

Ashta Chemicals' Zero Mercury Emissions Claim Refuted by Air Monitoring

Executive Summary

Ashta Chemicals, LLC, the smallest of four remaining mercury-based chlor-alkali plants in the United States is the unmistakable source of elevated mercury air concentrations detected downwind of the plant during two days of air monitoring conducted by Oceana in June of 2009. This monitoring was conducted in an attempt to verify reports by the company, once a major mercury emitter, that it had entirely stopped releasing the toxic chemical.

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Oceana has argued that the only way to stop mercury pollution from mercury cell chlor-alkali plants is to shift to readily available modern chlorine production technology, and more than 100 facilities worldwide already have done so. Ashta, however, has thus far refused to make this shift.

Ashta was required by the Ohio EPA to install some of the most stringent mercury pollution controls implemented by the remaining mercury-cell chlorine plants. Ashta was also required by the Ohio EPA to annually conduct what is known as a "mass balance", which tracks mercury use and calculates the difference between any new mercury added to cells, and the mercury reported as released every year. These two numbers should be equal since no mercury is consumed in the chlor-alkali process, but historically, the chlor-alkali industry could not account for many tons of missing mercury. However, this mass balance accounting appeared to be the basis of recent reports that Ashta no longer emitted any mercury to the air. .

If Ashta had, in fact, totally eliminated all mercury releases to the air, we would not expect to detect higher than average background levels of mercury in the air outside the plant, since Ashta is the only large mercury user in the vicinity--not any day of the week or any week of the year. However, mercury levels in the air outside and downwind of the plant were clearly elevated from the very first sampling pass made by Oceana researchers.

Key Findings

1. Elevated mercury levels were identified in nine of twelve monitoring runs outside of the Ashta plant over a two day period.
2. The highest mercury concentration detected around the plant, 105 ng/m³, is 20 times higher than the maximum, and 35 times higher than the average mercury level detected at a reference site 14 miles to the west of the Ashtabula, Ohio plant.
3. The pattern of elevated levels downwind of the plant and low background levels upwind of the plant clearly demonstrates that the Ashta plant is the source of the mercury emissions

The maximum mercury concentration detected at the Ashtabula plant was similar to the maximum mercury air level detected in an air survey around another chlor-alkali plant in 2005 which had reported emitting over 500 lbs of mercury annually—during a time period when mercury regulations were more lax.

These elevated mercury concentrations detected downwind of the Ashta plant are surprising, given Ashta's reported zero mercury emissions and its installation of the most rigorous pollution control technology in the industry.

The monitoring conducted was far from comprehensive and ambient conditions (low to no wind) during sampling were not ideal. Under more favorable wind conditions, with access beyond the public roads that necessarily limited this effort, and with a longer monitoring time frame, greater mercury air concentrations might be measured.

Conclusions

The high levels of mercury detected here--despite very limited sampling in less-than-optimal wind and plant-access conditions—demonstrate that even the most rigorous pollution control technology, cannot completely control or eliminate mercury pollution releases from the chlor-alkali sector.

Ashta's reports of no mercury air emissions are clearly erroneous, demonstrating that mercury mass balance methods are inadequate to accurately account for mercury losses and fugitive emissions.

Recommendations

Phase out mercury use at chlor-alkali plants. It is clear that the only way to eliminate mercury releases from chlor-alkali plants to the environment is to stop using mercury to produce chlorine. Fortunately, alternative, mercury-free technology is available and being used by 95% of the industry. To ensure that the remaining four plants upgrade to modern technology, Congress should pass the Mercury Pollution Reduction Act (H.R. 2190, S. 1428).

In the meantime:

Monitor, Quantify and Report Mercury Air Emissions. The EPA should require that mercury-based chlorine factories monitor, quantify and report fugitive and stack mercury air emissions. The Ohio EPA should not allow Ashta Chemicals to rely on questionable mass balance approaches to quantify fugitive emissions. No regulatory agency should assume that air emissions are zero without verification.

Require Greater Transparency in Industry-wide Mass Balance Accounting. Since mass balance methods are returning questionable or erroneous results, regulatory authorities should not blindly accept that they are a valid measure of industry-wide mercury use and losses. EPA should inspect all individual plant mass balances to insure that unexplained gains in mercury are not occurring at other plants that offset industry-wide mercury losses.

Background

Mercury is a unique heavy metal that has several physical properties, (e.g. liquid at room temperature, dense, high vapor pressure, good amalgamator and conductor of electricity) that have been exploited by humans and industry since historic times. These same properties have also made this potent neurotoxicant extremely hard to control and contain. Mercury cell chlor-alkali plants use mercury as a cathode in the electrolysis of salt brine to produce chlorine and caustic soda or potash. In this process, mercury is not consumed. Each mercury cell contains an average of 8000 lbs of mercury. Each plant contains an average of 56 cells—or over 200 tons of mercury.¹ As a result of this massive mercury use in chlor-alkali plants at very high temperatures, hundreds of tons of mercury have escaped to the local and global environment, as both monitored stack air emissions and water discharges, and as estimated fugitive air emissions. It is worth noting that mercury is no longer necessary to produce chlorine, as over 95% of the chlor-alkali produced in the US uses modern mercury-free technology.

