

Tonawanda Coke Corporation (TCC) Soil Study 2019 Second Year Report July 2018 through January 2019 February 28, 2019

Introduction and Summary

This second annual report covers the last six months of 2018 and the first month of 2019 of the TCC Soil Study, and includes efforts from the two of the three study partners, staff and students from the Department of Chemistry at the University at Buffalo, SUNY, led by the overall Study Principal Investigator, Professor Joseph A. Gardella, Jr., students from Department of Chemistry at SUNY Fredonia, led by Professor Michael Milligan and efforts from community volunteers organized by UB Department of Chemistry. Citizen Science Community Resources (CSCR), under the direction of Jackie James-Creedon was asked to contribute to this report but declined¹. Attached are summaries of activities and budget reports from UB and SUNY Fredonia Department of Chemistry (**Appendices 2-3**).

The present report will focus on activities ***after what was reported in the June 2018 (dated July, 2018) report***, which included the status of map development from Phase 1 sampling and preliminary geospatial data analysis and the initiation of Phase 2 sampling. This report will focus on the efforts to create maps of pollutants from Phase 1 results and have them reviewed by NY State DEC and EPA liaisons and to determine the areas of interest for Phase 2 soil sampling. Phase 2 soil sampling took place from July 2018 following through Summer and Fall 2018. The TCC Soil Study Community Advisory Committee (CAC) met monthly from July through December. In consultation with the CAC the SUNY Fredonia team led by Professor Michael Milligan proposed and began implementation of the expanded air sampling study in addition to the reference air sample that was taken at Tonawanda Coke. At the November CAC Meeting, DEC engineering staff who had reviewed the draft maps from Phase 1 data presented their conclusions and answered questions about the map review. A public meeting was held on January 16, 2019 to present a **comprehensive picture of the legacy of pollution due to Tonawanda Coke in the Town and City of Tonawanda, parts of Buffalo and portions of Grand Island.**

Updates on recent efforts

Outreach and Community Education

- Efforts led Kathryn Little, TCC Soil Study Community Organizer and Dr. Tammy Milillo, detailed below included the distribution of ca. 25,000 flyers by door to door canvassing from June to November 2018. Also, outreach led by Dr. Milillo resulted in informal “Talks with Tammy” continued regularly.
- At the January public meeting, UB has released a map describing the regions of interest for Phase 2 sampling, along with additional maps of individual pollutant distributions in the sampling area. Also released were updated FAQ sheets, and the PowerPoint that was presented by Dr. Gardella at the public meeting on the TCC Soil Study². These are all posted on the Friends of TCC Soil Study Facebook page and UB’s College of Arts and Sciences Website at <http://arts-sciences.buffalo.edu/chemistry/tonawanda-coke-soil-study.html>
- **Facebook, Twitter and Instagram Accounts were maintained for Friends of Tonawanda Coke Soil Study.** Live streaming of Talks with Tammy were done with Facebook.

¹ See email correspondence, Appendix 1.

² Appendix 4

Development, Validation and Reporting of Phase 1 mapping results

- As part of the evaluation by NY State DEC and EPA of Phase 1 results (the designated NYS DEC region 9 staff and EPA Region 2 staff who have served since 2017), Dr. Tammy Milillo, (UB Chemistry Dept) developed over 4000 draft maps resulting from various geographic analysis methodologies from the testing results.
- **TCC Soil Study Phase 2 Sampling Plan** was developed through outreach to potential participants. As noted in the outreach plan results, ca. 25,000 flyers distributed resulted in over 700 potential participants for Phase 2 sampling. 132 samples were taken in Phase 2 and results are under evaluation.
- **Expanded Air Sampling Study** proposed by Prof. Michael Milligan in response to discussions with the CAC was reviewed and implemented for six of nine residential samples (Appendix 3).
- **Tonawanda Coke leadership provided access for Court ordered soil sampling (October 12) and air sampling (October 15) just before the closure of the plant as part of Phase 2 Source Apportionment work**
- **Two samples from school sites in the Grand Island Central School District had elevated levels of Arsenic. One of these samples had high levels of polycyclic aromatic hydrocarbons (PAHs).** Because these samples were near other samples that had no elevated levels of contamination, we determined that highly localized contamination was not likely due to deposition from air emissions from TCC. We worked with the Grand Island School district leadership in reporting this to the Board of Education and then at a public meeting in December. The district is developing a remediation plan for the sites.
- **Soil sampling at the City of Tonawanda Schools** yielded no sites of contamination above SCOs and was reported to the Board of Education in December, 2018.
- **Elevated levels of Poly Chlorinated Biphenyls (PCBs)** were found in residential sites near the previously remediated Spaulding Fibre Superfund Site in the City of Tonawanda. Because Spaulding Fibre had serious PCB contamination on site, the NYS DEC has planned follow-up residential sampling in the residential area closest to the cleaned up Spaulding Fibre site.

Outreach and Education

Summary of Katie Little, Dr. Tammy Milillo, and Student Work/Education and Outreach Campaign as of February 11, 2019

Education Campaign Plan

Ms. Little and Dr. Milillo developed an Education Campaign Plan³ to fulfill tasks that were not being addressed by Jackie James-Creedon and CSCR for the Tonawanda Coke Soil Study. The Plan was distributed to the Soil Study Community Advisory Committee at the monthly meeting in April (4/25/18).

Distributing flyers (flyering)

Flyers were distributed as a method of increasing awareness about the soil study, identifying residents who are interested in participating in the soil study (either by having their soil tested or by volunteering), and informing residents of upcoming events related to the soil study. An example of a flyer can be seen below (Figure). Flyers also emphasized connecting to the soil study using social media as a way to stay informed about relevant soil study news and information. Flyers were updated periodically to advertise upcoming events such as community meetings and “Talks with Tammy” events.

³ Appendix 5

General flyer distribution locations were chosen based on results from Phase 1. In each location a flyer was distributed to each house and was placed in the door or on the side of the mailbox. The breakdown of the number of flyers distributed in each location is denoted in the following table. The current total number of flyers distributed is approximately 25,000. Flyer distribution is ongoing, so the total number of distributed flyers is expected to increase.

Table 1: Approximate number of flyers distributed as of 11/7/2018

City of Tonawanda	Town of Tonawanda	Grand Island	Southern Study Border	Eastern Study Border	Grand Total
2,800	4,500	2,400	6,650	8,650	25,000

Dear Neighbor,

- The University at Buffalo, SUNY Fredonia, and Citizen Science Community Resources are working together on the Tonawanda Coke Soil Study.
- This study hopes to develop a better understanding of how our community has been affected by Tonawanda Coke who knowingly released harmful coke oven gases.
- We are looking for residents in the neighborhood to participate in the study and have their soil tested.

**Contact Katie Little
if you are interested in
getting your soil tested.**

klittle@buffalo.edu
(716) 400-9410

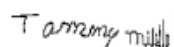
Soil samples are free of charge, confidential, and are limited

- Even if you don't have your soil tested, we want to share the results of the soil study with you and answer your questions.

Thank you for your interest in our community and our research.
In solidarity,


Katie Little
Community Organizer
klittle@buffalo.edu
716-400-9410




Tammy Milillo
Research Assistant Professor
tammymil@yahoo.com
716-645-4168



Community Q&A
"Talks with Tammy" series

Sunday 7/1/18 2-4pm at Spot Coffee
1 Delaware Road Buffalo, NY 14217

Saturday 7/7 11am-1pm at Adrian's Custard and Beef
2335 Grand Island Boulevard Grand Island, NY 14072
(Rain location: Tim Hortons 1885 Grand Island Blvd 14072)

Monday 7/30 6-8pm at Panera Bread
1747 Sheridan Dr, Tonawanda, NY 14223

Saturday 8/4 1-3pm at Panera Bread
1747 Sheridan Dr, Tonawanda, NY 14223

Tuesday 8/21 6-8pm at Panera Bread
1747 Sheridan Dr, Tonawanda, NY 14223

Fun events in the community:

Saturday 7/14 1-4pm Buffalo Science Fest at Canalside
44 Prime Street, Buffalo, NY 14202

Saturday 8/25 Elmwood Avenue Arts Festival 10am – 6pm
Sunday 8/26 Elmwood Arts Festival 10am – 5pm
at Elmwood and Lafayette

- facebook.com/TCCSoilStudy
- instagram.com/TCCSoilStudy
- twitter.com/TCCSoilStudy



We are always looking for volunteers from the community, if you are passionate about this project please contact Katie Little to get involved with us!

Figure 1: Example of a flyer distributed in the community to raise awareness about the soil study and upcoming events.

Ms. Little, Dr. Milillo and the student team have fielded and followed up with over 500 calls and emails in response to the flyering effort and have compiled the information into a list of people who are interested in getting their soil tested. In Phase 2 of the soil study we will mainly sample in areas of interest; those who expressed interest in having their soil tested in Phase 1 and are located in or near areas that have been tentatively identified as areas of interest were included in the list of interested participants for Phase 2. The additions from the 2018 flyering effort have brought the total number of interested soil study participants to nearly 700.

Talks with Tammy

In an effort to promote transparency and provide residents with the opportunity to ask questions about the research Ms. Little and Dr. Milillo scheduled a series of “Talks with Tammy” events. These are informal sessions located at local restaurants and/or parks where Dr. Milillo and Ms. Little are available and residents can come and go as they are available. Table 2 summarizes information about the “Talks with Tammy” events.

As Phase 2 of the study progresses “Talks with Tammy” events are places where participants in the soil study can pick up their soil study report and have a private consultation about their results. Many residents have questions about their result packet; these events give participants an in-person option to discuss their results in addition to other options such as a phone call or a meeting in the participant’s home.

Table 2: Talks with Tammy event dates, locations, and number of attendees.

Event Location	Date	Number of Attendees
Tim Hortons – 71 Niagara Street Tonawanda, NY 14150	Saturday, 6/23/18 11-1pm	1
Panera Bread – 1747 Sheridan Drive Tonawanda, NY 14223	Monday, 6/25/18 6-8pm	4
Spot Coffee – 1 Delaware Road Buffalo, NY 14217	Sunday, 7/1/18 2-4pm	5
Adrian’s Custard and Beef – 2335 Grand Island Blvd Grand Island, NY 14072	Saturday, 7/7/18 11-1pm	5
Panera Bread – 1747 Sheridan Drive Tonawanda, NY 14223	Monday, 7/30/18 6-8pm	7
Panera Bread – 1747 Sheridan Drive Tonawanda, NY 14223	Saturday, 8/4/18 1-3pm	0
Panera Bread – 1747 Sheridan Drive Tonawanda, NY 14223	Tuesday, 8/21/18 6-8pm	5
Panera Bread – 1747 Sheridan Drive Tonawanda, NY 14223	Monday, 9/10/18 6-8pm	3
Panera Bread – 1747 Sheridan Drive Tonawanda, NY 14223	Tuesday, 9/25/18 6-8pm	0
Panera Bread – 1747 Sheridan Drive Tonawanda, NY 14223	Tuesday, 10/16/18 6-8pm	7
Panera Bread – 1747 Sheridan Drive Tonawanda, NY 14223	Monday, 10/22/18 6-8pm	0
Panera Bread – 1747 Sheridan Drive Tonawanda, NY 14223	Monday, 11/5/18 6-8pm	3
Panera Bread – 1747 Sheridan Drive Tonawanda, NY 14223	Friday, 11/16/18 6-8pm	1
Panera Bread – 1747 Sheridan Drive Tonawanda, NY 14223	Friday, 11/30/18 6-8pm	0
Panera Bread – 1747 Sheridan Drive Tonawanda, NY 14223	Tuesday, 12/11/18 6-8pm	0
Panera Bread – 1747 Sheridan	Tuesday 1/8/19	2

Drive Tonawanda, NY 14223	6-8pm	
Panera Bread – 1747 Sheridan Drive Tonawanda, NY 14223	Wednesday 1/23/19 6-8pm	3
Panera Bread – 1747 Sheridan Drive Tonawanda, NY 14223	Monday 2/4/19 6-8pm	2

Social Media Outreach Statistics

In an effort to make information about the soil study more readily available Ms. Little has created accounts on Facebook, Instagram, and Twitter. These accounts are used to direct people who have an interest in the study to find out more information and to keep up with progress about the soil study. We intend to build our following and use the social media accounts as a tool- in addition to email, phone calls, and flyering, to get messages out to the community about soil study updates and other relevant news.

Table 3: Number of followers for social media accounts.

Facebook	Instagram	Twitter
248	25	11

We keep our Facebook followers engaged with our page by regularly posting about relevant science articles, current events, and updates about the soil study. Since our start date (4/17/2018), as of 2/11/2019 we have published 170 posts which have reached 13,159 viewers. The average reach, or people who viewed the post, was 77 persons per post. Generally, the most popular posts have been the live feeds, or videos, where Dr. Milillo and Ms. Little discuss common questions about the soil study. The most popular post reached 702 viewers.

The number of people who we have reached through our Facebook posts have been purely “organic” meaning that people who see the post are those who have either liked our page, or who have seen a post that has been shared from our page. We have not used the “Boost” feature, which posts content to others who are not friends of the page for a fee.

Other events/meetings

Table 4 shows events and meetings scheduled by Ms. Little and Dr. Milillo in an effort to promote transparency, knowledge about the research and to make information about the soil study more readily available to community members.

Table 4: Summary of soil study meetings.

