the activities listed below that are occurring and provide explanation (location relative to trailer, timing or duration if known, etc.):

___Roof and building repairs
___Road and drive repairs
___Agricultural activity
___Nearby construction
___Open burning
Explanation:

6. Field Data Collection/Chain of Custody Record form (for metals sampling)

FIELD DATA COLLECTION/CHAIN-OF-CUSTODY RECORD

FEDERAL OCCUPATIONAL HEALTH SERVICE
2165 WEST PARK COURT, SUITE C
STONE MOUNTAIN, GEORGIA 30087
PH (770) 498-3449 FAX (770) 469-8623

PROJECT REFERENCE NUMBER:
D8HO3HE34100/98FED16234-11/MI730: Continental EI: Michigan

SAMPLING SITE/DESCRIPTION:
MI730: Continental Exposure Investigation: Michigan

ANALYSIS REQUESTED
(INVESTIGATOR: YOU MUST SPECIFY EITHER METHOD OR ANALYTE(S) FOR EACH SAMPLE)

MATRIX CODES
A = air B = bulk S = soil T = tape L = liquid
DW = drinking water WW = wastewater
SD = sediment V = vacuum F = filter

PRESERVATION CODES
(1) COOL TO 4^0C (4) HNO_3 TO pH < 2, 4^0C
(2) HCL to pH < 2, 40C (5) NaOH to pH > 12, 4^0C
(3) H_2SO_4 to pH < 2, 4^0C (6) ZaOAc to pH > 9, 4^0C

ATTENTION LABORATORY: SEND RESULTS TO:

VIA: (Please check)
[X] Mail to: **NAME: Christina Bush** **PHONE: 517-335-9717**
ADDRESS: MI Dept of Community Health, 3423 N. MLK Blvd, Lansing, MI 48906
[X] E-MAIL to: same as above at: bushcr@michigan.gov
[X] Fax to: Clifford L. Moseley at (770) 469-8623

SAMPLE ID NUMBER	SAMPLING LOCATION	TYPE OF SAMPLE (MATRIX CODE)	FLOW RATE	START TIME	STOP TIME	Preservation Code	PM 10 weight gain	Metals Analysis (Al, Ba, Be, Cd, Cr, Cu, Pb, Mn, Se, Zn)			ADDITIONAL INFORMATION
	Dolsen Elementary School New Hudson, Michigan	F				NA					

RELINQUISHED BY:	TIME/DATE:	RELINQUISHED BY:	TIME/DATE:
Christina Bush			
(PRINCIPAL INVESTIGATOR)		*(LABORATORY REVIEWER)*	
RELINQUISHED BY:	**TIME/DATE:**	**RELINQUISHED BY:**	**TIME/DATE:**
(LABORATORY SAMPLE RECEIVING)		*(LABORATORY SUPERVISOR)*	
RELINQUISHED BY:	**TIME/DATE:**		
(ANALYST)			

SAMPLES SHIPPED TO:
COMPANY: DataChem Laboratories, Inc.
ADDRESS: 960 West LeVoy Drive, Salt Lake City, UT 84123
ATTN: SAMPLE RECEIVING (Paul Pope)
PHONE: 800-356-9135
FAX: 801-268-9992
CARRIER: UPS (per State of Michigan)
DATE:
TIME:
AIRBILL #:

7. High-Volume Data Record

Hi-Volume Data Record

Project: Continental Aluminum Exposure Investigation (FOH# MI730)____________

Station:__MDEQ Air Monitoring Trailer_at Dolsen Elementary School____________

Sampling Site:__56789 Rice Road, New Hudson (Oakland Co.), Michigan_________

Sampler Model:_Anderson____________Sampler Serial No.:_____________________

Sample Date:_______________________Filter No.:_____________________________

****allow hi-vol to run at least 5 min before taking reading****

FLOW READING: Initial (filter in) ______ Time and Date In:____________________

Final (filter out)______ Time and Date Out:__________________

Average__________

RUNNING TIME METER: Initial___________Final____________________________

TOTAL SAMPLE TIME:_________________minutes

TOTAL AIR VOLUME:__________________std m^3

TSP/PM10 CONCENTRATION:___________________µg/std m^3

****see Dixon Chart on inside of door to unit; replace chart when filter goes in;**

write date on back on chart once removed**

Comments:

____

____

____

____

Operator:____

Appendix B. Routine Maintenance Schedule for SPM Monitor

The maintenance schedule described herein is based on the guidelines given in the Operating Instructions manual for the SPM Single Point Monitor, P/N 907889 Rev. 4.6 (6/97).

Three items of routine maintenance apply: replacing Chemcassettes®, verifying system response, and replacing the two internal filters annually.

1. **Replacing Chemcassettes® - Extended Play (EP) Chemcassettes® (the cassettes to be used in this Investigation) require replacement every 30 days.** Refer to the diagram in the manual for proper positioning.
   A. Open the tape load lever. The green system status LED will flash slowly. The digital display will show "AC LINE."
   B. Remove the center retaining screw securing the Chemcassette®. Remove the old cassette.
   C. Remove the take-up reel, slip off the used Chemcassette® tape, and replace the take-up reel.
   D. Install the fresh Chemcassette® with raised lettering facing up. Pull 12 inches of tape out of the fresh cassette. Place the end of the tape in the slot on the take-up reel cover.
   E. Thread the Chemcassette® tape through the detector head, capstan assembly, and over the guide posts (refer to diagram in manual). The EP cassette will lock in position when tape outlet is at approximately the one o'clock position.
   F. Install the take-up reel cover.
   G. Rotate the assembled take-up reel clockwise to take up any slack.
   H. Install the Chemcassette® center retaining screw.
   I. Close the tape load lever. The SPM will automatically begin monitoring.

2. **Verifying System Response – Perform the verification routine every two to four weeks.** This routine checks the operating condition of the SPM optical system through use of the optical test card supplied with the instrument. The instrument must be in Monitor Mode to start this test, and if the unit has the ChemKey option, the ChemKey must be installed and turned on. Refer to the diagram in the manual for proper positioning.
   A. Open the tape load level. Remove the Chemcassette® from the detector head.
   B. Press the alarm test button. The green system status LED will flash rapidly and display will show "VERIFY."
   C. Insert the test card with position #1 centered in the detector head. Be sure that the colored chip on the test card faces up and that the card is inserted fully into the detector head.
   D. Close the tape load lever and press the alarm test button. The audible alarm will emit one short signal.

E. Open the tape load lever and reverse the test card, centering position #2 in the detector head.
F. Close the tape load lever and press alarm test key.
G. If all electronics and optical systems are operating properly, the instrument will simulate an alarm condition and activate both the audible and visual alarms.
H. Open the tape load lever and press alarm reset. Replace the Chemcassette® and re-thread the tape. After pressing the alarm reset button, the alarm lamp does not extinguish. Wait until monitoring is resumed, then press the alarm reset button again.
I. Close the tape load lever. The SPM will automatically begin monitoring.
J. Press the alarm reset button to turn off the alarm lamp.
K. Plug the end of the sample line. A fault #17 will be generated, indicating that there are no leaks between the sampling point and the SPM.
L. If the system is not operating properly, the audible alarm will signal two times and the red system status LED will light. If this occurs, open the tape load lever, press alarm reset and repeat the verification procedure. If the system still indicates a malfunction, contact the manufacturer for assistance.

3. Replacing Internal Filters **– Internal filters should be replaced annually.** Refer to the diagram in the manual for proper access to the internal unit.
    A. Separate cover/collar from body.
    B. Open unit. Filters are located inside center area of cover/collar, below and partially behind printed circuit board.
    C. Remove the three screws and six fiber washers securing the printed circuit board.
    D. Leave all cables connected except J-11 and J-3 (refer to manual).
    E. Carefully lift outward on the printed circuit board to locate J-11.
    F. Support the printed circuit board temporarily in a raised position.
    G. Remove acid scrubber filter, mounted vertically. Replace with new filter (P/N 710235).
    H. Remove particulate filter. Replace with new filter (P.N 780248). Arrow on body of filter must point in correct airflow direction.
    I. Verify there are no kinks in tubing.
    J. Lower the printed circuit board to its original position.
    K. Reconnect cables, double-checking all connections.
    L. Secure the Printed circuit board with the screws and fiber washers.
    M. Before securing the cover to the body, verify that the SPM will go into Monitor Mode by powering up the unit. If the SPM does not go into Monitor Mode, power it down and check all connections and try again. If the problem persists, contact the manufacturer.
    N. Power down the SPM.
    O. Secure the cover to the body.
    P. Power up the unit and verify system response, as outlined previously.

Appendix B. Contents of Sampler's Resource Folder for MDCH Exposure Investigation at Continental Aluminum, Lyon Township, Oakland County, Michigan

MDCH Exposure Investigation
Lyon Twp, Oakland Co, Michigan
March 1 – May 29, 2004

Sampler's Resource Folder
(for Summa canister sampling)

CONTENTS:

1. Protocol to follow when responding to an odor-event call ("Responding to an Odor-Event Call") – light green sheet

2. Laminated map of area around Continental Aluminum (about 1.5-mile radius) showing semi-quadrants and control air sampling sites; reverse side shows description of sites and how to sample at them

3. List of potential confounders ("Odor-Causing Activities that can Potentially Confound Analytical Results of Odor Event Sample")

4. Lyon Township Odor Surveillance Forms

5. Exposure Investigation Protocol information sheet ("MDCH/ATSDR Exposure Investigation at Continental Aluminum") to distribute to those who ask

6. "Sampling Event Documentation (for Summa canister sampling)" forms

7. Sample ERG Chain of Custody form, showing areas to be filled out upon sampling

8. Business card for Christina Bush, lead investigator (keep in folder; contact information is also on the Protocol factsheet)

(Some contents have been modified for this report to protect privacy of individuals.)

Responding to an Odor-Event Call

Call Comes In

1. If a sample has already been taken during the current six-hour period (6 to 12 or 12 to 6), let the caller know. You do not have to go. **(Samplers only go to an odor event if sampling is a possibility.)** Ask the caller to be sure to submit an odor surveillance form to the township offices; MDCH will receive a copy.
2. If you are **not** able to leave your current situation, tell the caller, apologize, and ask them to call one of the other samplers.
3. If you **are** able to go to the event, get name, event address, and contact phone number information from caller.
4. Let caller know about how soon you will arrive. Let the caller know they need to remain at the site until you arrive, since you will be taking information from them.
5. **If the caller is dissatisfied, have them call Christina Bush at 1-800-648-6942 or 517-335-9717 to discuss the situation with her.**

Going to the Odor Event

1. BRING THE SUMMA CANS, SAMPLER'S RESOURCE FOLDER, AND YOUR ASSIGNED CELL PHONE.
2. If you are detained along the route to the odor event, call the person who reported the event and let them know you will be a little late. If you think you will be very late, suggest that they call another sampler.
3. When you are en route, **contact Continental Aluminum.**

At the Odor Event

1. The caller should be at the odor event site when you arrive. If they are not there, call them on your cell phone and ask them to return to the site, regardless of whether an odor is present. (If you do detect an odor, tell them so but that **you cannot take a sample without them present**, per your instructions. Also, you will be taking some information from them and providing them with a Lyon Township Odor Surveillance Form, if they need one, which they should fill out and submit to the township offices.) If the caller does not return to the site, make a note of it and do not continue with the visit. Christina Bush from MDCH will follow-up with the caller.
2. Follow the Sampling Event Documentation sheet, as instructed during training. If you cannot detect an odor right away, stay at the site at least 5 minutes. If you are unable to detect an odor at all, tell the caller that you cannot take a sample. **If the caller is dissatisfied, have them call Christina Bush at 1-800-648-6942 or 517-335-9717 to discuss the situation with her.**
3. **If you are taking a sample, take a vacuum reading on the canister before and after sampling.** Make sure the green valve on the canister is closed (turned all the way in, clockwise). Using crescent wrench, remove brass cap on top of canister and connect gauge. Open valve and take reading. Close valve. Remove gauge. Take sample by opening valve, allowing the can to

come to pressure. Repeat gauge reading to verify that vacuum condition has changed. Close valve and replace cap. Fill out the Chain of Custody form as instructed during training, retaining the pink copy (bottom page) to leave with the Sampling Event Documentation at the township offices.

4. If the caller or others who may be witnessing the event/sampling have any questions regarding the Exposure Investigation, give them the "MDCH/ATSDR Exposure Investigation at Continental Aluminum" information sheet and ask that they get in touch with Christina Bush at MDCH (contact information is on the sheet).

Control Air Sampling

1. If you took a sample at the odor-event site, determine which semi-quadrant you are to go to for the control sample and go to the pre-assigned location for that semi-quadrant. Proceed with sampling, following the Sampling Event Documentation sheet, as instructed during training, including checking the vacuum on the can.

Afterward

1. If you took samples, package the canisters and fill out the Chain of Custody forms as instructed in training. Bring the packages to the township offices as soon as possible for shipping. **Leave the Sampling Event Documentation and the pink copy of the Chain of Custody form with the township offices** to be copied and faxed to Christina Bush at MDCH. These sheets do not get sent in with the canisters.

IF YOU TOOK SAMPLES, NOTIFY THE OTHER SAMPLERS
(since we are limiting number of samples taken to 1 per 6-hour period).

2. If you did not take a sample, it is not necessary to notify the other samplers.
3. If you have concerns or questions regarding the sampling procedure, call Christina Bush at MDCH at 517-335-9717.

Control Air Sampling Sites

Take a control air sample only if you have taken an odor-event air sample. Determine which semi-quadrant you took the odor-event air sample and go to the opposite semi-quadrant for the control sample. Do this immediately after completing the steps for the odor-event sampling.

1. Airport. First thing before heading to the airport, make a **courtesy call to** the airport manager (leave voicemail if necessary) and let her know who you are, type of vehicle you are driving, and that you are sampling at the airport. (This is in case she receives word that "someone" is at the airport.) When you arrive, either pull in off Pontiac Trail at the gated pull-in east of the airport office building and park there, or enter the driveway west of the office building, drive around behind the building and park at the east end of the building (again, near the gated pull-in, just inside of it now). Walk over to the field east of the eastern hangars and take the sample there.

2. Open field between New Hudson Dr/Lyon Center Dr (same street, map says one, street sign says another, next to new apartment complexes) and Rondeau (1st street east). Walk at least 10 yards in from either road.

3. North side of Grand River Ave at bike-trail crossing. Park in the parking area right outside the gate for the Detroit Edison New Hudson Service Center. Take the sample on the trail, at least 10 yards from your vehicle and from Grand River.

4. South Hill Rd, 0.2 mile south of Grand River Ave, at fire hydrant. Park at least 10 yards away from the hydrant and take the sample at the hydrant.

5. End of Lee Drive. Lee Drive proceeds west from South Hill Road. At the top of the hill (a horse farm is on the left), the road turns to the north (right). Go to the end of this road (it might be called Coyote but there was no street sign when I drove the route); there is a line of trees and you can see Grand River Avenue in the distance. At the end of the cul-de-sac, park and sample from the road, at least 10 yards from your vehicle.

6. Coyote Golf Course on Milford Rd. If gates are open, park in parking lot and sample near the northern boundary of the property. (Do not sample in the cornfield.) If after hours and gates are closed, pull into driveway entrance, park, and sample along northern fence-line, at least 10 yards from your vehicle and from the road.

7. End of Ponds Drive. Take Ponds Drive all the way to the end. Park and sample from the road, at least 10 yards from your vehicle.

8. Travis Rd at Tindale. Park on Tindale and sample at least 10 yards south of your vehicle on Tindale.

Odor-Causing Activities that can Potentially Confound Analytical Results of Odor Event Sample:

Odor	Activity
Gasoline-engine exhaust	Idling car Traffic jam Lawncare equipment in use
Diesel-engine exhaust	Idling semi-truck Heavy-duty or agricultural equipment School bus
Fuel smell	Tanker refilling fuel tanks (gas station, airport)
Natural gas	Oil or gas pump/flare
General smokiness	Burning leaves, brush Outdoor cooking (barbeque, smoker) Wood-burner
Tar	Road-surface work Roofing work
“Chemical” smell	Pesticide application (yard, golf course, crop field) Exterior painting/staining work
“Waste” smell	Septic or sewer gas Livestock manure

LYON TOWNSHIP ODOR SURVEILLANCE FORM

Complainant Name:____

Complainant Phone Number (for any follow-up):_________________________

Address where odor is occurring/occurred:____

ODOR INFORMATION:

Date of odor:_____________ **Time detected:**____________ **Duration:**_______

Odor descriptor (circle all that apply):

A	**ammonia**
B	**burning leaves or brush**
C	**citrus**
D	**cut grass**
E	**diesel exhaust**
F	**fishy**
G	**garlic**
H	**gasoline**
I	**house (interior) paint**
J	**lawn/garden treatment chemicals**
K	**livestock manure**
L	**metallic**
M	**mint**
N	**mothballs**
O	**natural gas (propane, etc.)**
P	**paint thinner**
Q	**plastic**
R	**sewer or septic gas**
S	**spray paint (fumes)**
T	**sulfur (rotten eggs)**
U	**swimming pool**
V	**tar/asphalt**
W	**urine**
X	**vinegar**
Z	**other (please describe in Comments)**

Odor Intensity (no fractions):

0	**Just detectable**
1	**Easily noticed but can detect other smells/odors**
2	**Can't smell anything else**

Comments (description other than what is listed, weather conditions, other information):

Please return forms to Lyon Township or call in your complaint information. Additional copies of this form are available at the Township offices. The township may share these forms with state or local agencies for purposes of complaint investigations. Agencies will protect personal identifying information to the extent permitted by law.

MDCH/ATSDR Exposure Investigation at Continental Aluminum

This factsheet presents the very basics of the Exposure Investigation to be conducted in Lyon Township. For more detail, please read the Protocol, available at the Lyon Township offices, Lyon Township Public Library, Salem-South Lyon District Library, or at the MDCH website http://www.michigan.gov/mdch-toxics under Features.

Who: The person leading the investigation is Christina Bush, a toxicologist at MDCH. MDCH is the Michigan Department of Community Health. ATSDR is the federal Agency for Toxic Substances and Disease Registry.

What: MDCH and ATSDR are conducting an Exposure Investigation, which means we are going to take air samples to determine what chemicals are present in the air, especially during odor events.

Where: The Investigation is taking place in Lyon Township. "Grab" (instantaneous) air samples will be taken where odors are detected. Continuous monitoring and particulate monitoring will take place at a stationary trailer placed at Dolsen Elementary School.

When: The Investigation will start March 1, 2004, and is expected to last no more than 90 days.

Why: ATSDR received a petition from the township requesting a public health assessment. The township was concerned that the emissions from Continental Aluminum, a recycling aluminum smelter on Milford Road, may not be safe. Residents have complained since the recycler started operations about odors believed to be from the plant. The data available to ATSDR and MDCH were inadequate to determine whether a public health hazard existed.