The Ashta Chemicals facility, located in Ashtabula, OH, is the smallest of the four remaining mercury-based chlorine factories in the United States, with 24 mercury cells. Built in 1963, this privately-owned facility had consistently been a large source of mercury air pollution according to the Environmental Protection Agency's Toxics Release Inventory (EPA TRI). Between 1987, when public reporting began, and 2007, the Ashta plant reported emitting more than 27,000 pounds of mercury to the air.² While recent reports to the EPA have shown a marked reduction in reported emissions, no readily available air monitoring data surrounding the plants has confirmed those reports.

In 2001, the Ohio EPA sued Ashta for mercury violations of its wastewater permit.³ The Ohio EPA agreed to drop legal action and the \$1.54 million fine for these permit violations under a Consent Order with Ashta signed September 2004 (Case No. 2001-CV_982).⁴ Under the Consent Order, Ashta agreed to install pollution control technology to achieve early compliance with the federal Maximum Achievable Control Technology (MACT) standard for stack emissions from mercury cells.⁵ Ashta also agreed to install fugitive emissions control technology more strict than the MACT rule and to conduct yearly mercury mass balances. The fugitive emission controls include mercury cell maintenance covers, a central vacuum system with carbon bed absorbers (to trap mercury), and separate rooms with scrubbers for conducting maintenance on equipment. These fugitive controls were completed June 2008 and go beyond the housekeeping rules set forth in the proposed MACT rule.⁶

Questionable mass balance accounting methods and lost mercury

While no mercury is used up in the process of making chlorine and caustic soda, mercury escapes to the water, air and products and must be replenished in the cells. Some of the biggest fugitive losses are thought to occur when mercury cells are opened for maintenance or through leaking equipment.⁷ In a “mass balance,” the amount of mercury reported as released should equal the amount replenished each year, since mercury cannot be created or destroyed. However, the mercury cell chlor-alkali plants generally purchase and add more mercury than they report releasing to the EPA. For example, Ashta Chemicals added over 18,000 lbs more mercury to their cells than they reported releasing from 1993-1997.⁸ For many years, the industry and EPA had been unable to account for the many tons of missing mercury. In fact, between 2000 and 2004 the industry lost track of 130 tons of mercury,⁹ While some had speculated that part of these unaccounted mercury losses had left the plants as fugitive air emissions¹⁰, the industry claimed it was likely that most of the missing mercury was accumulating in plant equipment, even though the claim was unsubstantiated.¹¹

In 2004, the Chlorine Institute, the trade group for the industry, committed to account to EPA for all mercury used by mercury cell chlor-alkali plants in the US (including Ashta), using annual mercury “mass balances”.¹² In this mass balance accounting, the difference between the mercury inventory at the start of the year plus any additions, and the mercury inventory at the end of the year should equal the measured mercury lost to the environment or to product contamination, since no mercury is consumed in the process. If these two sums are not equal, the difference between them identifies either an unaccounted for annual loss or gain of mercury. Using these methods, the industry now claims to have reduced the yearly unaccounted for mercury losses from 30 to 4 tons between the years of 2004-2007.¹³

At the same time, Ashta, as required by the previously mentioned Consent Order with Ohio EPA, has been conducting its own mercury mass balance since 2004. Curiously, Ashta has calculated an unaccounted for *gain* in mercury in every year since 2004, rather than a loss (Table 1). Between 2005 and 2008, Ashta has mysteriously gained over 2000 lbs of mercury, with no clear explanation for how or why this occurs. But the company has used this odd accounting to essentially write-off any fugitive loss, resulting in a report showing no mercury released to the environment. Without field monitoring, there was no way to verify if this was true.

In every year since 2005 that Ashta creates mercury out of thin air on its balance sheet, it has reported releasing zero lbs of fugitive mercury emissions to the EPA. In the most recently available data, Ashta reported releasing absolutely no mercury to the air from either stack or fugitive sources in 2007.¹⁴ If this were true, there should be no elevated mercury detected in the air outside the plant, since no other large mercury users exist near Ashta.¹⁵

**TABLE 1:
Ashta's annual mercury mass balances show large unaccounted for gains in mercury**

Year	Unaccounted Mercury (lb)		Reported TRI fugitive emissions (lb)
	loss	gain	
2004	464		464
2005		686	464
2006		105	0
2007		1559	0
2008		200	
Total gain		2550	

Sources: Memoranda from Ashta Chemicals to Ohio EPA, 2005-2009. Fulfilling requirements of Paragraph 11 of Consent Order, Case No. 2001-CV-982.; EPA TRI

This odd accounting raises several questions. For one, if the Chlorine Institute is using Ashta's figures for their tally of mercury use at all chlorine plants, are Ashta's yearly "gains" offsetting yearly losses at other plants? Are there plants other than Ashta that find mercury instead of losing it? If so, how do these figures affect the bottom line on how much total mercury is missing from this industry?¹⁶