Meeting Name	Location	Date	Purpose	Approximate # Attendees
Community Meeting	Kenmore Library	5/15/2018	General update about the soil study	30
Soil Sampling Training	UB	6/11/2018	Train student employees about soil sampling procedure	6

Canvassing with Compassion Training	University Tool Library	6/16/2018	Educate student employees about nuances of community outreach. Partnered with Science Demands Action community group. Workshop was livestreamed on Facebook for those who could not attend in person.	In person – 10 Online – 7.3K+
Soil Sampling Training	UB	6/26/2018	Train student employees about soil sampling procedure. Students practiced taking a mock soil sample.	4
Science Fest	Canalside	7/14/2018	Educate visitors about the soil study, recruit participants and volunteers for Phase 2 of the study.	20
Nellie Brown Presentation	CSCR office	7/18/2018	Nellie Brown is the Director of Workplace Health and Safety Programs, Lead Programs Manager, and Certified Industrial Hygienist at the Cornell University. Her first job was as a chemist at Tonawanda Coke. She gave a presentation about her time at TCC and her experience in chemistry to the soil study Community Advisory Committee and research team.	11
Elmwood Avenue Festival of the Arts	Elmwood Avenue	8/25/2018	Educate visitors about the soil study, recruit participants and volunteers for Phase 2 of the study.	145
Elmwood Avenue Festival of the Arts	Elmwood Avenue	8/26/2018	Educate visitors about the soil study, recruit participants and volunteers for Phase 2 of the study	123
A Lecture on the Impact of Contamination	Center for Inquiry	9/21/2018	Educational presentation about Dr. Milillo's success and experience studying environmental contamination in Tonawanda and other communities	30
UB Senate/General Membership Meeting	UB	10/25/2018	Educational presentation about Dr. Milillo's success and experience studying environmental contamination in Tonawanda and other communities	50
Presentation to Grand Island School Board	Grand Island Schools	12/10/18	Explain interpretation of results from samples taken at Grand Island Schools.	-
Community Meeting	Grand Island HS Auditorium	12/17/18	Explain interpretation of results from samples taken at Grand Island Schools.	20

Meeting with Elected Officials	Grand Island Town Hall	12/18/18	Explain interpretation of Phase 1 results, maps, and plan for Phase 2 to Mayor Rick Davis and Deputy Supervisor Jim Sharpe. Provided opportunity to share questions and concerns.	2
Meeting with Elected Officials	Town of Tonawanda Town Hall	12/20/18	Explain interpretation of Phase 1 results, maps, and plan for Phase 2 to Supervisor Joe Emminger and CSCR representative Andrew Baumgartner. Provided opportunity to share questions and concerns.	2
Community Meeting	City of Tonawanda MS/HS Auditorium	1/16/19	Release maps from Phase 1 of soil study. Explain interpretation of Phase 1 results, maps, and plan for Phase 2. Answered questions from community members. This meeting was also live-streamed on Facebook.	In person - 60 Online - 200+

Map Development from Phase 1 (Dr. Tammy Milillo)

Phase 1 maps are complete. Over 4000 maps were created. The maps were optimized to minimize error in the estimates of spatial distribution of pollutants. 65 contaminants were identified with levels elevated above Soil Clean-up Objectives (SCOs). After review by NYS DEC (along with NYS DOH) and EPA advisors, in late July/early August, TCC Soil Study leadership released key maps that were identified that affected the decision to choose three specific regions of interest for Phase 2 sampling (Appendix 4).

Phase 2 sampling

In Phase 2 the sampling focused on increasing the sample density in the regions of interest to determine the extent of contamination in the region of interest at six inches depth. Phase 2 also includes a detailed analysis of source apportionment⁴, as described in the UB led proposal to Judge Skretny, using advanced testing methods at SUNY Fredonia (two-dimensional gas chromatography with time-of-flight mass spectrometry (GCxGC-TOF)) and UB (Time of Flight Secondary Ion Mass Spectrometry) along with Geospatial data analysis to determine the impact of TCC separated from other sources of the same chemicals in the geographic area.

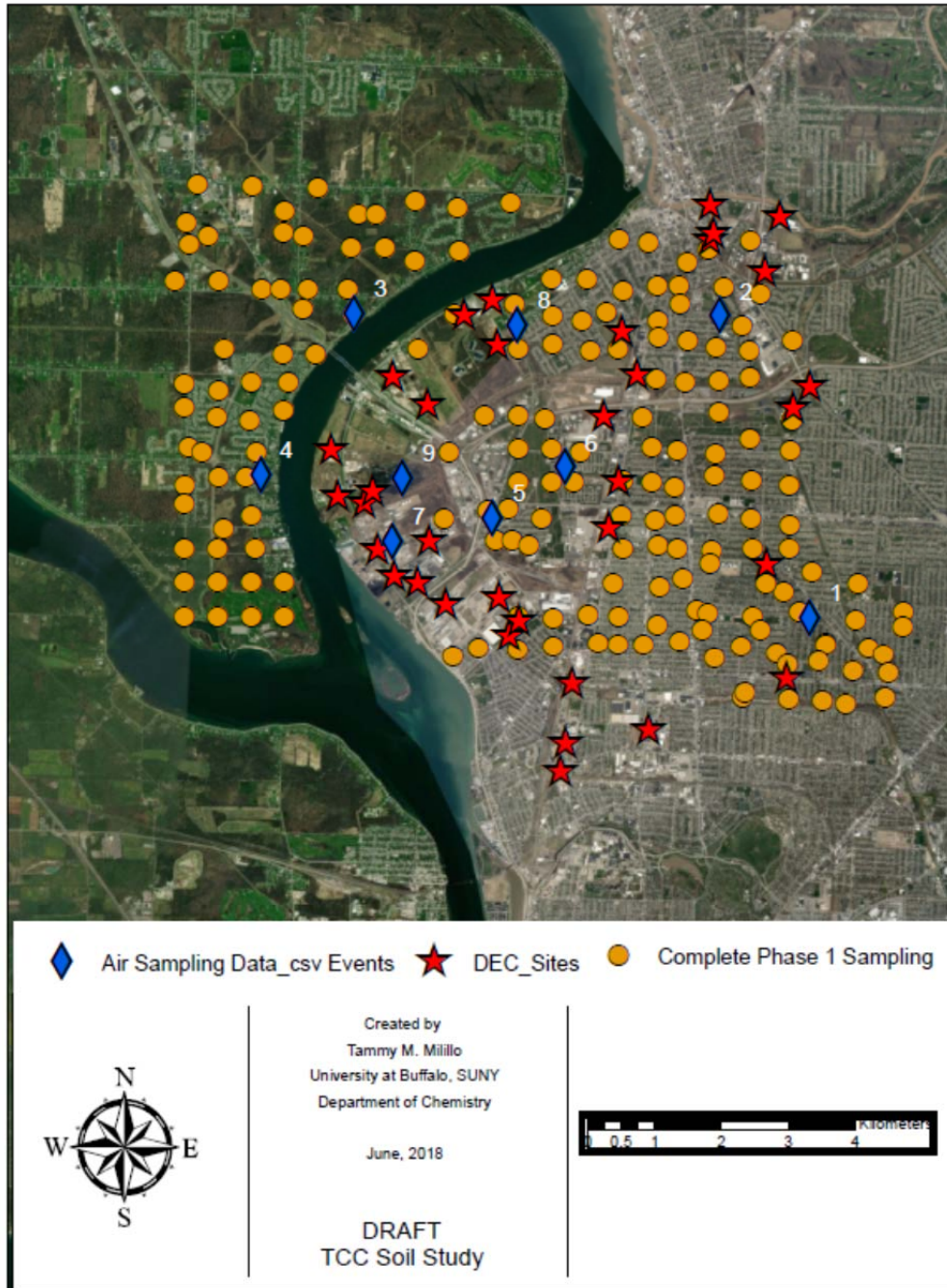
⁴ Hopke P.K. (1995) The Mixture Resolution Problem Applied to Airborne Particle Source Apportionment. In: Einax J. (eds) Chemometrics in Environmental Chemistry - Applications. The Handbook of Environmental Chemistry, vol 2 / 2H. Springer, Berlin, Heidelberg

P. Hopke, (2015) Chemometrics applied to environmental systems, Chemometrics and Intelligent Laboratory Systems 149 205–214 <http://dx.doi.org/10.1016/j.chemolab.2015.07.015>

J. S. Wallace Modernizing Environmental Analysis: Mass Spectrometry as a Tool for Investigating and Answering Salient Environmental Questions, Ph.D. Dissertation, May, 2016.

Expanded Air Study

Figure 2 (below) shows a map with soil sampling sites overlaid with a spatial distribution of 10 proposed air sample sites that we presented in the previous report in June 2018. Actual sites were determine based on the ability of the resident to provide outdoor power and cooperative neighbors who were tolerant of the noise levels of the sampling equipment. The initial air sample was taken at



Tonawanda Coke October 15th, 2018 to get a reference of emissions chemistry for source apportionment and was ordered by the Judge. A high volume 24 hour air sampler was deployed to collect air emissions for testing. As Professor Milligan started the community part of the air sampling, Tonawanda Coke had ceased production and the Coke Ovens were shut down. Emissions from TCC were no longer an issue in the community. He has completed sampling at six of the nine planned residences. Results are provided in

Appendix 3. The goal of this study is to get a detailed snapshot of the air quality in the absence of TCC emissions.

Next Steps

1. We will finish Phase 2 sampling and map development.
2. We will develop the collaborative effort for source apportionment analysis of contributions from Tonawanda Coke and separating these results from other polluters in the area.

List of Appendices

Appendix 1: Correspondence with Jackie James Creedon of CSCR regarding this report.

Appendix 2: Budget Report from UB

Appendix 3: SUNY Fredonia Report with SUNY Fredonia Budget Report

Appendix 4: Publicly available materials (Powerpoint presentation and Maps) from January 16 Public Meeting.

Appendix 5: Education Campaign Plan from Katie Little and Dr. Milillo

Appendix 1: Correspondence with Jackie James-Creedon of CSCR regarding this report

Subject: Re: Request for contributions to TCC Soil Study six month report due to Probation Office Feb 28th
From: Jackie James-Creedon <jackie@csresources.org>
Date: 2/22/2019, 2:36 PM
To: "Gardella, Joseph" <gardella@buffalo.edu>
CC: "Haberstro, Phil" <bwell1@ch.ci.buffalo.ny.us>, "William C. Altreuter" <altreuter@altreuterberlin.com>

Joe, Please remove me from all your correspondence regarding this matter and direct to Phil and/ or Bill going forward.

Jackie

On Friday, February 22, 2019, Gardella, Joseph <gardella@buffalo.edu> wrote:

Jackie:

Phil was copied on the original email.

Phil, please advise as to your response about this report.

Joe

On 2/22/2019 9:31 AM, Jackie wrote:

Joe-I am no longer employed. I'm forwarding your message to Phil.

Jackie

Sent from my iPhone

On Feb 22, 2019, at 6:45 AM, Joseph A Gardella Jr <gardella@buffalo.edu> wrote:

Dear Mike, Jackie and Phil:

The six month report for the TCC Soil Study is due February 28th to Melissa Colley.

Please provide me your reports, including financial reports, by February 27th.

Thank you Katie for providing your contribution to the report.

Jeff, can you please provide me the financial report using the same format as in the past, for the UB portion by the 27th?

Thank you

Sincerely,

Joe Gardella

--

Jackie James Creedon
Citizen Science Community Resources, Inc.
3200 Elmwood Ave.
Kenmore, NY 14217
716-873-6191
csresources.org

Appendix 2: Budget Reports from UB

Report Date: 02/22/19
RF Award No: 76458
Sponsor ID# : 110cr00219WMSHKS

Sponsor: US District Court for the Western District of New
Sponsor Address: 2 Niagara Square, Buffalo, NY 14202

Report Type: Interim	Report Period From: 08/12/16 To: 01/31/19
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Title of Project: UB Soil Sample Study: Determining the Environmental Impact of Coke Oven Emissions Originating from Tonawanda Coke C
Under direction of : Gardella, Dr. Joseph A
Award Period From: 08/12/16 To: 09/30/19

Award Authorized for Expenditure		-Cash Reconciliation-	
Award	\$712,906.62	Total Award Authorized For Expenditures	\$712,906.62
Authorized Transfer from Previous Year		Less: Cash Received to Date	\$712,906.62
Total Award Authorized For Expenditures	\$712,906.62	Balance	\$0.00
-Expenditures-		Unexpended Award Balance	\$135,711.45

Salary and Wages	\$243,535.79
Employee Benefits	\$78,887.16
Consultant Services	\$0.00
Equipment	\$6,846.00
Supplies	\$17,418.39
Travel Domestic	\$1,579.59
Travel Foreign	\$0.00
Tuition and Fees	\$462.00
Fellowships & Part. Support	\$112.00
Subaward	\$100,967.40
Conference & Training	\$0.00
General Services	\$119,960.38
Postage	\$120.00
Miscellaneous	\$7,306.46
SUBTOTAL DIRECT COSTS	\$577,195.17
F&A Cost Rate: 0.00 %	\$0.00

Comments:
This is an interim report of expenditures.