This Investigation proposes to determine what chemicals are in the air, especially during odor events. We may or may not be able to determine whether a public health hazard exists. However, we will attempt to answer the following questions:

6. What VOCs (volatile organic compounds, a class of chemicals), at what concentrations, are detected in the air during odor events? Are the concentrations above background, or control, levels?
7. Is hydrogen chloride or hydrogen fluoride (chemicals tested for in the stack tests at Continental Aluminum) detectable in the air during odor events? Is there a temporal (time) trend to the detection of these acids?
8. What metals (as airborne particulates), at what concentrations, are in the air?
9. Is it plausible that the earlier reported health effects are associated with detected chemicals and concentrations?
10. When an odor event occurs, do meteorological data indicate that the Continental Aluminum plant is upwind of the odor detection (i.e., is it plausible that Continental Aluminum is the source of the odor)?

How:

1. To determine if any VOCs (chemicals that easily enter a vapor or gas state and may have an odor) are present during odor events, we will analyze "grab," or instantaneous, air samples. Samplers will be trained how to take the samples. Certain criteria must be met in order for the sample to be taken. VOC sources include paint and solvents (which might be on aluminum scrap).

2. To determine if hydrogen chloride and hydrogen fluoride might be in the air, the air will be monitored continuously by a machine called an acid monitor. The monitor detects mineral acids on a chemically-treated paper tape, which is then "read" by the machine's optics to calculate the concentration of the acid. The data are logged onto a computer, which will be downloaded weekly by MDCH. Hydrogen chloride and hydrogen fluoride are acidic emissions routinely tested for in Continental Aluminum's stack tests.
3. To determine the amount of airborne particulate metals, 24-hour air samples will be collected every 6 days with a machine called a PM10 high-volume sampling pump. The air is drawn through a filter, onto which particles smaller than 10 microns (one thousandth of a millimeter) collect. The filter is then processed to determine the amount of each metal of interest. The metals we will be monitoring for are aluminum, barium, beryllium, cadmium, chromium, copper, lead, manganese, selenium, and zinc. These metals can be emitted by aluminum recycling smelters.
4. Meteorological data will be collected during the Investigation to help determine if detected odors are coming from the direction of Continental Aluminum or if there are certain conditions under which odors seem to be more prevalent. Temperature, wind speed, wind direction, relative humidity, and barometric pressure will be recorded.

Analytical results will be compared to Comparison Levels chosen by MDCH/ATSDR, the findings interpreted, and the information shared with the community. We will provide informal updates throughout the Investigation and prepare a formal document within three months of the completion of the Investigation.

What MDCH/ATSDR needs from the community:

We know that the results of this Investigation will be important to all of you in different ways. Your conscientious participation in this Investigation is also important.

First, there is a limited number of canisters to be used in the VOC (grab sample) testing. If you detect an odor and are thinking about calling the emergency responders, **the odor must last until the responder gets to your address AND the responder must be able to detect the odor.** This involves a judgment call, but we feel that it makes for the most prudent and efficient use of the resources. Also, no more than 1 sample per 6-hour period (midnight-6AM, 6AM-noon, noon-6PM, 6PM-midnight) will be taken (the sampler will tell you if a sample has been taken for that period when you call).

Contacting air samplers during odor events – **DO NOT CALL 9-1-1**

7 AM – 5 PM: call 486-3775 (fire department)

If event occurs **5PM – 7AM or the fire department is not available**, call one of the numbers below (these numbers are not available until March 1):

XXX-XXX-XXXX (5PM – 7AM, daily)
XXX-XXX-XXXX (24/7 daily after March 3)
XXX-XXX-XXXX (10AM – 5PM, Monday-Friday)
XXX-XXX-XXXX (8AM – 9PM daily after April 6)

Second, **continue logging odor complaints with the township**. We need the forms to be a consistent format, so Lyon Township has designed a new form and has them available at their offices.

Contact Information:

MDCH Christina Bush bushcr@michigan.gov 1-800-648-6942 or 517-335-9717

<u>Sampling Event Documentation (for Summa canister sampling)</u>

Date of Event:_____________________

Address of Event:____ (Semi-Quadrant ____)

<u>ODOR EVENT SAMPLING</u>

Time Odor Event first noticed (per caller):
Time Odor Event reported (per dispatch or sampler):
Time sampler arrived on-scene (per sampler):

1. Can you verify odor at the sampling location? Yes / No
If No, please wait a minimum of 5 minutes (unless emergency personnel are required elsewhere.) If no odor is detected, do <u>not</u> take a sample. Call is concluded.
If Yes, continue.

2. Are confounders present? Yes / No
If No, proceed to pre-sample vacuum reading.
If Yes, continue.

3. What are the confounders? (See sampler folder for list for activities that can cause odors that could confound analytical results.)

4. Could odor be attributable to confounders? Yes / No
If Yes, do <u>not</u> take sample. Call is concluded.
If No, continue.

Gauge reading of canister before taking sample:__________________
Take sample. Record time:____________________ Record canister ID:________________
Gauge reading of canister after taking sample:____________________

<u>FOLLOW-UP NOTES</u>

Caller's description of odor:

Sampler's description of odor:

Was a representative from Continental Aluminum present during the sampling? Yes / No
If yes, did the representative take an air sample? Yes / No

If you took a sample at the odor event site, proceed to the designated control site for this semi-quadrant and take a control sample. (OVER)

CONTROL AIR SAMPLING

Note: Take a control sample only if an odor-event sample was taken.

Control sample semi-quadrant:________

Proceed with taking control sample, then answer follow-up questions.

Gauge reading of canister before taking sample:__________________
Take sample. Record time:____________________ Record canister ID:________________
Gauge reading of canister after taking sample:____________________

FOLLOW-UP QUESTIONS

1. Can you detect any odor at the control location? Yes / No
   If Yes, please describe odor.

2. Are confounders present? Yes / No
   If No, skip to Question 5.
   If Yes, continue.

3. What are the confounders? (See attached list for activities that can cause odors that might confound analytical results.)

4. Can odor be attributable to confounders? Yes / No
   Regardless of answer, a control sample must be taken if a sample was taken at the odor event site.

5. Was a representative from Continental Aluminum present during the sampling? Yes / No
   If yes, did the representative take an air sample? Yes / No

Please complete forms and handle them and canisters as instructed.

NAME OF RESPONDER(S):____

AGENCY:____

SIGNATURE(S):____

Thank you for your time and effort in this Exposure Investigation.

Appendix C. Historic Continental Aluminum Odor Complaint Statistics

Total number of complaints per year (1 complaint/day/address):

Year	Total complaints
1998	55
1999	252
2000	271
2001	102
2002	55
Total	735

Number of complaints per month:

Month	1998	1999	2000	2001	2002	Total
January	0	0	16	3	15	34
February	0	1	26	4	5	36
March	1	3	21	6	8	39
April	6	1	26	17	6	56
May	6	20	29	6	6	67
June	13	24	40	7	1	85
July	9	25	13	1	3	51
August	10	28	22	8	5	73
September	8	46	30	14	0*	98
October	2	34	24	25	0*	85
November	0	34	15	6	4	59
December	0	36	9	5	2	52

*Fire in August 2002; plant not operating again until November.

Number of complaints per season (Winter = December-February, etc.):

Season	1998	1999	2000	2001	2002	Total
Winter	0	1	78	16	25	120
Spring	13	24	76	29	20	162
Summer	32	77	75	16	9	209
Autumn	10	114	69	45	4	242

Time of day with most complaints:

Time	1998	1999	2000	2001	2002	Total
Not specified	12	10	33	6	9	58
00:00 - 03:00	0	2	8	1	0	11
03:00 - 06:00	0	9	12	1	1	23
06:00 - 09:00	3	57	37	17	9	123
09:00 - 12:00	5	43	38	19	14	119
12:00 - 15:00	6	46	53	22	7	134
15:00 - 18:00	4	48	53	20	4	129
18:00 - 21:00	1	12	16	4	4	37
21:00 - 23:59	0	7	10	3	4	24
All day	24	18	11	9	3	65

Top 10 odor characteristics cited:

1. burning or burnt plastic
2. burnt
3. strong
4. burnt paint
5. acid
6. bad
7. burning or burnt wire
8. chlorine
9. musty
10. chemical

Top 10 health effects mentioned:

1. burned or burning eyes
2. breathing problems
3. headache
4. nausea, nauseous, retching, sick to stomach, or vomiting
5. burned or burning throat
6. burned or burning nose
7. coughing
8. dry, irritated, sore, or raw throat
9. choking
10. gagging

Appendix D. MDCH Response to Comments and Questions Received on the February 25, 2005 Public Comment Release "Continental Aluminum Exposure Investigation: Air Monitoring Results"

MDCH compiled the comments and organized them to follow the outline of the Exposure Investigation (EI) Report, paraphrasing as necessary. Several parties had the same comments. In these instances, MDCH combined the comments. This Responsiveness Summary does not list the comments' authors, to maintain their privacy.

MDCH changed some of the text in the EI Report, based on editorial suggestions provided by ATSDR, to improve readability. Most noteably, changes were made in:

1. Discussion – Environmental Sampling and Data – Mercury Vapor Data
2. Discussion – Environmental Sampling and Data – Confounders/Notes
3. Discussion – Comparison of Results to Comparison Values – Mercury Vapor Data
4. Table 1

<u>Acronyms commonly used in this Appendix:</u>

ATSDR	Agency for Toxic Substances and Disease Registry
CA	Continental Aluminum
EI	Exposure Investigation
EPA	U.S. Environmental Protection Agency
ERG	Eastern Research Group (analyzed VOC samples)
MDCH	Michigan Department of Community Health
MDEQ	Michigan Department of Environmental Quality
QA/QC	Quality Assurance/Quality Control
SPM	Single Point Monitor (acid monitor)
VOC	volatile organic compound

EI Process

1. How does MDCH have authority to conduct air sampling? Isn't this MDEQ's or EPA's role, as regulatory agencies?

MDEQ and EPA conduct air or other environmental sampling to ensure a facility's compliance with state or federal rules regarding emissions from that facility. This does not prevent other agencies or parties from testing air, soil, or water for their own purposes. MDCH conducted the air sampling around Continental Aluminum under a cooperative agreement with ATSDR. Lyon Township had requested that ATSDR conduct a public health assessment of the emissions from Continental Aluminum (CA). ATSDR and MDCH felt that an exposure investigation might provide more comprehensive information about the chemicals in the odors people were detecting near their homes and workplaces. ATSDR and MDCH focused on air sampling, due to the majority of the reported health effects being attributed to the odors.

2. How were local people involved?

MDCH invited and received information regarding descriptions of the odors, health effects residents were reporting, comments on the earlier (2002) public-comment health consultation, and comments on the EI Protocol. The agency convened a citizens' advisory group, encouraging all interested parties to attend, to discuss and reach consensus on some unresolved sections of the EI Protocol. One result of the advisory group's work was to choose local persons (the township fire department, the county health department, and two private citizens) to respond to and sample odor events. Perhaps the most important contribution that local citizens made was reporting odor events, so that they could be sampled or at least documented.

3. Why was no "blind" study done (i.e., why was CA informed of when the study would occur?) Couldn't CA have changed some of its procedures during the EI to reduce emissions? CA had ample opportunity to reduce and/or modify their operations in a manner that could minimize hazardous emissions (e.g., burn cleaner scrap, schedule more experienced employees). Continental should not have been informed of the dates of the study. They likely changed practices during the time and air quality data was not representative of normal operations.

This issue has concerned residents since the EI was first suggested. We are sorry that there is dissatisfaction with the openness of the investigation, however ATSDR and MDCH wanted the EI process to be transparent for all stakeholders. Since some local citizens were involved in a lawsuit against CA at the time, the argument could be made that, regardless of the number of odor events, the number of odor complaints could have been suppressed during the EI (by people deliberately not reporting them) and then "rebounded" afterward. This could make it appear that CA changed practices during the EI. (For odor complaint data before, during, and after the EI, please refer to Comment #26. For information on the scrap CA used before, during, and after the EI, please refer to Comment #76 and Appendix H.) As well, it is likely that CA would have known about the timing of the EI even if the company had not attended the citizens' advisory group and other public meetings: it was necessary to inform the community of the air-monitoring trailers placed at Dolsen Elementary and to ask for citizen participation in notifying responders of odor events. (MDCH felt that the best way to inform community members not already aware of the EI was via a guest column in the South Lyon Herald, 2/19/2004. Interested parties were directed to the MDCH website for more detailed information on the Protocol.) It should be noted that, during the EI, CA was notified when responders were called for only one-half of the odor events. The company received notification only *after* sampling took place for the remaining odor events.

4. There needs to be 24-hour monitoring, not just "spot" monitoring.

During the EI, there was continuous (24-hour) monitoring of acidic emissions. "Spot" monitoring, referred to as instantaneous or "grab" sampling in the EI Protocol and EI Report, was necessary because the timing and duration of odors could not be predicted. By having a local responder obtain an air sample during a time when an odor was actually occurring, MDCH could better determine what chemicals were present, what their concentrations were, and whether there was a public health threat.

5. **The limited time frame of the EI (three months) was not adequate. About two weeks after the EI was complete, an odor/emissions event occurred at CA and was videotaped (6/10/2004). The video is representative of past odor/emission events. Citizens were hoping such an alarming event would have been captured and measured during the EI.**

MDCH agrees that information from this event may have been helpful and appreciates receiving several copies of the video (which the agency also forwarded to MDEQ for their review). As mentioned in the response to Comment #4, the timing of an event such as this cannot be predicted. As well, the weather was not typical that day. Humid, drizzly, and calm meteorological conditions that day, as indicated in the video, kept the smoke from rising and dissipating as it normally would. Please refer to the response to Comment #57 regarding temperature inversion caps. Please refer to the response to Comment #80 regarding MDEQ's response to this event.

6. **The EI falls short of what is required to determine if there is a relation to health concerns. In order to obtain meaningful data, sampling should occur over a longer duration.**

ATSDR and MDCH feel that the duration of the investigation was adequate to determine public health implications of exposure to the detected chemicals.

7. **Monitoring equipment was not operable during a portion of the three months. However this time has never been made up. MDCH should have extended the length of the EI so that *valid* data collection occurred for three months.**

The main purpose of the air sampling and monitoring was to investigate odor events. The first reported odor event occurred March 16. Monitoring data were considered valid starting March 15. Therefore, all data collected when odor events occurred were considered valid.

8. **The EI was insufficiently comprehensive to adequately characterize the true 24 hour/7 days per week emissions from CA.**

It is true that the EI did not characterize the emissions from CA. The purpose of the EI was to characterize the air in the community, not at CA's stacks. Because there did not appear to be harmful "on-ground" concentrations of chemicals that would be expected to be released from a secondary aluminum smelter, further characterization was not warranted.

9. **It is likely that the detected chemical concentrations were not representative of the actual chemical concentrations in the various releases.**

It is true that community-level concentrations are not the same as concentrations coming from the stack. It is likely that concentrations detected in an air sample may not represent the concentrations present when the odor is first detected. There is further discussion under Comment #58.

10. The probability of capturing a short duration spike in pollutant discharge is very low. There was only one air monitoring station.

MDCH placed the air monitoring station in what was felt to be the best sampling location: Dolsen Elementary is in the predominant downwind direction from CA, there was concern regarding school children's exposure to the emissions, and the site provided relatively easy access to electricity. It is true that additional monitoring stations would have provided additional information. However, ATSDR and MDCH feel that the data collected at the Dolsen site are adequate.

11. When the MDCH staff person chose not to notify a sampler during one odor event, this introduced bias into the EI.

If this introduced bias into the EI, it was unintended. The MDCH staff person felt that the odor did not represent what local citizens had complained about in the past: it did not cause irritation. Rather, the odor smelled like burning metal. The MDCH staff person was hopeful that a more potent odor event would happen later during the EI. As well, 13 days previously, the staff person had requested that a sampler respond to a similar odor but the sampler was unable to detect anything upon arrival at the site. Please see Comment #30 for more discussion.

12. The Township asked for a public health assessment. Citizens were told there would be a full public health assessment. Why wasn't it done?

Although the Township requested a public health assessment, it is ATSDR's prerogative to determine agency-appropriate action. As discussed in the response to Comment #1, ATSDR and MDCH felt the odors people were experiencing and claiming harm from were of primary importance. If there were indications that the air near CA was harmful or could be significantly impacting the soil or drinking water, then further investigation would have been warranted. The EI provided no scientific evidence that indicated a full public health assessment was necessary.

MDCH was wrong to have said that there would be a full public health assessment. The state agency *incorrectly* believed that the EI was a first step and that additional investigation, into CA's impact on soil and water, would occur. MDCH staff conveyed this misunderstanding as fact to Lyon Township and its residents and deeply regret misinforming them.

13. It is incorrect for MDCH to declare that there is no public health hazard and that Lyon Township is "safe."

MDCH did not state that there is "no public health hazard" nor did the agency state that the Township is "safe." The ATSDR definition of "no public health hazard" indicates that no exposure is occurring. In this case, exposure *is* occurring to the detected chemicals but at levels that are not expected to result in adverse health effects. This fits the ATSDR category of "no *apparent* public health hazard" (emphasis added by MDCH), which is the category used in the Conclusion to the EI Report. (Please see Appendix E for the definitions of all ATSDR public health hazard categories.) The definition of being "safe" is interpreted differently by each individual, as safety is more of a value judgment. Government agencies generally do not use the word "safe" but rather provide information regarding the potential risks and whether they think those risks are likely to cause harm.

Airborne Metal Particulates

14. Some detections were labeled as "estimates." Please explain.

Concentrations for "estimates" fell between the Limit of Detection (LOD, a point at which an analytical machine "recognizes" and can identify a chemical) and the Limit of Quantitation (LOQ, a point at which the machine can estimate the concentration with confidence, when the peak is at least 5-10 times higher than background "noise.") DataChem, the analyzing laboratory, was obligated to report detections that fell between the LOD and LOQ. Therefore, while the detection and identification of the chemical were likely to be true, the concentration was estimated.

15. Did you receive a QA/QC package from DataChem, for the particulate sampling?

(Note of explanation: a Quality Assurance/Quality Control [QA/QC] package includes internal laboratory testing results for the day or batch during which the submitted sample was analyzed. QA/QC data are indicators as to how reliable the data in question are.) Yes. Each time DataChem sent MDCH a data package digitally, the lab included a QA/QC package. These are on file at MDCH.

16. Why wasn't the particulate sampling during the EI coordinated with the state-wide sampling program carried out by MDEQ? This would have been valuable comparison data.

This would have been interesting data to have, however it was not necessary for assessing the risk to public health around CA. MDEQ's particulate sampling is done for a variety of purposes, such as determining background concentrations of chemicals, assessing the impact of transportation and other widespread sources on air quality, and ensuring compliance with EPA's National Ambient Air Quality Standards.

17. Can MDCH arrange for an additional 30 days of particulate sampling, in sync with MDEQ's sampling schedule, to supplement the EI?