Another question concerns discrepancies in the amount of virgin mercury Ashta added to cells in 2008. Ashta submitted a mass balance calculation for 2008 to Ohio EPA on January 27, 2009, in which Ashta claimed 3,030 pounds of mercury were added to the cells and had a total "gain" of 200 pounds of mercury for 2008 (Table 1). Ashta submitted a semi-annual MACT report on July 30, 2008 to cover the first half of that year and in that report, Ashta told Ohio EPA it added 3,794 pounds of mercury to the cells. If that number had been used on its mass balance, Ashta would have shown a "loss" of over 560 pounds.¹⁷

These questions and the latest EPA TRI report (in 2007) from Ashta claiming zero stack and fugitive emissions lead us to ask:

1. Is it true that Ashta releases absolutely no mercury (due to these mysterious gains on the balance sheet)? Or
2. Could the stringent mercury control technology installed in 2008 really eliminate all fugitive and stack emissions?

These questions led Oceana to test the air around the plant for mercury. This report describes the result of our air monitoring for mercury around Ashta over two days.

Methods

We used a Lumex RA 915+ mercury analyzer supplied by Ohio Lumex in Twinsburg, Ohio. This type of analyzer has been used in similar studies by both EPA and by Oceana and the NRDC.¹⁸ The Lumex analyzer has a reported minimum detection limit of 2 nanograms of mercury per cubic meter of air (ng/m^3), and a maximum limit of 200,000 ng/m^3 . An Oceana scientist trained by the Lumex supplier performed all mercury measurements.

We monitored mercury levels around the perimeter of the Ashta plant by performing both stationary and mobile air sampling on June 24 and 25, 2009. The Ashtabula police were notified of our planned sampling at the start of the monitoring runs around Ashta and may have notified the company. The Lumex mercury analyzer records instantaneous (second-by-second) mercury measurements. The analyzer was calibrated before monitoring began each day and once again after several hours. Mercury concentrations were recorded by computer. Simultaneous location measurements were recorded by a Garmin GPS receiver. Time into an analytical run, periodic mercury concentration readings, times on the GPS track and associated landmarks were hand recorded in a bound notebook for each run. Mobile sampling involved driving on roads around the plant while collecting air sampling data, with some stops in areas downwind of the plant. Stationary monitoring was performed in several locations north, south and east of the plant. We also measured mercury concentrations in a state park about 14 miles west (upwind) of Ashtabula, to determine mercury concentrations in a remote area with no known local mercury sources.

Results

Ashta is the source of elevated air mercury levels detected around the plant

Elevated mercury levels were detected in 9 out of 12 monitoring runs around the Ashta Chemicals plant. Table 2 shows the locations, weather, and results of our sampling runs. The highest mercury concentration detected around the plant, 105 ng/m^3 , is 20 times higher than the maximum and 35 times higher than the average mercury level detected at a reference site 14 miles to the west of the Ashtabula, Ohio plant.

All instances of high mercury readings around the Ashta plant (33-105 ng/m^3) were detected in fairly narrow plumes directly downwind of the plant at distances from approximately one third to one mile from the plant. On the other hand, average mercury readings in the same vicinity upwind of the plant were near background levels at the control site (3-8 ng/m^3). (Table 2, Appendix Figures 1-3) Thus, the Ashta Chemical plant is the unmistakable source of elevated mercury emissions detected in our limited sampling.

