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FMC Corporation

June 26, 2007

Via E-Mail and Overnight Mail

Mr. Matt Mortefolio, P.E. NYSDEC Project Coordinator Bureau of Solid Waste & Corrective Action Division of Solid and Hazardous Waste Materials NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION 625 Broadway, 9th Floor Albany, NY 12233-7258

Mr. Michael Infurna USEPA Project Coordinator Environmental Planning and Protection Division UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, Region II 290 Broadway, 20th Floor New York, NY 10007-1866

Re: RCRA Section 3008(h) Administrative Order on Consent Docket No. II-RCRA-90-3008(h)-0209 FMC Corporation, Middleport, NY Facility EPA I.D. No. NYD002126845 Report on Revised Evaluation of Background Arsenic Soil Concentrations in Middleport, NY

Dear Messrs. Mortefolio and Infurna:

As advised, FMC Corporation (FMC) has undertaken a further review of the Gasport study on background arsenic soil concentrations relative to the Middleport, NY area in light of information that became available after the completion of the Gasport study and submittal of the report in February 2003, "Development of Arsenic Background in Middleport Soils" (Gasport Background Study Report). The New York State Department of Environmental Conservation (NYSDEC) and the United States Environmental Protection Agency (USEPA) (collectively, "Agencies"), in consultation with the New York State Department of Health (NYSDOH), approved the February 2003 Gasport Background Study Report in June 2003. FMC is now submitting a report on the revised calculations of background values for arsenic in soils based on this further review ("Background Arsenic Soil Concentrations in Middleport, NY") ("Revised Background



Study Report").

As described in the Revised Background Study Report, in 2004 FMC obtained additional aerial photos from 1931, 1958, and 1966 of the Middleport study areas from the Niagara County and Orleans County Highway Departments (copies of these photos were provided to the Agencies in January 2005, but without any interpretation or suggested application) that indicated more extensive orchard usage of the study areas than that which was included in the Gasport study and evaluation. In addition, in 2005-2006 the NYSDEC and NYSDOH issued guidance in connection with the establishment of background soil concentrations in New York under the State Brownfields Program that use a 98th percentile of the available data to establish the relevant background values, including for metals such as arsenic.

Use of the additional information (the aerial photos) that was not available in 2002-2003 results in small but significant adjustments to the weighting factors for the Gasport background study. Specifically, the percentage of orchard property goes from three (3) percent shown in the Gasport Background Study Report to nineteen (19) percent. With inclusion of additional available orchard sampling data (i.e., from the 1989 Gasport Orchard Study) to compensate for the deficit resulting from the adjusted percentages, the overall background levels for the Middleport study areas increase from 8.1 mg/kg (ppm) to 13.2 mg/kg (weighted mean), 8.7 mg/kg to 19.2 mg/kg (95th % UCL on the weighted mean), and 19.2 mg/kg to 49.7 mg/kg (95th percentile). If the 98th percentile of the total data set, as adjusted, is used, consistent with the recent NYSDEC/NYSDOH guidance on establishing background, the relevant background value is 87.4 mg/kg.

This new information and the revised calculations based on it do not affect the individual ranges found during the 2002 Gasport background study – e.g., the range for residential properties remains 3.3 mg/kg to 21.1 mg/kg. However, it does affect the assessment of arsenic concentrations in Middleport soil that would exist "without any influence of possible past releases from FMC's Middleport plant" (to quote the 2001 Work Plan for the Gasport background study). This becomes critical and important for purposes of delineation under the RFI.

The Agencies have requested that FMC provide a schedule for completion of the RFI and submittal of a revised RFI report. FMC shares these goals. There are two critical actions by the Agencies in this process: 1) establishment of the background value in accordance with good science and statistical analysis for use for delineation purposes; and 2) determination that investigation (i.e., sampling) has been completed. These actions turn on the background study, as revised and updated.

As soon as the Agencies' review of the revised and updated background study is completed, and written agreement has been reached on the background value to be used for RFI delineation purposes and on completion of the investigation and on the background value to be used for RFI delineation purposes, FMC should be able to complete the RFI work and to submit the revised RFI report in five months from the time of such agreement. Please advise me as to any questions or requests for additional information.