ATSDR and MDCH consider the data already collected sufficient on which to draw public health conclusions and do not feel that additional sampling is necessary.

Acid Monitoring

18. Did MDCH check into the availability of a second SPM machine (acid monitor)?

The ATSDR Regional Office in Chicago checked with their EPA counterparts as to whether any machines were available in the region. There were no SPM machines available.

19. Regarding the possibility that septic odors following a rain event caused detections on the SPM on 5/10 and 5/13, was the monitor showing detections on all humid or "heavy" days?

Nearly all days had greater than the 80% relative humidity at some time during the 24-hour interval. However, "humid days" is a relative term. Ninety percent relative humidity on a 10°C (50°F) day feels vastly different than 90% relative humidity on a 32°C (90°F) day. All instances of detections, along with the corresponding meteorological data, when available, are shown in Tables 3a and 3b of the EI Report. As indicated in the tables and the Report, relative humidity was not available for the readings on 5/10 and 5/13.

20. Why was it important to determine whether there was a "temporal" trend to the detection of acidic aerosols?

Several people claimed that odors were worse in the evening or on weekends, when government agency offices were closed and could not respond to complaints in a timely manner. If the EI data had indicated this type of trend, further investigation would have been warranted.

Mercury

21. Regarding the mercury monitoring follow-up to be conducted by MDEQ, please put a copy of MDEQ letter in the EI Report.

The letter and other documentation regarding follow-up are attached in Appendix F.

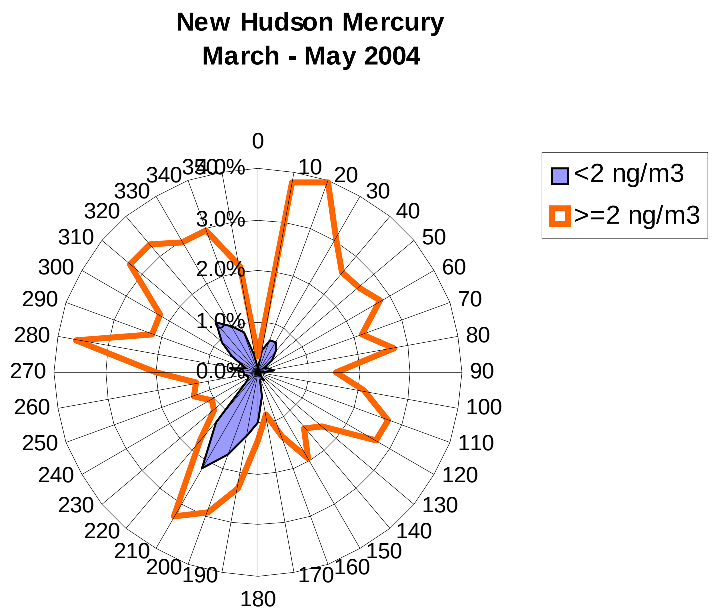
22. Because there has been a documented impact by mercury, this increases the need for soil sampling.

The mercury data are for vapors only, which tend to stay airborne longer than ionic or particulate forms. There is no information regarding what the concentration of ionic mercury or particle-bound mercury may be. Airborne particulates deposit to the earth sooner than do vapors from the same source. The 2001 soil data indicate that concentrations of mercury in area soils did not exceed background concentrations. There likely has been no significant deposition of any pollutants to the soil in the short time since the 2001 sampling. ATSDR and MDCH do not feel that further soil testing is warranted.

23. Additional analysis of the mercury data should be performed: what was the average mercury concentration by wind direction? How closely do elevated mercury readings for the complete data set correlate to CA's position relative to the sampling trailer (190-200 degrees)?

MDCH requested MDEQ to develop a wind rose for the mercury data. MDEQ used only those five-minute averages for which the wind speed was greater than 3 miles per hour. (In contrast, the average mercury concentration listed in the EI Report was based on all readings, regardless of wind speed.) The wind rose is shown below:

(Note of explanation: a wind rose indicates *from* which direction the wind blows, not



toward which direction. It also indicates the percentage of time the wind blows from that direction. It may also show wind speed.) For this specific wind rose, MDEQ has shown wind direction data for when mercury concentrations were less than 2 ng/m^3, the high end of expected background, and for when concentrations were at or above 2 ng/m^3. The wind rose demonstrates that, while there was a noticeable signal from the direction of CA (190-200 degrees), there was a more significant signal for concentrations at or above 2 ng/m^3 out of the north-northeast (10-20 degrees). The most significant signal for concentrations less than 2 ng/m^3 (concentrations within expected background) was from the direction of CA.

MDCH separated the mercury concentrations (for wind speeds greater than 3 miles per hour) into the four main compass quadrants. The data are presented in the table below:

Quadrant (Degrees range)	No. Data Points	Average Mercury Concentration (ng/m^3)
Northeast (1-90)	2,839	4.182
Southeast (91-180)	1,800	4.354
Southwest (181-270)	2,488	3.837
Northwest (271-360)	2,970	4.063

(As discussed in the EI Report, the overall average mercury concentration, calculated from all readings taken by the Tekran fixed unit, was 3.6 ng/m^3. It can be expected that the concentrations calculated in the above table would be different than the overall average because concentrations with wind speeds less than 3 miles per hour were excluded from these calculations.)

The average mercury reading for when the wind direction was 190-200 degrees (i.e., blowing from CA toward the air monitoring trailer) was 4.012 ng/m^3 (423 data points).

24. Air samples were not representative of the air quality to which local citizens were exposed. A definitive evaluation as to whether representative air samples contain concentrations of mercury that pose a health risk through inhalation is needed. In addition, soil sampling is needed to determine whether local citizens were exposed to mercury through ingestion or direct contact.

ATSDR and MDCH feel that the air samples for mercury are representative. The samples were collected continuously and reported in "real" time (10 minutes after each sampling event began). While it is very likely that the concentration was different in other locations (higher *or* lower than the reported concentration), the monitoring location was chosen because it was in the predominant downwind direction from CA, a potential source of mercury. If CA were emitting mercury on a regular basis, the Tekran would likely have detected more spikes than indicated in Table 4 of the EI Report. As discussed in the Report, the concentrations of elemental mercury in the air did not pose a public health risk.

ATSDR and MDCH do not feel that soil testing for mercury is necessary. The exposure route of concern for elemental mercury vapors is inhalation. If a person were to consume mercury, the most likely form would be methylmercury, which is found primarily in fish, not soil. Direct contact with mercury compounds is rarely a concern.

25. Please explain that there are usually two units operating in the Tekran trailer (one mobile unit and one stationary unit) and indicate which unit had operational difficulties.

The language has been added to the "Environmental Sampling and Data – Mercury Vapor Data" section.

26. It is not really accurate, in Table 4, to say that the mercury detected was "above average." It would be more correct to label the detections as the highest 5-minute values.

This change has been made to the table.

Odors

27. Have MDCH personnel been inside the CA plant? If so, did they smell odors?

MDCH staff have been inside CA on several occasions. The smell they remember from inside the plant is one of dust and hot metal. Staff have occasionally detected odors in the New Hudson area that they felt were from the plant. These odors smelled like hot metal and output from a forced-air furnace. MDCH staff did not experience an odor that caused a burning or irritating sensation in the eyes, nose, or throat, such as that reported by many residents when CA first started operating in Lyon Township.

28. What was the frequency of odor complaints before, during, and after the EI?
On August 1, 2005, MDCH collected odor complaint documents from the Lyon Township offices and the MDEQ Warren office. Two tables listed in Appendix C of the EI Protocol are updated below. The months and season during which the EI took place are shaded. As of August 1, 2005, there was no documentation of any complaints for 2005.

Number of complaints per month:

Month	1998	1999	2000	2001	2002	2003	2004
January	0	0	16	3	15	2	2
February	0	1	26	4	5	5	1
March	1	3	21	6	8	18	5
April	6	1	26	17	6	7	14
May	6	20	29	6	6	1	4
June	13	24	40	7	1	4	5
July	9	25	13	1	3	7	4
August	10	28	22	8	5*	5	3
September	8	46	30	14	0*	8	4
October	2	34	24	25	0*	5	3
November	0	34	15	6	4*	3	3
December	0	36	9	5	2	5	0
Total for Year	55	252	271	102	55	70	43

*Fire in August 2002; plant not operating again until November.

Number of complaints per season:

Season	1998	1999	2000	2001	2002	2003	2004
Winter*	0	1	78	16	25	9	8
Spring	13	24	76	29	20	26	23
Summer	32	77	75	16	9	16	12
Autumn	10	114	69	45	4	16	10

*Winter of year N includes December of year N-1 and January, and February of year N.

29. What is the definition of an "odor event" and why is it not in the EI Report?
The definition is listed in the EI Protocol (see Appendix A in the EI Report) and is repeated here: An "odor event" will be defined as "the occurrence or detection of an odor that is associated, by the person(s) detecting and reporting it, with emissions from Continental Aluminum."

30. Not all odor complaints included notification of samplers. Why not?
Please see the response to Comment #11. Also, MDCH called several people who submitted odor complaint forms but who did not notify samplers, to ask them why they did not call for a sample. One person thought that the odor would not be detected by the samplers or would go away before they arrived, and another person believed that the data would not help resolve the conflict. There was no requirement in the EI Protocol that those making an odor complaint also request a sample.

31. Regarding the 4/6/2004 odor, by not notifying samplers, this introduces bias into the investigation.

Please see the response to Comment #11.

32. Community members could have been reluctant to call in odor complaints, fearing that the limited number of air sampling canisters would be wasted by sampling low- to mid-level odor events.

This is a possibility and could have introduced unintentional bias into the EI. MDCH had encouraged citizens to call for samplers if they wanted a particular odor event sampled.

33. There was a severe odor incident during the EI (4/28/2004) that was not captured because the local responders could not be reached.

Several people contacted MDCH regarding this incident. Reportedly, odors were quite strong at Dolsen Elementary School that evening. MDCH agrees that this would have been an excellent chance to get data on a particularly bad odor event. Why no responder could be reached is unexplainable and inexcusable. MDCH apologizes for the missed opportunity.

34. On the Sampling Event Documentation sheet, was there a question for the sampler to describe the odor and its intensity?

The documentation sheet asked for the sampler's description of the odor but it did not ask specifically about the intensity.

35. In the report, you state, "The aluminum smelter cannot be eliminated as a potential source of the odors." That is an important point.

Regardless of where the odors are coming from, the chemicals detected in the air pose no apparent public health hazard.

Summa Canister Sampling (VOCs)

36. Regarding detections in the blank Summa canisters, did the QA/QC package from ERG indicate they were detecting these chemicals at the lab?

(Note of explanation: a Quality Assurance/Quality Control [QA/QC] package includes internal laboratory testing results for the day or batch during which the submitted sample was analyzed. QA/QC data are indicators as to how reliable the data in question are.) ERG is not required to supply a QA/QC package, according to their Quality Assurance Project Plan (QAPP), which they supply to all parties with whom they contract their services. A QAPP is a "formal document describing in comprehensive detail the necessary quality assurance (QA), quality control (QC), and other technical activities that must be implemented to ensure that the results of the work performed will satisfy the stated performance criteria" (ERG 2004). The Quality Control Procedures ERG uses when conducting Compendium Method TO-15 analyses (such as those performed for the EI) include:

- a daily bromofluorobenzene instrument tune/performance check;
- a five-point calibration, using a certified standard, following any major change, repair, or maintenance, or within three months of the previous calibration;
- a daily calibration check, using the curve defined by the most recent calibration;

- •a daily system blank analysis (which would detect laboratory contamination, as asked by the commenter);
- •analyses of duplicates and replicates, when provided;
- •canister cleaning certification (one canister per every eight);
- •annual sampler certification with either a known sample or an unused canister;
- •testing all samples with an Internal Standard to compare response and retention time against the calibration check.

ERG sets the acceptance criteria for each procedure as well as corrective action (usually re-analysis) for when a criterion is not met. The company is audited annually to ensure that they are fulfilling their QAPP.

37. Those canisters past their shelf life should have been exchanged for "fresh" canisters, as initially indicated in the EI Protocol.

MDCH relied on the expertise of the analytical laboratory, feeling that, since MDEQ and EPA regularly use ERG's services, the laboratory would inform MDCH if they suspected a problem using these canisters. As mentioned in the EI Report, ERG stated that canister performance would not be affected if the shelf life had passed as long as the vacuum held. Each canister was verified as under vacuum before taking a sample. Additionally, according to the QAPP supplied by ERG and discussed under Comment #34, all canisters are checked for leaks before being cleaned and sent to the agency conducting the sampling (ERG 2004).

38. There were 18 reported odor events but only nine canister samples were taken and analyzed. The VOC sampling database is too limited to conclude that the air emissions from CA cause no health hazard.

There were 10 canister-sample pairings (10 odor-sample canisters and 10 controls), and MDCH was prepared for two additional odor events, if necessary. MDCH sampled not only for VOCs during the EI but for other emissions expected from a secondary aluminum smelter: mercury, acidic aerosols, and airborne metal particulates. ATSDR and MDCH feel that the database is sufficient on which to base a public health opinion. Please see the discussion for Comment #s 11, 28 and 30 regarding the difference between the number of reported odor events and sampling events.

39. Due to the relatively short duration of polluted air emissions from CA and considering the time required to respond to the event and to capture a sample, it is reasonable to expect that the air sample did not contain pollution concentrations at levels initially perceived by the observer.

According to the Sampling Event Documentation Sheets, it usually took 0-10 minutes for the person who detected the odor to notify a responder, however there was one instance when the person did not call for more than half an hour. The time it took for the responder, usually the Lyon Township Fire Department, to get to the scene was 5-10 minutes. (As a reference, it is about a three-minute drive from the Fire Department on Grand River Avenue to CA on Milford Road.) From arriving at the scene to taking a sample, the time lapse ranged from 0-13 minutes. Thus, the detection-to-sampling time ranged from 5-39 minutes. Some might argue that a faster response would have been achieved by placing the canisters with residents who regularly experience the odors, but that argument is fraught with conflict and the data would have less credibility. Please see the response to Comment #58 regarding determining the peak concentrations of pollutants.

Sampling (General)

40. With such low detection limits, is it possible that a large concentration might not be detected correctly?

Yes, in regard to the VOCs. The analytical machine may not be prepared to read a very large concentration when the laboratory is expecting low-level readings. If there was an indication that the concentrations may be large, such as on the sample taken 5/18/2004, when the odor was reportedly the worst experienced in a long time, MDCH would notify the laboratory to warn them that there might be high chemical concentrations within the canister.

In regard to the airborne particulates, DataChem (the analyzing laboratory) first weighed the used filter before analyzing the sample. A filter with a heavier-than-average weight would suggest that there was more particulate matter in the air during that sampling period, and laboratory personnel would take appropriate steps to ensure accurate reporting.

The SPM monitor (for monitoring VOCs) has a sampling time "window," the length of which is dependent on the chemical "key" inserted in the machine. If a detection occurs, the time window closes and a new sampling event begins. If the concentration of the chemical being investigated increased, this would be evident in the data. If the concentration exceeded the detectable range (which it did not during the EI), this also would be evident in the data, in the form of numerous and consecutive data points at the maximum detectable concentration.

The Tekran has a broad detection range, from 0.1 to 10,000 ng/m^3 (nanograms per cubic meter). As a comparison, if a fever thermometer broke, spilling mercury onto the floor, but was neither cleaned up nor tracked throughout the house, the concentration of mercury vapors in that room, in the breathing zone (about four feet above the floor), might range from 1,000 to 5,000 ng/m^3, dependent on temperature and airflow. MDCH did not expect the ambient air concentrations of mercury in New Hudson to be as high as that seen for some thermometer breaks and spills.

41. Was the mileage from CA to the control sample sites reported as-the-crow-flies or by driving?

This was reported straight-line, as-the-crow-flies.

42. Were any of the samples tested twice, to compare results?

No, except for the mercury monitoring by the Tekran, which had two units operating during a portion of the EI.

43. The report says that a source cannot be determined. How does one determine the source?

To determine a source of air pollutants, one would first select the pollutants of concern and research their behavior in air streams (how far they may travel before depositing to earth, whether they undergo chemical changes). Then, there should be an investigation into the potential sources in the area of interest and what is known about their emissions (through permit records and stack-test data). Next, air sampling specific for the pollutants of concern should occur in upwind and downwind locations from the suspected source(s). Concurrent local meteorological data will be helpful when evaluating the air sampling results. The entire process may go quickly or may take some time before conclusions can be drawn.

Expected Emissions

44. Did you test for compounds that could be from contaminants in the scrap?

Yes. The aluminum scrap likely contained various metal alloys. The airborne metal particulate sampling tested for metals that may be of concern, such as aluminum, lead, and manganese, among others. Occasionally, mercury switches end up in metal scrap that is recycled. The Tekran analyzer sampled for elemental mercury vapors. There could have been plastics in the scrap charged to the furnaces, although CA's process attempts to remove such contaminants. It is likely that there was paint adhered to some of the scrap. Plastics and paints can release VOCs and odors when burned. These were tested for in the "grab" sampling with the Summa canisters.

45. The Ecology Center, one of the petitioners, had sent MDCH some information regarding testing at similar facilities. What did that information show? Was similar testing considered for CA?

The Ecology Center sent MDCH air analysis reports for several secondary aluminum smelters: VAW of America, located in Phoenix, Arizona, tested in 1992; Reynolds Metals, located in Sheffield, Alabama, also tested in 1992; and IMCO Recycling of Ohio, located in Uhrichsville, tested in 1995. It appeared that most of the analyses were conducted as stack tests, in which emissions are measured directly at the source. MDCH was less interested in concentrations of pollutants within CA's property line than in concentrations experienced at the neighborhood level. Nonetheless, MDCH reviewed these reports and took the information into consideration when designing the sampling strategy for the EI.

Data from stack testing at VAW of America included metal particulate, phenol, and VOC sampling results. The report also discussed whether the open space between the furnace exhaust and the stack would affect emissions and testing results. (It was determined that any effect would be insignificant.) The testing conducted at Reynolds Metals investigated concentrations of VOCs, formaldehyde, acetaldehyde, and acrolein. However, the report, presented only as a data package, did not indicate whether the testing occurred at the stack, elsewhere on-site, or off-site. Data from stack testing at IMCO Recycling included metal particulate, hydrogen chloride (HCl), hydrogen fluoride (HF), chlorine gas, and VOC emissions. The report from this site also listed the baghouse's efficiency of removing the emissions generated when charging the furnace before they were released to ambient air.

Confounders

46. Did you check for other potential sources in the area? What are they? When were they first in the area?

One potential odor source would be the natural gas flare located behind (west of) CA's property. Occasionally the flare would go out, resulting in the smell of natural gas. This site was in place and operating before CA moved to New Hudson. Another potential odor source would be when pesticides or fertilizer were being applied to the farm field east of CA or to the Coyote Golf Club southeast of the plant.