Table 2: Elevated mercury levels detected downwind of Ashta Chemicals

Sampling Run	Date	Duration (minutes)	Sampling site location	Weather	Mercury (ng/m3)		Location of Max reading relative to Ashta
					Average (upwind)	Max	
Geneva 1	6/23/2009	18	Stationary sampling at reference site, Geneva-on-the-Lake State Park, Ashtabula County, Ohio	Wind variable, calm to 1.9 mph; sunny; 84.4°F	3	5	14 miles W (upwind)
Ashta 1	6/24/2009	25	Mobile run from 20 and State Ave (N) to Middle Road (E) to Labounty (N) to Lake Rd (E)	Wind NNW, calm to 2 mph; sunny; 89°F	4	105	Middle Rd (ESE of plant)
Ashta 2	6/24/2009	12	Mobile run from Lakeshore Park to downtown Ashtabula (upwind of plant)	Wind NNW, 5 mph; sunny; 90.7°F	4	7	State Rd W (upwind)
Ashta 3	6/24/2009	24	Mobile run from West Ashtabula on 20 (E) to Cook Rd (N) to Middle Rd (paused 7 min at intersection until end of run)	Wind NNW, 1-2 mph; sunny; 90.7°F	5	51	Cook Rd (SSE)
Ashta 4	6/24/2009	11	Mobile run from Cook and Middle (W) to State (N) to Lake Rd.	Wind NNW, light; sunny; 89.6°F	3	44	Middle Rd (ESE of plant)
Ashta 5	6/24/2009	46	Mobile run from Lakeshore park to Lake Rd (E) to Labounty Rd (S) to Middle Rd (E) to Sill Rd (S) to 20 (W) to Tillotson(N) (pause); S on Tillotson to 20 (W) to State (N)	Wind calm; sunny, 83.8 F	4	16	Tillotson Rd (SE of plant)
Ashta 6	6/24/2009	36	Mobile run from Lakeshore Park to State Rd (S) to Middle (E) to Cook (S) to 20 (W) to Towne Square Mall	Wind N, 0-2 mph; sunny	3	69	Middle Rd (ESE of plant)
Ashta 7	6/25/2009	51	Mobile run from Lake and State (S) to Middle (E) to Labounty (N) to Lake Rd (W) (pause 19 min); backtrack to State Rd.	Wind SSW, 3 mph; partly cloudy, 76.3 F	6	40	Lake Rd (North of plant)
Ashta 8	6/25/2009	48	Mobile run from West Ashtabula on 20E to Cook (N) to Middle (E) to Labounty (N) to Lake (W) (pause for 32 minutes of stationary sampling); West on Lake to State	Wind S, 0-4 mph, partly cloudy, 92 F	3	33	Lake Rd (N of plant)
Ashta 9	6/25/2009	31	Mobile run from 20 and State (N) to Middle (E) to Cook (pause 9 minutes); Middle (E) to Labounty(N) to Lake (W)	Wind W 0-2 mph, clouds building, 94.1 F	8	99	Middle Rd (ESE of plant)
Ashta 10	6/25/2009	25	Mobile run Beach and Lake (E) to Labounty (S) to Middle (W) to Cook (pause 10 minutes); Middle (W) to State (N) to Lake Rd	Wind WSW, 0-1 mph; cloudy	7	44	Cook and Middle Rd (ESE of plant)
Ashta 11	6/25/2009	54	Mobile run from 20 and State (N) to Middle (E) to Sill Rd (S) to 20 (E) to Cook (N) (pause 29 minutes).	Wind variable, very slight breeze; partly cloudy; 87 F	7	84	Cook and Middle Rd (ESE of plant)
Ashta 12	6/25/2009	20	Mobile run from Cook and Middle (W) to State (N) to Lake Rd (E) to Labounty (S) to Middle (W)	Wind variable to calm	8	15	State Rd (upwind)

The air mercury concentrations detected in our limited sampling are below public health criteria, which range from 200- 300 ng/m³ for chronic mercury exposure.¹⁹ Previous air monitoring surveys conducted around mercury-cell chlorine plants by academic, governmental and non-governmental scientists indicate that instances of highly elevated mercury air concentrations are episodic and likely related to plant equipment maintenance operations.²⁰ Detection of such elevated concentrations at distances away from the plant is dependent on wind strength and being in the right place at the right time to intersect the plume. Our sampling protocol was not ideal: it was limited to a few hours over two days on public access roads and during low wind conditions. Thus, one cannot rule out the possibility of greater mercury air emissions from this plant at other times.

Mercury air levels detected around Ashta are similar to levels monitored at another chlorine plant with reported mercury air emissions of over 500 lbs

The maximum concentration detected at the Ashtabula plant was similar to the maximum mercury air level detected in a survey of another chlor-alkali plant in Alabama in 2005. At the time, this other plant reported releasing more than 500 lbs of mercury as fugitive and stack emissions. Furthermore, because the 2005 survey was undertaken before the December 2006 compliance date for new pollution control MACT regulations aimed at reducing fugitive emissions from chlor-alkali plants, routine mercury releases were likely higher than at present.²¹

The detection of mercury concentrations around the Ashta plant--which supposedly employs the most stringent fugitive controls in the industry--at levels comparable to those detected at less highly regulated and leaky plants, demonstrates that even the best controls allow considerable amounts of mercury to escape. The type of monitoring data presented here does not allow us to quantify the full amount of mercury routinely escaping from Ashta Chemicals to the air. In order to estimate annual fugitive emissions, one would have to continuously measure the concentration of mercury in the air leaving the plant and the associated air volumes over time, something federal regulations do not require (but should) and that is beyond the scope of this project.

Mercury mass balance methods as used by industry are unreliable

Although often useful to track difficult-to-measure mass flows and highlight where more information is needed, mass balance methods have limitations and must be ground-truthed. Any unaccounted for mass losses or gains should be used to investigate and verify the sources of these mass balance errors. Because mercury is highly volatile, unnoticed losses of a transparent gas are more likely than unexplained gains of a very dense metal. And indeed, the industry has consistently lost many tons of mercury over the years, while Ashta is the only plant we know of that has created it. The fact that Ashta now reports zero mercury air emissions while emitting mercury at levels similar to those at other plants demonstrates that these methods do not work for tracking mercury in this industry. If mass balance methods accurately reflected mercury flows in the industry, it is not unimaginable that a small gain in one year might be offset by a small loss in the subsequent year. But four consecutive years of consistent unaccounted for *gains* on Ashta's balance sheet totaling over one ton of mercury (Table 1) should have raised concerns for regulatory agencies about this method. To use these hypothetical gains as a basis for reporting zero fugitive emissions is unacceptable and calls into question the validity of these methods to track industry-wide mercury use and loss.

