Onondaga County Health Department

Division of Environmental Health
421 Montgomery Street
Syracuse, New York 13202

Incinerator Monitoring Program

2012 Summary Report

June 1, 2013

Submitted To: Cynthia B. Morrow, M.D., M.P.H.
Commissioner of Health

Submitted By: Kevin L. Zimmerman
Director, Division of Environmental Health

Summary Statement:
In the monitoring conducted to date, no relationship has been established between the operation of the incinerator and any significant increased levels of constituents in the environment.

Introduction

The Onondaga County Health Department initiated an incinerator monitoring program in 1994, the year prior to the Waste to Energy (WTE) facility being placed into operation. In 2003, the monitoring program for air, soil and ash was reevaluated, and a more effective and efficient program was developed and implemented starting in 2004. As an alternative to offsite air monitoring, direct interaction was established with the Onondaga County Resource Recovery Agency (OCCRA) and the New York State Department of Environmental Conservation (DEC) in providing stack monitoring results and improved assurance on reporting of adverse events and equipment failures. This allows for evaluation of short-term changes in the incinerator emissions, an effective alternative to the previous limited scope offsite air monitoring conducted over a nine year period.

Long-term deposition impacts continue to be evaluated by soil and ash monitoring. All soil samples are analyzed for metals twice a year. Several changes related to organics testing have been implemented based on the low levels detected in the monitoring conducted to date, and the fact that there is no evidence of a trend or levels associated with health risks. Starting in 2009, half of the soil sampling sites were analyzed for organics each year, therefore each site is sampled biennially. The monitoring program has the flexibility of testing a site again in the following year should an elevated level of any organic constituent be detected. The four soil ash route sites have been eliminated from the program. To date these sites have not shown any elevation of metals or organics indicating that ash transport in covered vehicles is not a significant environmental or health concern. Ash, directly from the incinerator continues to be analyzed for metals twice a year and organics once a year. Under present contracts, organic analysis is performed by Axys Analytical Services, LTD, and metal analysis is performed by Life Science Laboratories, Inc. The collection of soil is performed by Onondaga County Health Department, Division of Environmental Health staff, while collection of the ash is the responsibility of Covanta Energy System under New York State Department of Environmental Conservation protocols.

Air Monitoring

During 2012, the department interacted directly with OCCRA and DEC in review of the stack monitoring results and reporting of adverse events and equipment failures by the facility operator, Covanta Energy. The department also reviewed both the monitoring conducted at the stack on a continuous basis and reported quarterly to DEC, as well as the annual stack test that is performed by an independent contractor. At no time did the monitoring indicate constituents above levels of health concern. The annual stack test incorporates an extensive list of analytes that include metals and organics. All of the analytes were well below permit limits.

Soil and Ash Testing for Organics

Soil from seven routine soil sites collected in the spring of 2012 was analyzed for dioxins/furans (PCDD/PCDF), polychlorinated biphenyls (PCB's), and polycyclic aromatic hydrocarbons (PAH's). Ash, also collected in the spring of 2012, was analyzed for the same constituents.

Organic sample results are compared to published background data and U.S. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry (ATSDR) Toxicological Profiles, EPA Preliminary Remediation Goals, and NYSDEC Soil Cleanup Objectives. In general, little change in levels of these compounds has been observed from background through the present organic screening period. The levels of organics in the ash were similar to reports for ash identified by other investigators and reported in published literature.

Each form of dioxin/furan has associated with it a toxic equivalency factor that is used to calculate a total toxic equivalency (TEQ) for each sample. Attachment A shows the historical dioxin/furan TEQ values for routine soil sites and ash samples. All levels remain well below the ATSDR and EPA action levels and there is no indication of a trend. For ash, dioxin/furan total TEQ remain fairly consistent. Ash is not homogeneous and an inconsistent result occurs occasionally. The results are similar to those reported by other investigators.

Attachment B shows the historical PCB values for routine soil sites and ash samples. All levels remain below the ATSDR and EPA action levels and there is no indication of a trend.

Soil and Ash Testing for Metals

Soil from the fourteen soil sites and ash were analyzed for ten different metals twice during the year (Spring and Fall). The metal results are issued in two different reports, one for soils and one for ash.

In 2011, due to improvements in the contract laboratory's equipment, the detection limits for beryllium, cadmium, and selenium have been lowered. Therefore there are detectable levels of these metals in many of the samples as compared to previous years.

Metal results are compared to background levels, published national averages for urban areas and a statewide rural soil survey. Soil and ash are not homogeneous and can contain materials that can account for an occasional inconsistent result. Hence, a single elevated or depressed value will not be assumed to be indicative of a change at a specific site. Rather, the pattern of values for that specific element must demonstrate a statistically significant difference, which may be indicative of a real environmental change. In general, the metal results for 2012 fall within the expected range of values for urban areas and demonstrate no significant variation from background levels.

Attachment C shows the historical levels for the ten metals at the routine soil sites. Due to the volume of data, the mean (average) of all routine sites and all routine control sites

for each year is presented. The complete report includes all of the data for each site. Attachment C-1 provides data on New York State Department of Environmental Conservation Soil Cleanup Objectives, a New York State rural soil survey, and USEPA soil screening levels for metals in residential soil.

Attachment D shows the historical levels of the ten metals in ash.

Summary and Conclusions

In general, the organic and metal results for this monitoring period are within the expected range for urban environments and are below any levels associated with health risk. Any fluctuations in sample results appear to be a reflection of the low levels detected, expected variation as a result of sample collection, preparation, and laboratory procedures, or possible variable levels due to past activities at a site. All levels remain below those associated with health concerns. The results should be viewed in the context of an ongoing program of environmental monitoring performed by the Onondaga County Health Department as a part of its overall Incinerator Monitoring Program. In the monitoring conducted to date, no relationship has been established between the operation of the incinerator and any significant increased levels of constituents in the environment.

The following are the detailed Incinerator Monitoring Program reports that have been issued on the 2012 soil and ash testing:

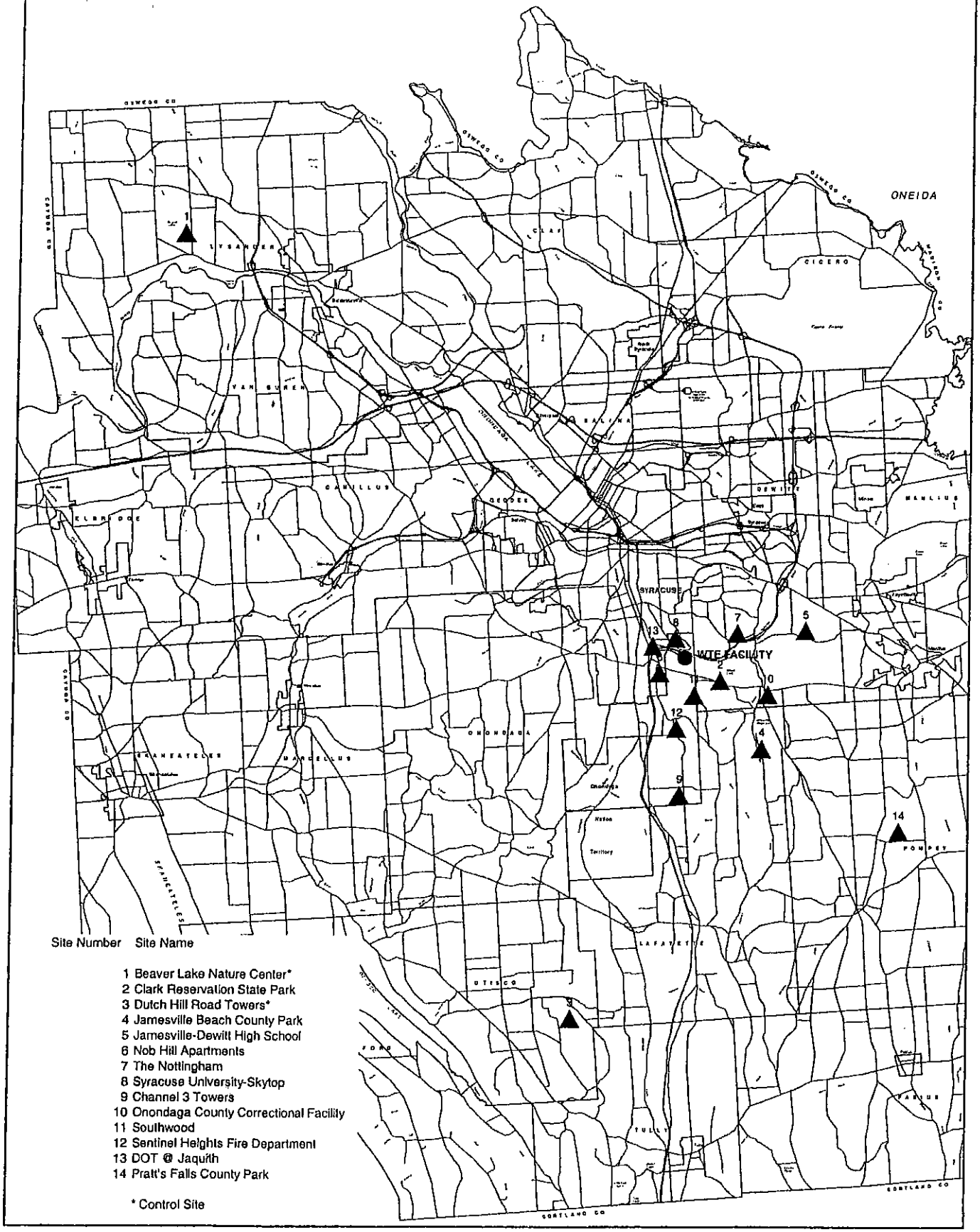
2012 Screening Summary for Organic Constituents
2012 Soil Metals Analysis Summary
2012 Ash Characterization Summary

Copies of these reports are available upon request.

The following abbreviations may be used in this report:

As	Arsenic.
ATSDR	Agency for Toxic Substances and Disease Registry
Be	Beryllium.
Cd	Cadmium.
CES	Certified Environmental Services.
Cr	Chromium.
CV	Coefficient of Variation.
ELS	Environmental Laboratory Services.
Hg	Mercury.
LD	Limit of Detection.
ND	None Detected.
ug/g	micrograms per gram.
Ni	Nickel.
OCCF	Onondaga County Correctional Facility.
OCHD	Onondaga County Health Department.
PAH	Polyaromatic Hydrocarbon
PCB	Polychlorinated Biphenyls
PCDD/PCDF	Polychlorinated Dibenzo-p-Dioxins/Dibenzofurans
Pb	Lead.
pg/g	picograms per gram
PPM	parts per million.
SD	Standard Deviation.
Se	Selenium.
SHFD	Sentinel Heights Fire Department
V	Vanadium.
WTE	Waste to Energy Facility.
Zn	Zinc.
~	approximately.
<	Less than.
>	Greater than.
NA	Not applicable.
NS	Not sampled.

OCHD ROUTINE SOIL MONITORING SITES



Site Number Site Name

1 Beaver Lake Nature Center*
2 Clark Reservation State Park
3 Dutch Hill Road Towers*
4 Jamesville Beach County Park
5 Jamesville-Dewitt High School
6 Nob Hill Apartments
7 The Nottingham
8 Syracuse University-Skytop
9 Channel 3 Towers
10 Onondaga County Correctional Facility
11 Southwood
12 Sentinel Heights Fire Department
13 DOT @ Jaquith
14 Pratt's Falls County Park

* Control Site

Attachment
A

Attachment A

Dioxin/Furnan TEQ Soil Results through Year 2012 (pg/g dry weight)

Routine Soil Sites

Site	Year													
	1994	1999	2000	2001	2002	2004	2005	2006	2007	2008	2009	2010	2011	2012
Clark Reservation	1.8	1.2	2.27	1.42	1.23	2.03	1.90	1.76	1.73	1.26	***	1.64	***	1.75
Jamesville Beach	0.6	0.5	1.09	0.82	0.70	0.71	0.97	0.86	0.93	0.77	***	0.52	***	0.488
OCCF	0.79	2.2	1.68	1.47	1.26	1.38	5.54	1.52	1.94	1331.72@	1.72	***	2.13	***
DOT @ Jaquith	2		1.5	1.64	3.41	2.41	3.78	3.38	1.73	39.90@	2.62	***	3.95	***
Dutch Hill *	**0.77**		**1.41**	**1.16**	**1.40**	**1.03**	**1.26**	**1.02**	**1.02**	**0.64**	***	**0.73**	***	**2.44**
Erie - Poolsbrook*	**1.39**		**1.5**	**1.14**	**1.86**	**	**	**	**	**	**	**	**	**
Nottingham	0.51		0.78	0.79	0.80	0.70	0.94	0.85	0.84	0.74	0.76	***	0.43	***
SHFD	12		8.02	9.89	9.72	7.02	8.09	6.27	7.20	10.74	***	7.12	***	16
Sevier Rd	1.8		2.07	2.58	2.56	**	**	**	**	**	**	**	**	**
Beaver Lake *			**0.51**	**0.53**	**0.85**	**0.70**	**0.72**	**0.64**	**0.69**	**0.65**	**0.38**	***	**0.5**	***
Ch. 3 Towers			3.36	3.88	3.35	9.66	7.79	7.69	5.39	2.44	3.72	***	0.45	***
Gen.Crushed Stone			2.77	1.98	2.13	**	**	**	**	**	**	**	**	**
Highland Forest			1.18	1.24	0.96	**	**	**	**	**	**	**	**	**
JD High School			1.32	1.29	1.12	1.10	1.48	1.16	1.06	1.28	***	1.13	***	0.951
Nob Hill			0.93	0.91	0.90	6.83	1.01	1.00	1.07	1.05	***	0.78	***	0.488
Pratts Falls			0.91	0.98	0.77	0.87	0.98	0.83	0.94	1.17	0.82	***	0.94	***
Southwood			0.6	1.14	1.01	1.08	1.05	0.97	1.09	1.01	0.80	***	0.93	***
Syracuse University			3.11	6.97	9.47	13.89	3.14	3.66	12.96	0.67	***	2.45	***	1.63

* Denotes Control Sites

** Site no longer sampled due to program re-evaluation

*** Site not sampled this year. Sites are sampled every other year.

@ A single elevated value will not be assumed to be indicative of a change at a specific site, rather a pattern of values must demonstrate a statistically significant difference.