TOTAL	\$577,195.17	I hereby affirm that the foregoing report is true in all respects and that all the expenditures and obligations indicated above have been made within the provisions of the grant or contract.
Expenditure Previously Reported	\$0.00	
TOTAL EXPENDITURES	\$577,195.17	
UNEXPENDED AWARD BALANCE	\$135,711.45	

Signature	
Name, Title	Maryssa Kunes AR Financial Reporting Coordinator

**Appendix 3: SUNY Fredonia Report with SUNY Fredonia Budget Report
Determining the Environmental Impact of Coke Oven Emissions Originating from Tonawanda
Coke Corporation on Surrounding Residential Community**

Progress Report for Subcontract awarded to SUNY Fredonia, Co-PI Michael S. Milligan

07-10-18 to 01-31-19

Progress

- In October 2018, we conducted a 24 hour high-volume air sampling run on the Tonawanda Coke industrial site. We were taken by surprise by the sudden announced shut-down of the Tonawanda Coke batteries, but we were able to perform our sampling run on the last day of operation at the facility. We were fortunate to deploy the sampler directly next to the coke batteries while they were in operation. It should be noted that the Environmental Manager at Tonawanda Coke was very cooperative and accommodating in helping us squeeze in this sampling event at the last moment.
- During January of 2019, we conducted six high-volume air sampling runs at different residences in the vicinity of the Tonawanda Coke site.
- Continued work on the development, improvement, and refinement of analytical methods using comprehensive two-dimensional gas chromatography with time-of-flight mass spectrometry (GCxGC-TOF) to be used for non-targeted analysis of soil sample extracts and air samples. Our hope is to identify unique chemical markers to the coking industrial process from soil samples collected during the Phase I and Phase II elements of this project.
- Assisted in the analysis and interpretation of the analytical results generated from the Phase I soil sampling process.
- Attended monthly meetings with the Community Advisory Committee to update them with the details of our progress.
- Currently supervising a paid undergraduate research assistant (Samuel Johnson) for the summer of 2019. His responsibilities include assisting in optimizing analytical and instrumental techniques for soil and air analyses, and in the deployment and operation of the high-volume air sampler.

Plans

- We are planning to conduct at least three more air sampling runs in the community around the Tonawanda Coke facility in the next month or so. After these runs are completed, we will have conducted ten total air sampling runs: one at the Tonawanda Coke facility, and nine at private residences around Tonawanda Coke.
- The filter media for all of the air samples discussed above will be sent to the certified contract lab ALS Global in Burlington, Ontario for chemical analysis. This laboratory specializes in the analysis of an expanded suite of polycyclic aromatic hydrocarbons (PAHs), which we are hoping to use to help identify unique chemical markers associated with the coking process.

Budget details

- The total SUNY Fredonia subcontract for the two year period of this project was \$87,659.
- As of 01-31-19, the following expenditures have been made:

- \$19,897 on Co-PI Milligan partial summer salary, and undergraduate research student salary for the summers of 2017 and 2018.
- \$7,000 to purchase the TE-1000 PUF+ high-volume air sampler
- \$2,605 in fringe benefits
- \$7,700 in indirect costs
- The remaining funds will be used for the following in 2019:
 - Analytical standards to be used in GCxGC-TOF analyses of soil and air samples (approximately \$10,000)
 - Organic solvents and other reagents to be used in soil and air sample preparation and analysis.
 - Costs of analysis for air samples to be collected at the Tonawanda Coke site and in the surrounding neighborhood (approximately \$10,000)
 - Travel expenses for ten air sampling events (approximately \$1,000)

Appendix 4: Publicly available materials (Powerpoint presentation and Maps) from January 16 Public Meeting.



TONAWANDA COKE SOIL STUDY TIMELINE

2016

PLANNING



Soil study was initiated, with project staff hired.

2017

PHASE 1



Scientists from the U.S. Environmental Protection Agency (EPA) and New York State Department of Environmental Conservation (DEC) reviewed and provided feedback on the study's standard operating procedures.



Community meetings were held, and a community advisory committee established.



More than 180 soil samples were taken in Grand Island, the City of Tonawanda, the Town of Tonawanda and North Buffalo. Sampling was done, where possible, in an evenly distributed grid, with the goal of screening for pollutants.

2018

PHASE 2 BEGINS



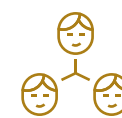
About 130 new samples were taken from areas of interest identified through Phase 1 sampling. These areas of interest are areas where a number of soil samples contained higher levels of selected pollutants than in the directly surrounding region.



EPA and DEC scientists reviewed and provided feedback on draft maps showing Phase 1 findings.

2019

PHASE 2 CONTINUES



A community meeting is planned for January 2019 to share Phase 1 findings.



Scientists at UB and SUNY Fredonia use advanced analytical and statistical techniques (source apportionment) to study whether pollutants found in soil may have originated from the Tonawanda Coke plant.



Additional samples may be taken, depending on results from Phase 2 sampling in 2018.



UPDATE AND PHASE 1 RESULTS TONAWANDA COKE SOIL STUDY

Joseph Gardella, SUNY Distinguished Professor
Department of Chemistry, University at Buffalo

Tammy Milillo, Research Assistant Professor
Department of Chemistry, University at Buffalo
Researcher, ATLAS Laboratory, Roswell Park Cancer Institute

Michael (Mike) Milligan, Professor
Department of Chemistry, SUNY Fredonia

Kathryn (Katie) Little, Community Organizer
Department of Chemistry, University at Buffalo

January 16, 2019

Overview

- ◎ Background on the Tonawanda Coke Soil Study
 - History
 - Study Goals
- ◎ Results
 - Maps generated
 - 3 ROIs identified
 - What this means for residents
- ◎ Next steps
 - Phase 2 sampling
 - Source apportionment

US vs. Tonawanda Coke Corporation

- ◉ Decided in March, 2013: Appeal Denied Jan 2016
- ◉ Found TCC guilty of violations of US Clean Air Act
- ◉ Fined \$12.5M
- ◉ Additionally, directed \$12.1 M toward follow-up community studies
 - 10 year epidemiology and health (Tonawanda/Grand Island Health Study)
 - 2 year study of neighborhood for deposition of air pollution (Tonawanda Coke Soil Study)
 - Both projects awarded to UB; UB waived all overhead (ca. \$4M) but agreed to provide all services normally funded by overhead



TONAWANDA COKE SOIL STUDY TIMELINE

PHASE 1



Scientists from the U.S. Environmental Protection Agency (EPA) and New York State Department of Environmental Conservation (DEC) reviewed and provided feedback on the study's standard operating procedures.



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Scientists at UB and SUNY Fredonia use advanced analytical and statistical techniques (source apportionment) to study whether pollutants found in soil may have originated from the Tonawanda Coke plant.



Additional samples may be taken, depending on results from Phase 2 sampling in 2018.

Completed Phase of Soil Study

- ⦿ Phase 1 survey study using geographic grid design
 - Learn where regions of interest are located
 - Learn geographic extent of pollutant deposition
 - Learn what pollutants are distributed in the community
- ⦿ 182 samples taken, evaluated public data from 65 superfund sites in the test grid area
 - Testing for 169 chemicals at ALS Laboratories, Rochester, NY (NYS DOH Certified)
 - Heavy metals, VOCs, SVOCs, PCBs, Pesticides, PAHs

Definitions

⦿ Contaminant

- Any physical, chemical, biological, or radioactive substance that can adversely affect air, water or soil.

⦿ Region of Interest (ROI)

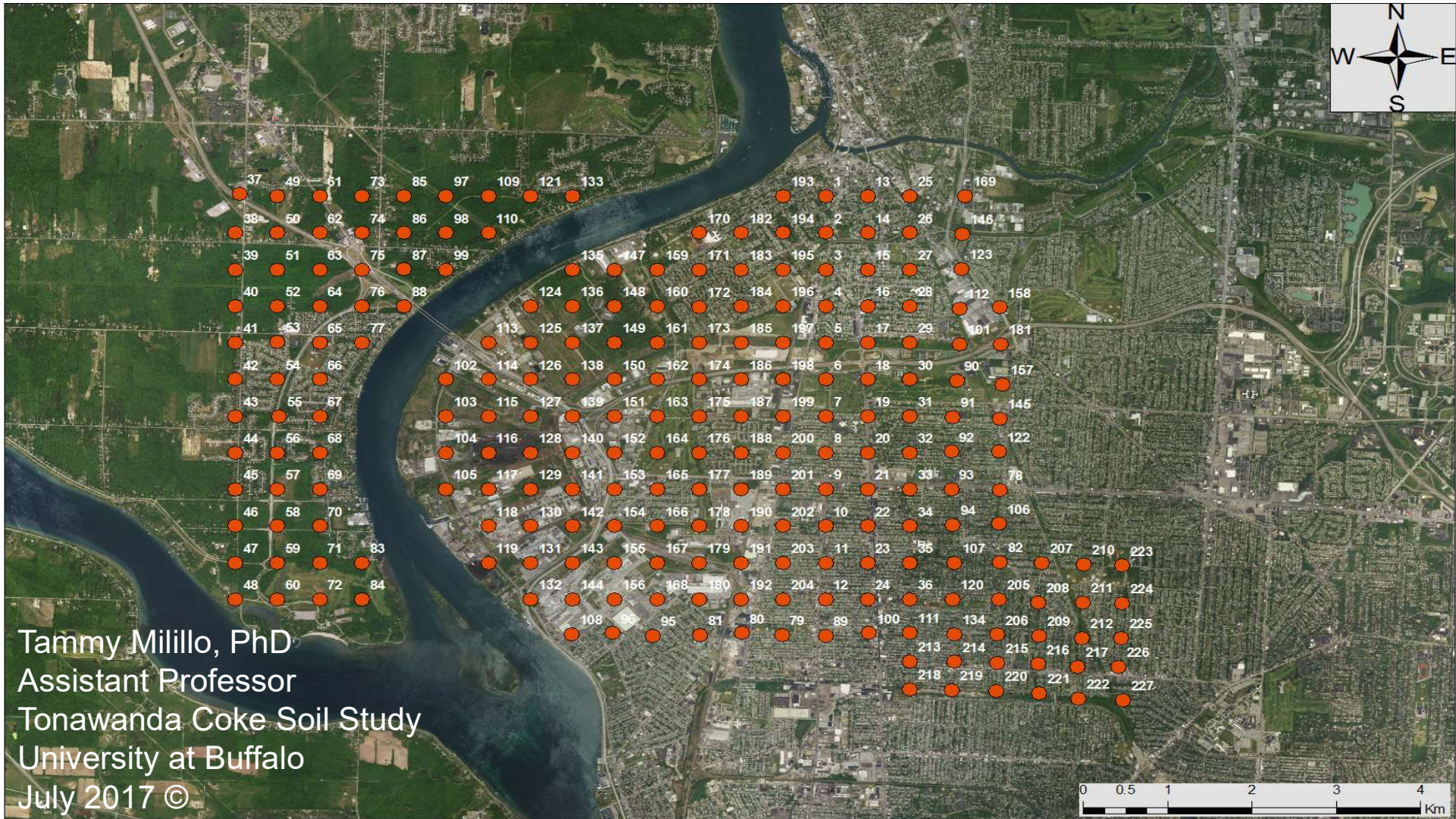
- A region or area known to have high concentrations of a contaminant

⦿ Soil Cleanup Objective (SCO)

- the concentration of a given contaminant for a specific site that must be achieved under a remedial program for soil.

EPA Terminology Service:
https://iaspub.epa.gov/sor_internet/registry/termreg/searchandretrieve/termsandacrony

NYS-DEC CP-51 / Soil Cleanup Guidance

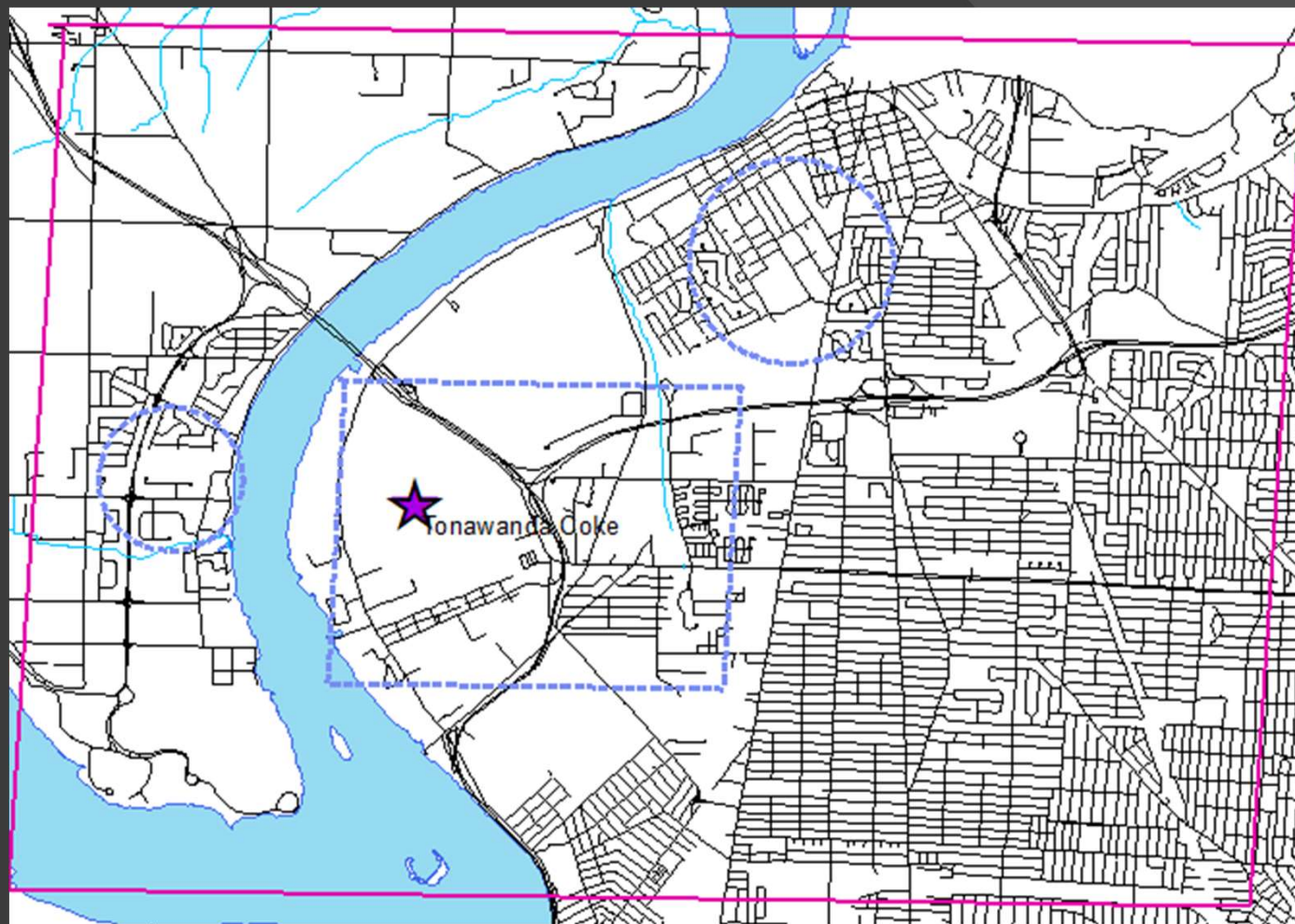


Current Phase of Soil Study

- Phase 2: study the ROIs identified in phase 1 and establish a boundary of any potential contamination
 - Soil and air sampling at Tonawanda Coke
- Innovative methods to identify source(s) of pollutants in soil (including air sample and soil samples from TCC) (UB and Fredonia)
- Community participation and education
- Reporting to community