While we applaud all measures undertaken to attempt to control and eliminate mercury releases from this industry, these results demonstrate that the best and possibly only way to control mercury pollution from chlorine plants is to end the use of mercury. Fortunately, other more modern, energy efficient, and less polluting methods exist to produce chlorine and caustic soda or potash. Ultimately, the passage of legislation now moving through Congress to end the use of mercury in the manufacture of chlorine will provide a much more reliable method for ending mercury releases from these plants.

Conclusions

Ashta is the unmistakable source of elevated mercury concentrations detected in Ashtabula Ohio downwind of the plant. Thus, we can conclude that Ashta emits mercury to the air, their mass balance accounting is in error and their pollution controls do not eliminate emissions.

These results show that even with the supposedly most rigorous pollution control technology, it is impossible to completely control or eliminate mercury pollution releases from the chlor-alkali sector. Mercury mass balance methods alone are inadequate to accurately account for mercury losses and fugitive emissions. These results also call into question the accuracy of mass balance accounting methods used by the Chlorine Institute to account for the industry's lost mercury.

Recommendations

Phase out mercury use at chlor-alkali plants. It is clear that the only way to eliminate mercury releases from chlor-alkali plants to the environment is to stop using mercury to produce chlorine. Fortunately, alternative, mercury-free technology is available and being used by 95% of the industry. To ensure that the remaining four plants upgrade to modern technology, Congress should pass the Mercury Pollution Reduction Act (H.R. 2190, S. 1428).

In the meantime:

Monitor, Quantify and Report Mercury Air Emissions. The EPA should require that mercury-based chlorine factories monitor, quantify and report fugitive and stack mercury air emissions. The Ohio EPA should not allow Ashta Chemicals to rely on questionable mass balance approaches to quantify fugitive emissions. No regulatory agency should assume that air emissions are zero without verification.

Require Greater Transparency in Industry-wide Mass Balance Accounting. Since mass balance methods are returning questionable or erroneous results, regulatory authorities should not blindly accept that they are a valid measure of industry-wide mercury use and losses. EPA should inspect all individual plant mass balances to insure that unexplained gains in mercury are not occurring at other plants that offset industry-wide mercury losses.