Combined Ash

Site	Year													
	1999-Spring	1999-Fall	2000-Fall	2001-Fall	2002-Fall	2004-Spring	2005-Spring	2006-Spring	2007-Spring	2008-Spring	2009-Spring	2010-Spring	2011-Spring	2012-Spring
Day 1 and 2	256	153	109	123	177	72	191	246	250	243	168	200	197	116
Day 3, 4, and 5	242	205	154	137	220	445	142	148	276	240	126	172	129	127

Note: For reference purposes, the ATSDR investigation level for Dioxin/Furan TEQ is 50 pg/g and the EPA clean up level is 1,000 pg/g.

Attachment
B

Attachment B

PCB Results through Year 2012 (pg/g dry weight)

Routine Soil Sites

Site	2000	2001	2002	2004	2005	2006	2007	2008	2009	2010	2011	2012
Clark Reservation	6010	2360	3150	2780	3610	2770	4110	2640	***	2960	***	2980
Jamesville Beach	1260	644	683	703	1110	781	1220	1610	***	589	***	707
OCCF	3080	5230	2000	2310	6940	3120	6320	2190	2810	***	2650	***
DOT @ Jaquith	16100	15400	45100	9220	67100	49100	18000	14200	34700	***	31800	***
Dutch Hill *	**2210**	**1170**	**1400**	**1200**	**1380**	**1140**	**1450**	**1340**	*******	**1060**	*******	**2350**
Erie - Poolsbrook *	**2620**	**1400**	**2020**	**	**	**	**	**	**	**	**	**
Nottingham	2140	2280	3610	1640	7380	2850	3050	2110	4200	***	2020	***
SHFD	3080	2970	1760	1900	2730	1610	2510	1730	***	2240	***	1260
Sevier Rd	1870	1600	2250	**	**	**	**	**	**	**	**	**
Beaver Lake *	**1970**	**1210**	**5250**	**2650**	**1420**	**1360**	**1360**	**1370**	**2450**	*******	**1110**	*******
Ch. 3 Towers	3360	2310	2490	1620	1830	1730	2220	1400	1510	***	723	***
General Crushed Stone	9430	3160	5450	**	**	**	**	**	**	**	**	**
Highland Forest	2120	1210	1270	**	**	**	**	**	**	**	**	**
JD High School	3580	1780	1732	1810	2640	1780	1720	2720	***	1750	***	1450
Nob Hill	3500	2480	2500	3440	2810	2970	2830	2950	***	2510	***	1820
Pratts Falls	1890	1840	1440	1620	1650	1220	1450	2050	1230	***	1910	***
Southwood	2240	2160	1150	1480	1470	1470	2750	1640	1640	***	1120	***
Syracuse University	10700	114000	11000	9510	6940	11400	10900	1170	***	78600	***	17400

* Denotes Control Sites
** Site no longer sampled due to program re-evaluation
*** Site not sampled this year. Sites are sampled every other year.

Combined Ash

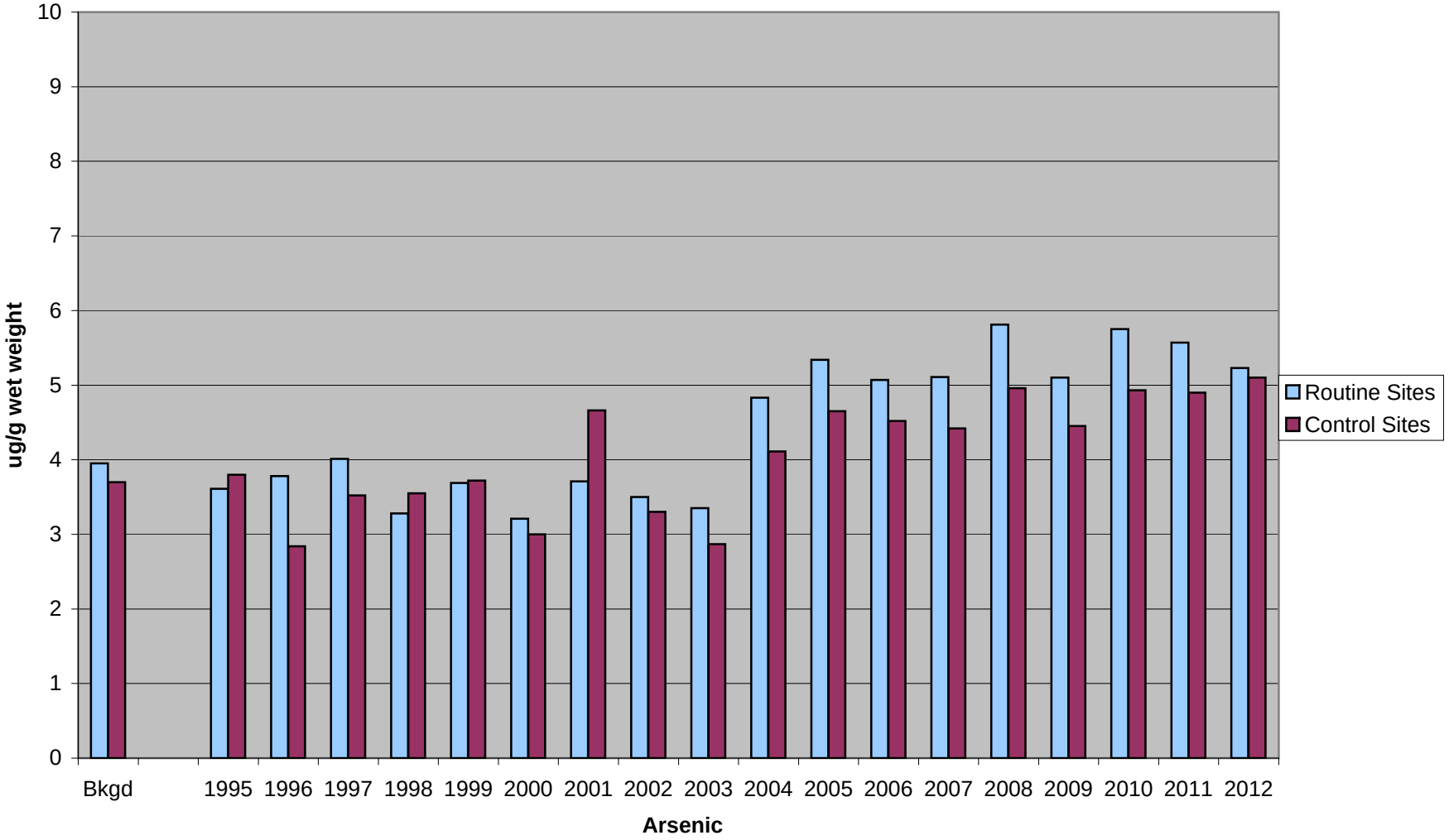
Site	2000-Fall	2001-Fall	2002-Fall	2004-Spring	2005-Spring	2006-Spring	2007-Spring	2008-Spring	2009-Spring	2010-Spring	2011-Spring	2012-Spring
Day 1 and 2	79000	22000	13600	7850	2470	5770	3080	23000	3100	5930	1260	1800
Day 3, 4, and 5	4700	7020	6580	38000	33000	57000	3060	5550	51900	8840	6060	20500

PCB results prior to 2000 were all less than detection limits. Starting in 2000 detection limits were lowered so that usable concentrations were available.

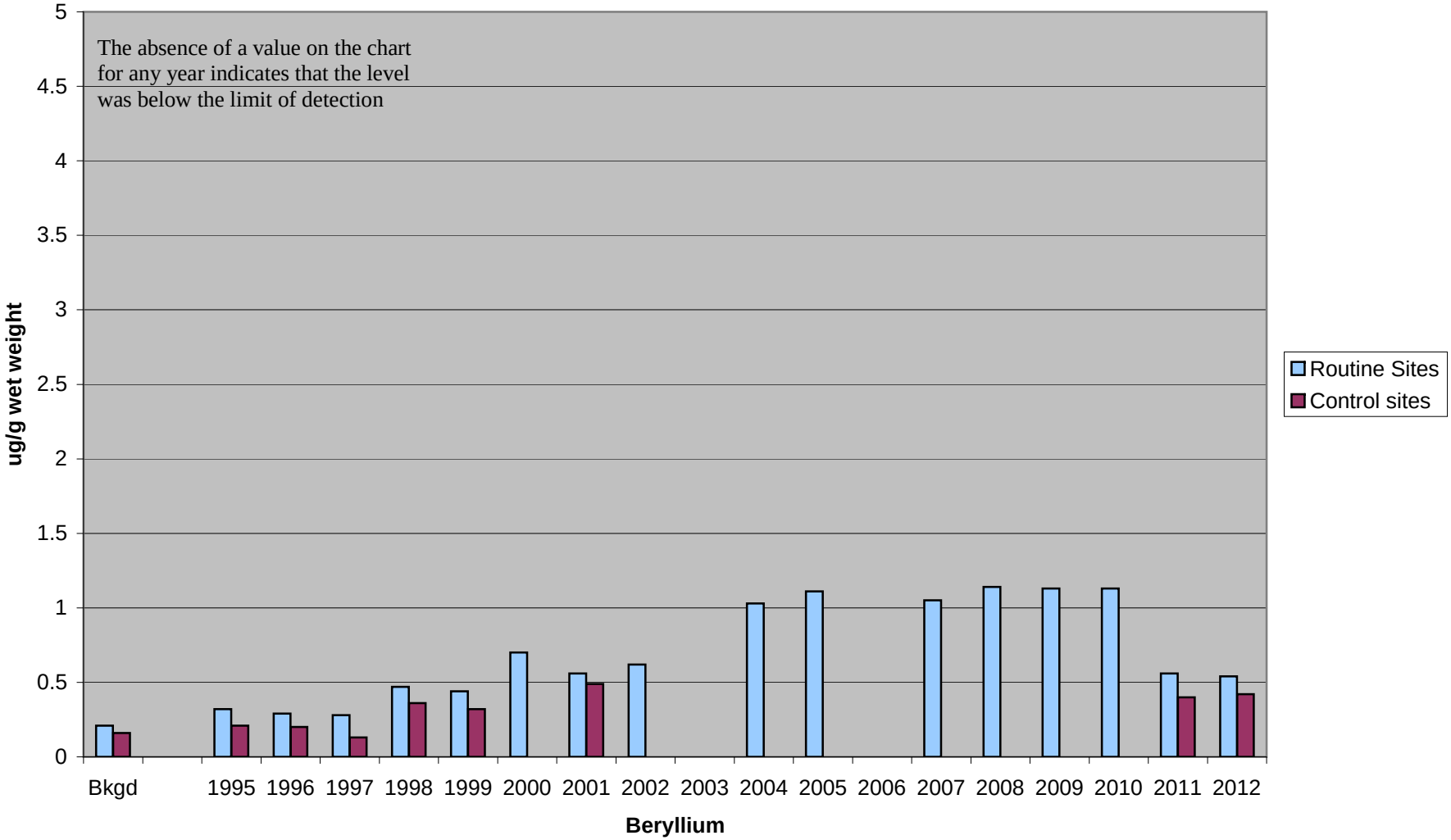
Note: For reference purposes, the ATSDR indicates that typical mean PCB concentrations in background soil are less than 100,000 pg/g

Attachment
C

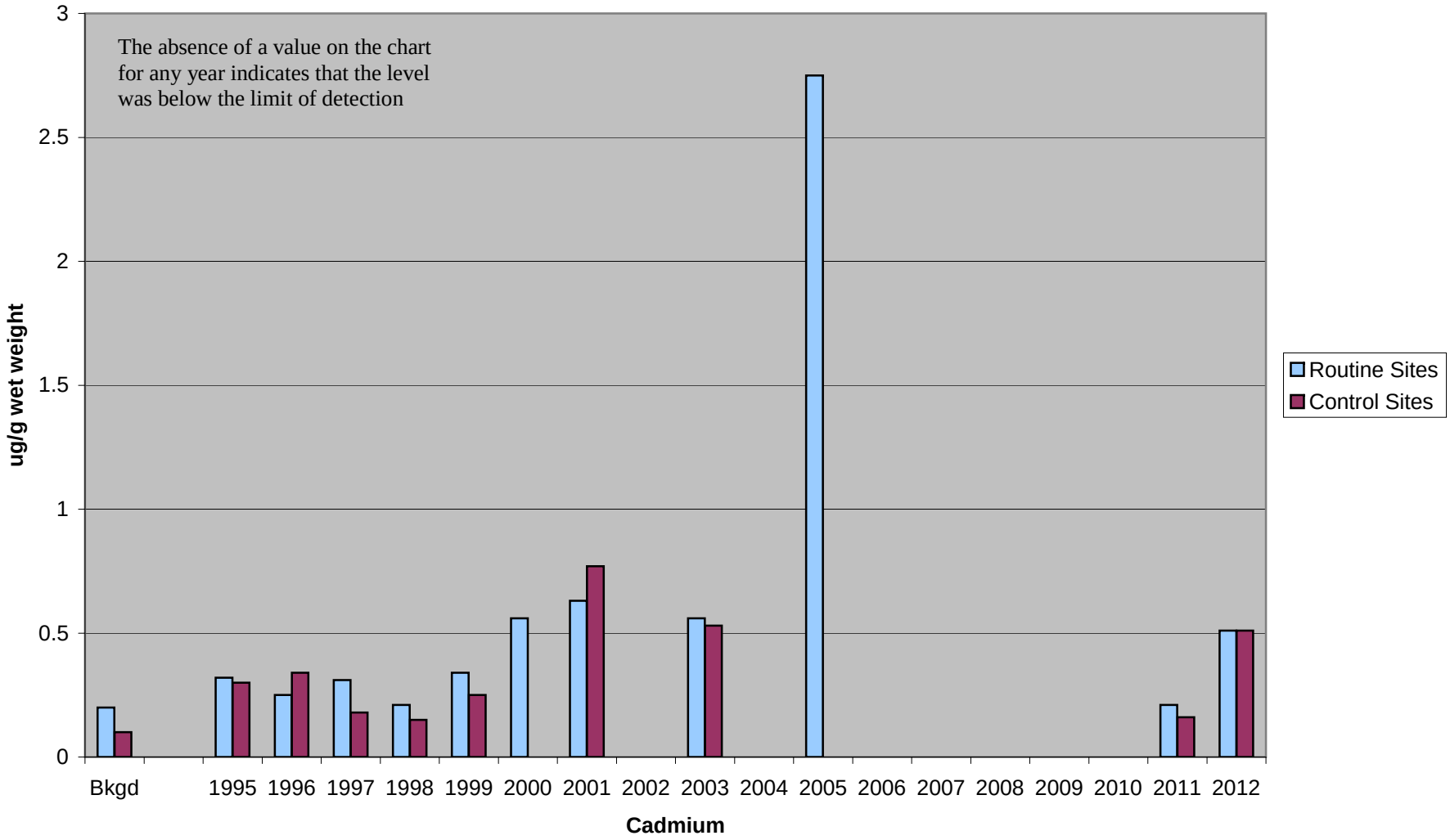
VII.A. Comparison of Annual Mean Values
Routine and Routine Control Sites