Regions of Interest

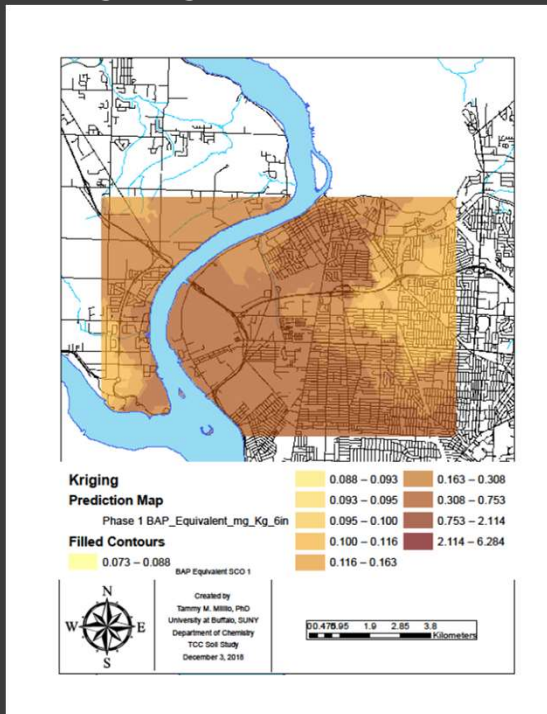
- Solid pink outline: Study Boundary
- Purple Star: Tonawanda Coke Plant
- Dashed blue lines: Regions of Interest



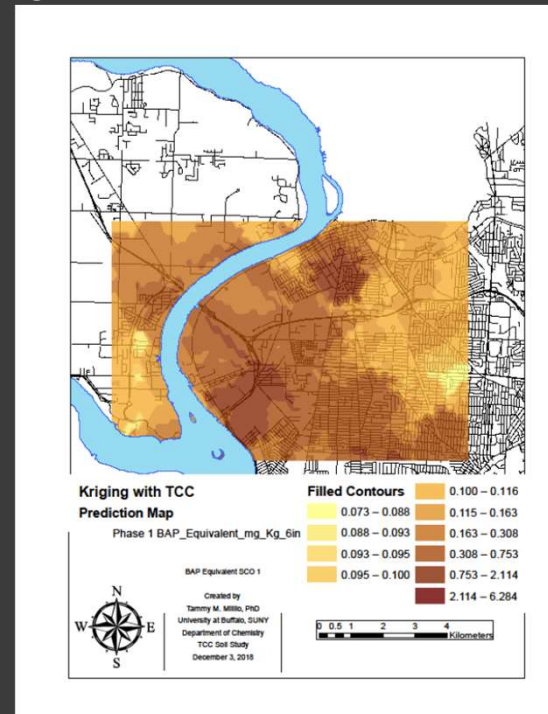
Credit: Tammy Milillo / Tonawanda Coke Soil

WHAT WAS THE BASIS FOR THE
CHOICES OF THE REGIONS OF
INTEREST?

Benzo(a)Pyrene Equivalents Polycyclic Aromatic Hydrocarbons (PAHs)



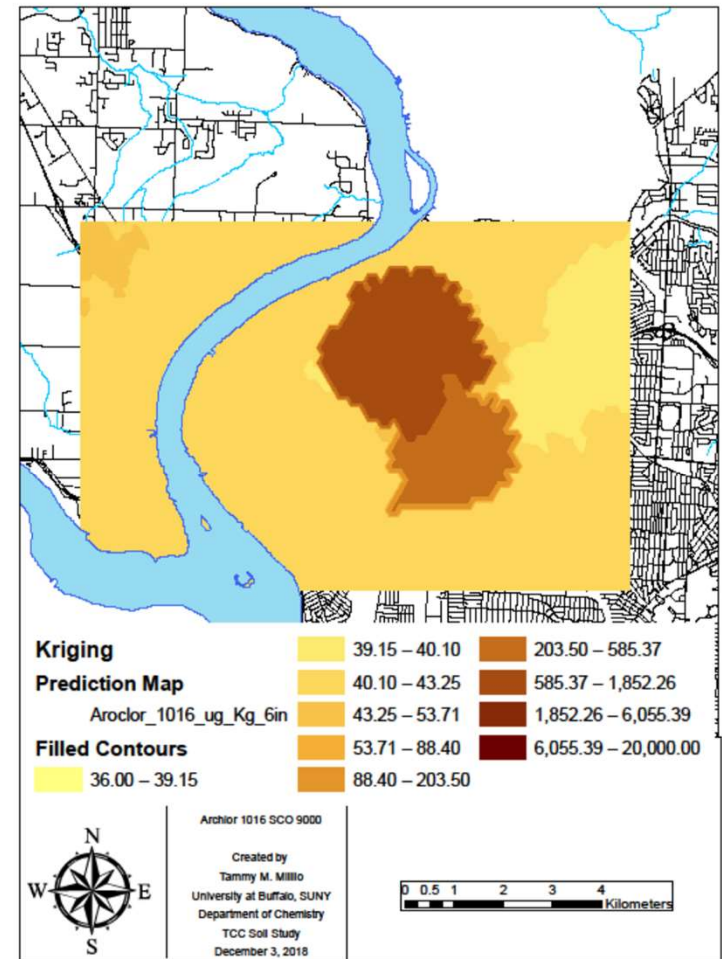
Without Tonawanda Coke



With Tonawanda Coke

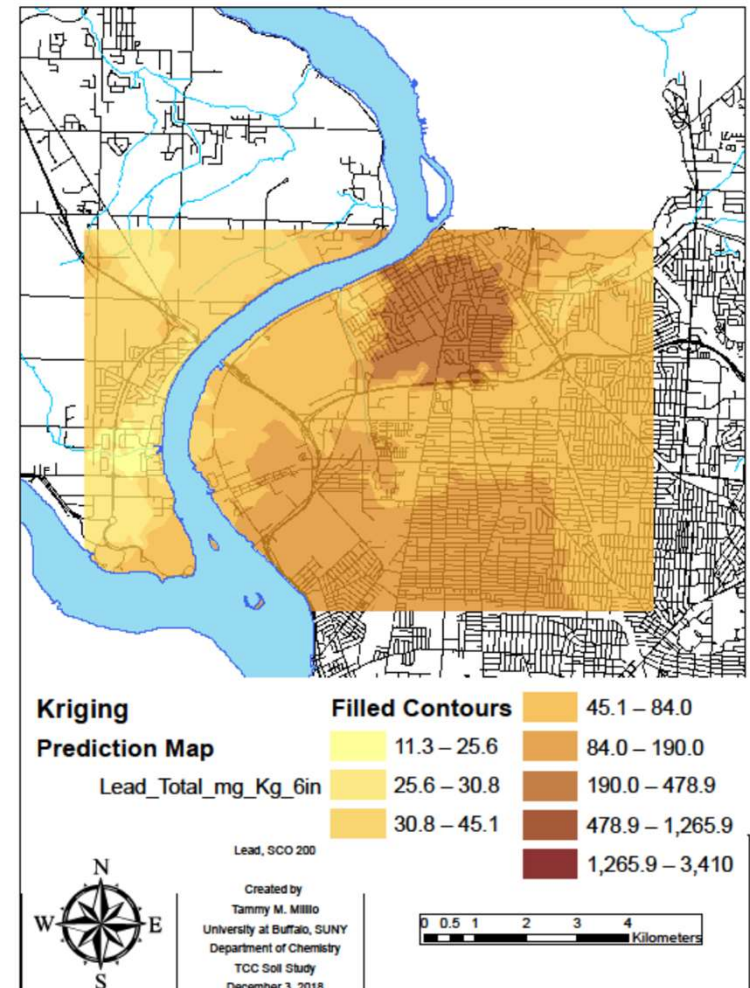
Aroclor 1016

- Polychlorinated Biphenyl (PCB)
- Estimated concentration increases as color darkens
- Localized concentrations were found above SCO



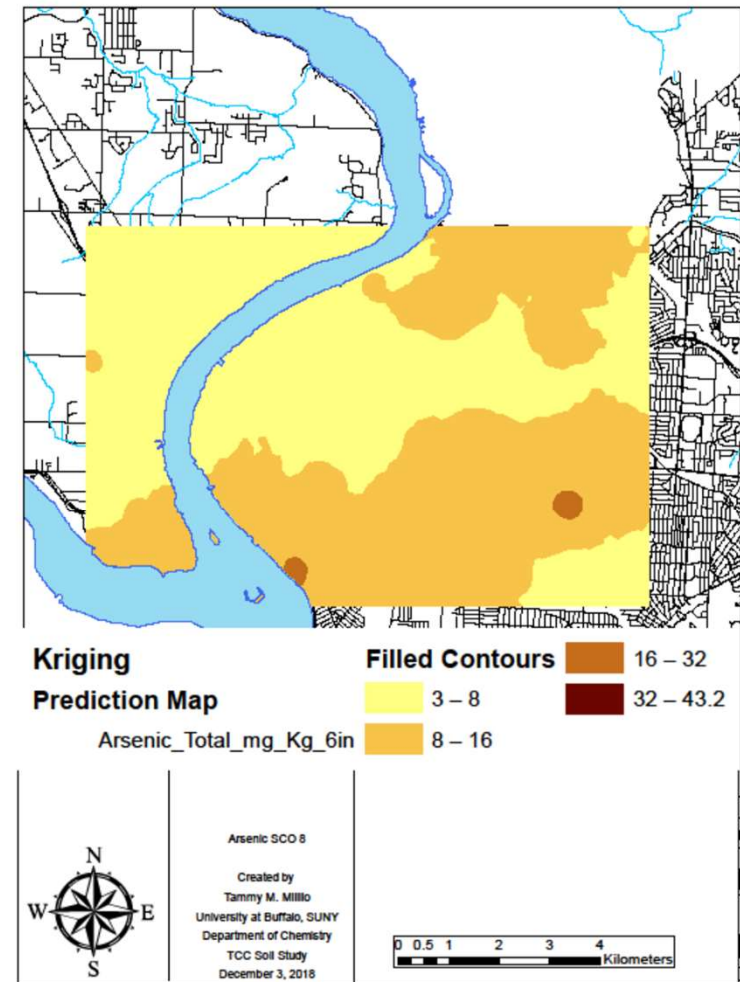
Lead

- Estimated concentration increases as color darkens
- This distribution indicates the same ROI as the PCBs
- Not every sample in the ROI exceeded the SCO level



Arsenic

- More study needed to determine origins of arsenic

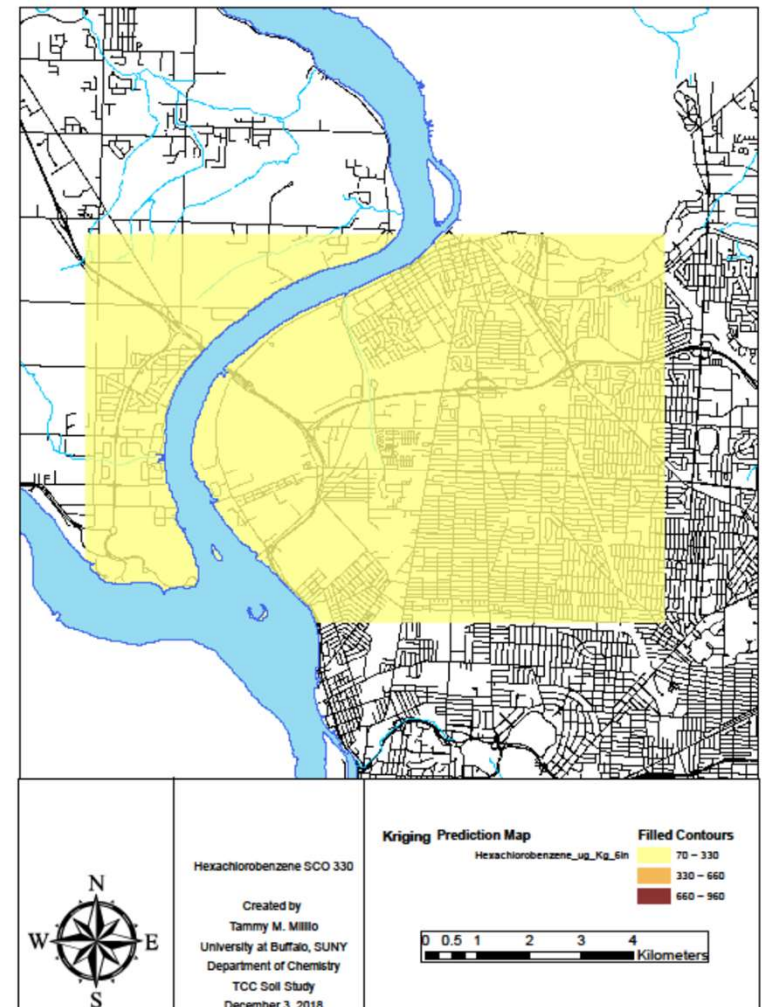


ROI on Grand Island

- Only ROI without samples above SCO values
 - Elevated above surrounding samples
 - Next to elementary school
- Arsenic detected