Sincerely,

B: MM

Brian M. McGinnis Remediation Project Manager (215) 299-6923

enclosure

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Background Arsenic Soil Concentrations in Middleport, NY

Prepared for FMC Corporation 1735 Market Street Philadelphia, PA 19103

Prepared by Gradient Corporation 20 University Road Cambridge, MA 02138

June 25, 2007

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Appendix A Middleport Background Soil Arsenic Data Set

1 Introduction

Several studies have been conducted to characterize background soil arsenic concentrations in Middleport, New York, including studies relative to the RCRA Facility Investigation (RFI) for FMC Corporation's (FMC's) Plant facility in Middleport. This report summarizes and re-evaluates the results of the soil arsenic background studies that have been conducted to date in Middleport and Gasport and provides revised calculations based on information that has become available since the last study in 2001-2003, and recent analysis of soil background by the New York State Departments of Environmental Conservation and Health (NYSDEC and NYSDOH). The most recent study completed was the 2001-2003 soil sampling and analysis of Gasport, a nearby community with similar features to Middleport. Since completion of that study, additional information on the property type/usage weighting factors utilized in the 2001-2003 Gasport Study was obtained, and has been used to re-evaluate the results of the 2001-2003 Gasport Study and previous arsenic background studies conducted in Middleport and Gasport. This re-evaluation is presented in this report.

This report also includes information about soil arsenic background collected in the neighboring community of Lyndonville, nine miles northeast of Middleport. Considered together, these data sets provide substantial information about natural and anthropogenic background levels of arsenic in soil in the greater Middleport area. Figure 1 identifies the locations of Middleport, Gasport and Lyndonville areas.

Arsenic is a naturally occurring element that is present in soil as a result of both geologic background and contamination through anthropogenic uses including pesticide applications, fertilizers, wood treatment, and various industrial and manufacturing uses. Several state-wide and nation-wide surveys of arsenic concentrations in soil have been made over time (*e.g.* Shacklette and Boerngen, 1984; Dragun and Chiasson, 1991; NYSDEC and NYSDOH, 2006). These surveys show that arsenic concentrations can vary from approximately 1 to 20 mg/kg in natural, or pristine soils, but typically reach concentrations of 100 mg/kg or higher where non-point source anthropogenic influences are present. Expected soil arsenic concentrations vary with land use, and it has long been known that former apple orchard lands in New York State often have high soil arsenic concentrations as a result of pesticide use (*e.g.*, Shacklette, 1980, reports a range of soil arsenic concentrations between 13 and 100 mg/kg in New York apple orchard soils).

Soils in the vicinity of industrial operations that have released arsenic through air emissions or surface run-off may show the influence of these events in elevations of arsenic concentrations above background levels expected from natural and anthropogenic sources. Because both background and facility-related concentrations of arsenic in soil are represented by a range, it can be difficult to estimate the respective contributions to the levels of arsenic found in soil from each source. As a result, in order to estimate the approximate extent of arsenic in soil that may be potentially related to past operations at the FMC facility, a thorough understanding of the background levels of arsenic (from natural and non-FMC related anthropogenic sources) in soil within the Middleport study areas is required.

2 Previous Investigations of Arsenic Background

FMC, NYSDOH, NYSDEC, and/or the United States Environmental Protection Agency (USEPA) (collectively "Agencies") variously performed soil sampling and analysis and/or background data evaluations as part of the following studies to characterize local background arsenic concentrations in Middleport area soils:

- <u>November 1985 Royalton-Hartland Central (Roy-Hart) School Surface Soil Sampling & Analysis</u> <u>Program</u> – A study conducted by FMC that included the collection and arsenic analysis of surface soil samples from the Roy-Hart Elementary School in Gasport.
- January 1989 NYSDOH Soil Sampling Program in Middleport, New York Included the collection and arsenic analysis of surface soil samples from residential yards and a farm field east of the FMC facility;
- <u>1989 Gasport Orchard Study</u> FMC collected soil samples from an active apple orchard east of Gasport in 1989 to further characterize background arsenic and lead concentrations in orchards (CRA, 1989e);
- <u>1990-1993 Off-Site Investigation</u> Included the collection and analysis of surface soil samples by FMC to characterize background soils south, southeast and east of the FMC facility, and in Gasport (CRA, 1993c);
- <u>1999 Draft RFI Report</u> In early 1996, the Agencies identified a set of arsenic soil background data from 11 background locations sampled as part of the above-mentioned studies and in early 1997 further identified 30 mg/kg as an appropriate criterion for comparison to investigative data in the draft RFI Report (CRA, 1999a);
- <u>2001-2003 Gasport Area Background Study</u> FMC implemented a study developed by the Agencies to re-evaluate local arsenic background concentrations in Middleport soils. The study included collection and arsenic analysis of surface soil samples from orchards, agricultural fields, undeveloped wooded properties, public properties and residential properties in Gasport. The arsenic data from the study was used to calculate various arsenic soil background criteria for Middleport.

The results from three of the earlier studies are discussed below. The results from the 2001-2003 Gasport Area Background Study are discussed in Section 3.

2.1 Background Data Presented in 1999 Revised Draft RFI Report

The 1999 Revised Draft RFI Report summarized a Site-specific background data set that was selected by the Agencies (Agencies, 1996a) from samples taken during the November 1985 Roy-Hart

School soil sampling, January 1989 NYSDOH Soil Sampling, the 1990-1993 OSI sampling, and February 1989 FMC sampling from an orchard east of Gasport and west of the Site. The samples in the background data set selected by the Agencies were collected between 1985 and 1990 from 11 background locations at depths of 0-3 inches or 0-6 inches bgs. The data set includes two samples from the 1989 Gasport Orchard study described in Section 2.2 below. Arsenic concentrations in this data set ranged from 4.4 mg/kg to 56.1 mg/kg with an arithmetic mean of 22.1 mg/kg and a 95% UCL on the mean of 30 mg/kg. The Agencies approved use of the 95% UCL on the mean for RFI delineation purposes (Agencies, 1997).

2.2 1989 Gasport Orchard Study

In February 1989, FMC collected surface (0-6 inches bgs) and shallow subsurface (6-12 inches bgs) soil samples from nine (9) locations in and adjacent to an apple orchard located east of Gasport, New York and west of the Site (CRA, 1989e). Samples were analyzed for lead and arsenic to identify background levels of arsenic and lead in orchard soils. Samples were collected at five (5) locations within the orchard, two (2) locations along the railroad ditches located to the north of the orchard, which receive runoff from the orchards, and two (2) locations in an open field adjacent to a vineyard located just to the east of the orchard. Arsenic concentrations in the soil did not vary significantly with sample depth. The surface samples ranged from 31.6 mg/kg to 56.1 mg/kg with a mean of 43.8 mg/kg (CRA, 1989e).

2.3 Lyndonville Data

To provide a comparison with the Middleport and Gasport data, soil arsenic concentrations from a site (Lyndonville-West Avenue Site) in Lyndonville, NY, which is located nine miles northeast of Middleport, were reviewed. Lyndonville is also a rural community of about 1000 residents with extensive present and former agricultural and orchard land use. The Barry Lime and Sulphur Company (subsequently purchased by DuPont) produced lime and sulfur solutions and dust mixtures containing pesticides, including arsenic, for agricultural and orchard application. (See NYSDEC Record of Decision, Lyndonville West Avenue Site, March 2004). DuPont collected 19 surface soil samples (0-6 inches bgs) between 1993 and 2002 to characterize background soil arsenic concentrations in Lyndonville (DuPont and URS Diamond Corporation, 2003). Soil samples were collected from locations representing a variety of land uses (*e.g.*, yard, library, high school playing field, playground, drainage swale, old

railroad bed, and adjacent field). Arsenic concentrations in the Lyndonville data set ranged from 2.6 mg/kg to 110 mg/kg, with a mean of 24.9 mg/kg and a 95% UCL on the mean of 49.9 mg/kg.