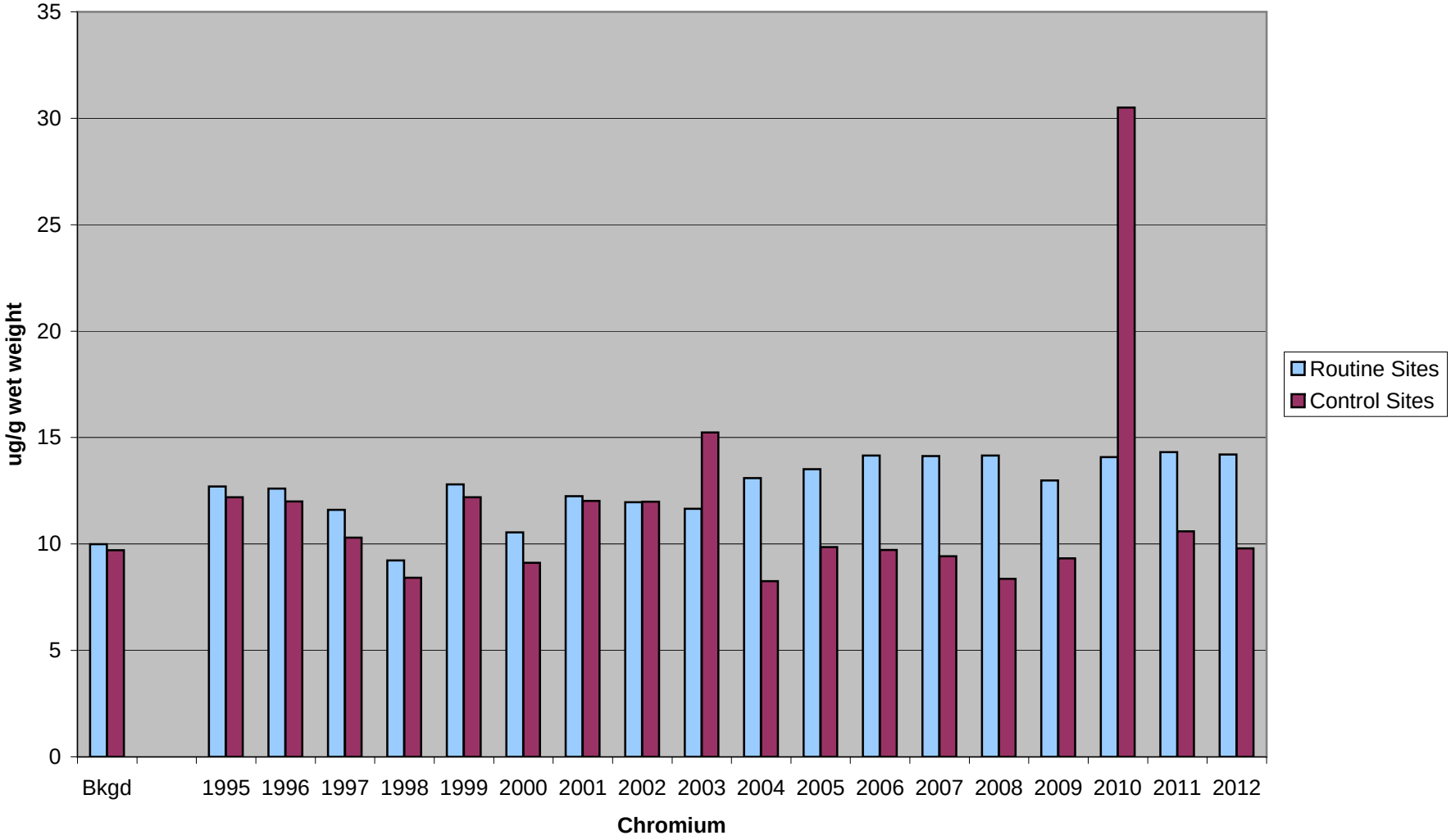
VII.B. Comparison of Annual Mean Values
Routine and Control Sites



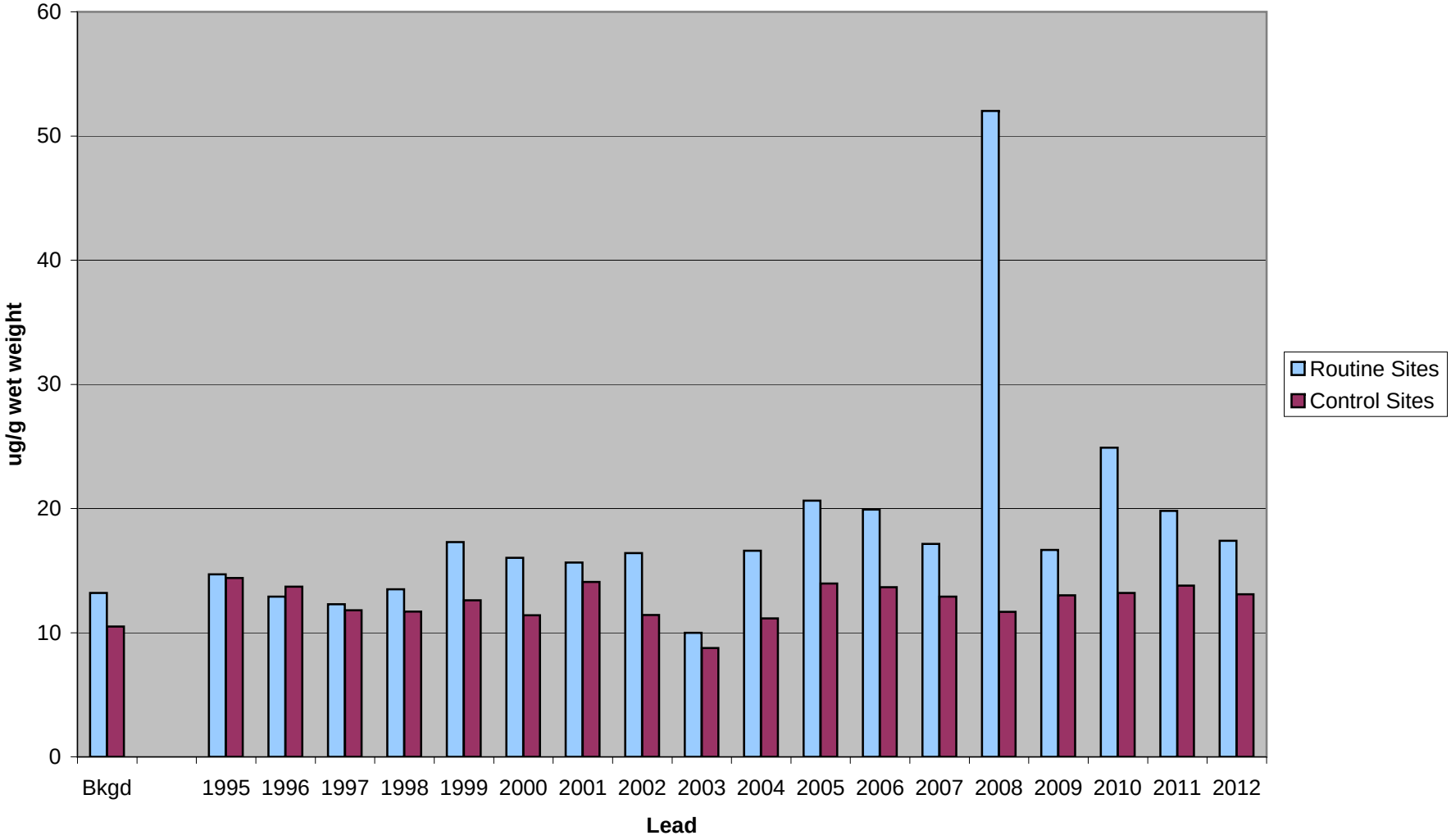
VII.C. Comparison of Annual Mean Values
Routine and Control Sites



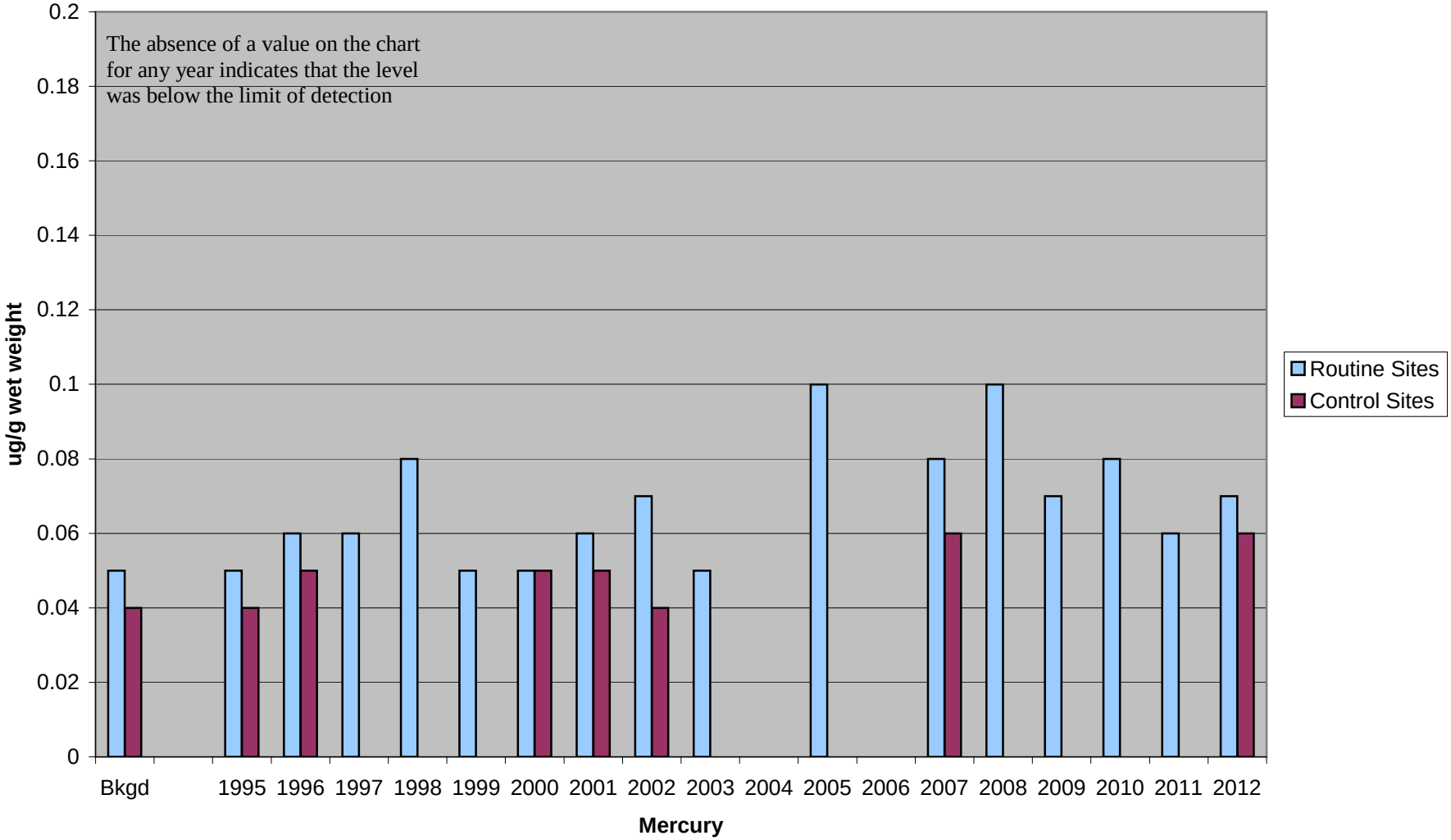
VII.D. Comparison of Annual Mean Values
Routine and Control Sites