One potential VOC source was airplane fuel. The local airport is north and somewhat west of CA. A VOC commonly found in the air near airports is 1,3-butadiene. (This chemical was found in several VOC samples.) The airport was in the area before CA moved to New Hudson. Automobile fuel and exhaust can also represent a source of VOCs (benzene, ethylbenzene, toluene, and xylenes) and can generate odors.

There are several industries in the area, off Grand River Avenue east of Milford Road, which could potentially add to the mixture of chemicals in the air. For complete information on what those industries are and how long they have been in the area, people should inquire at the Lyon Township offices.

47. Could the location of the air monitoring trailer, near buildings and trees, have impeded normal air movement, making the air data unrepresentative?

Ideally, an air-monitoring trailer should be located in an open, flat field. Barring the availability of such an open site, the trailer should be placed at a distance from a structure at least 2.5 times the height of that structure. The height of the Dolsen school building wing nearest the monitoring trailer is 14 feet, according to blueprints. The distance from the building to the trailer was approximately 44 feet, making the distance-to-height ratio about 3:1. The building closest to the trailer was the equipment shed, which was about 32 feet away. The height of the shed is approximately nine feet, making the distance-to-height ratio about 3.5:1. MDCH conferred with MDEQ air monitoring staff regarding whether placing the trailer at the school was appropriate. MDEQ staff felt the location would provide acceptable and representative exposure data.

Mixtures

48. What are the expected effects from exposure to the chemical mixture present as opposed to each chemical individually? Is the public health conclusion based on evaluating each chemical individually or the chemical mixture?

MDCH discussed chemical mixtures in the "Plausibility of Link to Reported Health Effects" section of the EI Report. Because the individual concentrations of the detected chemicals were so low, ATSDR and MDCH do not feel that there is a health risk posed by exposure to these chemicals as a mixture.

49. Could long-term exposure to these chemicals, individually or as a mixture, cause adverse health effects?

Long-term exposure to the concentrations detected is not expected to cause adverse health effects, either as individual chemicals or as mixtures.

50. Exposures are variable. It's likely the mixtures vary too.
True. The tables that show chemical concentrations (Tables 2a-5 and 6b) show no consistency of results between sampling events.

Biomarker Testing/Health Effects

51. Why is blood testing preferable to urine testing for aluminum?
Persons whose kidneys are not functioning properly cannot excrete aluminum, or other potentially toxic compounds, from their bodies efficiently. If a person has undiagnosed kidney problems, a urine sample tested for aluminum content may yield incorrect (low) results. Therefore, a blood serum test, taking into consideration all known sources of aluminum, is preferable.

52. Children at Dolsen should be randomly selected for blood tests.
This statement is broad and undefined. ATSDR and MDCH do not believe it is necessary to test children in relation to pollutants from CA. Blood or other biomarker testing should not occur unless an excessive exposure is suspected or known.

53. The asthma data should consider that an Oakland County resident may seek medical help outside of Oakland County.
The asthma data are based on the zip code of the patient's residence at the time of hospitalization, not the hospital to which they were admitted. MDCH has clarified the "Asthma Incidence" section of the EI Report.

54. The cause of observed respiratory effects still needs to be identified.
Ideally, the cause of respiratory distress or other ailments can be identified to better treat the patient (and perhaps eliminate the cause). However, this is beyond what ATSDR and MDCH can do in this case.

55. Regarding the "Aluminum Levels in Blood" section, how did it get resolved for those families?
ATSDR and MDCH felt that the blood aluminum results were not of concern and discussed their conclusions with the parents. Although the parents said they would have their children retested, they have not responded to repeated requests for those results.

56. Regarding the "Mutagenicity or Tumorgenicity" section, how did it get resolved for those families?
ATSDR and MDCH could not conclude that there was any link between the emissions from CA and the health issues each of these families was facing and explained this to those families.

Air Dispersion

57. An air dispersion model would help show where high concentrations would be expected. Please include one in the report.
This information has been added as Appendix G. Although Dolsen Elementary School (and therefore the air monitoring trailer) was not located in an area expected to receive

maximum dispersion, this location was desirable due to proximity to power, being predominantly downwind from CA, and the ability to assess exposure to children attending the school.

58. Has the recent increase in stack height at CA, when the silencers were installed, allowed the emissions from the stacks to disperse over a wider area, thereby lowering local concentrations of emissions? How could that have impacted the EI?

The stack height reportedly did not change when the silencers, or noise mufflers, were installed. A section of each stack was replaced with a silencer. (MDCH staff saw the removed stack sections on CA's property.) The installation of the silencers was done only to address the vibration and noise that were disturbing area residents. No change of emissions was expected.

During the interpretation of scrap use (discussed under Comment #76 and depicted in Appendix H), MDCH noticed that, according to scrap use records and the approximate date of installation of the silencers, CA was charging scrap to at least one furnace during installation. The work on the stack may have altered emissions until the silencer was in place. MDCH has referred this matter to MDEQ.

59. Can a temperature inversion "cap" emissions from CA, thereby producing a greater pollution concentration for a period of time? Could MDEQ investigate this possibility and provide a model for what might happen?

A temperature inversion occurs when air and pollutants are separated from the cold upper atmosphere, and prevented from dispersing quickly, by a warmer layer of air. According to the Modeling and Meteorology Unit in the MDEQ Air Quality Division, the air dispersion model MDEQ used for CA (the Industrial Source Complex Short-Term or ISCST3 model) considers multiple factors that could cause a temperature inversion. One factor is the mixing height, which is affected by time of day and whether the site being modeled is in an urban or rural setting. Whether or not a site is considered urban or rural depends on the proportion of concrete and asphalt cover in relation to natural cover, buildings (number, height, density), and human population density. An urban setting would have a greater depth of mixing height. New Hudson is considered a rural site for air dispersion modeling purposes and therefore has a low mixing height. Another factor that influences dispersion is wind speed. A low wind speed combined with a low mixing height can slow dispersion. This explains, in part, why some people felt odors were more noticeable and more disagreeable on still, "heavy" days.

60. In a plot of concentration versus time, the concentrations of pollutants in a single release would normally be distributed in a bell shaped curve, or even in a sharp peak. Therefore, air samples taken during the EI did not capture pollutants at concentration levels that would be shown in the upper levels of the plotted curves. It is likely that the concentrations of these chemicals may have exceeded health-based standards. MDCH should perform further analysis of this data and previous modeling to determine what the actual predicted maximum exposure levels are.

To answer this question, MDCH conferred with MDEQ regarding predicting maximum contaminant levels following a release. Using ARCHIE software (Automated Resource for Chemical Hazard Incident Evaluation, a computer model that can be used to plan responses to chemical releases) and site-specific data, agency staff estimated peak concentrations for the VOCs that were detected closest to their comparison values: 1,3-butadiene, benzene, chloromethane, and toluene. Inputs included:

- molecular weight of the compound of interest;
- discharge height (either 53 feet, if discharged from the furnace stack, or 80 feet, if discharged from the baghouse stack);
- wind speed (MDCH used 10 miles per hour for a breezy day, for furnace stack releases, and 3 miles per hour for a relatively calm day, for baghouse stack releases);
- release temperature (according to stack test records, the furnace stack temperature was about 370° C and the baghouse stack temperature was about 30° C);
- ambient air temperature (MDCH chose the midpoint between minimum and maximum temperature recorded during odor-event sampling, which was 5° C);
- release rate (according to stack test records, VOCs were released at a rate of 0.46 pounds per hour, but this value was too small for the ARCHIE program, so MDCH selected the default rate of 1 pound per minute [60 pounds per hour] and adjusted the results accordingly);
- and duration of the release (MDCH tested 1 hour and 24 hours; the results were the same for either duration).

The modeling for the baghouse stack, versus the furnace stack, resulted in the highest peak concentrations, primarily due to the lower wind speed allowing emissions to deposit to the earth sooner. As well, the release temperature from the baghouse stack was cooler, meaning emissions would not rise as far (from the stack opening) before returning to earth. The distance from the source (the baghouse stack) at which the peak concentrations would occur was about 425 feet (0.08 mile).

The maximum predicted on-ground concentration for 1,3-butadiene was 0.54 ppb, from the odor event that occurred 3/31/2004 on Travis Road. This value does not exceed any of the Comparison Values used in the EI.

The maximum predicted on-ground concentration for benzene was 12.7 ppb, from the odor event that occurred 4/12/2004 on Tyrrell Lane. (This event was mislabeled as "Travis Road 5" in Table 6b in the EI Report. The table has been corrected.) This value exceeds the ATSDR Environmental Media Exposure Guide for intermediate exposure (greater than two weeks to one year) to benzene in air (4 ppb; ATSDR 2005) but does not exceed any acute (up to two weeks' exposure) Comparison Values. ATSDR and MDCH consider exposure to the odor events to be sporadic and therefore acute in duration.

The maximum predicted on-ground concentration for chloromethane was 44.4 ppb, from the odor event that occurred 4/22/2004 on Travis Road. This value slightly exceeds the EPA Reference Concentration (RfC) for chloromethane of 44 ppb (EPA 2001). This exceedance is minor. As well, as discussed for benzene, ATSDR and MDCH consider exposure to the odor events to be acute in duration and the RfC refers to chronic exposure.

The maximum predicted on-ground concentration for toluene was 13.5 ppb, from the odor event that occurred 4/22/2004 on Travis Road. This value does not exceed any of the Comparison Values used in the EI.

If the peak concentrations had been closer to their acute Comparison Values, then concern regarding exposure to these chemicals as a mixture would have been warranted. However, this was not the case. ATSDR and MDCH conclude that the predicted maximum on-ground concentrations for these chemicals do not pose a public health risk, individually or as a mixture. Since the remaining chemicals were detected at lower concentrations relative to their respective Comparison Values and because the conversion to maximum predicted concentration is linear, the maximum predicted concentrations of the other VOCs are not expected to pose a public health risk either.

61. Additional statistical analysis of all the continuous emission data with the various data points collected (wind speed, wind direction, etc.) would place the data collected in a more appropriate context.

MDCH stated in the EI Protocol, under "Reporting of Results" (see Appendix A of this document) that statistical analysis of the findings could not be conducted with any assurance of statistical power and that the agency, therefore, would not conduct this analysis.

62. No modeling data exist "for TO-17 compounds that we are aware of." This modeling should be completed to calculate peak concentrations from the detected concentrations.

(A note of explanation: "TO-17 compounds" are those VOCs tested for using the Compendium Method TO-17. This method involves collecting a sample onto sorbent tubes. The EI used Compendium Method TO-15, which involves collecting a sample in an evacuated canister.) Please refer to the discussion for Comment #58 regarding calculating peak concentrations from the detected concentrations.

63. Ground-level winds, or those recorded at the air-monitoring trailer, may be moving in a different direction than higher-level winds, such as at the height of CA's stacks. It should not be assumed that the reported wind direction is a straight line.

This statement is correct. The approximate height of the anemometer (wind gauge) at the air-monitoring trailer was 20-25 feet. CA's furnace stacks are 53 feet and the baghouse stacks are 80 feet in height. Surface wind direction can be influenced by friction, downwash, or disturbances caused by natural or man-made features. However, using a wind speed observation, such as was done during the EI, is an acceptable procedure that is used by regulatory agencies. As well, the straight-line distance from CA to the air-monitoring trailer was ¼ mile and there were no large buildings in between the two locations that could have significantly altered wind direction. Please see the response to Comment #45 for further discussion regarding surrounding features.

Soil

64. MDCH promised to test local soils, specifically at Dolsen Elementary School. These tests were never conducted. Local leaders would have vigorously pursued additional community support had the promise not been made. If the petitioners had known that the investigation would not include soil sampling, they would have asked for soil testing from the start.

As indicated in the response to Comment #12, it is ATSDR's prerogative to choose the most appropriate action in response to a petition for a public health assessment. That action, in this case, was an EI. The results of the EI provided no scientific data to conduct further environmental sampling.

MDCH was wrong to have said that there would be soil testing. The state agency *incorrectly* believed that air sampling was a first step and that soil testing would follow. MDCH staff conveyed this misunderstanding as fact to Lyon Township and its residents and deeply regret misinforming them.

65. Soil must be sampled as well, especially since past air data are not available. This would provide historic release information as well as information concerning accumulated pollutants over time. Since metals are present in the air emissions, this should present even more of a case for sampling the soil. There should be a well-planned sequential analysis of soils within the most probably impacted geographical areas. This would show levels of existing soil contamination, the depth to which the contamination occurs, and the chemical nature of the contamination. By performing vertical profiles of soil samples and determining soil types and porosities, a model can determine the rate of transport of contaminants in the soil and the timeline of previous pollutant excursions.

The 2001 soil data indicated that there were no concentrations of concern. It is not likely that the relatively short passage of time since then has changed those findings.

66. If soil testing were conducted, what would be the radius of the testing area?

ATSDR and MDCH do not plan to conduct soil testing. Those persons interested in having the soil analyzed should confer with an environmental consultant or MDEQ to determine a sampling strategy.

67. If masking agents were used to minimize odors from the stacks, thereby keeping the complaints down, the soil would act as a repository for the released chemicals, disregarding the masking agent.

This is true. Nonetheless, ATSDR and MDCH do not intend to sample the soil. As well, chemicals used as masking agents would have been detected in the other sampling events and this did not occur.

68. On what dates were the 2001 soil samplings conducted? Please correlate these to dates when CA received citations (before and after sampling).

The soil samples were taken 3/20/2001. CA received seven Letters of Violation (LOVs) from MDEQ before the sampling event. Three of the LOVs, dated 7/24/1998, 9/17/1999, and 12/8/1999, were in response to the presence of strong odors. The remaining citations, dated from 1/27/1999 to September 2000, were sent in response to stack-testing results exceeding permit limits. MDCH is unaware of the number or type of LOVs the smelter has received since the soil sampling event. Persons interested in obtaining further information regarding LOVs sent to CA should contact the MDEQ Air Quality District Office in Warren.

69. Regarding the 2001 soil sampling, MDCH did not conduct the sampling and does not have a copy of the chain of custody, QA/QC data, specific sampling locations, information as to whether hold times were met or exceeded, or knowledge of the preservation techniques. Without this information, the analytical data cannot be considered substantially significant.

The soil sampling data were provided to MDCH by a local citizen who had obtained them through the Wayne County Court public records office. These samples were taken as evidence in the class-action suit against CA. It would be prudent that legal counsel ensure such evidence be collected and documented in the correct manner. It is true that MDCH does not have the documentation or information listed in the comment. However, the agency, along with ATSDR, feels that the samples were collected and documented in an acceptable fashion and that the data are sufficient.

70. The 2001 soil sampling was conducted only at two locations, which were near each other, and is too small a database upon which to conclude that the entire impacted area of Lyon Township is not at risk.

ATSDR and MDCH feel that the soil data are adequate.

71. The Direct Contact Criteria were not considered.

The MDEQ generic Residential and Commercial I Direct Contact Criteria were used when evaluating the soil data. Please see Table 8.

72. MDCH should have exerted its public health responsibility and obtained a legal order to obtain the soil samples required to determine the nature and extent of exposure for the Dolsen students.

The air data did not suggest that area soils likely had been significantly impacted by emissions from CA. Therefore, ATSDR and MDCH did not have a scientific basis to proceed with soil sampling.

CA's Process

73. What information is available from when CA was in Detroit and being investigated by other agencies?

The Wayne County Department of Health Air Pollution Control Division investigated many complaints when CA was located in Detroit. (This division was closed and its responsibilities taken over by MDEQ in 2001.) The county office issued several violations to CA, regarding visible emissions from the smelter. Other information in the MDEQ file on CA, regarding when the plant was in Detroit, includes baghouse dust analysis, metal content of the melt, photo-documentation of visible emissions, CA's response to correct situations that had resulted in violations, and agency responses to inquiries from legislators' offices. Persons seeking further information regarding CA's history at its former location should contact the MDEQ Air Quality District Office in Detroit.

74. What part of the recycling process generates emissions?

Emissions requiring pollution control are generated when the scrap is charged to the furnace. There is a hood positioned over the charging end of the furnace (sidewell) to capture these emissions and route them to the baghouse. Furnace emissions come from the compartment of the furnace where there is only molten material and are released straight to the atmosphere. Steam is generated during the shot-making process and released untreated to outside air through a separate vent.

75. Has CA modified their processing of aluminum from when they were located in Detroit? If so, please explain.

One major modification that CA has implemented is the installation and use of an eddy current separator, which helps remove combustible, non-metal contaminants from the scrap before it is charged to the furnace. Also, when it was located in Detroit, the company initially did not use a baghouse to capture emissions. Inspections conducted by and citations received from the Wayne County Department of Health Air Pollution Control Division pushed CA toward updating its pollution control devices. CA has improved its employee training, equipment maintenance, and documentation practices as well, according to the MDEQ file.

76. Are all of Continental's stacks tested?

All stacks that carry exhaust gas from the furnaces have been tested. These stacks are the baghouse stack and the hearth stack on each reverberatory furnace and the single stack for the rotary furnace, for a total of five stacks. There are other openings on the roof, such as the HVAC ductwork and the steam line for the shot process, which are not tested for hazardous emissions.

77. Isn't it true that emissions from aluminum smelters are especially toxic because the metal is often contaminated with toxics or materials that form pollutants when heated? How are these toxic emissions measured and can CA provide weekly, monthly, or yearly data on these substances? Does CA have emission controls and does CA have variable data to provide to the DEQ?

The scrap that CA receives can have various amounts and types of contamination. There may be paint adhered to siding, plastics on pots and pans, wood from broken pallets, and rubber from auto parts. By running scrap through the eddy current separator, much of the contamination can be removed or at least minimized. When the scrap is then charged to the sidewell of the furnace and the contaminants are burned off, the emissions enter a hood and are ducted to the baghouse, where acidic emissions are neutralized with lime and particulates are captured in filter bags. These pre-process and post-process pollution control steps significantly reduce (usually with greater than 90% efficiency) the amount of pollutants that could otherwise be released to the ambient air. Stack-testing conducted by CA's consultants and overseen by MDEQ verifies that the pollution control equipment is working or that adjustments need to be made. CA passed its last stack test and is not required to test again unless the company proposes a major change to its process.

78. Did Continental use a different grade of scrap during the EI? Were CA's processing lot sizes and types consistent with prior years during the sampling (i.e., did CA process less material during the EI)?

MDCH obtained the scrap use records for CA and plotted use by furnace and by scrap type starting one year before the EI started (3/1/2003) and ending a little more than one year after the EI concluded (6/30/2005). Those plots are shown in Appendix H. It does not appear that CA varied its scrap use during the EI when compared to other times.

As MDCH was compiling and interpreting scrap use data, the agency noticed two days on which one of the reverberatory furnaces was being charged at a rate greater than 10,000 pounds per hour (lbs/hr). The charge rates were almost 13,000 lbs/hr, for RV1 on 10/30/2003, and about 15,000 lbs/hr, for RV2 on 12/17/2004. It is unclear whether CA's permit limits the smelter to a charge rate of 10,000 lbs/hr or if that rate was used solely for modeling purposes. This matter has been referred to MDEQ.