3 2001-2003 Gasport Area Background Study

In mid 2000, the Agencies proposed a program to re-evaluate local arsenic background concentrations in Middleport soils with collection of a larger, more extensive data set. This program, which is described in "Part A – Work Plan for Development of Arsenic Background in Middleport Soil" (Agencies, 2001) included the collection and analysis of surface soil samples from the Gasport Area. FMC implemented the Part A Work Plan beginning in December 2001, issued a final report ("Development of Arsenic Background in Middleport Soils" [CRA, 2003a]) in February 2003, and submitted revisions in May 2003. The Agencies approved the report in June 2003. As stated in the Part A Work Plan, the goal of the study was "to develop an estimate of arsenic concentrations in Middleport soil that are as close as possible to the arsenic concentrations which would exist in the area's soil without any influence of possible past releases from FMC's Middleport Plant."

The Part A Work Plan identified four major property type/usage groups in the Middleport Study Area, which included the area within the Village of Middleport limits, the area east and southeast of the Village limits to the Niagara/Orleans County Line, and the area north of the Village limits to Pearson Road. The major property type/usage groups identified for the Middleport Study Area are:

- Orchard Land
- Wooded/Overgrown/Agricultural Crop Field Land
- Commercial/Industrial Land
- Residential/Public Land

Using historic Sanborn Maps and aerial photos that were available during development of the work plan (photos dated 1938, 1951, 1958, 1973 and 1978), the area of each property type/usage group was estimated for the period during and immediately following the time when arsenic was actively managed at the FMC Facility (arsenical compounds were produced and formulated by FMC and predecessor companies at the Middleport location from the late 1920s to 1974). The fraction of the study area covered by each of the four major property type/usage groups was estimated for two time periods (1931-1958 and 1968-1978). A time-weighted fraction, or weighting factor, was calculated for each property type/usage group for weighting of the background sample results. The property type/usage group weighting factors, as set forth in the 2001 Part A Work Plan, are presented in Table 1.

Property Type/ Usage Group	1931-1958 Property Map Group Percentages	1968-1978 Property Map Group Percentages	1931-1978 Property Group Weighting Factors (Percentages)
Time Weighted Factor	0.68	0.32	
Wooded/Overgrown/ Agricultural Crop Field Land	57%	50%	55%
-	(10% Wood/Over only) (47% Crop Field Only)	(28% Wood/Over only) (22% Crop Field Only)	(16% Wood/Over only) (39% Crop Field Only)
Commercial/Industrial Land	8%	11%	9%
Orchard Land	5%	0%	3%
Residential/Public Land (Includes school)	30% (0% School only)	39% (4% School only)	33% (1% School only)

Table 1Property Type Weights (from 2003 Final Report)

3.1 Selection of Sample Properties

The Part A Work Plan selected properties within and near Gasport, New York (Gasport Area) for the background soil sampling for the following reasons:

- The Gasport Area includes properties similar to the four major historic Middleport property type/usage groups.
- The Gasport Area is similar to Middleport in character (*i.e.*, economics, topography, surface water features, soil geology, and proximity to the Erie Canal and the mainline railroad tracks) and history (*i.e.*, rural agricultural usage).
- The Gasport Area is approximately 4.5 miles west of the Facility and is sufficiently distant in an upwind direction from the FMC Facility so as not to have been impacted by past operations at the Facility.

The number and types of Gasport properties sampled are shown in Table 2.

Major Property Type/ Usage	Number of Properties
Orchard Land	3 Orchards
Wooded/Overgrown/Agricultural Crop Field Land	2 Wooded Lands 5 Crop Fields
Commercial/Industrial Land	2 Business Properties 2 Industrial Properties
Residential/Public Land	7 Residential Properties 1 School Property

Table 2Properties Sampled in Gasport

3.2 Sample Collection and Analysis

A total of 150 soil samples were collected in May, 2002 from 21 individual properties according to the property types shown in Table 2 (CRA, 2003a). Initially 75 samples were analyzed for arsenic, and the remaining samples were archived (CRA, 2003a). After a statistical analysis of data adequacy, FMC and the Agencies agreed that an additional 28 samples from the Wooded-Agricultural group, including eight samples from two wooded properties and 20 samples from five crop fields, would be analyzed. This created a data set with 103 samples.