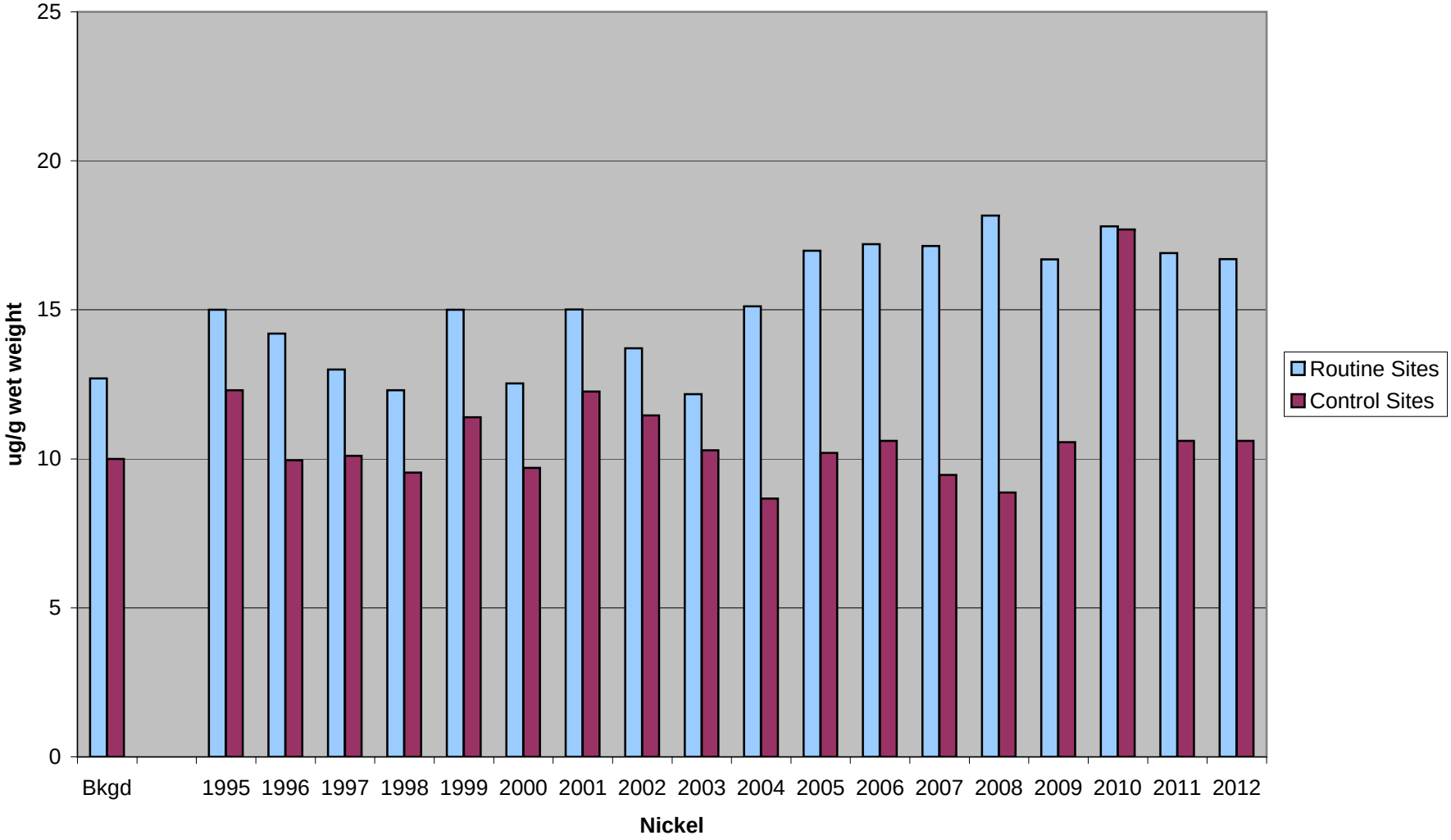
VII.E. Comparison of Annual Mean Values
Routine and Control Sites



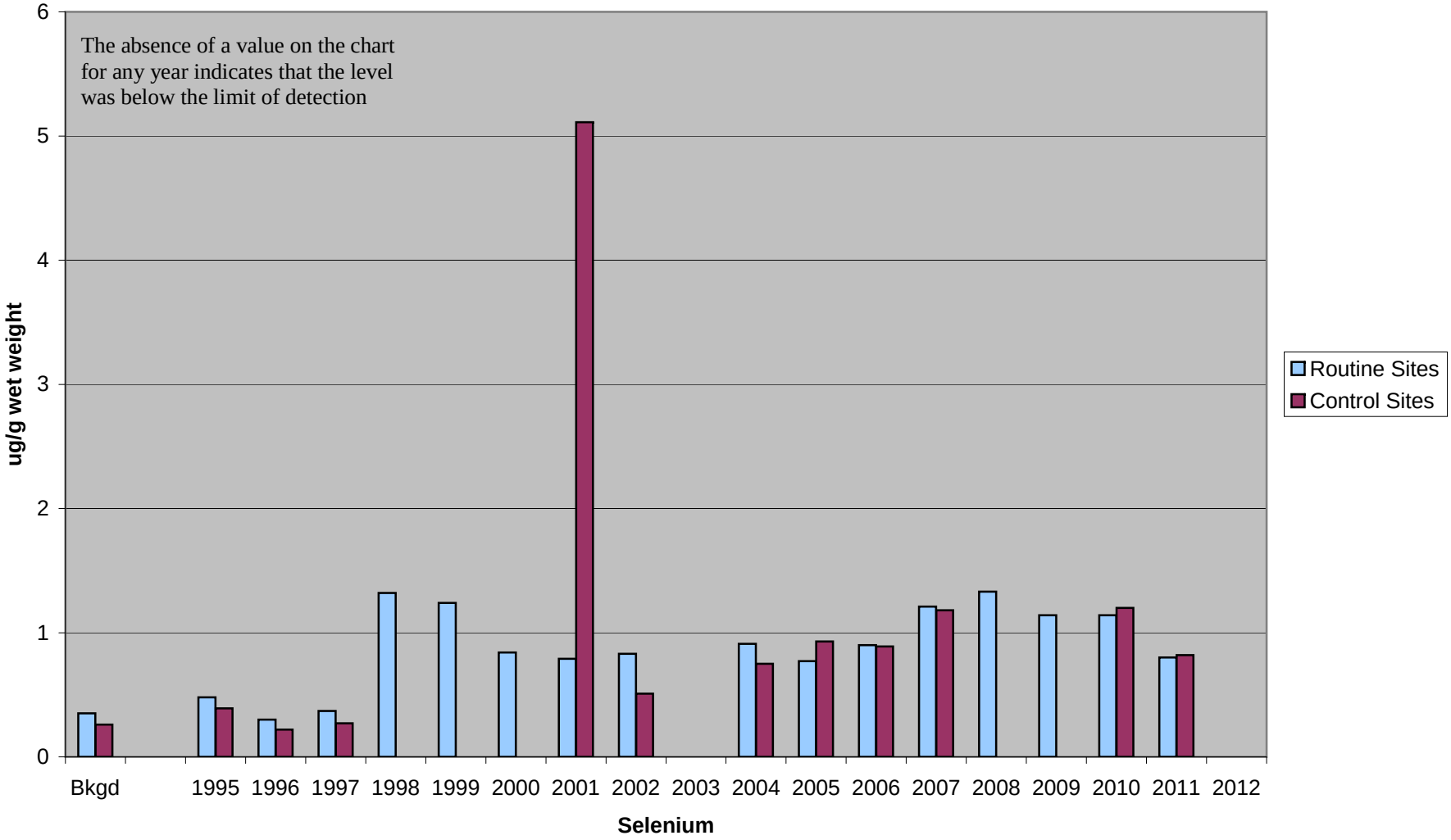
VII.F. Comparison of Annual Mean Values
Routine and Control Sites



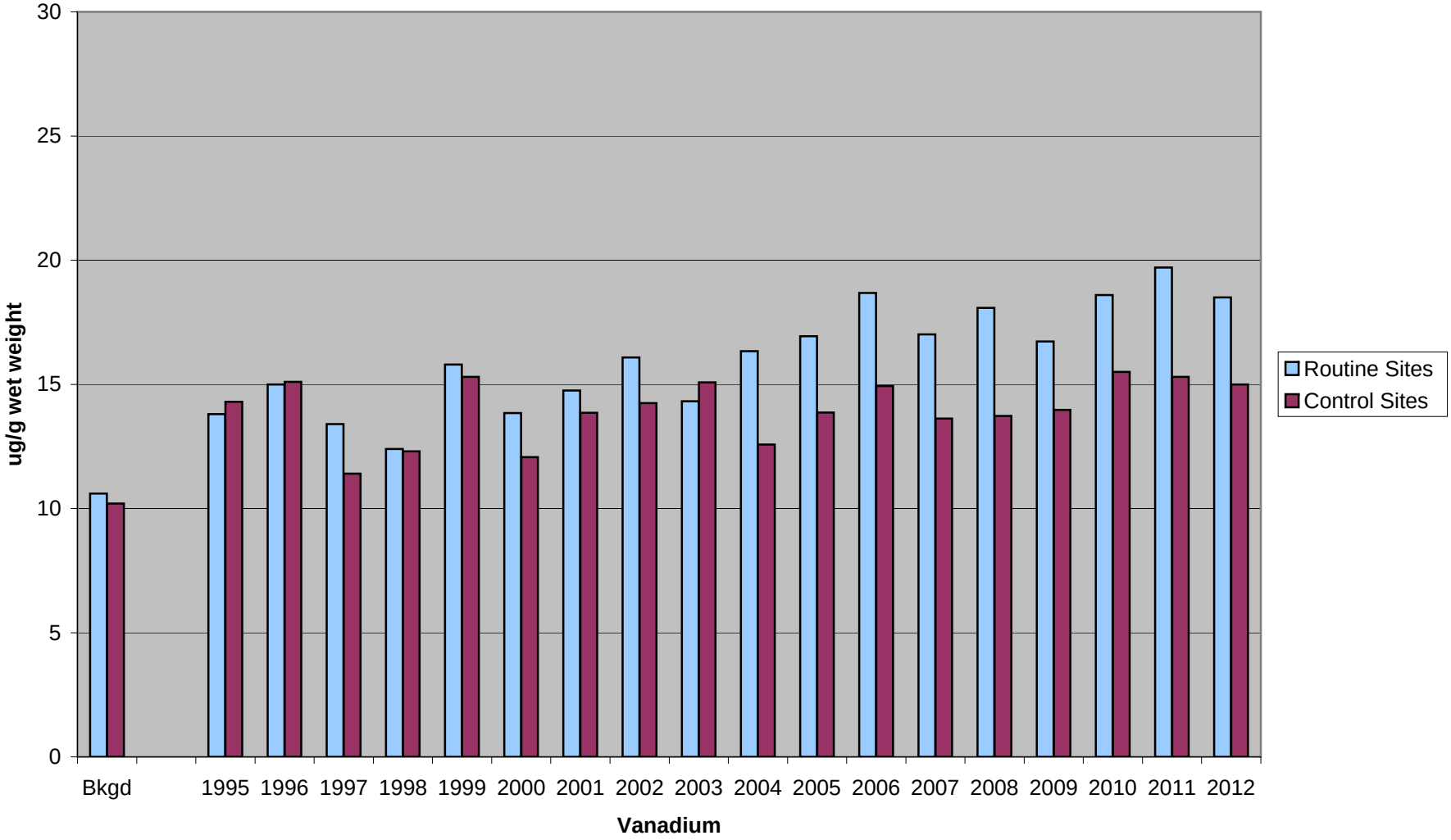
VII.G. Comparison of Annual Mean Values
Routine and Control Sites



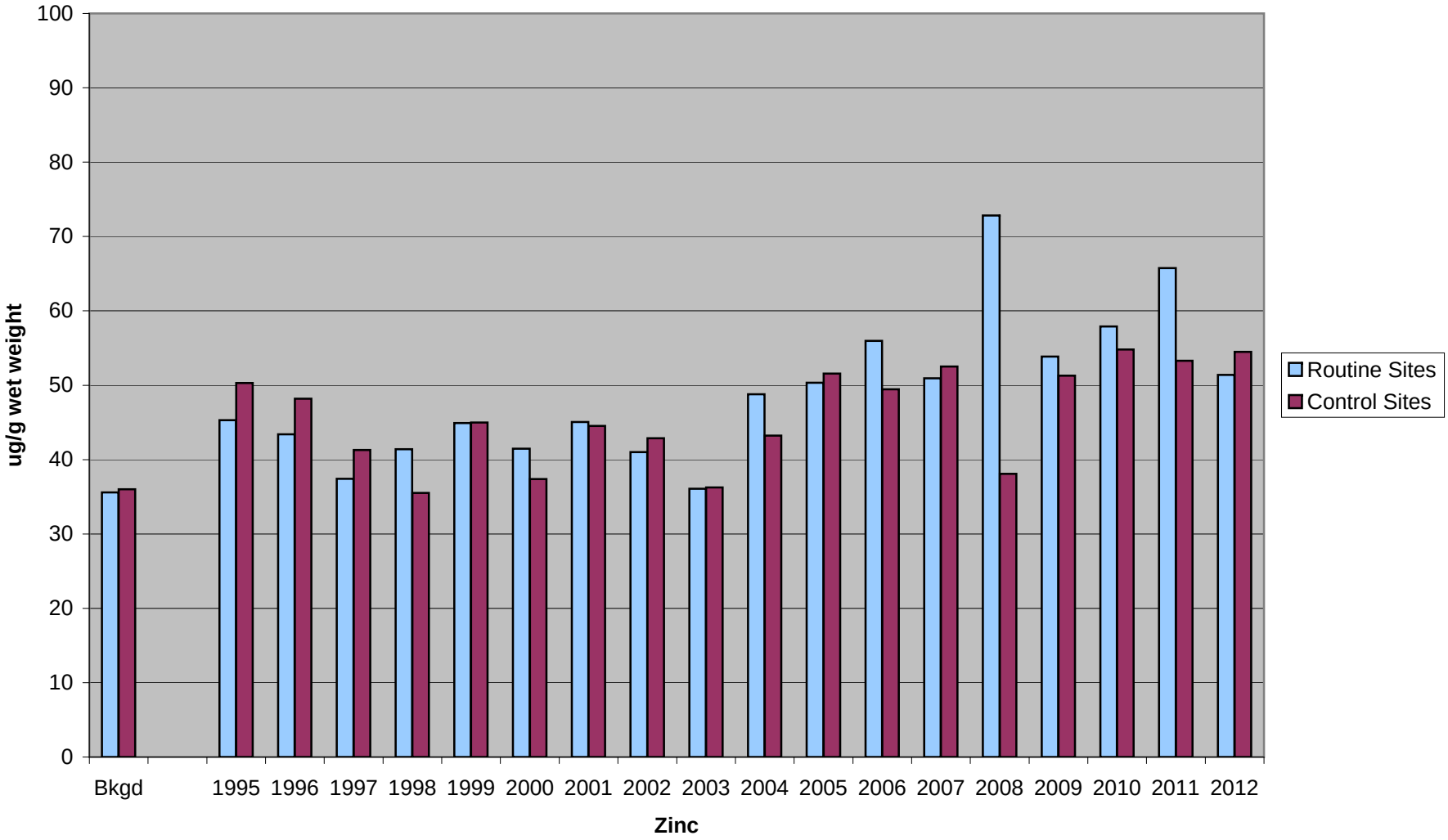
VII.H. Comparison of Annual Mean Values
Routine and Control Sites