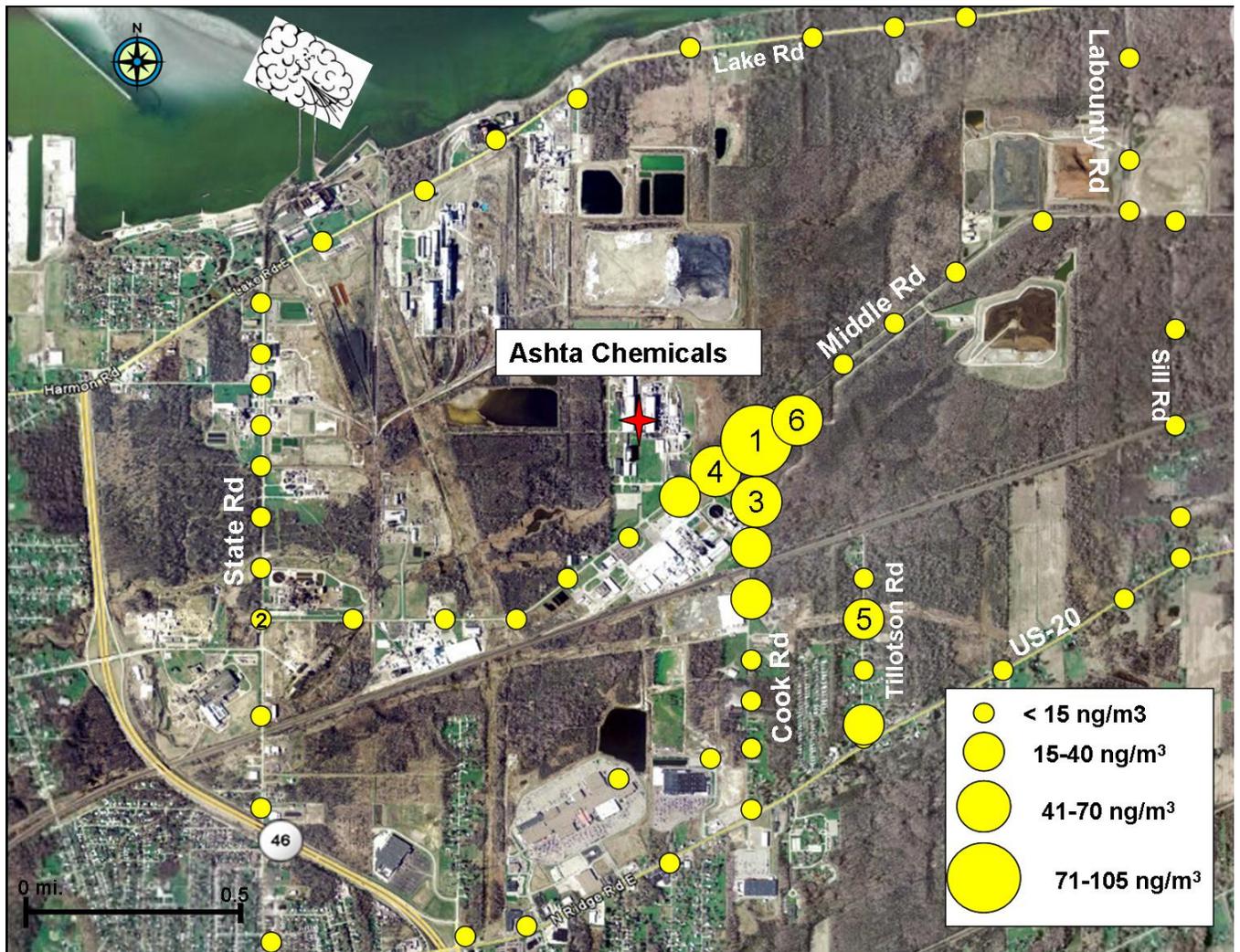
Appendix Figure 1



Control Site

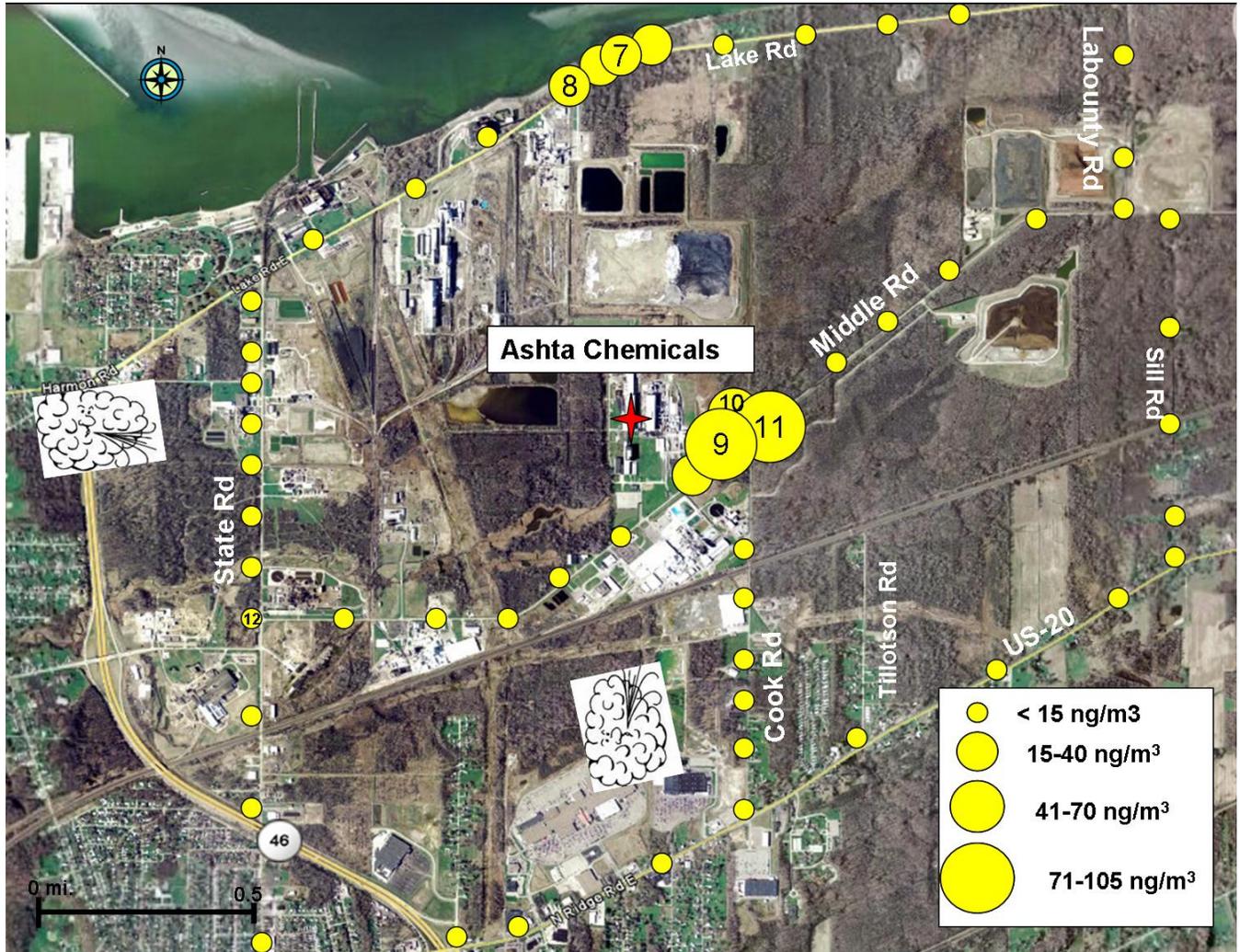
Geneva-on-the-Lake State Park, (Ashtabula county), in northeastern Ohio on Lake Erie. This control site is 14 miles west (upwind) of Ashta Chemicals in Ashtabula, Ohio. This rural area has no known mercury sources. Average and maximum mercury concentration readings during 18 minutes of monitoring on June 23, 2009 were 3 and 5 ng/m³.