3.3 Statistical Analysis of Outliers and Data Adequacy

An evaluation of outliers showed that there were four potential outliers in the Wooded-Agricultural land group. The four potential outliers are presented in Table 3.

Major Property Type/ Usage Group	Sample Location	Arsenic Concentration (mg/kg)
	Ca-1A	56.7
Wooded/ Overgrown/ Agricultural	Ch-3A	53.5
Crop Field Land	Ch-2B	36.9
	Ca-4A	32.3

 Table 3

 Potential Outliers in the Wooded-Agricultural Group

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A statistical analysis of data adequacy was performed using the property type weights and the background arsenic data set (N = 103). This analysis indicated that with the outliers included, there were sufficient data to represent the Commercial/Industrial, Orchard, and Residential/Public land groups, but that there were not enough data in the Wooded-Ag land group. The analysis indicated that 63 samples should be added to the Wooded-Ag set. With the outliers excluded (N = 99), the analysis indicated the opposite: that there were sufficient data in the Wooded-Ag land group, but there were not enough data in the Wooded-Ag land group, but there were not enough data in the Wooded-Ag land group, but there were not enough data in the Commercial/Industrial, Orchard, and Residential/Public land groups. FMC and the Agencies agreed to proceed without these additional data and the Agencies approved the adequacy of the 2002 background data set.

3.4 Statistical Comparison Tools and Criteria

After receipt of Agencies' approval of the adequacy of the background data set, statistical comparison tools and criteria were calculated using the background data set with and without the potential outliers. The following tables present a summary of the data and statistically derived values used to represent the whole background data set (CRA, 2003a). The statistical comparison tools and criteria were calculated using the property group weighting factors in accordance with the procedures specified in the Part A Work Plan. The statistical values listed in Table 4 were presented in the final report, entitled Development of Arsenic Background in Middleport Soils" (CRA, 2003a), in February 2003, with revisions submitted in May 2003. The Agencies approved the report in June 2003.

Comparison Tools	Including potential outliers N=103 (mg/kg)	Excluding potential outliers N=99 (mg/kg)
Weighted Mean	9.7	8.1
95% UCL on Weighted Mean	11.6	8.7
95 th Percentile	21.5	19.2
95% UCL on the 95th percentile (UTL)	30.3	28.2
99th percentile	40.7	38.8
95% UCL on the 99 th percentile	86.8	85.7

Table 4Middleport Background Arsenic Statistical Comparison ToolsPresented in 2003 Final Background Report

Note: UCL = Upper confidence limit; UTL = Upper tolerance limit

4 Re-Evaluation of the 2001-2003 Gasport Area Background Study

4.1 Development of Revised Property Type/Usage Weighting Factors

In 2004, FMC obtained additional aerial photos of the Middleport study areas dated 1931, 1938, 1957, 1958, and 1966, from the Niagara County and Orleans County Highway Departments. Copies of the photos were provided to the Agencies by transmittal dated January 28, 2005. Based on a review of these aerial photos, FMC has now revised the area estimates for each of the property type/usage groups in the Middleport Study Area, for the 1931-1958 time period, and recalculated the overall property group weighting factors for the 1931-1978 time period, consistent with the protocols in the Part A Work Plan. The revised property group percentages reflect the significant current and historic use of land by orchards in the Middleport Study Area, as depicted in all of the available documents, including the additional aerial photos obtained in 2004. As shown in Table 5, the revised percentage for orchard land is 19%, which is an increase from the 3% value shown in the 2003 Soil Background Study Report (CRA, 2003a). There were corresponding adjustments to the percentage weighting factors for other property usages.

Property Type/ Usage Group	Revised 1931-1958 Property Map Group Percentages	Revised 1968-1978 Property Map Group Percentages	Revised 1931-1978 Property Group Weighting Factors (Percentages)
Time Weighted Factor	0.68	0.32	
Wooded/Overgrown/ Agricultural Crop Field Land	41%	50%	44%
C 1	(9% Wood/Over only)	(28% Wood/Over only)	(15% Wood/Over only)
	(32% Crop Field Only)	(22% Crop Field Only)	(29% Crop Field Only)
Commercial/Industrial Land	7%	11%	8%
Orchard Land	27%	0%	19%
Residential/Public Land	24%	39%	29%
(Includes school)	(0% School only)	(4% School only)	(1% School only)