VII.I. Comparison of Annual Mean Values
Routine and Control Sites



VII.J. Comparison of Annual Mean Values
Routine and Routine Control Sites



Attachment
C-1

Metal	NYS SCO's for restricted use residential (ppm)	Rural Soil Survey (ppm)	USEPA Soil Screening levels for residential (ppm)	
Arsenic	16 (0.21)	16	0.39	
Beryllium	14	1.2	160	
Cadmium	2.5 (0.86)	2.5	70	
Chromium	36	30	280	
Lead	400	133	400	
Mercury	0.81	0.3	6.7	
Nickel	140	29.5	1600	
Selenium	36	4	390	
Vanadium	NA	38	390	
Zinc	2,200	180	23,000	

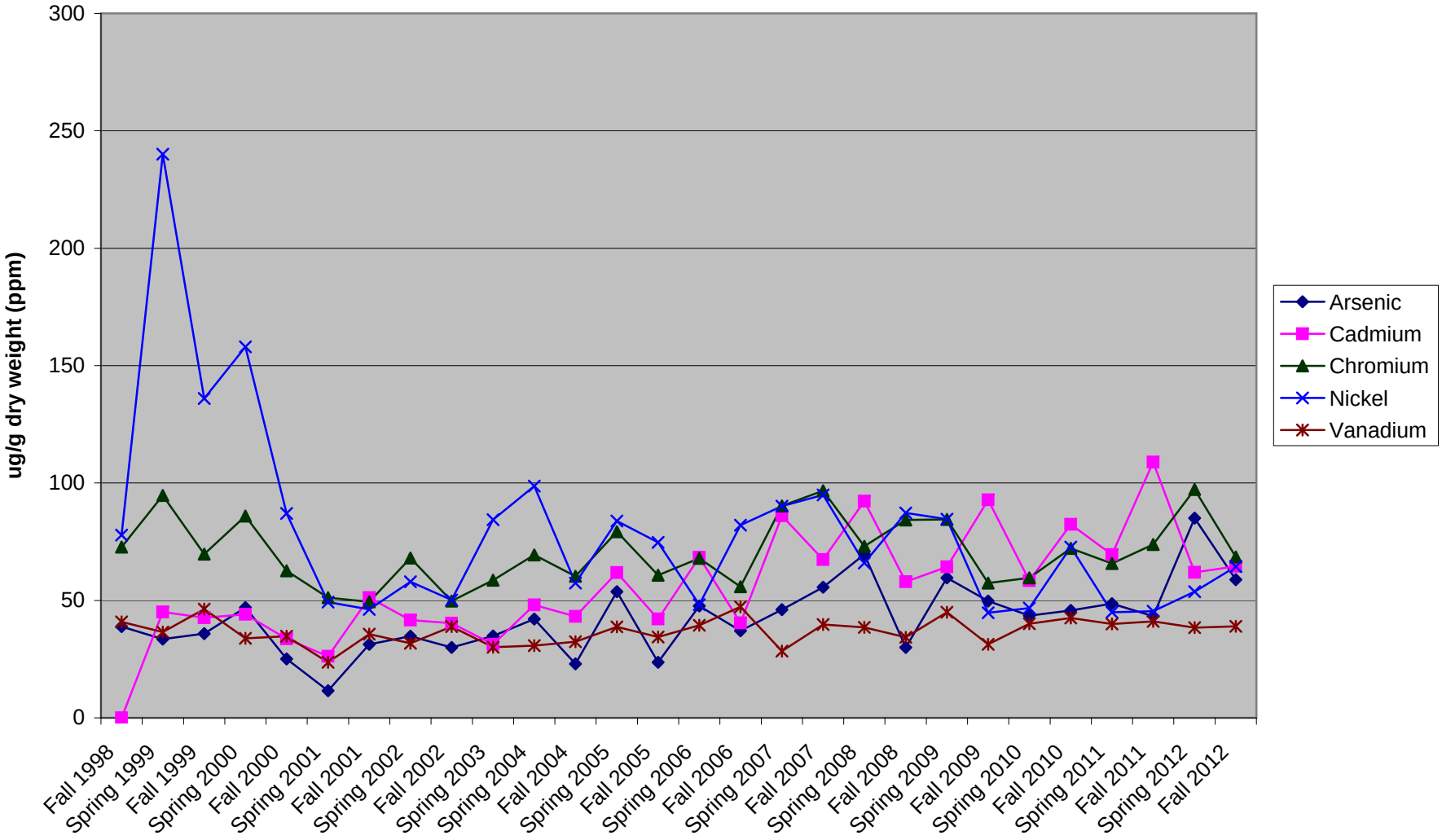
New York State Department of Environmental Conservation Soil Cleanup Objectives. The Health Based SCO's were calculated considering all exposure pathways: ingestion, inhalation, dermal, carcinogenic (1 in a million cancer risk), and non-carcinogenic (using risk reference doses). The final health based SCO is based on the most conservative pathway calculation. In some cases the SCO has been modified to match background if the rural background levels for NYS are above the calculated SCO (the health based SCO is in parenthesis). Restricted use means no livestock or animal product consumption.

NYS Statewide Rural Surface Soil Survey (2005)-determined concentration ranges for 170 commonly assessed analytes in discrete surface soil samples collected at randomly selected rural NYS properties.

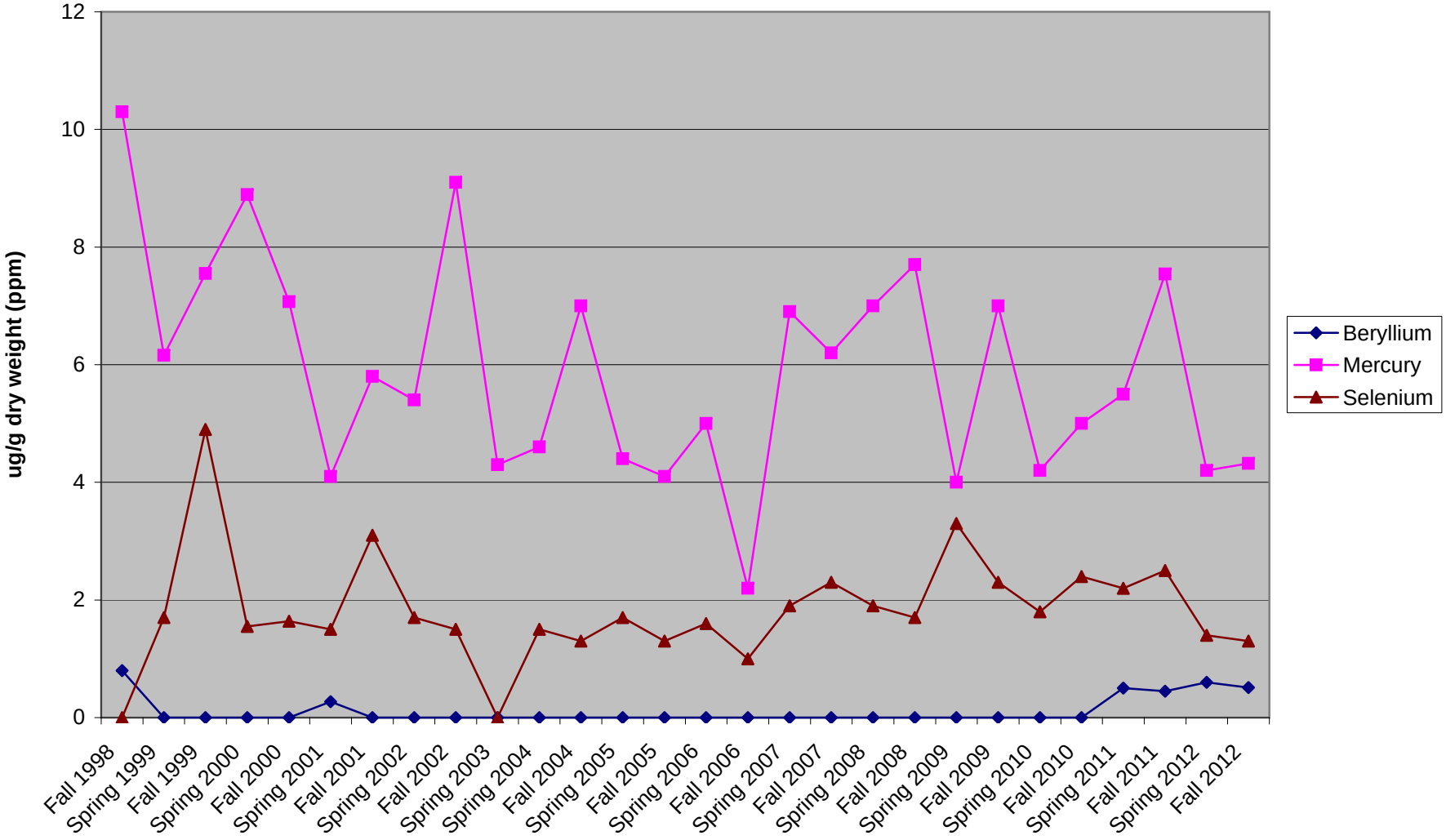
USEPA Soil Screening Levels for residential–Values were calculated based on the ingestion-dermal exposure pathway for residential soils. These screening levels are not action levels or clean up levels, they are a tool for further evaluation.

Attachment
D

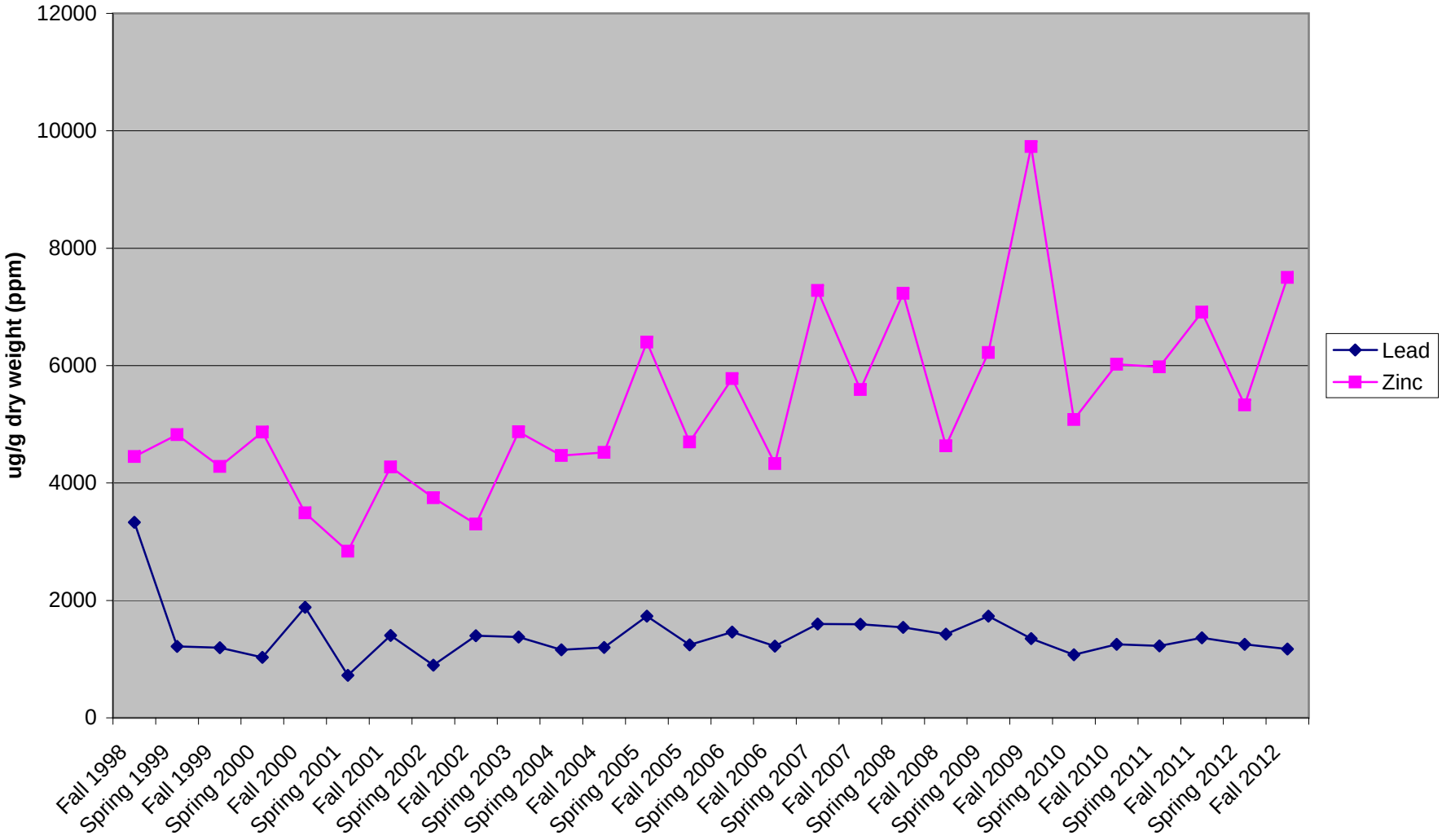
VII.A. Mean Values Ash Data
Dry Weight



VII.B. Mean Values Ash Data
Dry Weight



VII.C. Mean Values Ash Data
Dry Weight



Onondaga County Health Department

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Incinerator Monitoring Program

2012 Soil Metals Analysis Summary

June 1, 2013

Submitted To: **Cynthia B. Morrow, M.D., M.P.H.**
Commissioner of Health

Submitted By: **Kevin L. Zimmerman**
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WTE	Waste to Energy Facility.
Zn	Zinc.
~	approximately.
<	Less than.
>	Greater than.
NA	Not applicable.
NS	Not sampled.