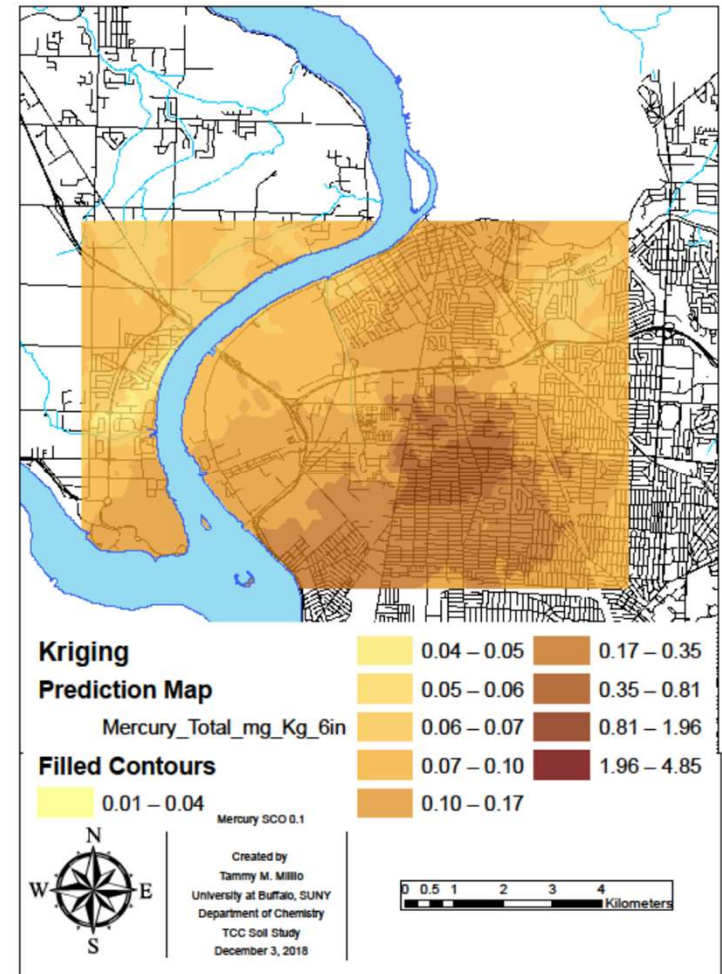
Hexachlorobenzene

- No dark regions were identified
- This chemical was not detected (found)
- This was common: 70 out of the 169 tested compounds



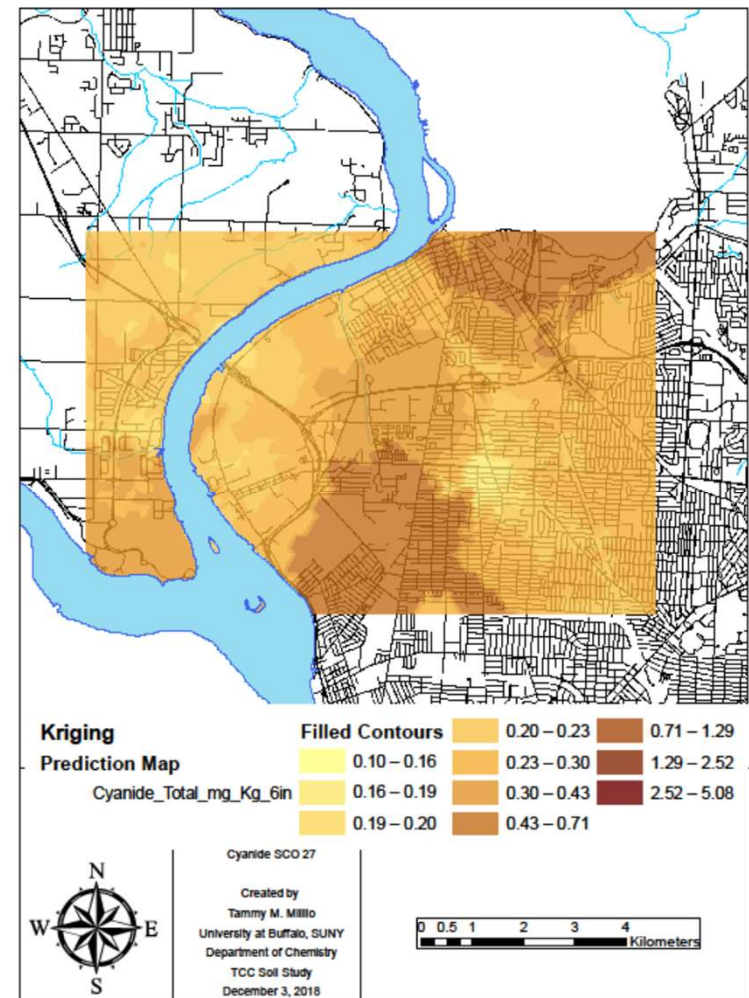
Mercury

- Not a known TCC contaminant
 - Known contaminant from the Huntley plant
- Court Order included determining historic impact of TCC only
 - Source apportionment



Cyanide

- Chemical of concern based on contamination found on TCC site
- Shows elevated levels not above DEC's SCO
- Important for source apportionment analysis



Take Home Message

- ⦿ Large parts of the study area are free from contamination above SCO values
- ⦿ Conservative SCO values used
 - Screening study
- ⦿ Boundaries for ROIs will change with Phase 2
- ⦿ Source apportionment analysis, ordered by Judge, begins now.

Findings from the Tonawanda Coke Soil Study will benefit local communities.

- ⦿ Results will provide communities with information on:
 - What chemicals are in their soil
 - How widespread any pollution may be
 - Whether pollutants may have originated at the Tonawanda Coke plant
 - Areas with no concern for elevated levels of pollutants
- ⦿ This knowledge is the first step in understanding whether a clean-up is needed, and where.

Next Steps: Community Involvement

- ◎ Community members are encouraged to:
 - Contact local elected officials and encourage them to give permission to use data collected on public sites
 - Reach out to members of the soil study team with questions regarding study findings
- ◎ Residents or property owners are asked to
 - Allow access to enter, sample and test soil from owners property
 - Reporting to individual property owners (confidential)
 - Ask follow-up permission to include in analysis
 - Based on the practice used in 18 Mile Creek (Lockport) studies following standard human subject protection procedures

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THANK YOU

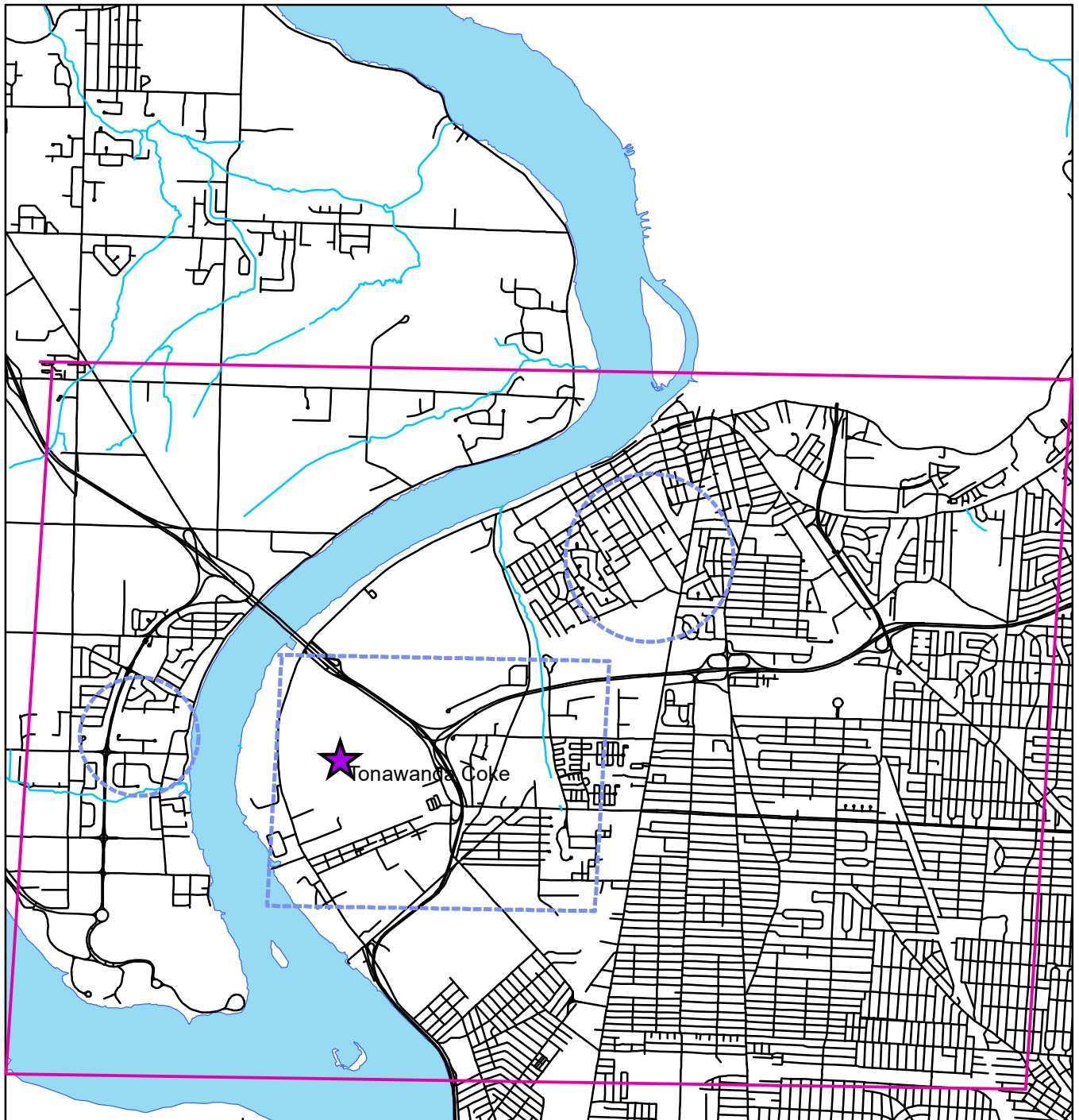




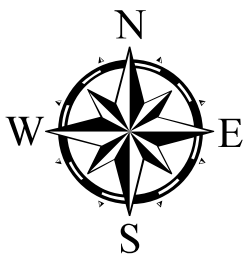
University at Buffalo
The State University of New York

Tonawanda Coke Soil Study
Phase 1 maps

A map showing the Tonawanda Coke Soil Study area. The Tonawanda Coke Plant is marked with a star. The solid pink line indicates the boundary of the study area, where soil samples have been taken. Dashed blue lines indicate areas of interest that researchers are investigating more closely based on preliminary results from soil samples taken in 2017. Areas of interest are tentative and subject to further investigation. Credit: Dr. Tammy Milillo / Tonawanda Coke Soil Study



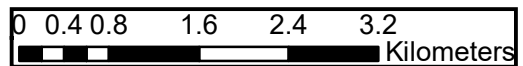
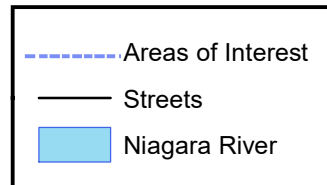
★ Tonawanda Coke



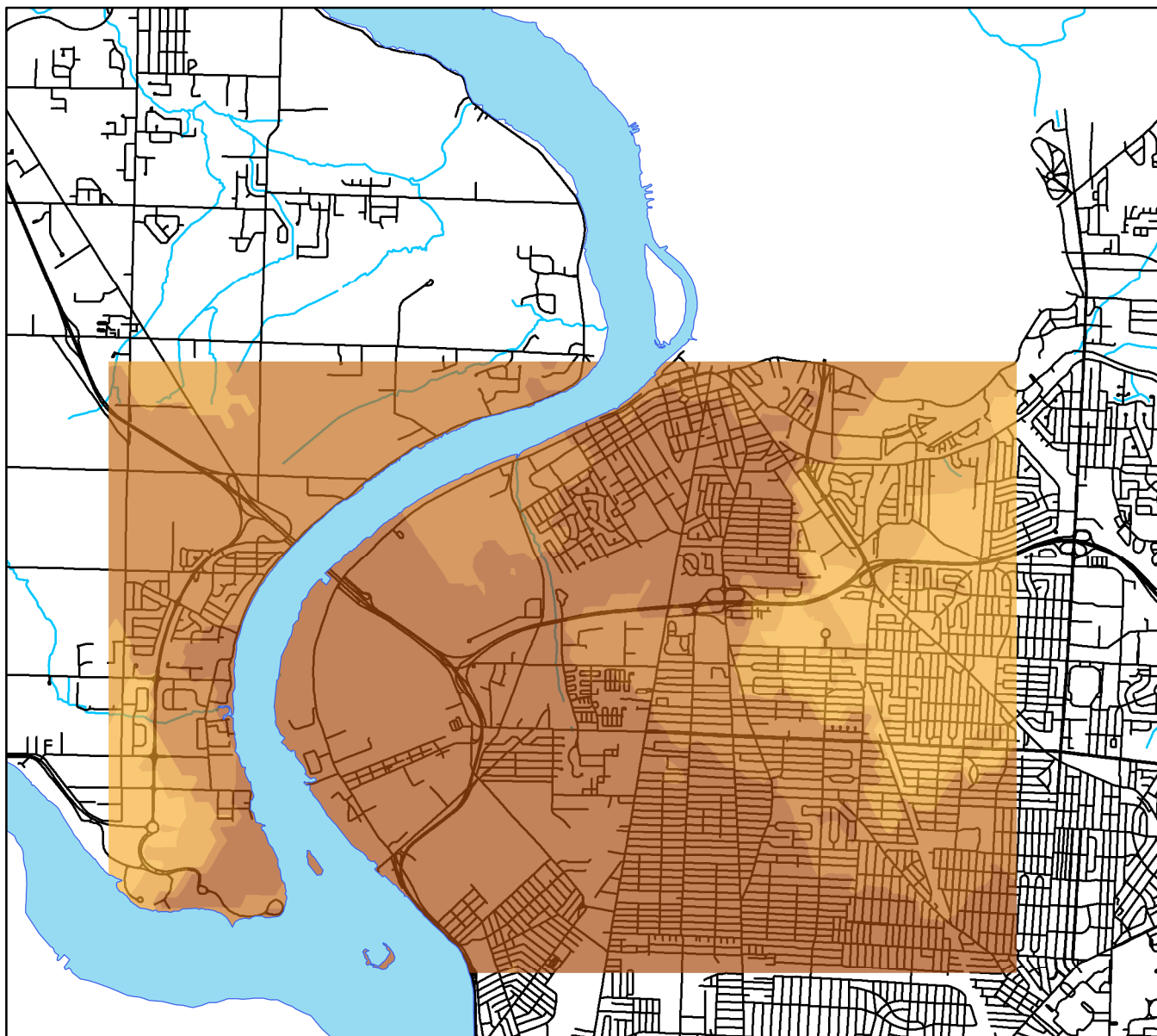
Created by
 Tammy M. Milillo
 University at Buffalo, SUNY
 Department of Chemistry