79. Where does the raw scrap aluminum come from? Please provide a breakdown of other materials within a typical scrap lot.

The scrap can come from a variety of suppliers. CA categorizes the scrap they receive and processes different "recipes," dependent upon orders. Category 1 consists of aluminum scrap that is the result of machining, cutting, and manufacturing operations. Types of scrap within this category include turnings, borings, chips, drosses, skimmings, and larger pieces, such as auto castings and structural aluminum. Scrap within this category may contain machining and cutting liquids. Category 2 consists of used, old, and obsolete aluminum products, such as siding, pots, pans, window frames and doorframes, aluminum auto parts, and traffic signs. Scrap lots within this category that have greater than 8% combustible materials are sent through the eddy current separator to help remove the combustibles. Category 3 contains cleaner scrap, such as clippings, radiators, extrusions, structural pieces, sow, ingot, forgings, castings, shredded aluminum, and aluminum solids (RMT 2000).

80. Is CA still using hydrochloric acid? Will they be able to use it in the future? How would the public be informed, so they could comment on the possible reinstatement of chlorine use?

CA did not use hydrochloric acid (HCl) but rather chlorine gas in its "demagging" furnace. This process generated the majority of HCl emissions. To resolve past violations of the HCl emission limit, CA stopped using chlorine in August 2002. According to MDEQ, the company now uses nitrogen for the "demagging" process. In order for CA to use chlorine in the future, the company will have to apply for a permit through MDEQ. These types of permit applications generally undergo a public comment period during which MDEQ may hold a public hearing. MDEQ would notify the public through newspaper ads, flyers, and its website. Interested parties can view the MDEQ calendar at http://www.michigan.gov/deq/0,1607,7-135-3308_3325---,00.html.

81. Please comment on emissions from the past seven or so years in terms of cumulative toxic fallout in and around the facility.

As discussed in the EI Report, soil sampling conducted in 2001, three years after CA was completely on-line in New Hudson, indicated that concentrations of metals in the soil were not of concern. (Metal particulate emissions would most likely be deposited the soonest, compared to other expected pollutants, after they exit the stack.) Most of the odor complaints occurred before the soil sampling took place, suggesting that emissions may have been greater when CA first started operating in the area. Based on that assumption, it can be inferred that the greatest amount of deposition occurred during the first few years. If the soils were not of concern following a time of potentially greater emissions, it is likely that deposition since the 2001 sampling has not significantly added to the concentrations.

Compliance Issues

82. There was a smoke and odor event ("visible emissions") on 6/10/2004, documented on videotape. CA admitted that there were "visible emissions" that day. Their consent order with MDEQ states that if the regulatory agency had to respond to a visible release, the company would be in violation. With the video footage, shouldn't this be enough evidence?

MDCH was unable to find the language referred to by the commentor in the consent order. According to the MDEQ Complaint Log for this event, MDEQ was unable to determine the degree of visible emissions from the video due to poor picture quality (the lens was wet) and position of the camera relative to the sun and CA (the sun must be behind the viewer). Although the video provided preliminary evidence, MDEQ compliance staff must observe the reported event in person and document it appropriately using EPA Method 9 (http://www.epa.gov/ttn/emc/promgate/m-09.pdf). MDEQ conducted several Method 9 observations/readings following this event but did not detect emissions that would constitute a violation.

83. In May of 2000, EPA added the company to its Significant Violators list. Violations can be enforced monetarily and criminally. Is CA still on that list and is EPA taking any action?

According to MDEQ, the agency that placed the company on EPA's Significant Violators list, CA currently is in violation regarding pressure drops in the baghouse during shaking of the bags. CA is paying fines and working with MDEQ to resolve this issue.

84. When the detected acidic concentrations (0-46 ppb) are compared to modeling performed by MDEQ and CA as part of previous MDEQ permitting, there are significant discrepancies. The Predicted Ambient Impact (PAI) was 4.9 ppb for hydrogen fluoride and 2.3 ppb for hydrogen chloride.

It is true that, when averaged over a 24-hour period, some concentrations of acidic aerosols exceeded the PAI for hydrogen chloride. (As discussed in the EI Report, it is *not* likely that the acidic aerosol was hydrogen fluoride.) The PAI, however, is not a concentration that a facility cannot exceed, but rather only a prediction, given the modeling inputs, of a maximum concentration.

MDCH noticed that the 24-hour average of the acidic aerosols detected during the event that started 3/25/2004 (the second event listed in Table 3a) temporarily exceeded the MDEQ Initial Threshold Screening Level (ITSL) for hydrogen chloride. The ITSL is 13 ppb. The maximum 24-hour average detected was 26.4 ppb. MDCH has informed MDEQ of this finding, in case there are regulatory concerns. It should be emphasized, however, that MDCH cannot verify that the detection was for hydrogen chloride. It should also be noted that this short-term exceedance of the ITSL, which is based on the EPA Reference Concentration for the chemical, would not be expected to result in adverse health effects if the detection were indeed hydrogen chloride.

85. Past emission violations have occurred during periods when there were positive air pressures within the CA building (i.e., overhead doors were open). Since monitoring of the doors during the EI was not conducted, it is not possible to determine if typical or biased conditions occurred.

MDCH realizes that Lyon Township has issued an ordinance that requires CA to keep its overhead doors shut during operation. Due to the nature of smelting operations, the temperature of the plant interior can become dangerously hot, putting workers at risk of heat exhaustion or heat stroke. Protective work practices, such as frequent breaks and rotation of duties, may alleviate the risk.

MDCH acknowledges that some people believe that emissions may be released directly to ambient air through the open overhead doors at the plant (i.e., fugitive emissions). Since the agency's involvement at this site, several odor complainants have indicated to MDCH that the doors were open at the time of an odor event. There is documentation of the overhead doors reportedly being open during one odor event during the EI. (This observation is not requested on the Lyon Township Odor Surveillance Form.) If the door was open one time, it was likely open at other times during the EI, although exact dates of these occurrences are unknown.

On 6/6/2000, MDEQ compliance personnel discussed with CA whether negative or positive pressure within the building was preferable. At that time, MDEQ felt that the efficiency of the baghouse would be maximized if the interior of the plant were under negative pressure (overhead doors closed). However, other MDEQ compliance personnel feel that the baghouse acts as a large vacuum and that opening a door 100 or more feet away from the furnace should not influence the flow of emissions from the sidewell to the hood above it. After investigating the facility, ATSDR and MDCH agree with the latter opinion, that the flow of emissions would not be significantly affected by opened doors.

86. Is CA in compliance now?

CA passed its last stack test and is considered to be in compliance with regard to emissions. However, as discussed under Comment #81, CA has corrections to make regarding baghouse pressure drops.

87. Does CA comply with notification, testing, planning, reporting, operating, file-maintenance, monitoring, measuring, and recordkeeping requirements of the Clean Air Act? If so, please provide evidence.

CA must comply with all Clean Air Act requirements and supply documentation to MDEQ. If CA were found to be in violation, MDEQ would bring enforcement actions against the company, in the form of Letters of Violation, Consent Orders, fines, or revoking the company's permit. Persons seeking evidence of CA's compliance should contact the MDEQ Air Quality District Office in Warren.

Runoff to Local Waterways

88. MDCH should also consider runoff from roof downspouts and the parking lot at CA and determine if the public storm drain adjacent to the facility has been affected or transferred pollutants off-site.

Although MDCH will not be pursuing further environmental testing at CA, the agency has some information in its files regarding storm water runoff at the site and area surface water and groundwater.

In the spring of 2001, the MDEQ Surface Water Quality Division (now part of the MDEQ Water Bureau) conducted a site inspection at CA. Agency staff noticed poor housekeeping practices that could lead to runoff of pollutants to a public drain and a wetland west of the property. The public drain empties further south on Milford Road into Lake Angela (Figure 1). MDEQ issued a notice to CA, indicating that the company was to comply with federal and state storm water regulations. In 2003, CA completed the training and documentation required for compliance. This included devising an Integrated Contingency Plan that implemented a Spill Prevention Control and Countermeasures Plan, a Storm Water Pollution Prevention Plan, a Pollution Incident Prevention Plan, and a Hazardous Waste Contingency Plan. MDEQ issued a Certificate of Coverage under the National Pollutant Discharge Elimination System (NPDES) that authorized CA to discharge storm water (but not waste water) to the public drain via the retention pond on the company's property.

MDCH is not aware of any water sampling that may have occurred in the wetland west of CA's property or in area surface waters. At the 3/26/2002 meeting MDCH had with concerned citizens, one area resident mentioned that he had not heard spring peepers in the drain and wetland near CA for some time and attributed this to pollution from the company. When an MDCH staff person was in the New Hudson area on 3/27/2003, she walked the bike path between CA and the wetland. She heard frogs calling (spring peepers and Western chorus frogs) and saw mallard ducks and Canadian geese in the pond of the wetland. This would suggest that the area can still support populations of wildlife, although it is not known whether those populations have decreased since CA began operations in New Hudson. Persons interested in estimating the populations of frogs and toads in the New Hudson area can contact the Michigan Department of Natural Resources (MDNR) regarding frog survey techniques (http://www.michigan.gov/dnr/0,1607,%207-153-10370_12143_12194---,00.html). Yearly surveys would help monitor the ecological health of New Hudson. According to MDNR, there are no frog survey data yet for this area.

On the day of the 8/16/2002 fire at CA, MDEQ inspected the facility to determine whether contaminated water was running off to the public drain. There was no runoff to the retention pond, as the water was contained inside the facility. The waste water from the fire reportedly was pumped out of holding pits the next day.

The groundwater in New Hudson has been affected by several area industries. The now-closed landfill between Grand River Avenue and Interstate 96 and west of Milford Road is releasing freon to the groundwater. Trichloroethylene (TCE) is being released from the New Hudson Corporation site at Milford Road and Pontiac Trail. Former gas stations at this intersection had underground storage tanks, some of which leaked. MDEQ is monitoring private wells on a quarterly basis for VOCs.

Next Steps

89. What recourse does the community have, now that ATSDR and MDCH have stated there is no public health threat? Should the complaint forms or hotline still be used?

If a pollution emergency event appears to be occurring, it should be reported to the MDEQ Pollution Emergency Alerting System (PEAS) at 1-800-292-4706. Concerned citizens should continue to work with local government and CA to keep lines of communication open between the community and the company. Progress was evident during the EI, and MDCH hopes that the community finds resolution to this matter.

90. What comes next, now that the EI for air is done? Can the Township ask for an EI on the soil?

ATSDR and MDCH do not believe that soil sampling is necessary. However, if citizens are concerned about chemical concentrations in the soil in the area, they can hire an environmental testing and consulting agency. MDEQ has generated an Environmental and Drinking Water Testing Labs Directory, available at http://www.michigan.gov/deq/0,1607,+7-135-3304-18205--,00.html. (The directory is not exhaustive but does provide additional information regarding environmental sampling.) ATSDR and MDCH will assist in the interpretation of the results, if requested.

91. Is the new township library, proposed to be built just south of CA, going to be located in a safe area?

ATSDR and MDCH do not expect emissions from CA to negatively impact this area. However, Lyon Township (or the party responsible for this parcel) should conduct a baseline environmental assessment to ensure any contamination that currently exists is documented and, if necessary, addressed. New Hudson had many orchards before its growth into a residential and commercial area: there may be pesticide residues in the soil.

General Comments

92. Please provide an Executive Summary (or at least a layman's brief).

When MDCH released the Public Comment version of the EI Report, the agency also released a two-page Report Synopsis, which stated what was tested for, what was found, and public health conclusions. Both documents are on the department's website at www.michigan.gov/mdch-toxics, under "Health Assessments and Related Documents." Additionally, MDCH also posted on its website the slideshow the agency presented at community meetings discussing the EI findings. MDCH will issue an updated Report Synopsis, labeling it "Executive Summary," when this Report is finalized.

93. The past public health impacts cannot be determined, per MDCH's conclusions. This is important information to know, however.

MDCH understands that this is an important matter to residents and workers who feel their health has been affected by emissions from CA. However, the past public health impacts cannot be determined.

94. Citizens are still complaining about odors.

These complaints should be documented, should there be further government agency involvement.

95. If another odor event occurs, citizens will call the media, not MDEQ or CA.

This is the citizens' prerogative. However, official documentation of the odors may be helpful in the future.

96. Complaints of odors emanating from secondary aluminum smelters can be found in other states, also including health related reports. Isn't it quite obvious that there is a correlation?

ATSDR and MDCH do not dispute that people may find these odors offensive and may experience health effects. It appears that the smelters are the sources of the odors. However, the data from the air sampling conducted in New Hudson for the EI indicate that the concentrations of the chemicals in the air around CA, especially during odor events, are not expected to cause adverse health effects.

97. Developers should consider conducting baseline environmental assessments being building on land that might be affected by CA's emissions.

This is a prudent business practice regardless of where the development is taking place and what kind of industry has been in the area.

98. If CA submits another permit application to MDEQ, how are citizens made aware of this?

Please see the response to Comment #80.

Appendix D References:

Agency for Toxic Substances and Disease Registry (ATSDR). Air comparison values. 21 July 05. (Available from ATSDR Division of Health Assessment and Consultation.)

Eastern Research Group, Inc. (ERG). Support for the EPA national monitoring programs (NMOC, UATMP, PAMS, HAPs, and NATTS). Morrisville (NC): ERG; 2004/2005. Contract No. 68-D-03-049.

RMT, Inc. Scrap Inspection Plan, Continental Aluminum Company, New Hudson, Michigan. October 2000.

U.S. Environmental Protection Agency (EPA). Integrated Risk Information System: Methyl chloride (CASRN 74-87-3). http://www.epa.gov/iris/subst/1003.htm

Appendix E. ATSDR Public Health Hazard Categories

Public Health Hazard Categories

Depending on the specific properties of the contaminant, the exposure situations, and the health status of individuals, a public health hazard may occur. Using data from public health assesments, sites are classified using one of the following public health hazard categories:

Category 1: Urgent Public Health Hazard

Sites that pose a serious risk to the publics health as the result of short-term exposures to hazardous substances.

Category 2: Public Health Hazard

Sites that pose a public health hazard as the result of long-term exposures to hazardous substances.

Category 3: Potential/Indeterminate Public Health Hazard

Sites for which no conclusions about public health hazard can be made because data are lacking.

Category 4: No Apparent Public Health Hazard

Sites where human exposure to contaminated media is occurring or has occurred in the past, but the exposure is below a level of health hazard.

Category 5: No Public Health Hazard

Sites for which data indicate no current or past exposure or no potential for exposure and therefore no health hazard.

Appendix F. Follow-up Investigation of Mercury Detections near the Continental Aluminum Plant

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING

JENNIFER M. GRANHOLM
GOVERNOR

STEVEN E. CHESTER
DIRECTOR

December 21, 2004

Ms. Christina Bush, Toxicologist
Division of Environmental and Occupational Epidemiology
Toxics and Response Section
Michigan Department of Community Health
3423 N. Martin Luther King Jr. Boulevard
Lansing, Michigan 48909

Dear Ms. Bush:

Thank you for your letter dated November 29, 2004, regarding the ambient mercury monitoring that was conducted in the vicinity of Continental Aluminum located in Lyon Township of Oakland County as part of an Exposure Investigation conducted by the Michigan Department of Community Health (MDCH). As you know, Ms. Joy Taylor Morgan and Ms. Amy Robinson of the Air Quality Division (AQD) have worked very closely with staff from MDCH on this project and will continue to be involved in the future, as needed.

While the elemental mercury values detected near Continental Aluminum do not pose a health concern from inhalation exposure, they do indicate a potential source of mercury in the area that warrants further investigation. It is important to identify and characterize all significant sources of mercury emissions in the state since emissions from these sources may undergo deposition and subsequent bioaccumulation in aquatic systems, contributing to the ongoing problem of fish consumption advisory warnings for Michigan lakes due to mercury contamination.

In follow-up to the initial findings from the MDCH's Exposure Investigation, my staff plans to do further monitoring work this summer once we are in receipt of the mercury monitoring equipment housed in our mobile mercury monitoring trailer. This trailer is shared with the states of Wisconsin and Minnesota and is currently located in Wisconsin. It will be returned to us by this summer to obtain additional data in the vicinity of Continental Aluminum to attempt to better quantify mercury concentrations in the area and identify locations of fugitive mercury emissions.

For further information regarding this effort, you may contact Ms. Taylor Morgan, Toxics Unit, AQD, at 517-335-6974.

Sincerely,

G. Vinson Hellwig, Chief
Air Quality Division
517-373-7069

cc: Mr. Craig Fitzner, DEQ
Ms. Teresa Seidel, DEQ
Ms. Amy Robinson, DEQ
Ms. Joy Taylor Morgan, DEQ

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Mercury Monitoring around Continental Aluminum
June 14, September 28, and October 5, 2005

Background

Continental Aluminum is a secondary aluminum smelter located in Lyon Township, Oakland County, Michigan (42.50º N, 83.62º W). Secondary aluminum smelters recycle aluminum from aluminum-containing scrap, while primary aluminum producers convert bauxite ore into aluminum. Secondary aluminum production involves the pretreatment of aluminum-containing scrap and the smelting/refining of this scrap.

In response to a petition for a public health assessment by local citizens, the Michigan Department of Community Health (MDCH) conducted a three-month exposure investigation (EI) from March through May 2004. The MDCH investigated the presence of acidic aerosols and concentrations of airborne metal particulates, elemental mercury and volatile organic compounds (VOCs). A limited set of elemental mercury data collected during the EI time period demonstrated concentrations exceeding background levels. Background concentrations in clean areas, that is those geographic areas not impacted by urban sources, are known to be approximately 1.5 ng/m^3 in Michigan and elsewhere (Keeler 2003, Malcolm et al. 2003 and Bullock 2004). Although the highest concentrations appeared to be when the wind was not blowing from the vicinity of the Continental Aluminum facility, staff of the Michigan Department of Environmental Quality (MDEQ), Air Quality Division (AQD) agreed to conduct follow-up monitoring to determine if elevated elemental mercury concentrations were originating from the facility.

Follow-Up Monitoring Summary

Amy Robinson, Air Monitoring Unit; Patrick Bigelow, Air Monitoring Student Assistant; and Joy Taylor Morgan and Leah Granke, both with AQD's Toxics Unit, monitored the vicinity surrounding the facility on June 14, 2005. On September 28 and October 5, 2005, monitoring was conducted by Amy Robinson, Joy Taylor Morgan, and Leah Granke.

The smelter was operating on all occasions when MDEQ staff visited the site. Operation of the smelter was evident by a burning refuse/sulfurous odor on June 14 and especially on September 28 (when located within 50 yards downwind of facility) and by noise. Monitoring was conducted without notifying the company ahead of time. On June 14, the weather was cloudy and warm (84°F and 53% humidity), with a 14 mph wind from the south gusting to 23 mph as reported by the Oakland County International Airport, which is located approximately 31 miles northwest of the facility, in Pontiac, Michigan. On September 28, 2005, it was sunny and warm (77°F) with a variable south/southwest breeze ranging from zero to 6 mph as measured by a LaCrosse Technology anemometer. The weather on October 5, 2005 was also warm (79°F) and sunny with a variable light southwest breeze (~0-2 mph), as measured by the anemometer.