II. Introduction:

The analysis of soil samples provides a useful and convenient mechanism for monitoring changes in the environment. Surface soil samples can be representative of deposition of atmospheric particulate materials, and normally provides a continuous, cumulative monitor for many such events. The soil sample analyses described in this report is part of an ongoing program of environmental monitoring performed by the Onondaga County Health Department as part of its overall Incinerator Monitoring Program.

This report represents data from the analyses of soils collected during the calendar year 2012, which is the eighteenth year of operation of the Waste to Energy (WTE) Facility. Three samples were collected at each site location during each sampling event. An independent contract laboratory created one composite sample from each sampling event and used this sample for metal content analysis.

II.A. Executive Introduction:

Metals analysis, along with sample composite preparation for this reporting period, was conducted by Life Science Laboratories, Inc. (formerly O'Brien and Gere Laboratory, Inc.) The collection of all environmental samples was, and continues to be, the responsibility of the Onondaga County Health Department's Division of Environmental Health.

Results of soil analyses from the start of the Incinerator Monitoring Program until June 1998 were reported exclusively on a wet weight basis. Starting with the second half of 1998, soil sample results have been reported on both a wet and dry weight basis. Each of these reported values provides important information regarding site specific data. Wet weight values provide ambient concentrations, the conditions in which soil may be ingested. This information is useful in determining risk assessment factors in environmental matrices. Wet weight values will be used for historical site comparison. Dry weight values will allow for better comparison with future metal concentrations, removing the factor of soil moisture variability and seasonal fluctuations. Dry weight values will tend to be higher than wet weight since the weight of the "inert" water is removed in the concentration calculations.

III. Summary:

In November 1994, the Onondaga County Resource Recovery Agency, in contract with the Covanta Energy Company (formerly Ogden Martin Company), commenced operation of a municipal solid waste incinerator. This undertaking was part of a multifaceted solid waste management program to achieve a reduction of volume of landfill waste, energy withdrawal and the removal of solids incompatible with incineration. Part of the management program for the reuse of materials and the removal of materials prior to the municipal waste stream had been started earlier.

The Onondaga County Health Department initiated a program in 1994 to include short and long term monitoring aspects to document any health implications to the public and environmental changes from the incinerator. In 2003 the monitoring program was re-evaluated to provide a more effective and efficient program. Direct interaction was established with the Onondaga County Resource Recovery Agency (OCCRA) and the New York State Department of Environmental Conservation (DEC) in providing stack monitoring results and improved assurance on reporting of adverse events and equipment failures. This allows for effective evaluation of short-term change in the incinerator emissions rather than the previous limited scope offsite air monitoring conducted over a nine year period. Several changes were implemented in 2009 based on the low levels of organic constituents detected in the monitoring conducted to date, and the fact that there is no evidence of a trend or levels associated with health risks. The fourteen routine soil sites (which include two control sites) continue to be sampled and analyzed twice a year for ten different metals. Half of the sites (7, including one control) are being tested for organics once a year and documented in a separate report. The four ash route sites have been eliminated from the program. These sites were located along the route that trucks take to carry ash across and out of the County. To date these sites have not shown any elevation of metals or organics and the trucks are covered at all times. Ash, directly from the incinerator continues to be analyzed for metals twice a year and organics once a year. The department continues to interact directly with OCCRA and DEC in review of stack monitoring results.

Fourteen soil sample sites are currently established as routine sites. Some of these sites were specifically chosen because of their proximity to the WTE facility, and their potential to show maximum impact from its operation (due either to a high likelihood of deposition or the impact of deposition on any areas with “sensitive individuals”). These sites included Southwood, Sentinel Heights, Channel 3 Towers, Jamesville Pen. DOT @ Jaquith and Clark Reservation. Sites such as Jamesville-Dewitt High School, The Nottingham, and Nob Hill Apartments were chosen because of their large population of “sensitive individuals” (i.e. the very young and the elderly). Regions at or near potentially high impact areas in publicly owned land were chosen to ensure long-term accessibility. These sites include Pratts Falls, Jamesville Beach, and Syracuse University. Two sites (Beaver Lake and Dutch Hill) have been established as routine control sites because they are considered to be outside the impact area of the WTE facility.

The individual values for each element are presented in this report as a means of evaluating the intra-site variation. Element mean values have been calculated based on results above the limit of detection for comparison with historical data. Further, we have prepared an overall summary of all the data points and their

associated statistical parameters on an element-specific basis, as a means of evaluating inter-site variation as well.

It is anticipated that the primary basis for evaluation of potential environmental changes will be both site and element specific from a strictly statistical basis. Hence, a single elevated or depressed value will not be assumed to be indicative of a change at a specific site. Rather, the pattern of values for that specific element must demonstrate a statistically significant difference, which may be indicative of a real environmental change.

While this study was designed to be locally focused with a concern for potential environmental contamination of local origin, it is also hoped that this compilation of data may be a useful benchmark for the determination of subtle environmental impacts covering a large area, and not necessarily a function of local activities.

In 2011, due to improvements in laboratory equipment, the detection limits for beryllium, cadmium, and selenium were lowered. Therefore there are detectable levels of these metals in many of the soil samples starting in 2011 as compared to previous years.

The ten metals are discussed individually in the metal specific summaries, which follow. Levels of metals in soils can be compared with background levels (samples taken prior to the operation of the incinerator) and to national averages, as shown in the site specific summaries. In addition, Attachment A provides data on New York State Department of Environmental Conservation Soil Cleanup Objectives, a New York State rural soil survey, and USEPA soil screening levels for residential soil. In general, the metal results for the 2012 soil sampling year fall within the expected range of values. All levels remain below those associated with health concerns.

IV. Soil Sample Site Locations:

Routine Soil Monitoring Sites (*Denotes Control Sites):

1. ***Beaver Lake:** Beaver Lake County Park is located approximately 13 miles NW of the City of Syracuse in the Town of Lysander. The sample site is located in the overflow parking area, in the SE corner of the park.

2. **Clark Reservation:** Clark Reservation State Park is located approximately 0.5 miles SE of the WTE facility on Route 173. The sample site is in an open grassy area, adjacent to the basketball court.

3. ***Dutch Hill Road:** The sampling site is located on the Dutch Hill Road Radio Tower site, approximately 11 miles SSW of the City of Syracuse, in the Town of Otisco.

4. **Jamesville Beach:** The Jamesville Beach County Park is located on the western shore of the Jamesville Reservoir, off Apulia Road. The sample site is near the entrance of the park.

5. **Jamesville-DeWitt H.S.:** The Jamesville-DeWitt High School is approximately 3.5 miles ENE of the WTE facility. The sample site is located on the southern edge of the property, near the bus garage.

6. **Nob Hill:** The Nob Hill Apartments are located between Seneca Turnpike and Lafayette Road. The sampling site is located near the rental office building.

7. **Nottingham:** The Nottingham Retirement Complex is located approximately 2 miles ENE of the WTE facility on Nottingham Road. The sample site is in the NE corner of the property, adjacent to the maintenance garage.

8. **Syracuse University:** The Syracuse University site is located approximately 1/2 mile north of the WTE facility, near the Skytop administrative building. The sample site is adjacent to the radio towers.

9. **Channel 3 Tower:** The Channel 3 Tower site (formerly Tennessee Gas site) is approximately 4 miles south of the WTE on Sentinel Heights Road. The tower site is just south of the Sentinel Heights Road / Bull Hill Road intersection.

10. **Jamesville Pen.:** The Jamesville Penitentiary (Onondaga County Correctional Facility) is located on Route 173, just east of the village of Jamesville. The sample site is adjacent to the sewage treatment plant.

11. **Southwood:** The Southwood Park is located approximately 1 mile south of the WTE facility, off Barker Hill Road and Southwood Park Drive. The sample site is adjacent to the picnic area.

12. Sentinel Heights: The Sentinel Heights Fire Department is located on Dave Tilden Road, approximately 2.5 miles SSW of the WTE facility. The sampling site is on the lawn, just east of the building.

13. DOT @ Jaquith: The Onondaga County DOT property site borders Brighton Ave, the Jaquith Industries property and Route 81, near the Route 481 - Route 81 interchange. The sampling site is located in the middle of the grassy open field.

14. Pratts Falls: The Pratts Falls County Park is located approximately 2 miles NNE of the Village of Pompey. The sample site is in the center of the park, in an open recreation area.

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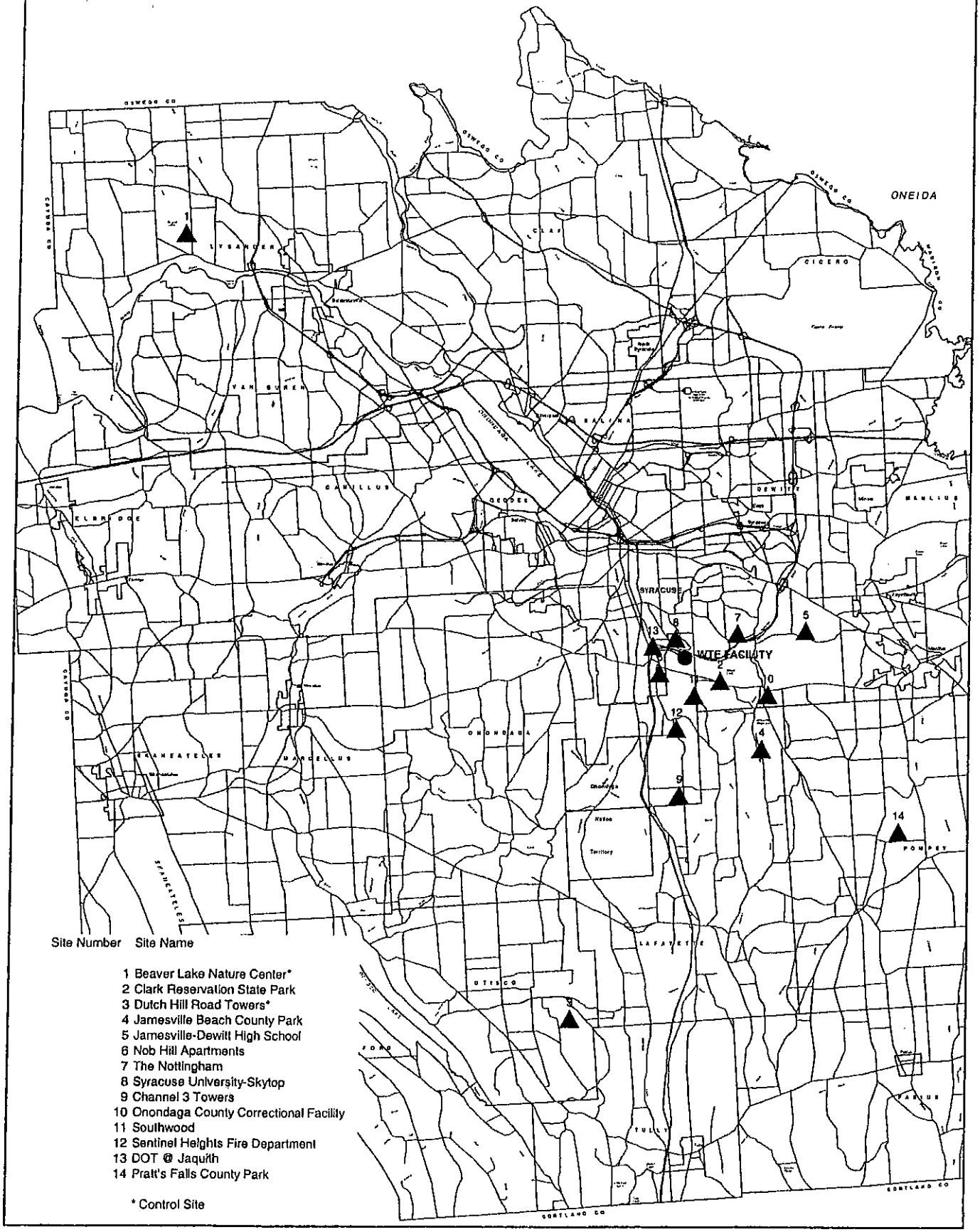
OCHD ROUTINE SOIL MONITORING SITES



Site Number Site Name

1 Beaver Lake Nature Center*
2 Clark Reservation State Park
3 Dutch Hill Road Towers*
4 Jamesville Beach County Park
5 Jamesville-Dewitt High School
6 Nob Hill Apartments
7 The Nottingham
8 Syracuse University-Skytop
9 Channel 3 Towers
10 Onondaga County Correctional Facility
11 Southwood
12 Sentinel Heights Fire Department
13 DOT @ Jaquith
14 Pratt's Falls County Park

* Control Site

V. Element Specific Summaries:

A. Arsenic

Soil levels of Arsenic range from 1 - 40 ppm nationwide, while NYS levels average 16 ppm. Routine site values in the 2012 study varied from 3.2 ppm wet weight (3.8 ppm dry wt) to a high value of 8.3 ppm wet weight (11.0 ppm dry wt), and a mean value of 5.23 ppm wet weight.

These do not represent statistically significant changes when compared to background findings and levels remain in the lower range of nationwide and NYS averages.

B. Beryllium

Soil levels of beryllium range from 0.01 - 10 ppm nationwide, while NYS levels average 1.2 ppm. Routine site values in the 2012 study varied from 0.28 ppm wet weight (0.32 ppm dry wt) to a high value of 1.1 ppm wet weight (1.5 ppm dry wt), and a mean value of 0.54 ppm wet weight.

These do not represent statistically significant changes when compared to background findings and levels remain in the range of nationwide and NYS averages.

C. Cadmium

Soil levels for cadmium are highly variable and average ~0.25 ppm nationwide, while NYS levels average 2.5 ppm. Routine site values in the 2012 study varied from 0.12 ppm wet weight (0.15 ppm dry wt) to a high value of 1.1 ppm wet weight (1.4 ppm dry wt), and a mean value of 0.51 ppm wet weight.