June, 2018

TCC Soil Study
 11/30/2018



Map of Benzo[a]pyrene (BAP) equivalents in mg/kg. The map shows the modeled surface, as the color darkens, the predicted concentration of BAP equivalents increases. Samples taken on properties owned by the Town of Tonawanda and the City of Tonawanda are excluded, due to lack of permission from elected officials. BAP equivalents are a measure used by the EPA to evaluate polycyclic aromatic hydrocarbon (PAH) concentrations. The TCC soil study used an SCO of 1 mg/kg for BAP equivalents. Intervals below the SCO are of no immediate concern to residents. Intervals which contain values above the SCO do not directly correlate to risk. Credit: Dr. Tammy Milillo / Tonawanda Coke Soil Study



Kriging

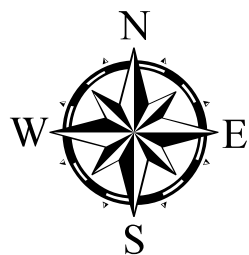
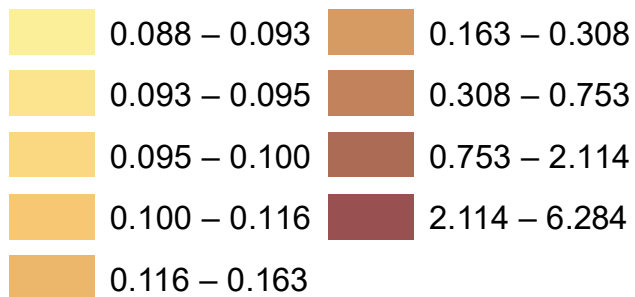
Prediction Map

Phase 1 BAP_Equivalent_mg_Kg_6in

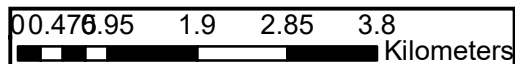
Filled Contours

0.073 – 0.088

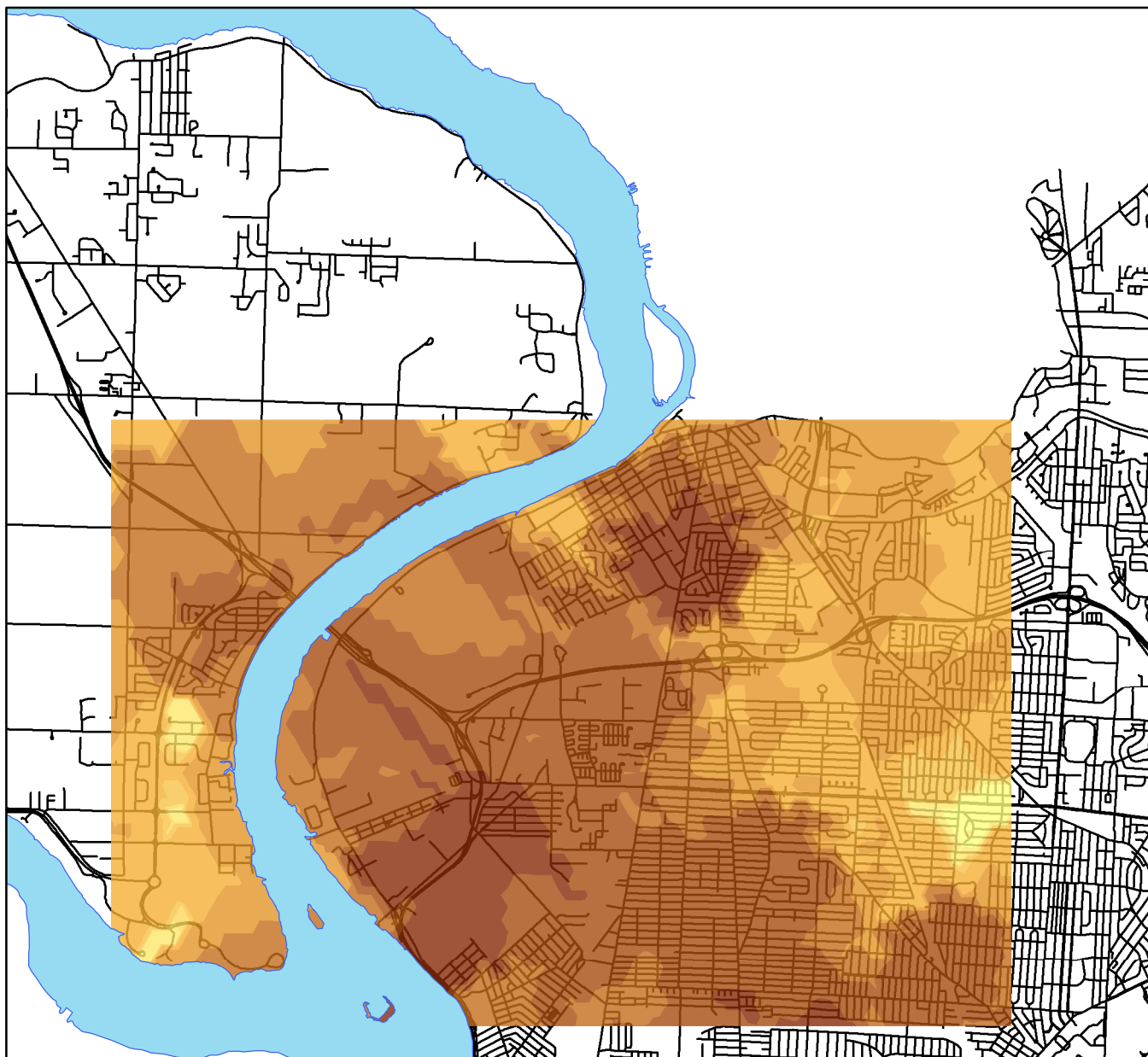
BAP Equivalent SCO 1



Created by
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 TCC Soil Study
 December 3, 2018



Map of Benzo[a]pyrene (BAP) equivalents in mg/kg. The map shows the modeled surface, as the color darkens, the predicted concentration of BAP equivalents increases. Samples taken on the Tonawanda Coke property are included. Samples taken on properties owned by the Town of Tonawanda and the City of Tonawanda are excluded, due to lack of permission from elected officials. BAP equivalents are a measure used by the EPA to evaluate polycyclic aromatic hydrocarbon (PAH) concentrations. The TCC soil study used an SCO of 1 mg/kg for BAP equivalents. Intervals below the SCO are of no immediate concern to residents. Intervals which contain values above the SCO do not directly correlate to risk.
Credit: Dr. Tammy Milillo / Tonawanda Coke Soil Study

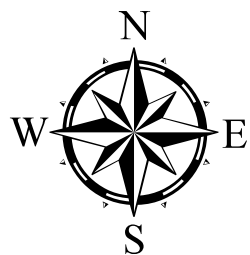


Kriging with TCC

Prediction Map

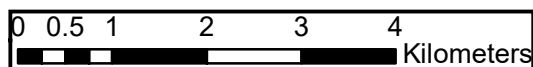
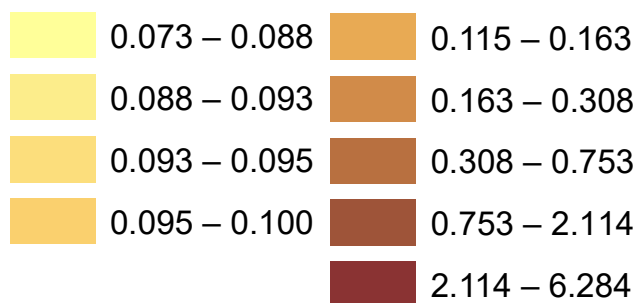
Phase 1 BAP_Equivalent_mg_Kg_6in

BAP Equivalent SCO 1

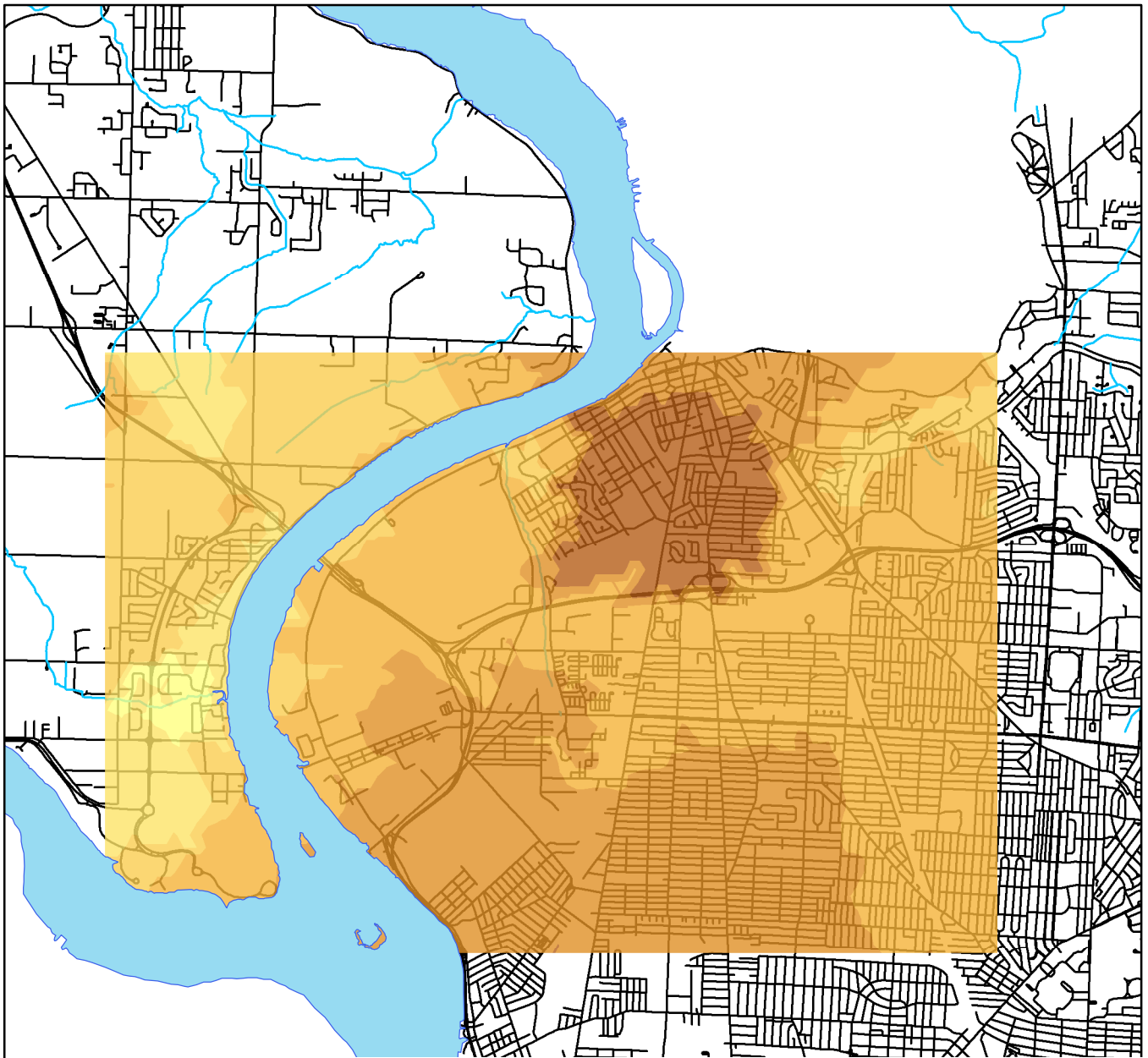


Created by
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 Department of Chemistry
 TCC Soil Study
 December 3, 2018

Filled Contours



Map of lead in mg/kg. The map shows the modeled surface, as the color darkens, the predicted concentration of lead increases. The TCC soil study used an SCO of 200 mng/kg for lead. Intervals below the SCO are of no immediate concern to residents. Intervals which contain values above the SCO do not directly correlate to risk. Credit: Dr. Tammy Milillo / Tonawanda Coke Soil Study