Table 5Revised Property Type Weights

4.2 Augmented Data Set with Additional Orchard Samples

A revised statistical analysis of data adequacy was performed considering the revised property group percentages. This analysis indicated that there are insufficient data in the orchard land group as a

result of the higher percentage of property classified as orchard land. In an effort to augment the 2002 sample data for the Orchard group, the surface soil (0-6 inches bgs) sample results from the nine (9) locations where sampling was conducted during the 1989 Gasport Orchard Study were added. This created a data set of 21 orchard samples, and an aggregated data set of 112 samples. The aggregated data set is presented in Appendix A. This was a necessary step because of the large percent of land historically used as orchards and the corresponding severe insufficiency number of samples in the 2002 orchard background data set. Excluding the four outliers from the 112-sample data set resulted in a final data set with 108 samples.

A second data adequacy analysis on the 108-sample data set indicated that there were still not enough samples in the Orchard data set. This analysis indicated that 46 samples should be added to the Orchard set, to bring the total to 67 samples. However, no further action has been taken at this time to increase the size of the data set.

4.3 Summary Statistics

Table 6 presents the revised summary statistics that were calculated for the Middleport aggregated background data set, excluding outliers (N=108), following procedures outlined in the 2003 Soil Background Study Report (CRA, 2003a). These summary statistics are based on the revised weighting factors.

Excluding 4 Potential Outliers."			
Parameter	Arsenic Concentration (mg/kg) (N = 108)		
Weighted Mean	13.2		
95% UCL on Weighted Mean	19.2		
95 th Percentile	49.7		
98 th Percentile	87.4		

Table 6
Middleport Background Data Set Arsenic Concentrations
(Aggregated 1989 & 2002 Gasport Data*)
Excluding 4 Potential Outliers**

Note:

* Includes 9 samples from the 1989 Gasport Orchard data set.

** Excludes 4 samples identified as outliers in the 2002 Wooded/Ag property type.

5 Selecting a Soil Arsenic Concentration for Delineation Sampling

As part of the RFI, the Agencies requested in January 2002 (in Enclosure 2 to the Agencies' January 11, 2002 letter to FMC) that FMC delineate the extent of potential FMC-related arsenic in soil based on comparisons to locally-derived background soil arsenic criteria. In order to determine whether or not potential FMC-related arsenic has been adequately delineated, the investigative data obtained from the FMC study areas will be compared to an appropriate locally-derived background soil arsenic concentration.

Recent guidance, "New York State Brownfield Cleanup Program, Development of Soil Cleanup Objectives, Technical Support Document" (NYSDEC and NYSDOH, 2006), states:

"There is no widely accepted definition of "background soil concentration." In establishing a Rural Soil Background Concentration (RSBC), we [NYSDEC and NYSDOH] selected a concentration that approximated the 98th percentile concentration for that analyte in rural New York State soils. The 98th percentile was used because it is the nearest whole percentile to the 97.5th percentile, which is the upper bound of the "reference range" (2.5th to 97.5th percentile) often employed to define values that are considered typical. For example, the 97.5th percentile was used by the Ontario Typical Range Model to establish upper bounds for organic and inorganic analytes in various environmental media including soil (OMEE, 1993)."

On this basis, the 98th percentile of the aggregated data set, or 87 mg/kg, is the appropriate value for use as the comparison criterion for delineation sampling and the determination that delineation is or is not complete.

6 References

Agencies, 1996a. Letter to Mr. James Bodamer, FMC Corporation, from Ms. Denise Radtke, New York State Department of Environmental Conservation, and Mr. Andrew Bellina, United States Environmental Protection Agency. The Agencies presented their final determinations with respect to the need for additional soil sampling and on FMC's July 19, 1995 proposed scope of work for additional soil sampling and analysis as part of the RCRA Facility Investigation. Letter dated January 24, 1996.

Agencies, 1997. Letter from Raymond Basso (USEPA) and Denise Radtke (NYSDEC) to James Bodamer (FMC), May 20.