These do not represent statistically significant changes when compared to background findings and levels remain in the range of nationwide and NYS averages.

D. Chromium

Soil levels of chromium are highly variable, ranging from “trace” to thousands of ppm nationwide, while NYS levels average 30 ppm. Routine site values in the 2012 study varied from 8.8 ppm wet weight (11.0 ppm dry wt) to a high value of 26.0 ppm wet weight (32.0 ppm dry wt), and a mean value of 14.2 ppm wet weight.

These do not represent statistically significant changes when compared to background findings and levels remain in the range of nationwide and NYS averages.

E. Lead

Soil levels of lead range from <10 to 30 ppm nationwide, with NYS averaging 133 ppm in rural areas. Higher levels can occur as a function of proximity to vehicular traffic.

Routine site values in the 2012 study varied from 6.0 ppm wet weight (7.0 ppm dry wt) to a high value of 56.0 ppm wet weight (69.0 ppm dry wt), and a mean value of 17.4 ppm wet weight.

These do not represent statistically significant changes when compared to background findings and levels remain in the range of nationwide and NYS averages.

F. Mercury

Soil levels of mercury range from 0.02 to 0.60 ppm nationwide, while NYS levels average 0.3 ppm. Routine site values in the 2012 study varied from 0.054 ppm wet weight (0.069 ppm dry wt) to a high value of 0.091 ppm wet weight (0.12 ppm dry wt), and a mean value of 0.07 ppm wet weight.

These do not represent statistically significant changes when compared to background findings and levels remain in the range of nationwide and NYS averages.

G. Nickel

Soil levels of nickel range from 4 to 80 ppm nationwide, while NYS levels average 29.5 ppm. Routine site values in the 2012 study varied from 8.2 ppm wet weight (9.6 ppm dry wt) to a high value of 30.0 ppm wet weight (38.0 ppm dry wt), and a mean value of 16.7 ppm wet weight.

These do not represent statistically significant changes when compared to background findings and levels remain in the range of nationwide and NYS averages.

H. Selenium

Soil levels of selenium range from 0.01 to 0.20 ppm nationwide, while NYS levels average 4 ppm. There were no routine site samples above the detection limit for selenium.

I. Vanadium

Soil levels of vanadium range from 3 to 310 ppm nationwide, while NYS levels average 38 ppm. Routine site values in the 2012 study varied from 14.0 ppm wet weight (18.0 ppm dry wt) to a high value of 29.0 ppm wet weight (38.0 ppm dry wt), and a mean value of 18.5 ppm wet weight.

These do not represent statistically significant changes when compared to background findings and levels remain in the range of nationwide and NYS averages.

J. Zinc

Soil levels of zinc range from 10 to 300 ppm nationwide, while NYS levels average 180 ppm. Routine site values in the 2012 study varied from 24.0 ppm wet weight (28.0 ppm dry wt) to a high value of 110.0 ppm wet weight (130.0 ppm dry wt), and a mean value of 51.4 ppm wet weight.

These do not represent statistically significant changes when compared to background findings and levels remain in the range of nationwide and NYS averages.

VI. Site Specific Summary

2012 Soil Summary Data; Beaver Lake (ppm; ug/g)

			Spring 2012				Fall 2012			
Element	National Average	Background Mean 1994 (wet wt.)	Three Point Composite (wet wt.)		Three Point Composite (dry wt.)		Three Point Composite (wet wt.)		Three Point Composite (dry wt.)	
Arsenic	1.0 - 40	3.51	4.4		5.1		4.1		5.2	
Beryllium	.01-10	0.22	0.27		0.31		0.28		0.36	
Cadmium	~0.25	<0.1	<0.1		<0.12		0.27		0.34	
Chromium	trace-thousands	5.63	5.9		6.8		6.2		7.9	
Lead	<10 - 30	6.02	8.6		9.9		9.3		12	
Mercury	.02-.06	0.024	<.050		<0.058		<.050		<0.063	
Nickel	4.0 -80	5.72	6		7		5.3		6.7	
Selenium	.01 -.2	0.227	<0.5		<0.58		<0.5		<0.63	
Vanadium	3.0 -310	8.72	11		13		12		15	
Zinc	10.0 -300	22.7	22		25		25		32	

Analysis performed by Life Sciences Laboratories, Inc.

VI. Site Specific Summary

2012 Soil Summary Data; Clark Reservation (ppm; ug/g)

			Spring 2012			Fall 2012	
Element	National Average	Background Mean 1994 (wet wt.)	Three Point Composite (wet wt.)	Three Point Composite (dry wt.)		Three Point Composite (wet wt.)	Three Point Composite (dry wt.)
Arsenic	1.0-40	4.87	7.4	9.9		7.1	9.6
Beryllium	0.01-10	0.5	1.1	1.5		1.1	1.4
Cadmium	~0.25	0.26	0.43	0.58		0.62	0.83
Chromium	trace-thousands	11.83	15	20		15	21
Lead	<10-30	15.03	22	29		20	27
Mercury	0.02-0.6	0.063	0.091	0.12		0.078	0.11
Nickel	4.0-80	13.39	15	20		17	22
Selenium	0.01-0.2	0.259	<0.5	<0.67		<0.50	<0.67
Vanadium	3.0-310	11.26	20	27		21	28
Zinc	10.0-300	30.7	28	38		34	45

Analysis performed by Life Sciences Laboratories, Inc.

VI. Site Specific Summary

2012 Soil Summary Data; Dutch Hill (ppm; ug/g)

			Spring 2012			Fall 2012	
Element	National Average	Background Mean 1994 (wet wt.)	Three Point Composite (wet wt.)		Three Point Composite (dry wt.)	Three Point Composite (wet wt.)	Three Point Composite (dry wt.)
Arsenic	1.0-40	4.58	5.8		7.8	5.9	8.1
Beryllium	0.01-10	0.16	0.59		0.79	0.52	0.7
Cadmium	~0.25	0.15	0.57		0.77	0.69	0.94
Chromium	trace-thousands	10.14	14		18	13	18
Lead	<10-30	15.19	22		30	19	26
Mercury	0.02-0.6	0.048	0.063		0.085	<0.05	<0.068
Nickel	4.0-80	12.45	16		22	15	21
Selenium	0.01-0.2	0.3	<0.50		<0.67	<0.5	<0.68
Vanadium	3.0-310	9.96	19		26	18	24
Zinc	10.0-300	55.8	91		120	80	110

Analysis performed by Life Sciences Laboratories, Inc.

VI. Site Specific Summary

2012 Soil Summary Data; Jamesville Beach (ppm; ug/g)

			Spring 2012			Fall 2012	
Element	National Average	Background Mean 1994 (wet wt.)	Three Point Composite (wet wt.)	Three Point Composite (dry wt.)		Three Point Composite (wet wt.)	Three Point Composite (dry wt.)
Arsenic	1.0-40	2.99	8.1	10		3.8	4.7
Beryllium	0.01-10	0.26	0.88	1.1		0.41	0.51
Cadmium	~0.25	0.16	0.47	0.6		0.31	0.39
Chromium	trace-thousands	9.73	23	29		11	14
Lead	<10-30	8.77	20	26		9.8	12
Mercury	0.02-0.6	0.037	<0.05	<0.063		<0.05	<0.062
Nickel	4.0-80	13.62	30	38		16	20
Selenium	0.01-0.2	0.236	<0.5	<0.63		<0.5	<0.62
Vanadium	3.0-310	9.12	29	36		14	18
Zinc	10-300	27.3	65	82		33	42

Analysis performed by Life Sciences Laboratories, Inc.

VI. Site Specific Summary

2012 Soil Summary Data; Jamesville Dewitt H.S. (ppm; ug/g)

			Spring 2012			Fall 2012	
Element	National Average	Background Mean 1994 (wet wt.)	Three Point Composite (wet wt.)	Three Point Composite (dry wt.)	Three Point Composite (wet wt.)	Three Point Composite (dry wt.)
Arsenic	1.0-40	4.98	4.7	6.2	4.7	6.1
Beryllium	0.01-10	0.23	0.5	0.65	0.54	0.7
Cadmium	~0.25	0.17	0.12	0.15	0.64	0.83
Chromium	trace-thousands	11.37	16	21	18	23
Lead	<10-30	12.9	15	20	13	17
Mercury	0.02-0.6	0.041	<0.05	<0.065	0.062	0.08
Nickel	4.0-80	12.07	15	20	19	24
Selenium	0.01-0.2	0.32	<0.5	<0.65	<0.5	<0.64
Vanadium	3.0-310	11.08	19	25	20	28
Zinc	10-300	33.5	54	70	51	66

Analysis performed by Life Sciences Laboratories, Inc.

VI. Site Specific Summary

2012 Soil Summary Data; Nob Hill (ppm; ug/g)

			Spring 2012			Fall 2012	
Element	National Average	Background Mean 1994 (wet wt.)	Three Point Composite (wet wt.)		Three Point Composite (dry wt.)	Three Point Composite (wet wt.)	Three Point Composite (dry wt.)
Arsenic	1.0-40	3.75	3.9		4.9	3.9	4.7
Beryllium	0.01-10	0.23	0.43		0.53	0.42	0.5
Cadmium	~0.25	0.17	0.17		0.21	0.54	0.65
Chromium	trace-thousands	8.94	11		13	11	14
Lead	<10-30	11.74	13		16	14	17
Mercury	0.02-0.6	0.037	<0.05		<0.063	<0.05	<0.061
Nickel	4.0-80	12.65	12		15	11	14
Selenium	0.01-0.2	0.355	<0.5		<0.63	<0.5	<0.61
Vanadium	3.0-310	10.15	15		19	17	20
Zinc	10-300	26.5	31		39	33	40

Analysis performed by Life Sciences Laboratories, Inc.

Site Specific Summary

2012 Soil Summary Data; The Nottingham (ppm; ug/g)

			Spring 2012		Fall 2012	
Element	National Average	Background Mean 1994 (wet wt.)	Three Point Composite (wet wt.)	Three Point Composite (dry wt.)	Three Point Composite (wet wt.)	Three Point Composite (dry wt.)
Arsenic	1.0-40	4.4	3.7	4.7	4.8	6.2
Beryllium	0.01-10	0.29	0.53	0.66	0.55	0.71
Cadmium	~0.25	0.21	0.24	0.3	0.57	0.73
Chromium	trace-thousands	10.41	16	20	16	20
Lead	<10-30	8.13	9.3	12	12	16
Mercury	0.02-0.6	<0.50	<0.05	<0.063	0.054	0.069
Nickel	4.0-80	11.26	16	21	16	21
Selenium	0.01-0.2	0.334	<0.5	<0.63	<0.50	<0.64
Vanadium	3.0-310	10.16	15	19	19	24
Zinc	10-300	31.6	41	51	52	67

Analysis performed by Life Sciences Laboratories, Inc.

VI. Site Specific Summary

2012 Soil Summary Data; Syracuse University (ppm; ug/g)

			Spring 2012			Fall 2012		
Element	National Average	Background Mean 1994 (wet wt.)	Three Point Composite (wet wt.)		Three Point Composite (dry wt.)	Three Point Composite (wet wt.)		Three Point Composite (dry wt.)
Arsenic	1.0-40	3.15	3.2		3.8	4.1		5.6
Beryllium	0.01-10	0.3	0.28		0.32	0.41		0.56
Cadmium	~0.25	0.22	<.1		<0.12	0.57		0.77
Chromium	trace-thousands	9.3	11		13	14		18
Lead	<10-30	13.41	6		7	15		20
Mercury	0.02-0.6	0.046	<0.05		<0.59	<0.05		<0.067
Nickel	4.0-80	11	8.2		9.6	13		17
Selenium	0.01-0.2	0.306	<0.5		<0.59	<0.5		<0.67
Vanadium	3.0-310	10.49	17		20	17		23
Zinc	10-300	33.4	24		28	48		65

Analysis performed by Life Sciences Laboratories, Inc.

VI. Site Specific Summary

2012 Soil Summary Data; Channel 3 Tower (ppm; ug/g)

			Spring 2012				Fall 2012		
Element	National Average	Background Mean 1994 (wet wt.)	Three Point Composite (wet wt.)		Three Point Composite (dry wt.)		Three Point Composite (wet wt.)		Three Point Composite (dry wt.)
Arsenic	1.0-40	5.24	4.5		6.9		6.4		8.3
Beryllium	0.01-10	0.16	0.49		0.76		0.59		0.76
Cadmium	~0.25	0.34	0.31		0.48		1.1		1.4
Chromium	trace thousands	9.83	11		17		15		19
Lead	<10-30	11.18	13		20		14		18
Mercury	0.02-0.6	0.046	<0.05		<0.078		0.057		0.073
Nickel	4.0-80	13.49	15		23		25		32
Selenium	0.01-0.2	0.355	<0.5		<0.78		<0.5		<0.65
Vanadium	3.0-310	8.27	15		23		17		23
Zinc	10-300	56.4	61		95		73		94

Analysis performed by Life Sciences Laboratories, Inc.

VI. Site Specific Summary

2012 Soil Summary Data; Jamesville Pen. (OCCF) (ppm; ug/g)

			Spring 2012			Fall 2012		
Element	National Average	Background Mean 1994 (wet wt.)	Three Point Composite (wet wt.)		Three Point Composite (dry wt.)	Three Point Composite (wet wt.)		Three Point Composite (dry wt.)
Arsenic	1.0-40	6.4	5.4		7.1	8.3		11
Beryllium	0.01-10	0.29	0.39		0.51	0.53		0.67
Cadmium	~0.25	0.25	0.22		0.29	0.92		1.2
Chromium	trace-thousands	9.8	8.8		11	13		16
Lead	<10-30	18.38	18		23	20		25
Mercury	0.02-0.6	0.053	<0.05		<0.065	0.059		0.076
Nickel	4.0-80	20.53	19		25	30		38
Selenium	0.01-0.2	0.38	<0.5		<0.65	<0.50		<0.64
Vanadium	3.0-310	12.03	14		18	17		22
Zinc	10-300	38.7	46		60	53		68

Analysis performed by Life Sciences Laboratories, Inc.