Kriging

Prediction Map

Lead_Total_mg_Kg_6in

Filled Contours



11.3 – 25.6



25.6 – 30.8



30.8 – 45.1



45.1 – 84.0



84.0 – 190.0



190.0 – 478.9

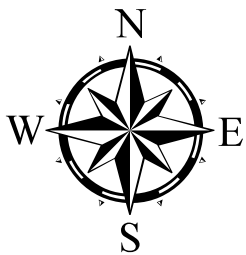


478.9 – 1,265.9

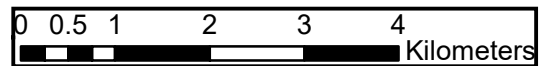


1,265.9 – 3,410

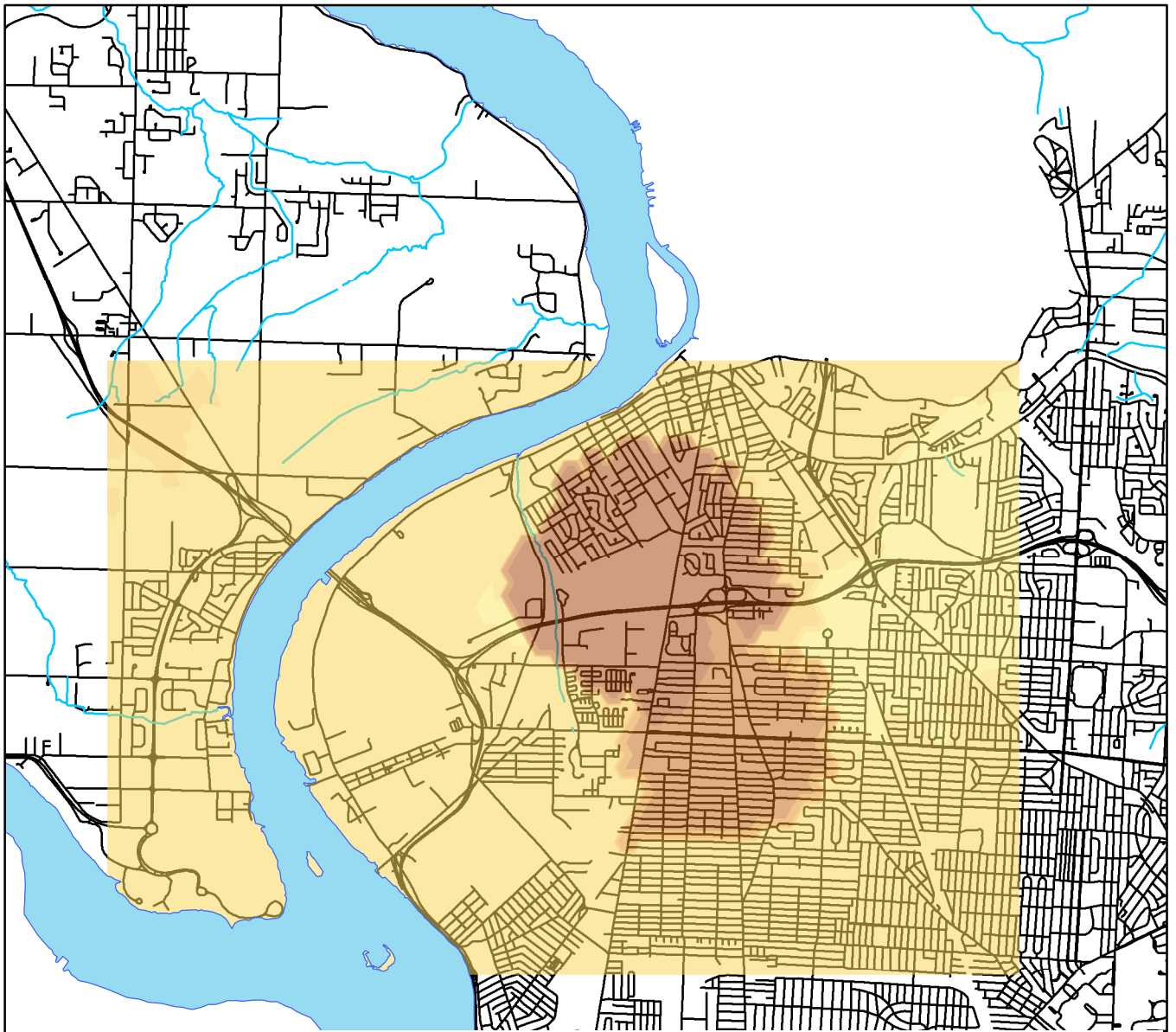
Lead, SCO 200



Created by
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 TCC Soil Study
 December 3, 2018



Map of Archlor 1016 in $\mu\text{g}/\text{kg}$. The map shows the modeled surface, as the color darkens, the predicted concentration of Archlor 1016 increases. The TCC soil study used an SCO of 9000 $\mu\text{g}/\text{kg}$ for Archlor 1016. Intervals below the SCO are of no immediate concern to residents. Intervals which contain values above the SCO do not directly correlate to risk. Credit: Dr. Tammy Milillo / Tonawanda Coke Soil Study



Kriging

39.15 – 40.10

203.50 – 585.37

Prediction Map

40.10 – 43.25

585.37 – 1,852.26

Aroclor_1016_ug_Kg_6in

43.25 – 53.71

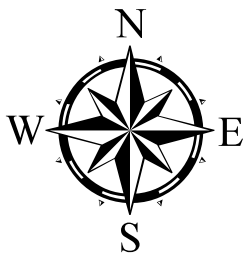
1,852.26 – 6,055.39

Filled Contours

36.00 – 39.15

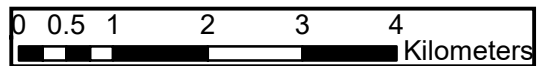
88.40 – 203.50

6,055.39 – 20,000.00

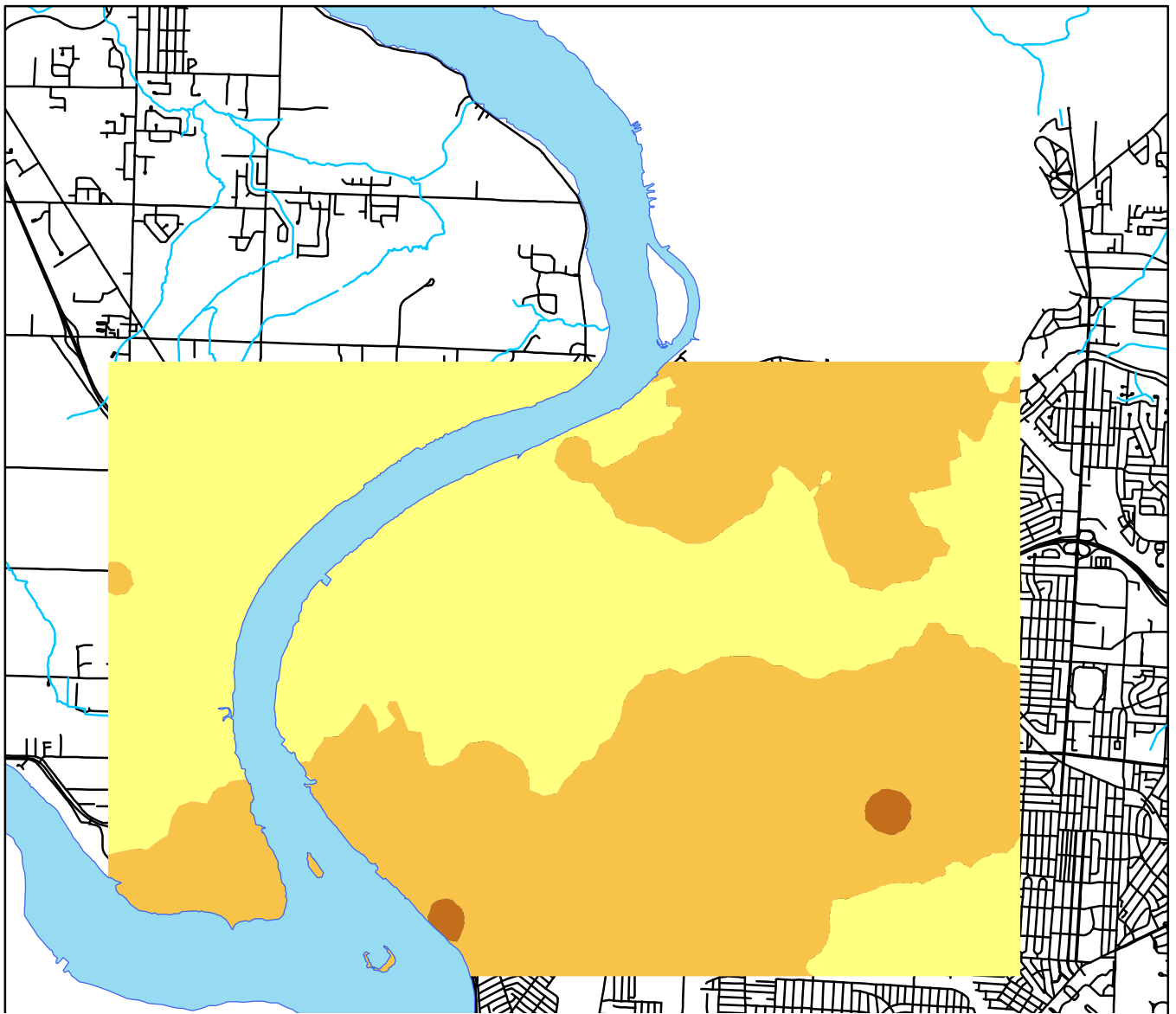


Archlor 1016 SCO 9000

Created by
 Tammy M. Milillo
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 TCC Soil Study
 December 3, 2018



Map of arsenic in mg/kg. The map shows the modeled surface, as the color darkens, the predicted concentration of arsenic increases. The TCC soil study used an SCO of 8 mg/kg for arsenic. Intervals below the SCO are of no immediate concern to residents. Intervals which contain values above the SCO do not directly correlate to risk. Credit: Dr. Tammy Milillo / Tonawanda Coke Soil Study



Kriging

Prediction Map

Arsenic_Total_mg_Kg_6in

Filled Contours

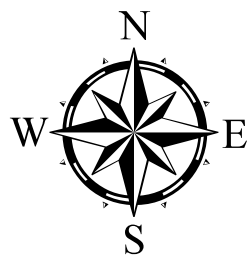
3 – 8

8 – 16



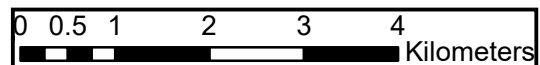
16 – 32

32 – 43.2

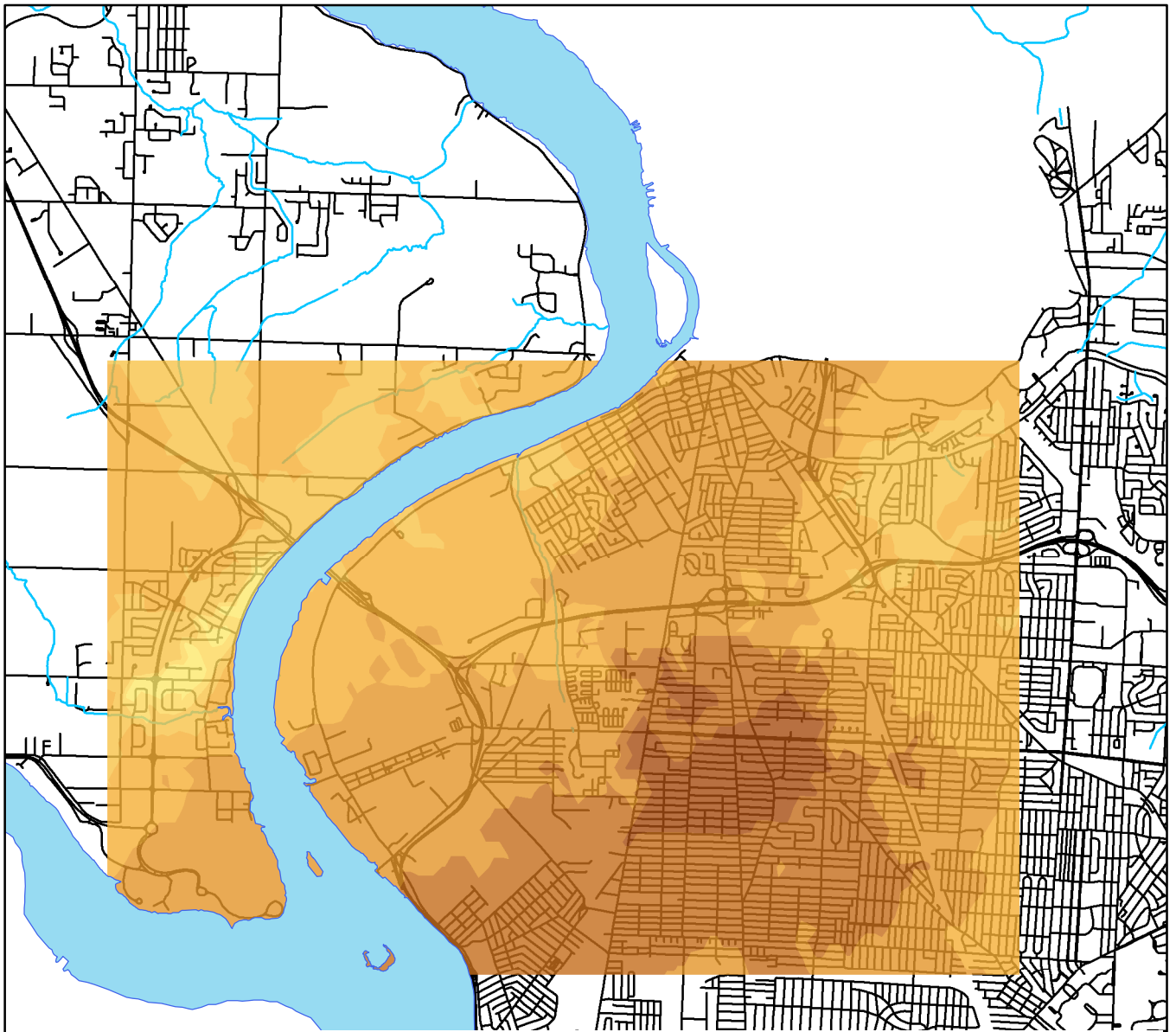


Arsenic SCO 8

Created by
 Tammy M. Milillo
 University at Buffalo, SUNY
 Department of Chemistry
 TCC Soil Study
 December 3, 2018