Appendix Figure 2



Sampling runs 1-6 around Ashta Chemicals, Ashtabula, Ohio on June 24, 2009. Winds were light and from the NNW. The maximum mercury concentration detected on each run is identified with a number corresponding to the run (See Table 2). On this day the maximum mercury concentration was 105 ng/m³, downwind of the plant. Average mercury concentrations upwind were < 10 ng/m³.

Appendix Figure 3



Sampling runs 7-12 around Ashta Chemicals, Ashtabula Ohio, on June 25, 2009. Wind direction was variable, beginning from the SSW (runs 7&8) and then more westerly (Runs 9-12). The maximum mercury concentration detected on this day was 99 ng/m³, ESE of the plant.

Acknowledgements

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Endnotes

¹ U.S. Environmental Protection Agency (U.S. EPA) National Emission Standards for Hazardous Air Pollutants: Mercury Emissions from Mercury Cell Chlor-alkali Plants, Proposed Rules. 67 Fed.Reg. 44672 (July 3 2002).

² U.S. EPA, Toxics Release Inventory, 1987-2007, available on line at: <http://www.epa.gov/triexplorer/>

³ Ohio EPA News Release, “Ashta Chemicals, Inc. Agrees to Reduce Mercury Emissions to Settle Permit Violations” 22 Sept. 2004.

⁴ State of Ohio v. Ashta Chemicals, Court of Common Pleas, Ashtabula County, Ohio. Consent Order, Case No. 2001-CV_982, September, 2004

⁵ U.S. EPA National Emission Standards for Hazardous Air Pollutants: Mercury Emissions from Mercury Cell Chlor-alkali Plants, Final Rule. 68 Fed..Reg. 70904 (Dec. 19, 2003).

⁶ U.S. EPA. National Emission Standards for Hazardous Air Pollutants: Mercury Emissions from Mercury Cell Chlor-alkali Plants, Proposed Rule. 73 Fed..Reg. 33258 (June 11, 2008).

⁷ 73 Fed. Reg. at 33260

⁸ Quirindongo, M., J. Devine, A. Leiter, and L. Greer. 2006. Lost and Found: Missing Mercury from Chemical Plants Pollutes Air and Water. Natural Resources Defense Council, Washington, DC

⁹ 68 Fed Reg. at 70920; Chlorine Institute, Inc., 2003. Sixth Annual Report to EPA, for the Year 2002; Chlorine Institute, Inc., 2005. Eighth Annual Report to EPA, for the Year 2004; Quirindongo, M., J. Devine, A. Leiter, and L. Greer. 2006. Lost and Found: Missing Mercury from Chemical Plants Pollutes Air and Water. Natural Resources Defense Council, Washington, DC.

¹⁰ Winalski, D., S. Mayson, and J. Savitz. 2005. Poison Plants: Chlorine Factories are a Major Source of Mercury. Oceana, Washington, DC. Quirindongo, M., J. Devine, A. Leiter, and L. Greer. 2006. Lost and Found: Missing Mercury from Chemical Plants Pollutes Air and Water. Natural Resources Defense Council, Washington, DC.

¹¹ 68 Fed. Reg. at 70920

¹² Chlorine Institute, Inc., 2004. Seventh Annual Report to EPA, For the Year 2003.

¹³ Chlorine Institute, Inc., 2008. Eleventh Annual Report to EPA, For the Year 2007.

¹⁴ U.S. EPA, Toxics Release Inventory, 2007, available on line at: <http://www.epa.gov/triexplorer/>

¹⁵ We conducted a search of mercury emitters in Ashtabula and surrounding counties. The closest power plant was ~ 2.5 miles to the east of Ashta Chemicals; no easterly winds were measured during our monitoring that took place west of this power plant. The next nearest plant was over 40 miles away to the west. The tall height of power plant stacks would essentially preclude detection of their mercury plumes in our ground level surveys around Ashta. Any

contribution of these power plants to mercury measured surrounding Ashta would be incorporated in the ambient air mercury levels measured at ground level upwind of the Ashta plant.

¹⁶ Thus far, the public has only had access to annual summary reports for the entire industry from the Chlorine Institute to the EPA (available at: <http://www.epa.gov/region5/air/mercury/reducing.html#heavy%20industry>), so these questions are difficult to answer without further transparency or disclosure. Oceana obtained Ashta's mass balance in a Freedom of Information Act request. Since the Ohio EPA specifically required Ashta to conduct mass balances under a consent order, it is unclear if all the other mercury-based chlorine plants conduct their own mass balance or instead rely on the Chlorine Institute.