Monitoring was conducted utilizing a handheld, portable Lumex RA 915+ monitor that measures and provides continuous real-time data for elemental mercury [Hg(0)]. Airborne

Hg(0) measurements were collected both during car tours and by walking around the periphery of the facility. During car tour monitoring, the monitoring probe was suspended in the ambient air through a partially open window. For the on-foot monitoring, the probe was held in the ambient air at approximately chest height. A handheld geocoordinate positions system (GPS) device (Garmin eTrex Vista) was also utilized to record locations where sampling occurred. Both car tour monitoring and monitoring on foot involve connecting the Lumex RA 915+ monitor to a laptop that automatically downloads the data collected from the continuous ambient monitor. On June 14, during monitoring while walking on the bike path behind Continental Aluminum, the laptop was not used because of laptop battery failure. Instead, ten second averages were calculated by the Lumex and recorded by hand.

The monitoring locations were chosen to provide a representative sample of upwind and downwind ambient mercury levels in the vicinity of Continental Aluminum (see Map of Monitoring Activities). The intersection of Travis Road and Fletcher Lane provided an upwind background reading. This was the baseline, which was compared with downwind readings to determine if elevated mercury levels were present. The bike path monitoring location provided close access to the fence line of the Continental Aluminum property. The MDCH monitoring had been conducted at Dolsen Elementary School. Consequently, the AQD also monitored at Dolsen Elementary school. Monitoring along Grand River Avenue was conducted to screen for potential mercury sources other than Continental Aluminum.

The upwind measurement (corner of Travis Road and Fletcher Lane) found Hg(0) concentrations were at the minimum detection limit (MDL) of the Lumex at approximately 2 ng/m^3 (see Graph 1). It is normal for the Lumex to experience “instrument drift” where the values recorded fluctuate above and below the actual ambient air measurement for a location. This drift can result in values less than the MDL being recorded by the Lumex. Values less than the MDL should be interpreted as equivalent to the MDL of 2 ng/m^3.

Airborne Hg(0) measurements around the vicinity of the facility indicated that most measured downwind concentrations were very close to background concentrations. During the September 28, 2005 sampling event, levels were elevated above background when approximately 50 yards directly downwind of the facility on the bike path (see Graph 2). During this sampling event, the battery failed on the Lumex. The data collected prior to the Lumex battery failing should be considered valid, however, since all of the Lumex operating parameters were within their normal range (personal communication with OhioLumex personnel). A precise plume estimate based on this data is not possible because the battery failed before the instrument exited the plume. However, an approximate range of Hg emitted from Continental Aluminum can be calculated using the stack height, modeled estimates for plume width, wind speed, the average mercury concentration in the plume, and facility operating data. Based on these data, we can expect that Continental Aluminum emits between <1 and 2 pounds of elemental mercury per year. It should be noted that this estimate was generated from the limited, periodic, short-term monitoring that MDEQ conducted and should be considered fairly rough. The data from these sampling events suggests that Continental Aluminum is a relatively minor source of mercury.

During the car tours, the concentrations were primarily at the minimum detection limit of the instrument. Concentrations around Dolsen Elementary School (42.51ºN, 83.61ºW) approximately one mile northeast of Continental Aluminum, were at detection (see Graph 3). Therefore, during these specific sampling events, levels did not appear to be elevated at Dolsen Elementary School.

The ambient air concentration of Hg(0) did increase during the June 14 car tour when we moved away from Continental Aluminum and drove to Trident Industrial Blvd/Lyon Oaks Drive area, approximately 2.5 miles east of the facility (see Graph 4). The highest concentrations detected were approximately 14 ng/m^3 (see Graph 5*),* which indicated the possibility of a source of Hg(0) nearby. While it is normal for the Lumex to experience "instrument drift," this sampling event showed an increase above normal drift in the vicinity surrounding Trident Industrial Boulevard and Lyon Oaks Drive. The source, however, could not be confirmed as there were numerous buildings within the vicinity of where somewhat elevated concentrations were detected, and the September 28 and October 5 sampling events did not yield the elevated levels seen during the June 14 event.

Conclusion

During monitoring on June 14, September 28, and October 5, 2005, Continental Aluminum did not appear to be a source of a significant amount of Hg(0) to the atmosphere. No further monitoring is planned at this time.

References

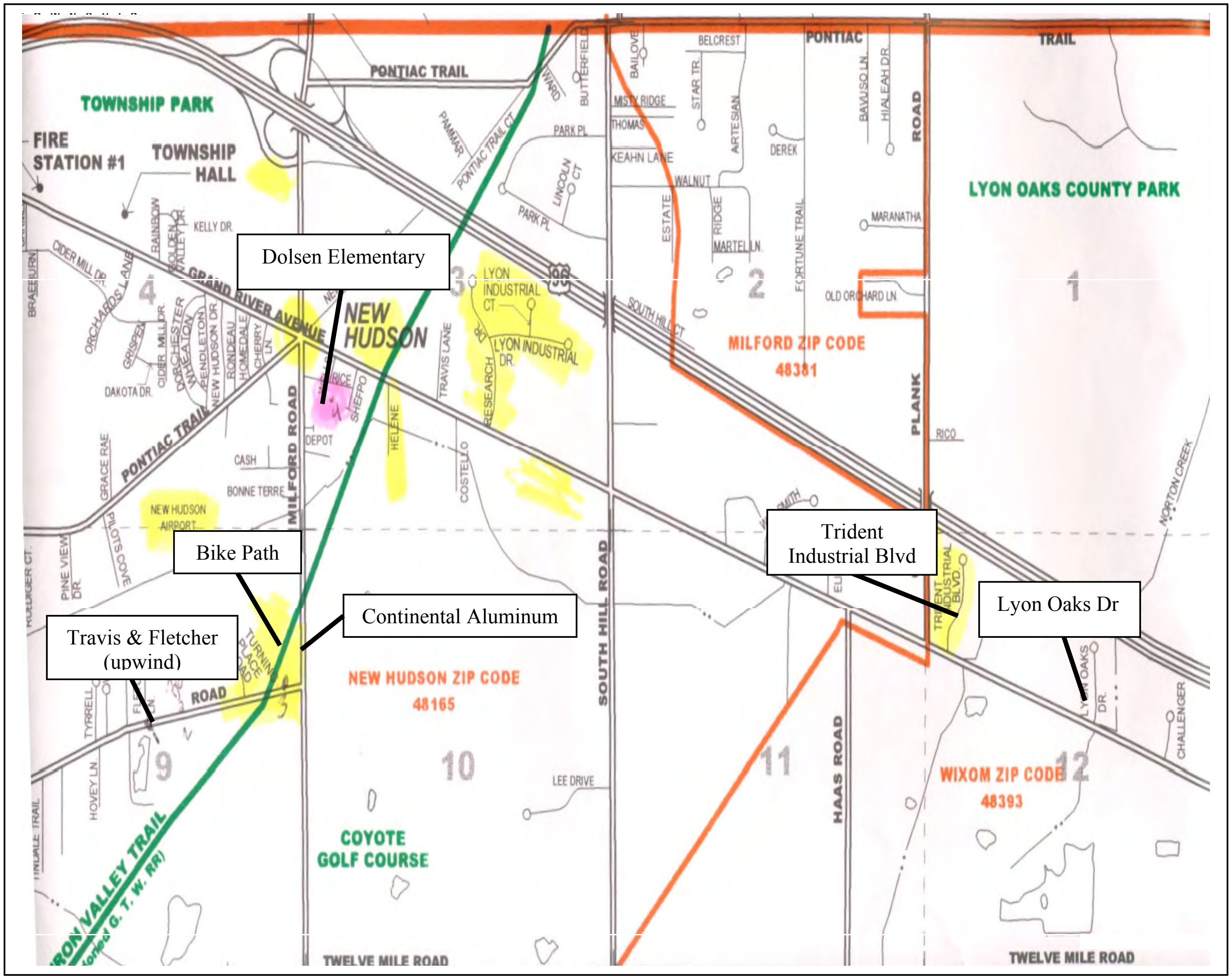
Keeler, G. J. Mercury monitoring in Michigan and the Great Lakes Basin – methods and source characterization. Presented at: Great Lakes Regional Workshop – Measuring Atmospheric Mercury: Goals, Methods, and Results. 2003 Mar 26, East Lansing, Michigan.

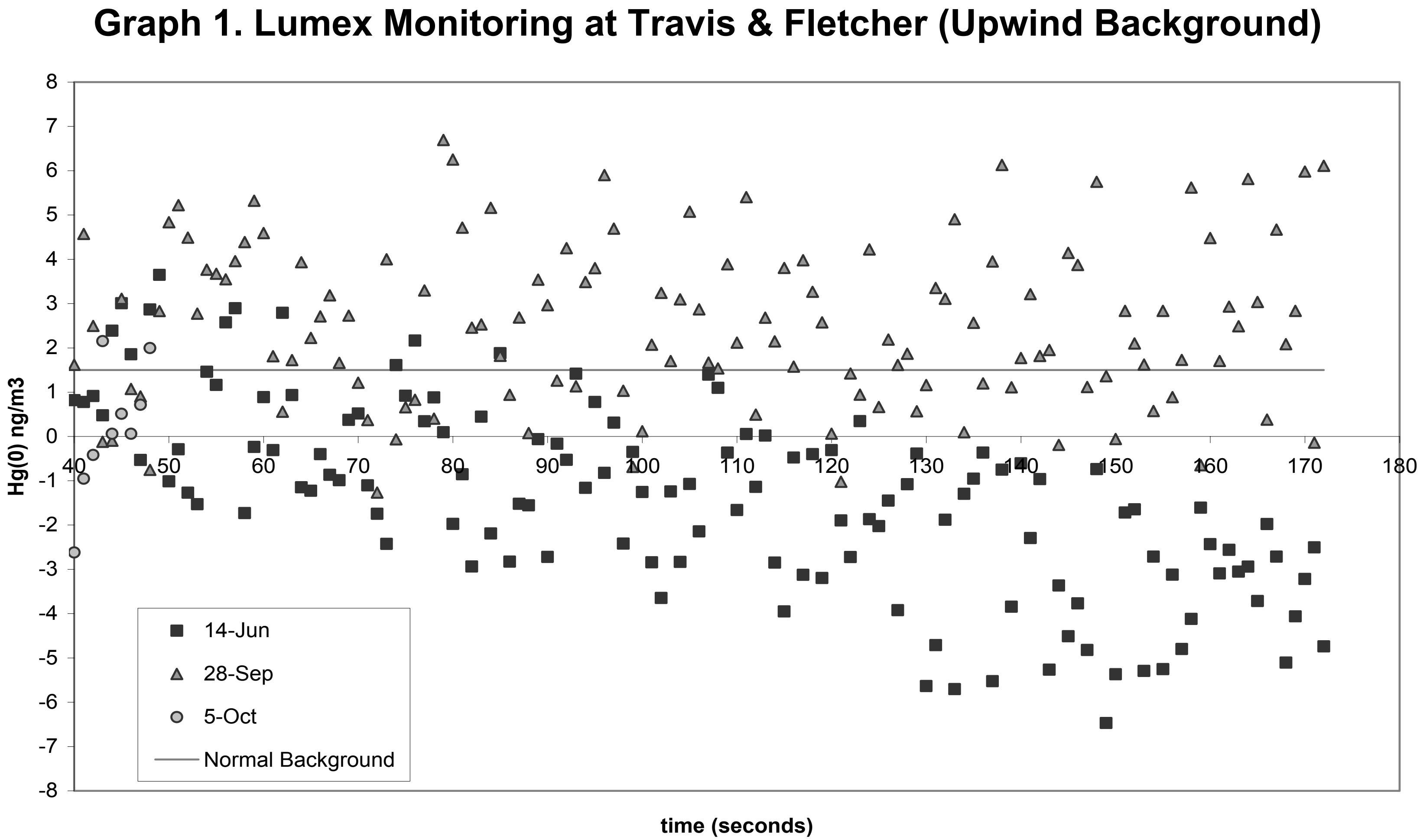
Malcolm, E. G., G. J. Keeler, and M. S. Landis. The effects of the coastal environment on the atmospheric mercury cycle. J Geophysical Res 2003;108(D12):4357.

Bullock, R. O. Global emissions and transport: what is known and unknown. Presented at: US EPA/USGS Mercury Roundtable; 2004 Sep 15, quarterly conference call.

Compiled by: Joy Taylor Morgan, MDEQ, AQD –Toxics Unit
Leah Granke, MDEQ, AQD –Toxics Unit
Amy Robinson, MDEQ, AQD – Air Monitoring Unit
November 7, 2005

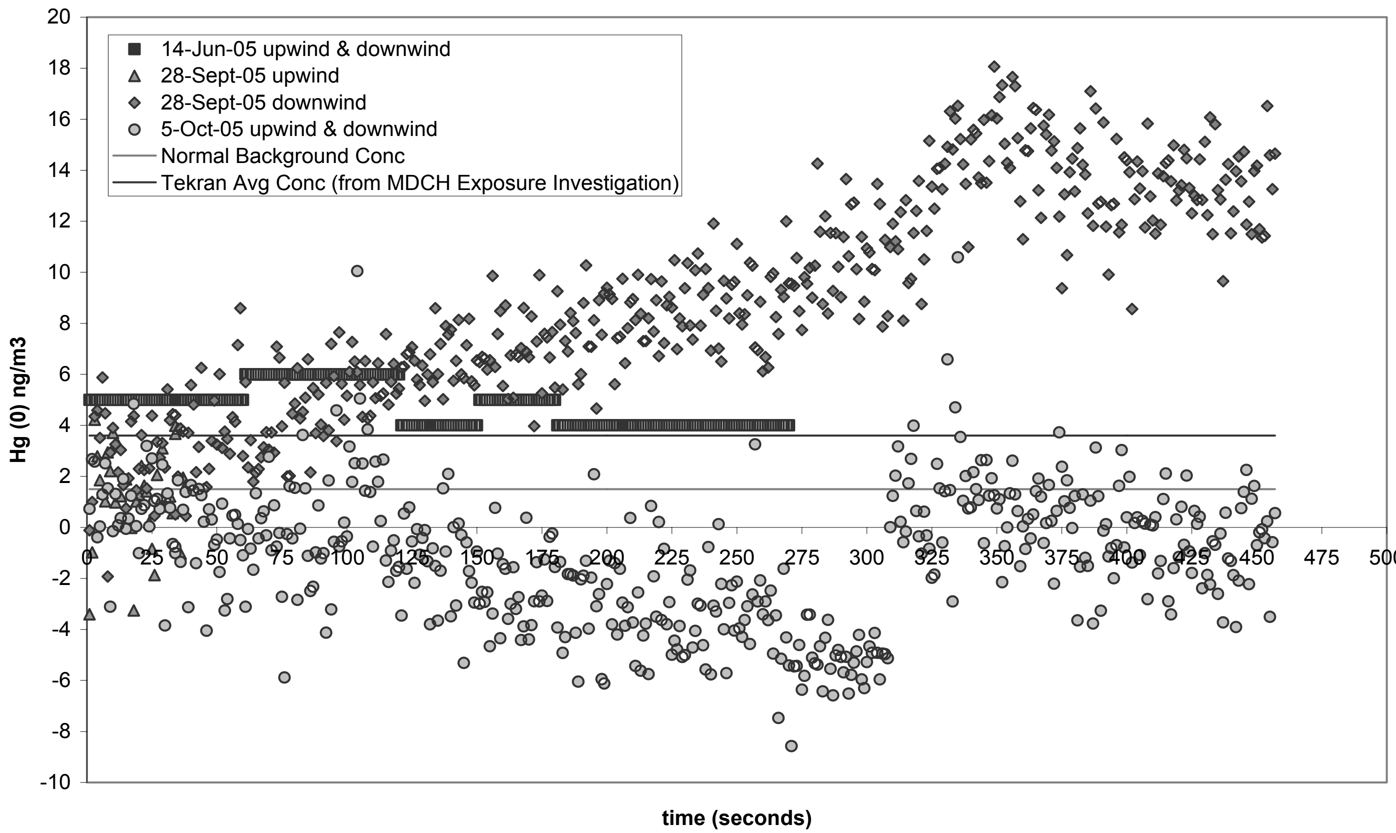
Map of Monitoring Activities:



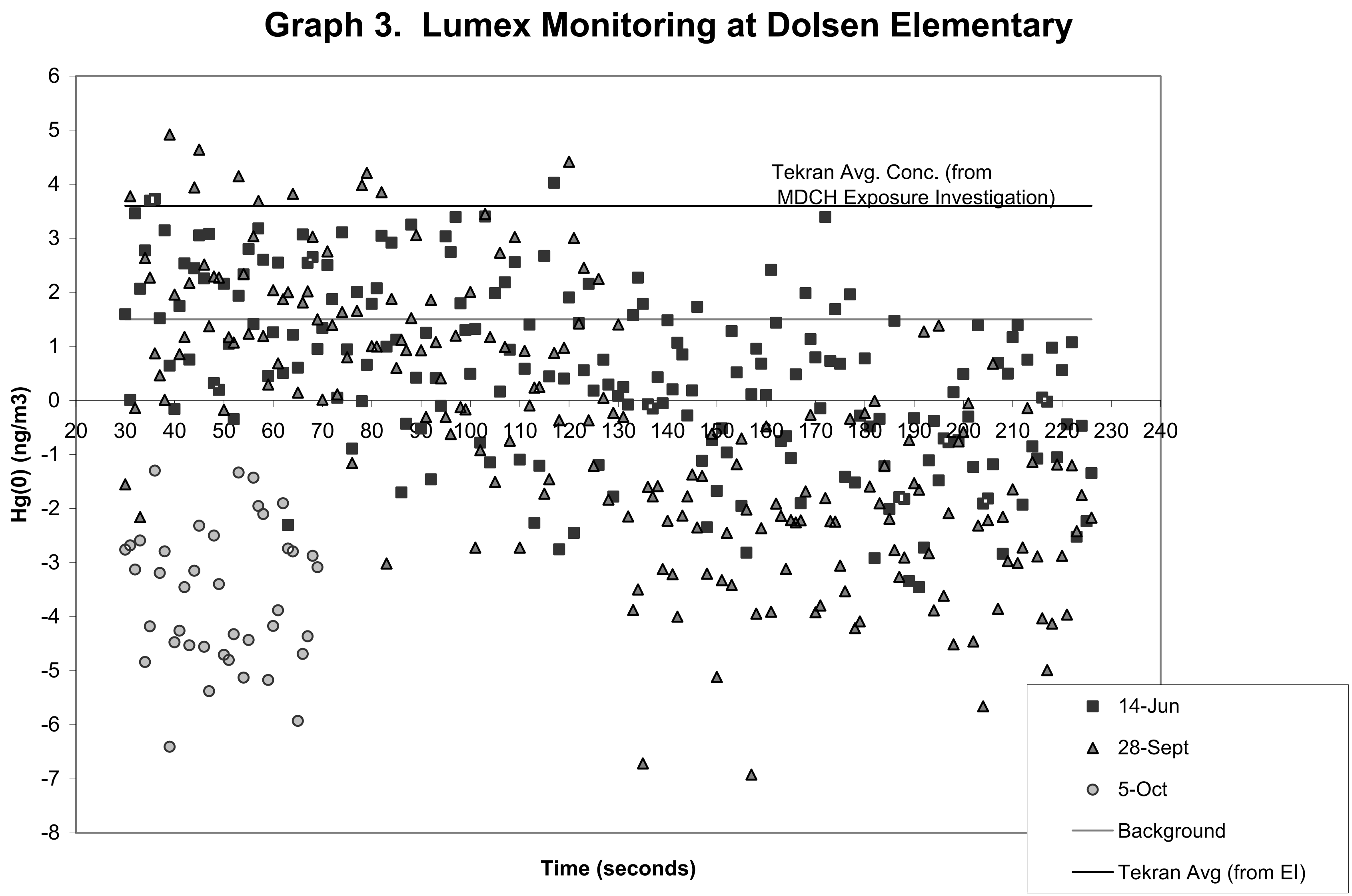


Graph 1. The upwind background reading was taken west and slightly south of the facility at the intersection of Travis Road and Fletcher Lane (see Map of Monitoring Activities). This reading is at the detection limit of the Lumex at approximately 2 ng/m^3.