Agencies, 2001. Program to Determine Extent of FMC-Related Arsenic Contamination in Middleport Soil, Part A – Work Plan for Development of Arsenic Background in Middleport Soil. September 2001, revised November 2001.

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Appendix A

Middleport Soil Background Arsenic Data Set

Property	Arsenic Concentration	_
Type Group	(mg/kg)	Comment
Wooded-Ag	2.3	
Wooded-Ag	2.9	
Wooded-Ag	3.0	
Wooded-Ag	3.2	
Wooded-Ag	3.3	
Wooded-Ag	3.4	
Wooded-Ag	3.4	
Wooded-Ag	3.4	
Wooded-Ag	3.5	
Wooded-Ag	3.7	
Wooded-Ag	3.7	
Wooded-Ag	3.8	
Wooded-Ag	4.0	
Wooded-Ag	4.0	
Wooded-Ag	4.1	
Wooded-Ag	4.1	
Wooded-Ag	4.2	
Wooded-Ag	4.2	
Wooded-Ag	4.3	
Wooded-Ag	4.4	
Wooded-Ag	4.4	
Wooded-Ag	4.6	
Wooded-Ag	4.7	
Wooded-Ag	4.7	
Wooded-Ag	4.8	
Wooded-Ag	4.9	
Wooded-Ag	5.1	
Wooded-Ag	5.1	
Wooded-Ag	5.2	
Wooded-Ag	5.2	
Wooded-Ag	5.3	
Wooded-Ag	5.3	
Wooded-Ag	5.5	
Wooded-Ag	6.7	

Middleport Background Soil Arsenic Data Set Total N = 112

Property	Arsenic Concentration	
Type Group	(mg/kg)	Comment
Wooded-Ag	6.9	
Wooded-Ag	7.1	
Wooded-Ag	7.2	
Wooded-Ag	7.6	
Wooded-Ag	7.7	
Wooded-Ag	8.1	
Wooded-Ag	8.4	
Wooded-Ag	8.8	
Wooded-Ag	9.4	
Wooded-Ag	9.8	
Wooded-Ag	11.9	
Wooded-Ag	32.3	Outlier
Wooded-Ag	36.9	Outlier
Wooded-Ag	53.5	Outlier
Wooded-Ag	56.7	Outlier
Com-Ind	3.3	
Com-Ind	3.3	
Com-Ind	4.6	
Com-Ind	4.9	
Com-Ind	5.2	
Com-Ind	6.4	
Com-Ind	7.5	
Com-Ind	12.5	
Com-Ind	13.2	
Com-Ind	20.6	
Com-Ind	26.1	
Com-Ind	32.8	
Orchard	31	
Orchard	3.8	
Orchard	4.6	
Orchard	8.4	
Orchard	10.4	
Orchard	14.7	
Orchard	24.5	
Orchard	24.5	
Orchard	31.6	from 1989 dataset
Orchard	40.7	from 1989 dataset
Orchard	40.7	from 1989 dataset
Orchard	40.9	from 1989 dataset
Orchard	41.8	from 1989 dataset
Orchard	42.5	from 1989 dataset
Orchard	тэ.1 ДЗ Э	nom 1909 uataset
Orchard	43.2	from 1090 dataset
Orchard	4J.0 51 7	from 1000 detect
Orchard	JI./	from 1000 detect
Orchard	20.1 56.2	from 1989 dataset
Orchard	56.5 91.0	
Orchard	81.9	
Orchard	121.3	

Property Type Group	Arsenic Concentration (mg/kg)	Comment
Res-Pub	3.3	
Res-Pub	3.8	
Res-Pub	4.2	
Res-Pub	4.5	
Res-Pub	5.6	
Res-Pub	5.7	
Res-Pub	6.3	
Res-Pub	7.3	
Res-Pub	7.7	
Res-Pub	7.7	
Res-Pub	8.0	
Res-Pub	9.1	
Res-Pub	9.5	
Res-Pub	9.9	
Res-Pub	10.1	
Res-Pub	11.6	
Res-Pub	12.8	
Res-Pub	14.5	
Res-Pub	14.5	
Res-Pub	15.0	
Res-Pub	19.5	
Res-Pub	20.3	
Res-Pub	21.1	