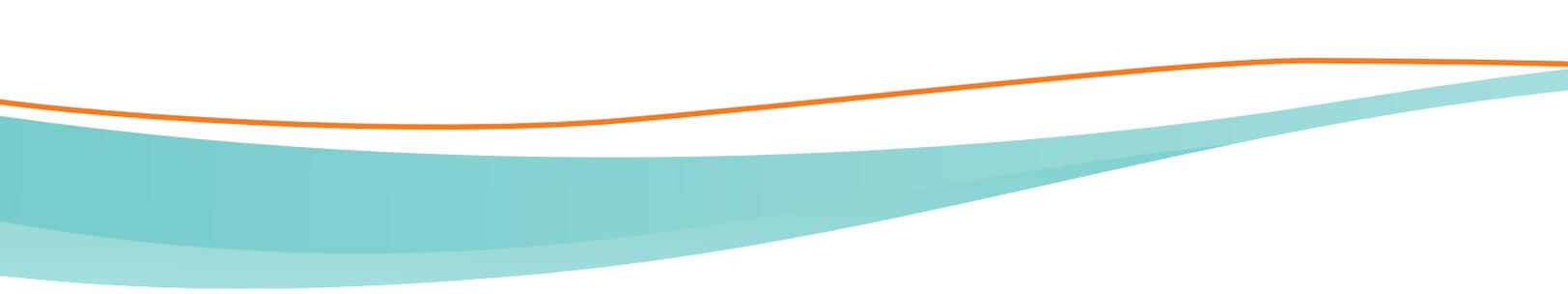
¹⁷ In 2004, Ashta reported an accounted for loss of 464 lbs as a fugitive loss to TRI. See Table 1. However, the chlor-alkali industry rarely treats these losses as fugitive emissions.

¹⁸ Southworth, G.R., S.E. Lindberg, H. Zhang and F.R. Anscombe. 2004. Fugitive Mercury Emissions from a Chlor-Alkali Factory: Sources and Fluxes to the Atmosphere. *Atmospheric Environment*, 38: 597-611.; Quirindongo, M., J. Devine, A. Leiter, and L. Greer. 2006. Lost and Found: Missing Mercury from Chemical Plants Pollutes Air and Water. Natural Resources Defense Council, Washington, DC.; Quirindongo, K. Warner, J. Savitz, L. Greer and E. Uram. 2006. Lost and Found in Wisconsin: Mercury from Chlorine Plant Found in Nearby Air. Natural Resources Defense Council, Oceana, and Mercury Policy Project, Washington, DC.

¹⁹ ATSDR, "Minimal Risk Levels (MRLs) for Hazardous Substances," available online at <http://www.atsdr.cdc.gov/mrls.html>.; U.S. EPA Integrated Risk Information System, Mercury, Elemental, Quick Review. Available online at: http://cfpub.epa.gov/ncea/iris/index.cfm?fuseaction=iris.showQuickView&substance_nmbr=0370#refinhal. Accessed 29 July 2009.

²⁰ Southworth, G.R., S.E. Lindberg, H. Zhang and F.R. Anscombe. 2004. Fugitive Mercury Emissions from a Chlor-Alkali Factory: Sources and Fluxes to the Atmosphere. *Atmospheric Environment*, 38: 597-611.; Quirindongo, M., J. Devine, A. Leiter, and L. Greer. 2006. Lost and Found: Missing Mercury from Chemical Plants Pollutes Air and Water. Natural Resources Defense Council, Washington, DC.; Quirindongo, K. Warner, J. Savitz, L. Greer and E. Uram. 2006. Lost and Found in Wisconsin: Mercury from Chlorine Plant Found in Nearby Air. Natural Resources Defense Council, Oceana, and Mercury Policy Project, Washington, DC.; Wisconsin Department of Natural Resources, Ambient Mercury Monitoring Near Vulcan Materials Company, Port Edwards, April 8 – May 16, 2002 and August 16 –September 27, 2002, [Memorandum from D. Grande and M.K. Allen to Air Toxics Monitoring File], February 18, 2003.

²¹ 68 Fed. Reg. at 70928



Oceana campaigns to protect and restore the world's oceans. Our teams of marine scientists, economists, lawyers and advocates win specific and concrete policy changes to reduce pollution and to prevent the irreversible collapse of fish populations, marine mammals and other sea life. Global in scope and dedicated to conservation, Oceana has campaigners based in North America (Washington, DC; New York, NY; Juneau, AK; Anchorage, AK; Monterey, CA; Portland, OR; St. Petersburg, FL and Boston, MA), Europe (Madrid, Spain; Brussels, Belgium) and South America (Santiago, Chile). More than 300,000 members and e-activists in over 150 countries have already joined Oceana. For more information, please visit www.Oceana.org.



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