Map of mercury in mg/kg. The map shows the modeled surface, as the color darkens, the predicted concentration of mercury increases. The TCC soil study used an SCO of 0.1 mg/kg for mercury. Intervals below the SCO are of no immediate concern to residents. Intervals which contain values above the SCO do not directly correlate to risk. Credit: Dr. Tammy Milillo / Tonawanda Coke Soil Study



Kriging

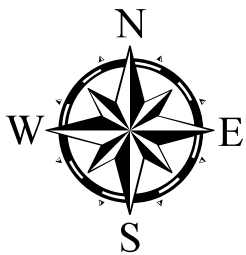
Prediction Map

Mercury_Total_mg_Kg_6in

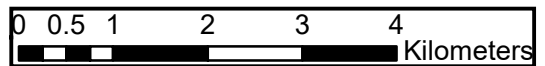
Filled Contours



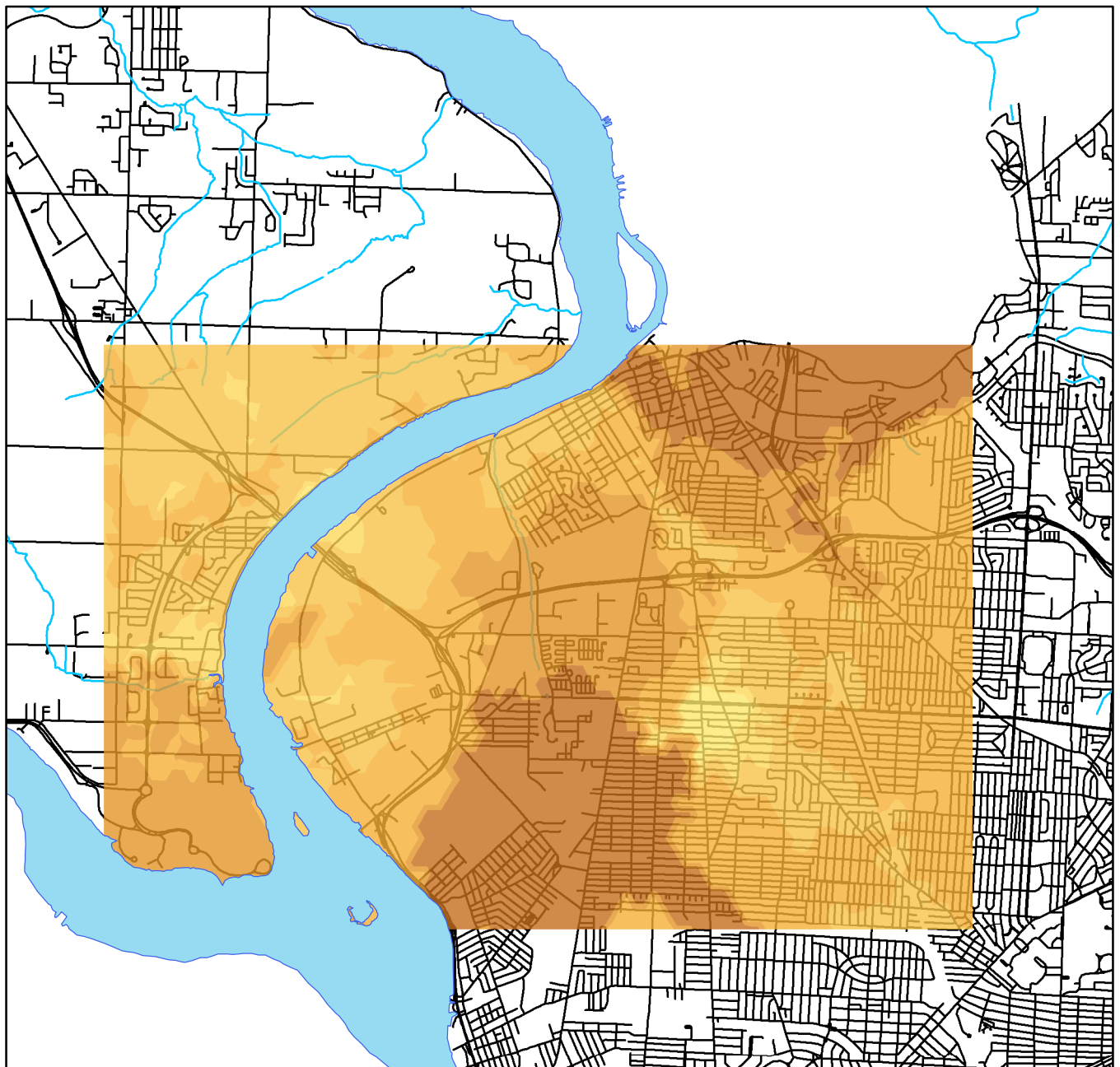
Mercury SCO 0.1



Created by
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 Department of Chemistry
 TCC Soil Study
 December 3, 2018



Map of cyanide in mg/kg. The map shows the modeled surface, as the color darkens, the predicted concentration of cyanide increases. The TCC soil study used an SCO of 27 mg/kg for cyanide. Intervals below the SCO are of no immediate concern to residents. Intervals which contain values above the SCO do not directly correlate to risk. Cyanide is not a suspected contaminant from Tonawanda Coke, but it may provide necessary information for distinguishing Tonawanda Coke Corporation impact compared to other industries in the area. Credit: Dr. Tammy Milillo / Tonawanda Coke Soil Study











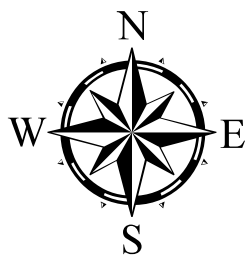
Kriging

Prediction Map

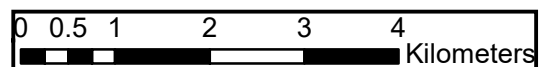
Cyanide_Total_mg_Kg_6in

Filled Contours

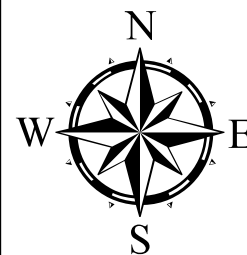
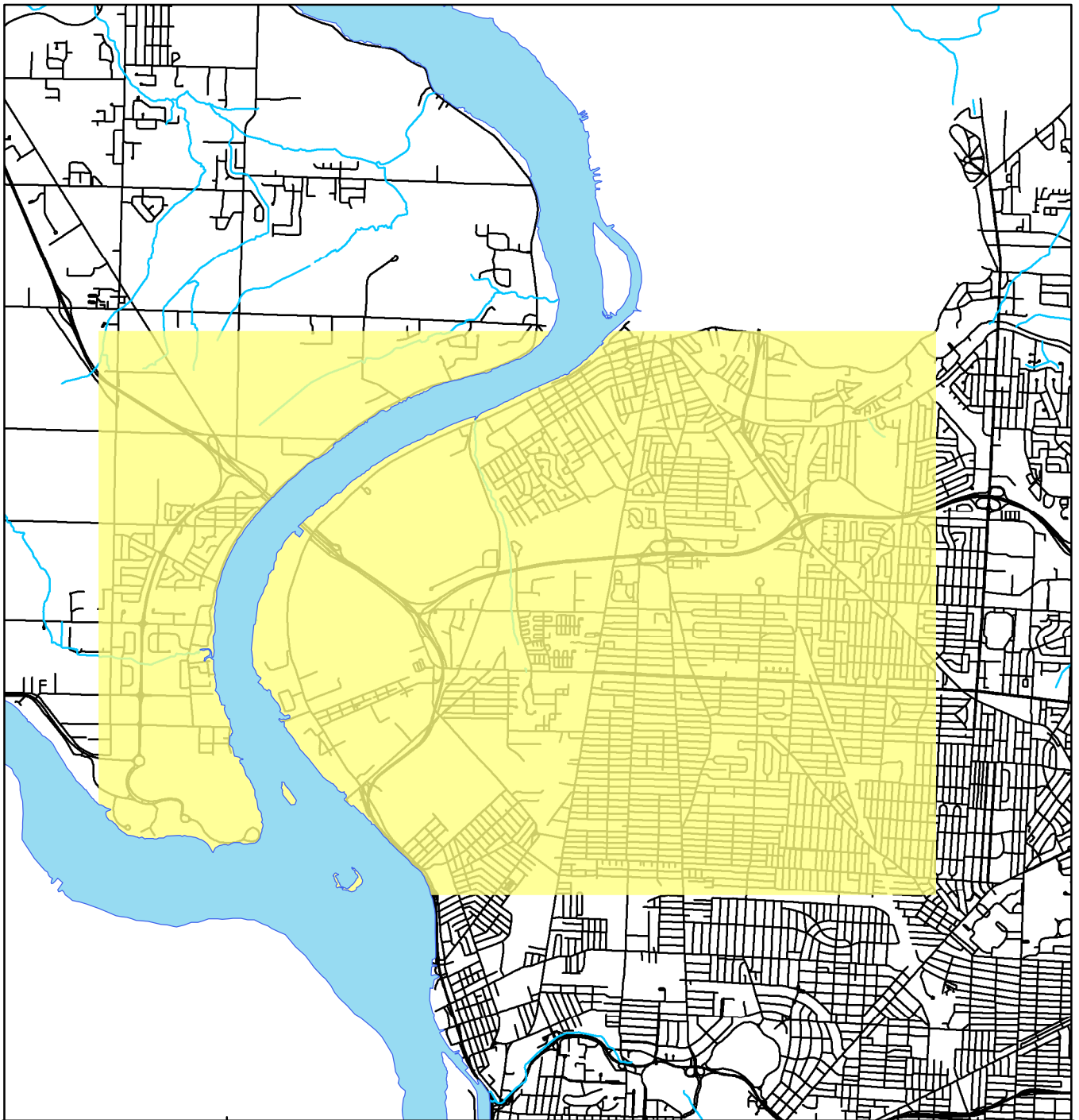
	0.10 – 0.16		0.23 – 0.30		0.71 – 1.29
	0.16 – 0.19		0.30 – 0.43		1.29 – 2.52
	0.19 – 0.20		0.43 – 0.71		2.52 – 5.08



Cyanide SCO 27
 Created by
 Tammy M. Milillo
 University at Buffalo, SUNY
 Department of Chemistry
 TCC Soil Study
 December 3, 2018



Map of Hexachlorobenzene in $\mu\text{g}/\text{kg}$. The map shows the modeled surface, as the color darkens, the predicted concentration of hexachlorobenzene increases. The TCC soil study used an SCO of $330 \mu\text{g}/\text{kg}$ for hexachlorobenzene. Intervals below the SCO are of no immediate concern to residents. Intervals which contain values above the SCO do not directly correlate to risk. This map is an example of a surface generated by chemical concentrations that are either not detected or significantly below any SCO value.
Credit: Dr. Tammy Milillo / Tonawanda Coke Soil Study



Hexachlorobenzene SCO 330

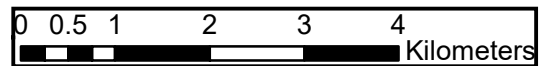
Created by
 Tammy M. Milillo
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 TCC Soil Study
 December 3, 2018

Kriging Prediction Map

Filled Contours

Hexachlorobenzene_ug_Kg_6in

- 70 – 330
- 330 – 660
- 660 – 960



Appendix 5: Education Campaign Plan from Katie Little and Dr. Milillo

Education Campaign Plan Ideas

Purpose

- To establish and maintain a presence within the community throughout the TCC soil study
- To build, support, and make known the credibility of the research team at UB and SUNY Fredonia
- To build trust and relationships between research team and community members
- To cultivate a platform that encourages discussion about the soil study and relevant topics with and among the community

How to Achieve the Purpose

- Online
 - Facebook, Instagram, Twitter, others?
- In person
 - Door to door
 - Larger General Community Meetings
 - Flyers with “rippy tabs”, postcards, notices
- Other media – TV news, newspaper, etc.
- Collect data from online community and create an analysis plan

Facebook content details:

“Friends of the Tonawanda Coke Soil Study”

- About us
 - Bios/pictures of the team
 - What we’ve done in other communities
 - Relevant published papers
 - Posters
 - News articles
- Ongoing events
 - Awards
 - Developments of the study
 - Commentary on other similar/relevant science
 - Updates on soil/environmental studies
 - Sharing useful databases/online tools
 - Get feedback from the community
 - Discussion board for general questions/comments/concerns
- Other group content
 - Project summary
 - De-identified maps approved by CAC
 - Past CAC notes or general summary of meetings
 - Posting of projected dates soil team members will be in the community, summary of purpose of community visit/activity
 - Countdown/tally on numbers of samples taken, permissions collected, etc.
 - General air sampling map
 - FAQs for air and soil sampling
 - Links to EPA standards
 - Ways community members can participate and help

Community Meetings

- Encourage a generic Q&A – “Do you have a question about what is going on in your community?”