Graph 2. Lumex Monitoring On the Bike Path

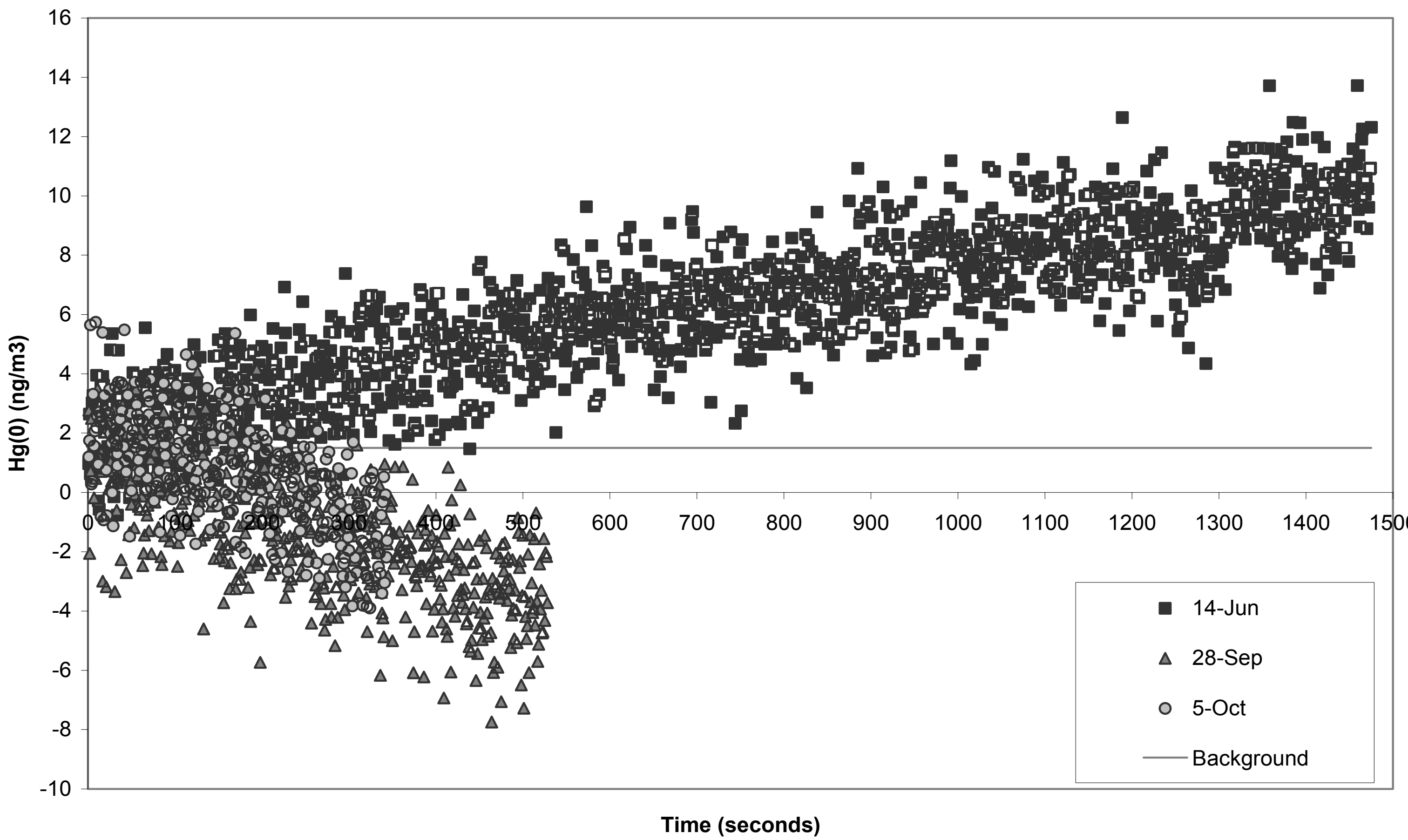


Graph 2. The bike path is southwest and upwind of the facility at its intersection with Travis Road (see Map of Monitoring Activities). Near the bike path's intersection with Milford Road, it is north and slightly west of the facility and is a good location for downwind monitoring. During the June 14 monitoring, the laptop's battery failed. As a result, the June 14 values are 10-second averages that were recorded by hand. Hence, the June 14 values on this graph are all whole numbers, unlike the other sampling events. Notice that somewhat elevated values were detected downwind of the facility during the September 28 monitoring event. During this monitoring event, the Lumex battery failed, prohibiting further downwind monitoring of these elevated levels.



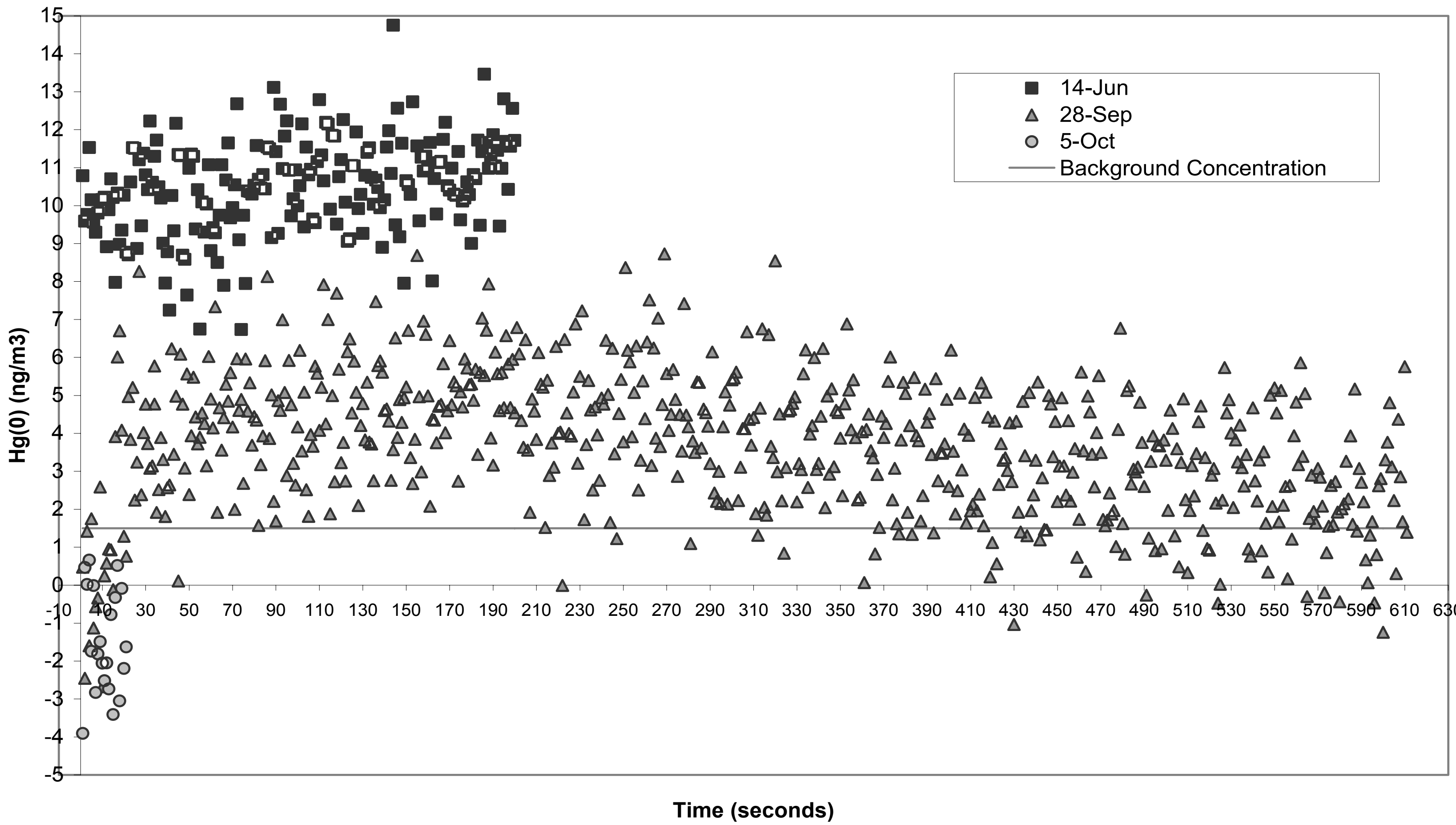
Graph 3. Dolsen Elementary is located approximately 1 mile northeast of Continental Aluminum (see Map of Monitoring Activities). The readings at this site were at the detection limit of the Lumex at ~2 ng/m^3.

Graph 4. Lumex Monitoring moving East on Grand River



Graph 4. This graph shows the values detected during car tour monitoring driving East on Grand River from the vicinity of Dolsen Elementary to Trident Industrial Blvd. (see Map of Monitoring Activities). On June 14, a slightly elevated signal was evident in the vicinity of Trident Industrial Blvd., but this signal was not present during the September 28 and October 5 sampling events.

Graph 5. Lumex Monitoring on Trident Industrial Blvd



Graph 5. The area around Trident Industrial Blvd and Lyon Oaks Drive (see Map of Monitoring Activities) showed a slightly elevated signal during the June 14, 2005 monitoring event. An elevated signal was not present during the September 28 and October 5 monitoring.

Appendix G. MDEQ Air Modeling for Emissions from Continental Aluminum

Notes:

1. The models use the most current (2002) stack test data for chlorine gas (which is no longer used at the plant), hydrogen fluoride, and hydrogen chloride. Particulate matter and VOCs are not modeled since these are classes of, and not individual, compounds. Dioxins and furans have been modeled but are not shown here. (They are emitted in extremely small amounts and would not contribute to odor events.)
2. It is assumed that all furnaces would be running. Therefore, three baghouse stacks and two furnace stacks would be emitting.
3. One year of meteorological data from the Pontiac airport is used, rather than data from the monitoring trailer used for the EI in New Hudson, for which there are only three months of information.
4. The averaging time is based on the MDEQ Initial Threshold Screening Level for each compound.
5. Although the plots use the same colors, the scale is different for each plot. (See "MAX" at the bottom of each page for maximum concentration expected.)
6. Green or brown areas that are repeated on each plot (usually rectangular-shaped) are not part of the plume. Rather, they are woodlots and a part of the map that underlies the plot.

Chlorine

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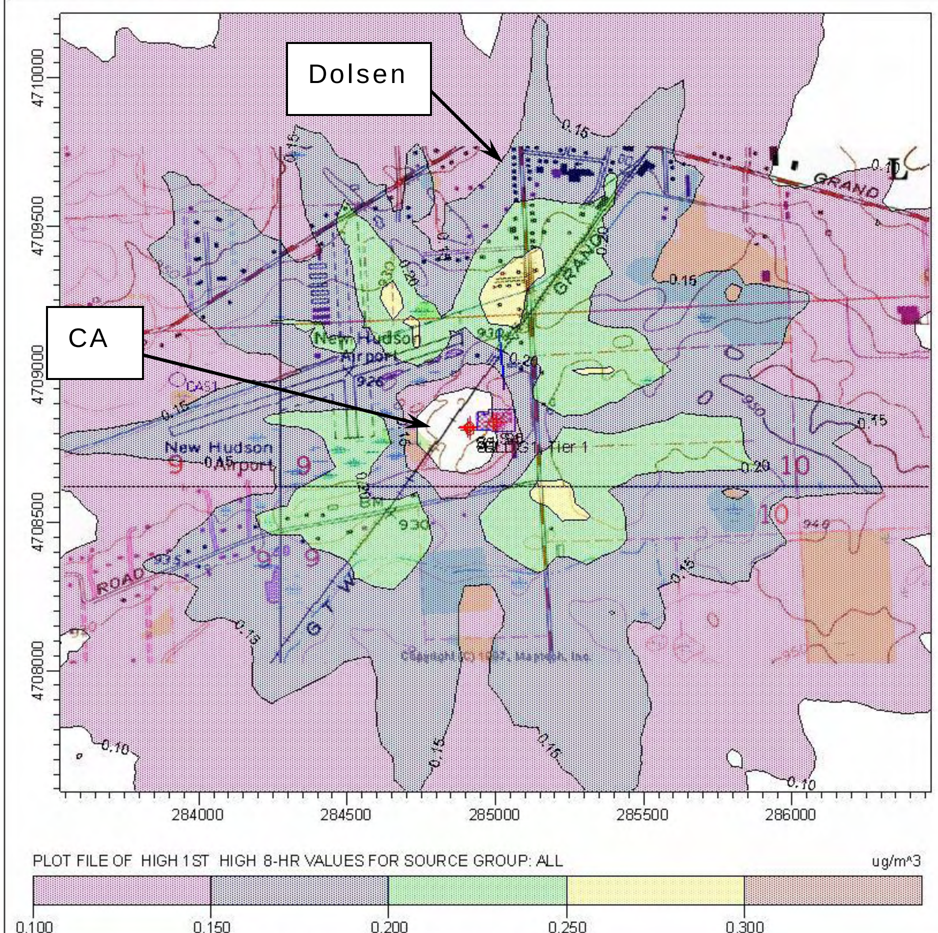
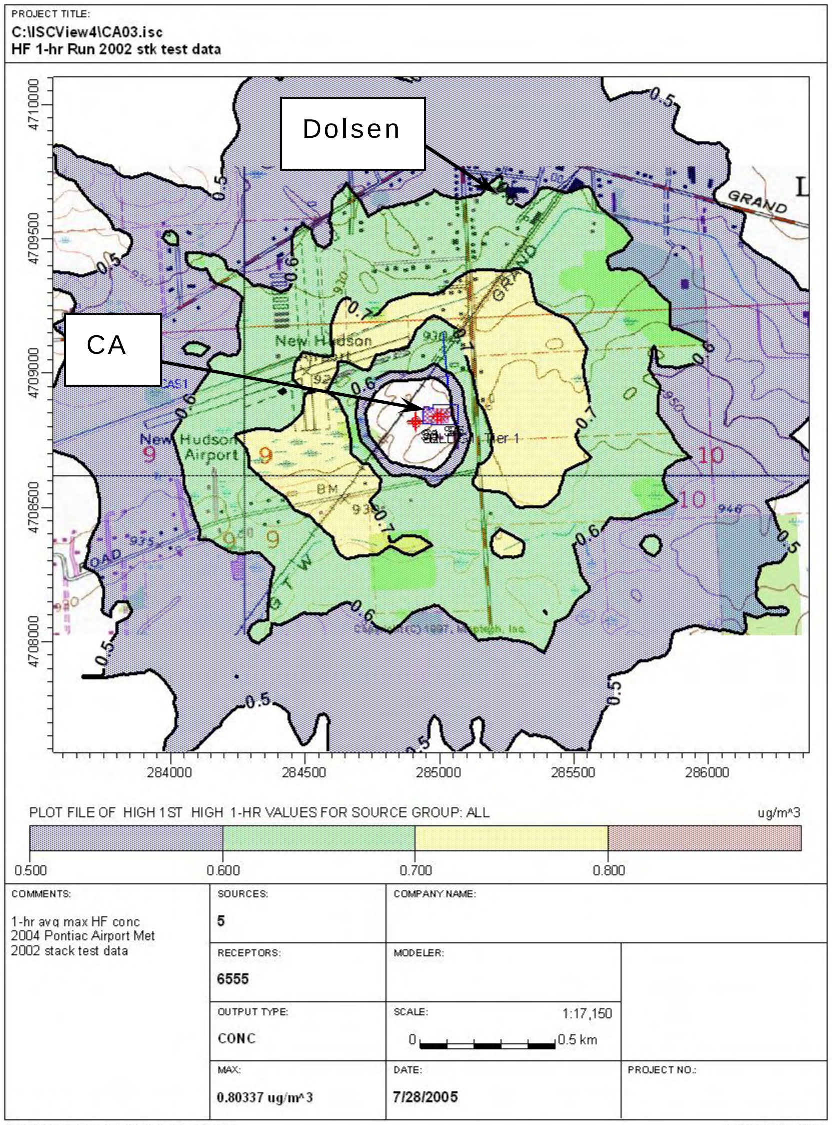
C:\ISCView4\CA03.isc
Cl2 8-hr Run 2002 stk test data



COMMENTS:	SOURCES:	COMPANY NAME:	
8-hr avg max Cl2 conc 2004 Pontiac Airport Met 2002 stack test data	5		
	RECEPTORS: 6555	MODELER:	
	OUTPUT TYPE: CONC	SCALE: 1:17,916 0 — 0.5 km	
	MAX: 0.31212 ug/m^3	DATE: 7/29/2005	PROJECT NO.:

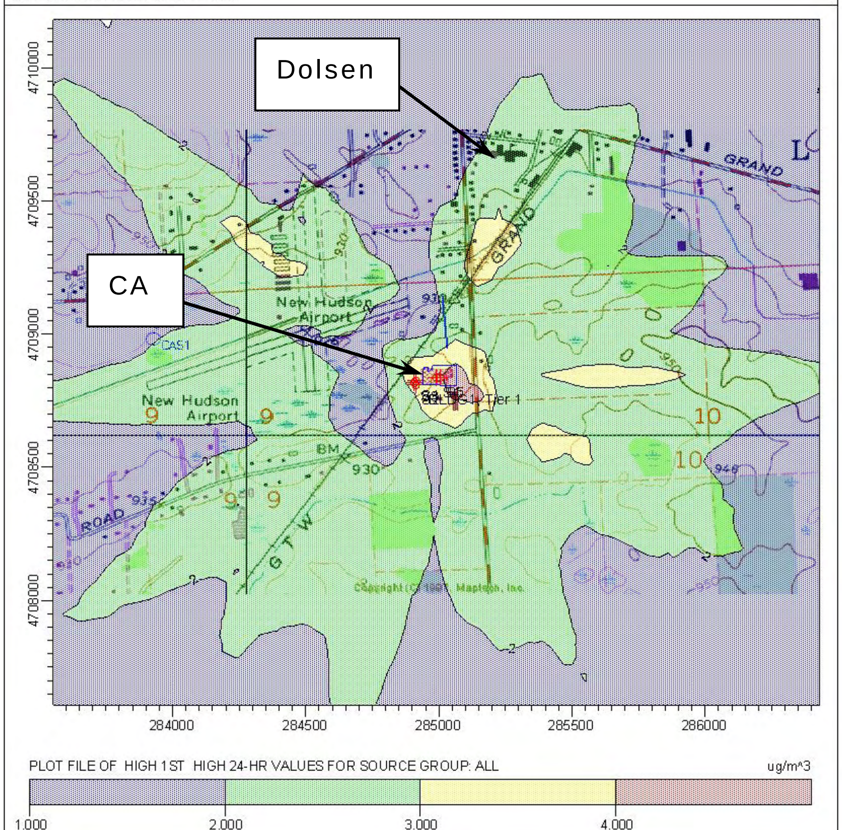
ISC-AERMOD View - Lakes Environmental Software C:\ISCView4\CA03.isc

Hydrogen Fluoride



Hydrogen Chloride

PROJECT TITLE:
C:\ISCView4\CA03.isc
HCl 24-hr Run 2002 stk test data



COMMENTS:			
24-hr avg max HCl conc 2004 Pontiac Airport Met 2002 stack test data	SOURCES: **5**	COMPANY NAME:	
	RECEPTORS: **6555**	MODELER:	
	OUTPUT TYPE: **CONC**	SCALE: 1:17,559 0 — 0.5 km	
	MAX: **7.30045 ug/m^3**	DATE: **7/29/2005**	PROJECT NO.:

ISC-AERMOD View - Lakes Environmental Software — C:\ISCView4\CA03.isc

Appendix H. Scrap Use at Continental Aluminum Before, During, and After the Exposure Investigation

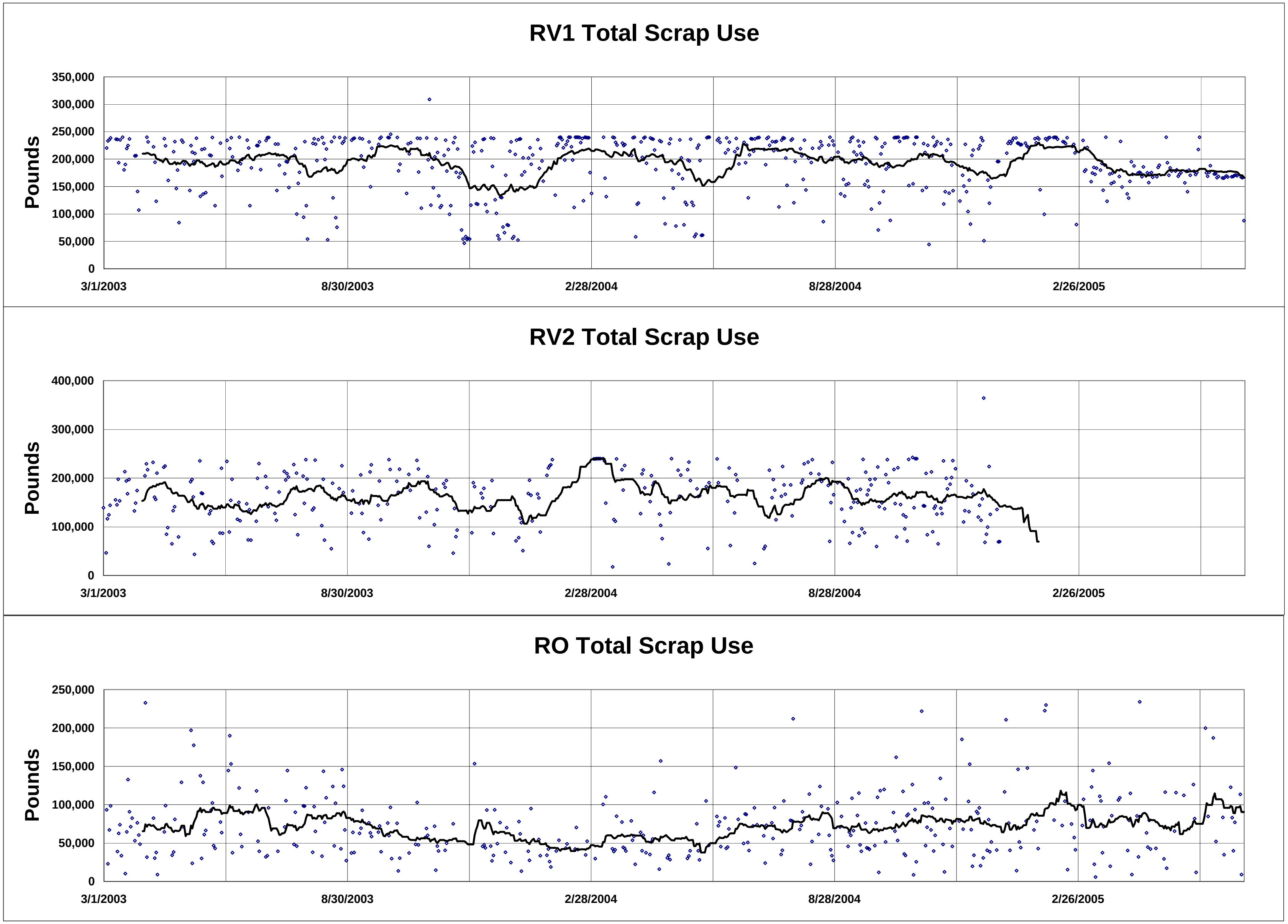
MDCH requested scrap-use records from Continental Aluminum for one year before the Exposure Investigation (EI) began (3/1/2003) to about one year after the EI concluded (6/30/2005). MDCH then plotted total scrap use by furnace and scrap type use by furnace over time. The plots are attached. The timing of the EI is the section of the plot that begins at 2/28/2004 on the X (horizontal) axis.

MDCH added a trendline to the plots of the scrap types that were used regularly. Note that some scrap types were rarely used. For instance, scrap type 1.4 was not used at all in the RV furnaces and hardly at all in the RO furnace. Scrap type 1.3 was rarely used in the RV furnaces but used more frequently in the RO furnace. This can make the trendline difficult to interpret in these cases. Scrap categories are described briefly under Comment #77 in Appendix D.

In general, the reverberatory furnaces (RV1 and RV2) were run for both shifts (24 hours) each day they were used, although there was an occasional one-shift-only (12-hour) day. RV2 did not run for the entire month of February 2004 and has not run at all in 2005. The rotary (RO) furnace usually was run for only one 12-hour shift, though there were several 24-hour-use days.

The reader should also note that each plot varies in the scale of the Y (vertical) axis. Scrap-use plots should not be compared against each other.

Figure H-1. Total scrap use by furnace at Continental Aluminum, New Hudson, Michigan one year before and one year after 2004 Exposure Investigation.



RV reverberatory furnace
RO rotary furnace

Figure H-2. Scrap use by RV1 at Continental Aluminum, New Hudson, Michigan one year before and one year after 2004 Exposure Investigation.

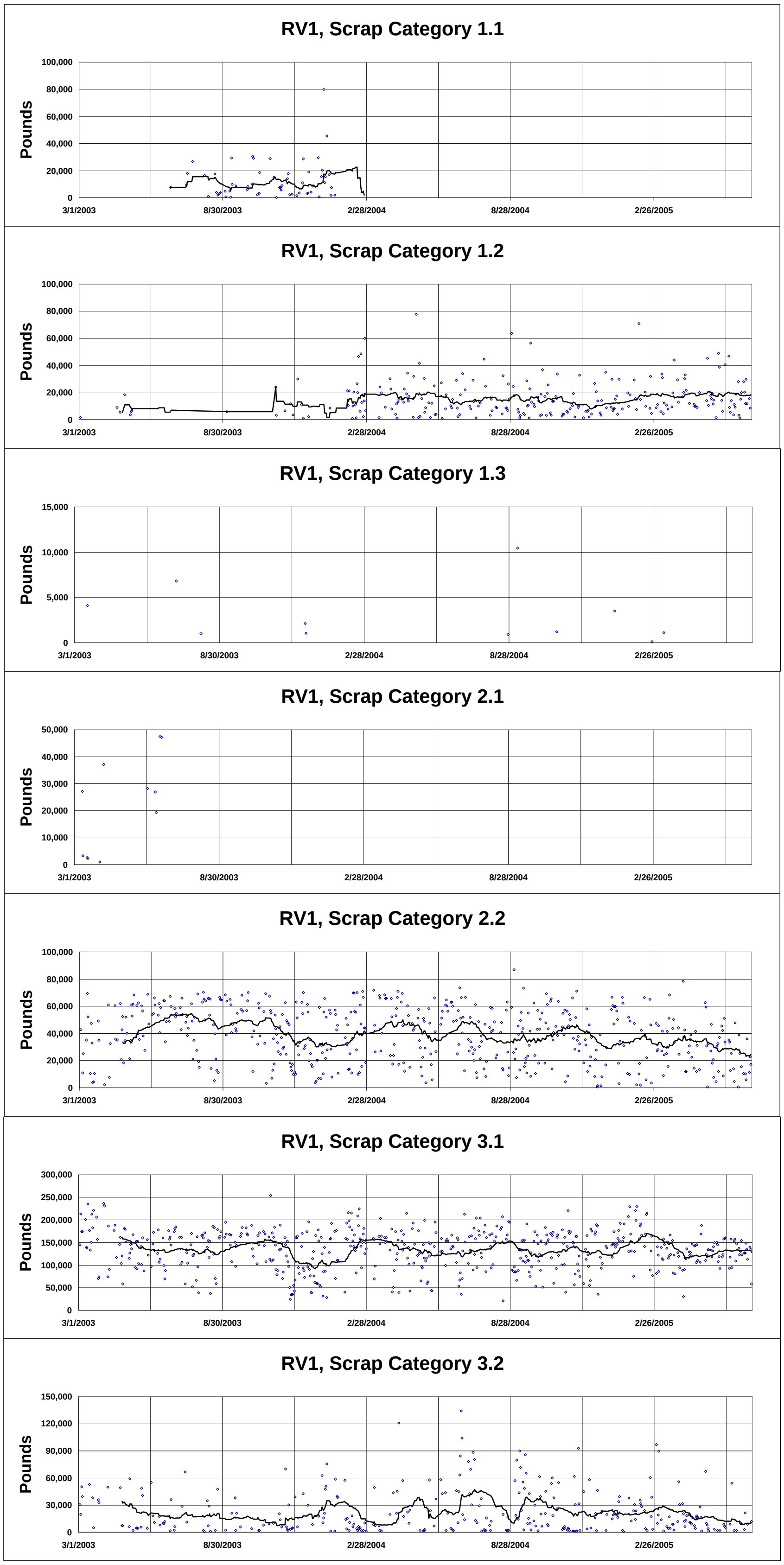


Figure H-3. Scrap use by RV2 at Continental Aluminum, New Hudson, Michigan one year before and one year after 2004 Exposure Investigation.

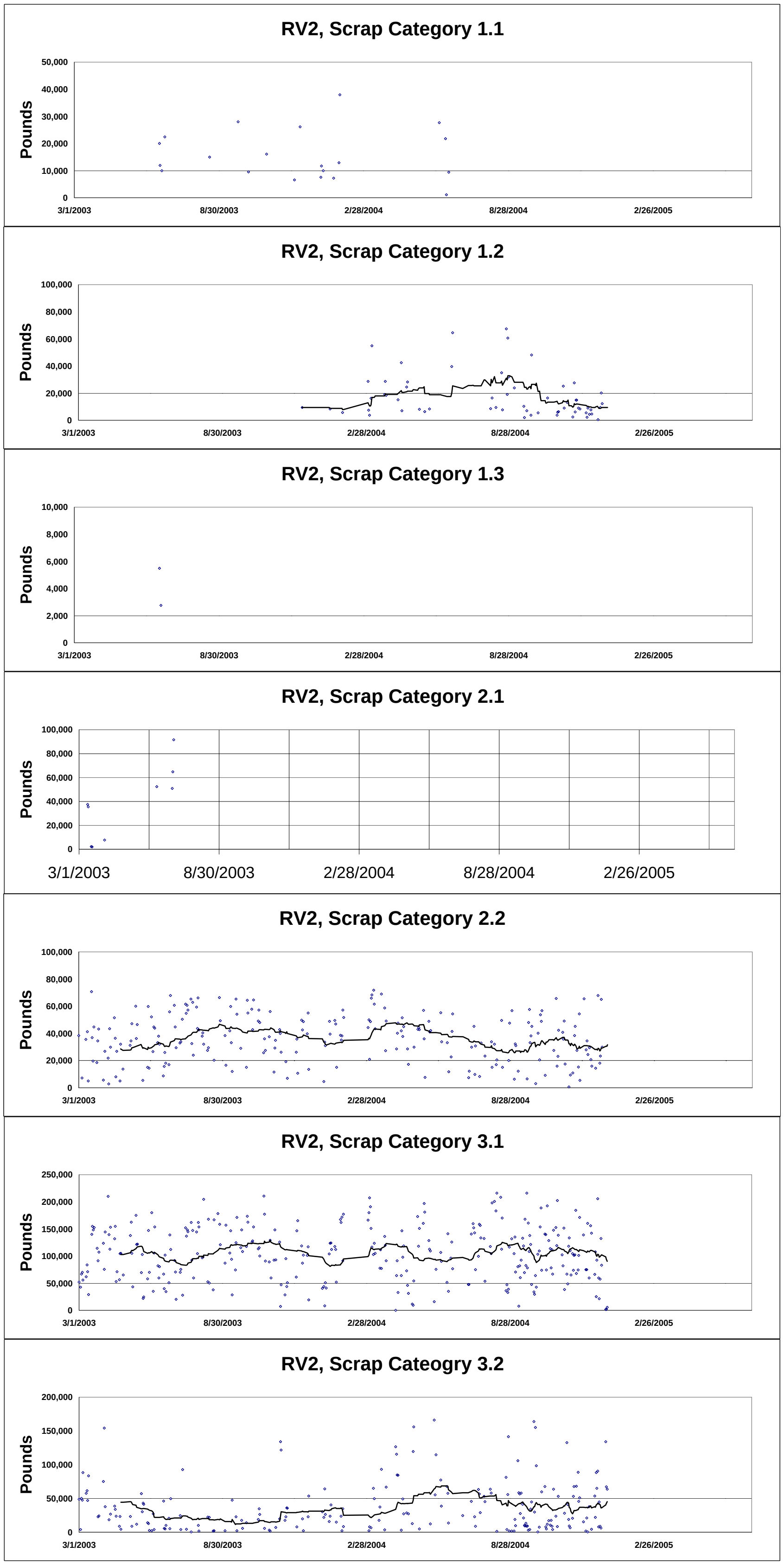
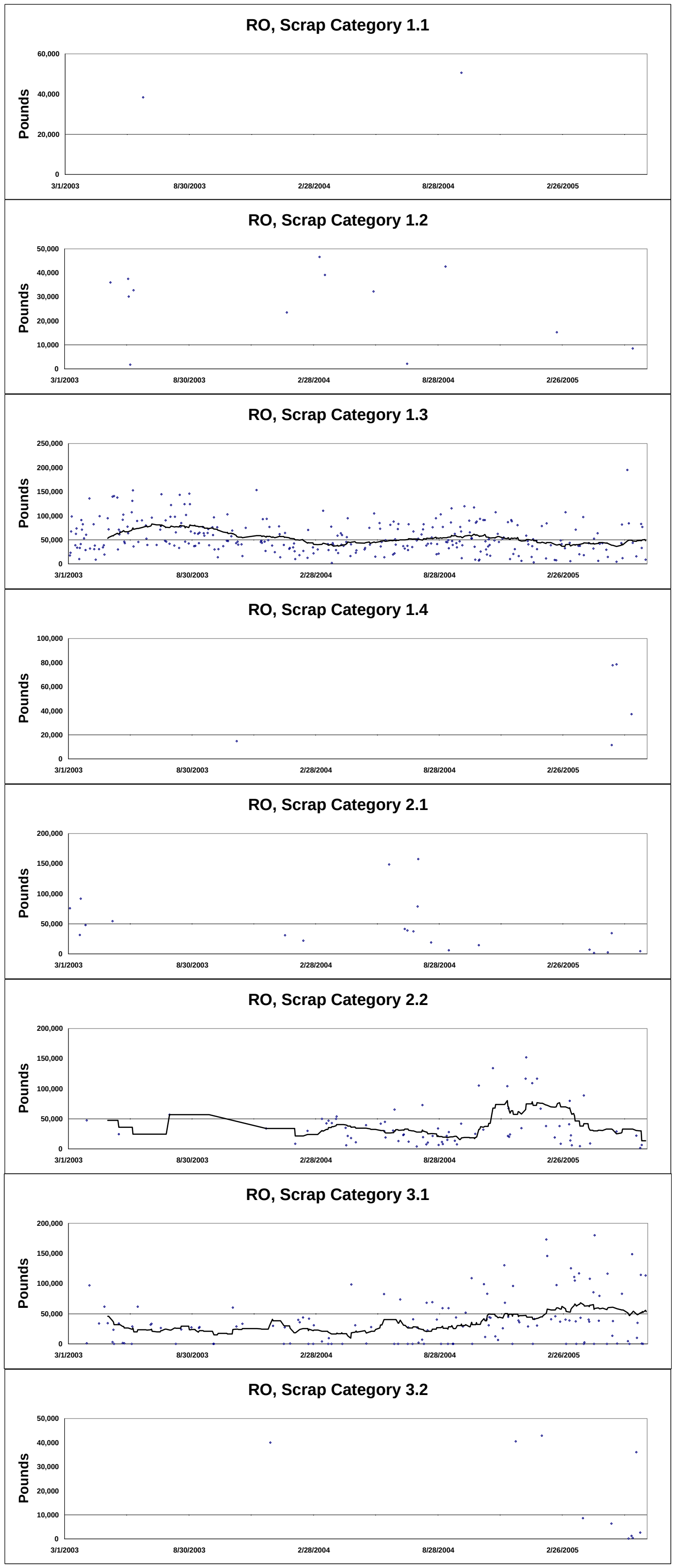


Figure H-4. Scrap use by RO furnace at Continental Aluminum, New Hudson, Michigan one year before and one year after 2004 Exposure Investigation.



RO rotary furnace