VI. Site Specific Summary

2012 Soil Summary Data; Southwood (ppm; ug/g)

			Spring 2012			Fall 2012		
Element	National Average	Background Mean 1994 (wet wt.)	Three Point Composite (wet wt.)		Three Point Composite (dry wt.)	Three Point Composite (wet wt.)		Three Point Composite (dry wt.)
Arsenic	1.0-40	3.23	4		5.6	5		6.8
Beryllium	0.01-10	0.31	0.48		0.67	0.63		0.86
Cadmium	~0.25	0.24	0.19		0.27	0.92		1.2
Chromium	trace-thousands	12.17	12		17	16		22
Lead	<10-30	11.95	12		16	14		18
Mercury	0.02-0.6	0.045	<0.05		<0.07	<0.05		<0.068
Nickel	4.0-80	13.39	13		18	15		21
Selenium	0.01-0.2	0.353	<0.5		<0.7	<0.5		<0.68
Vanadium	3.0-310	13.14	16		23	20		27
Zinc	10-300	44.1	46		65	52		71

Analysis performed by Life Sciences Laboratories, Inc.

VI. Site Specific Summary

2012 Soil Summary Data; Sentinel Heights (ppm; ug/g)

			Spring 2012			Fall 2012	
Element	National Average	Background Mean 1994 (wet wt.)	Three Point Composite (wet wt.)	Three Point Composite (dry wt.)		Three Point Composite (wet wt.)	Three Point Composite (dry wt.)
Arsenic	1.0-40	4.71	6.2	9		6.3	8.8
Beryllium	0.01-10	0.41	0.59	0.86		0.59	0.83
Cadmium	~0.25	0.44	0.4	0.59		0.92	1.3
Chromium	trace-thousands	9.98	12	17		13	18
Lead	<10-30	13.16	15	22		15	21
Mercury	0.02-0.6	0.043	<0.05	<0.073		0.05	0.07
Nickel	4.0-80	17.06	19	27		19	27
Selenium	0.01-0.2	0.511	<0.5	<0.73		<0.5	<0.7
Vanadium	3.0-310	14.22	21	30		22	31
Zinc	10-300	46.9	58	84		58	81

Analysis performed by Life Sciences Laboratories, Inc.

VI. Site Specific Summary

2012 Soil Summary Data; DOT@Jaquith Industries (ppm; ug/g)

			Spring 2012			Fall 2012	
Element	National Average	Background Mean 1994 (wet wt.)	Three Point Composite (wet wt.)	Three Point Composite (dry wt.)		Three Point Composite (wet wt.)	Three Point Composite (dry wt.)
Arsenic	1.0-40	3.46	5.3	6.7		6.8	8.4
Beryllium	0.01-10	0.21	0.41	0.52		0.48	0.6
Cadmium	~0.25	0.13	0.38	0.48		0.93	1.1
Chromium	trace-thousands	10.17	14	18		26	32
Lead	<10-30	29.67	55	69		55	67
Mercury	0.02-0.6	0.043	0.061	0.1		0.085	0.1
Nickel	4.0-80	9.44	16	20		19	23
Selenium	0.01-0.2	0.15	<0.5	<0.63		<0.50	0.061
Vanadium	3.0-310	8.6	15	18		18	22
Zinc	10-300	34.1	94	120		110	130

Analysis performed by Life Sciences Laboratories, Inc.

VI. Site Specific Summary

2012 Soil Summary Data; Pratts Falls (ppm; ug/g)

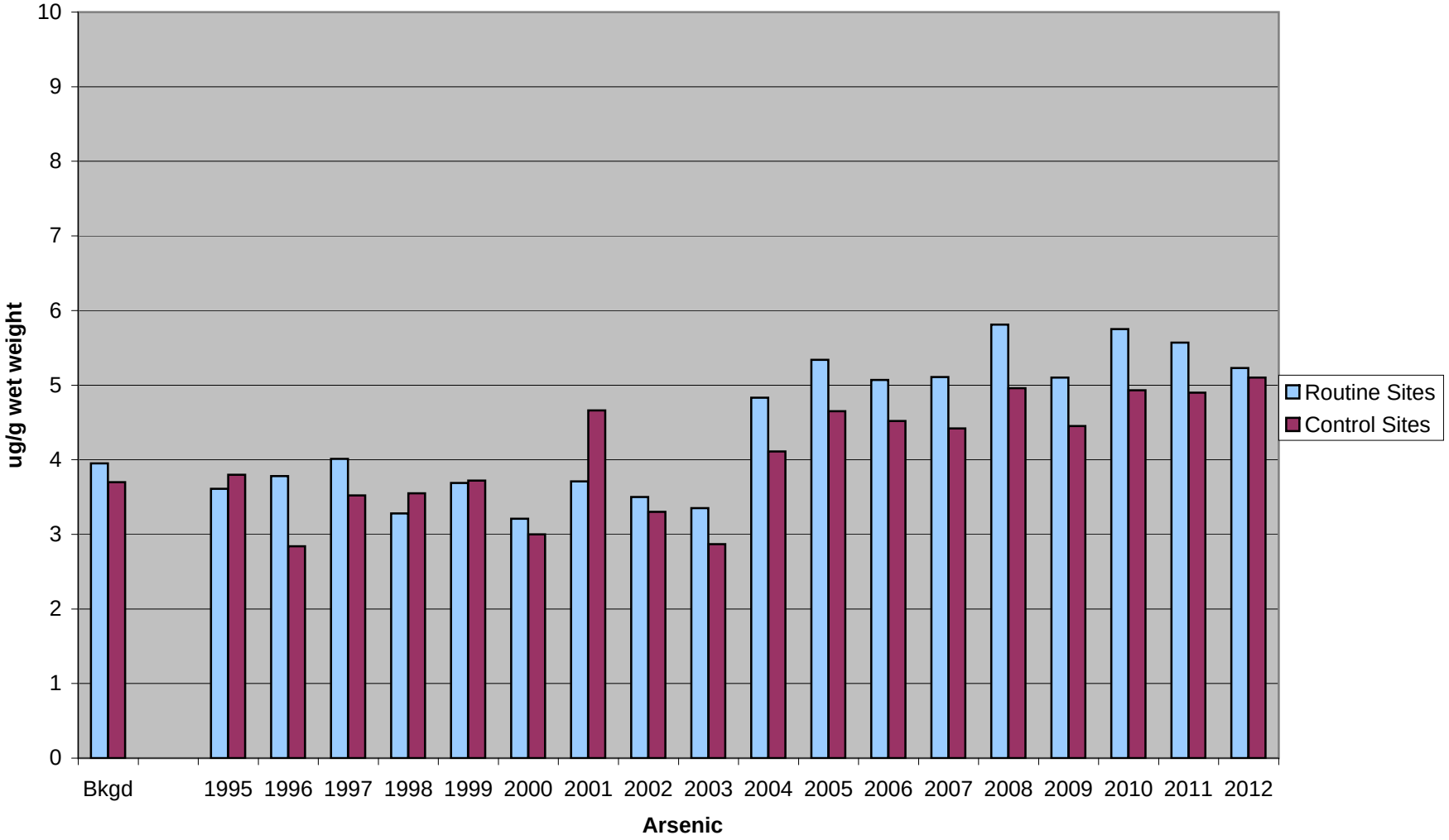
			Spring 2012				Fall 2012		
Element	National Average	Background Mean 1994 (wet wt.)	Three Point Composite (wet wt.)		Three Point Composite (dry wt.)		Three Point Composite (wet wt.)		Three Point Composite (dry wt.)
Arsenic	1.0-40	2.51	4.4		6.1		4.2		5.5
Beryllium	0.01-10	0.12	0.35		0.48		0.38		0.49
Cadmium	~0.25	0.22	0.32		0.44		0.4		0.52
Chromium	trace-thousands	9.05	12		17		11		15
Lead	<10-30	11.18	15		21		13		17
Mercury	0.02-0.6	0.034	<0.05		<0.70		<0.05		<0.065
Nickel	4.0-80	9.62	11		15		12		16
Selenium	0.01-0.2	0.269	<0.5		<0.7		<0.5		<0.65
Vanadium	3.0-310	11.44	23		32		20		25
Zinc	10-300	28.4	45		63		44		57

Analysis performed by Life Sciences Laboratories, Inc.

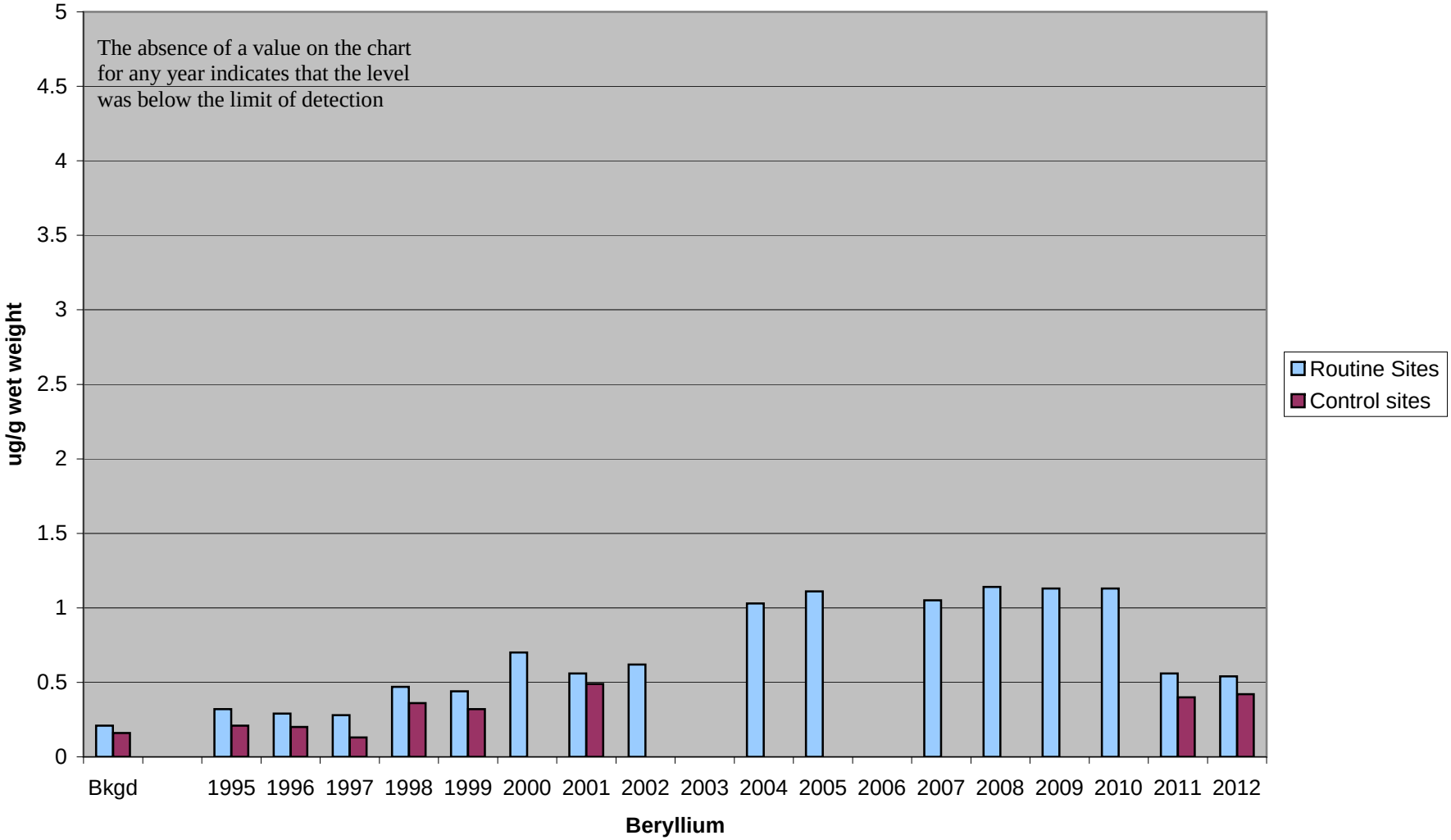
VII. Routine Sites Mean Comparison

Soil Metal Analysis - ug/g wet weight	As	Be	Cd	Cr	Pb	Hg	Ni	Se	V	Zn
Background Mean - Routine Sites	3.95	0.21	0.2	9.99	13.2	0.05	12.7	0.35	10.6	35.6
Background Mean - Routine Control Sites	3.7	0.16	0.1	9.71	10.5	0.04	10	0.26	10.2	36
1995 Mean - Routine Sites	3.61	0.32	0.32	12.7	14.7	0.05	15	0.48	13.8	45.3
1995 Mean - Routine Control Sites	3.8	0.21	0.3	12.2	14.4	0.04	12.3	0.39	14.3	50.3
1996 Mean - Routine Sites	3.78	0.29	0.25	12.6	12.9	0.06	14.2	0.3	15	43.4
1996 Mean - Routine Control Sites	2.84	0.2	0.34	12	13.7	0.05	9.95	0.22	15.1	48.2
1997 Mean - Routine Sites	4.01	0.28	0.31	11.6	12.3	0.06	13	0.37	13.4	37.4
1997 Mean - Routine Control Sites	3.52	0.13	0.18	10.3	11.8	NA	10.1	0.27	11.4	41.3
1998 Mean - Routine Sites	3.28	0.47	0.21	9.23	13.5	0.08	12.3	1.32	12.4	41.4
1998 Mean - Routine Control Sites	3.55	0.36	0.15	8.42	11.7	NA	9.54	NA	12.3	35.5
1999 Mean - Routine Sites	3.69	0.44	0.34	12.8	17.3	0.05	15	1.24	15.8	44.9
1999 Mean - Routine Control Sites	3.72	0.32	0.25	12.2	12.6	NA	11.4	NA	15.3	45
2000 Mean - Routine Sites	3.21	0.7	0.56	10.55	16.02	0.05	12.53	0.84	13.84	41.46
2000 Mean - Routine Control Sites	3	NA	NA	9.12	11.41	0.05	9.7	NA	12.07	37.39
2001 Mean - Routine Sites	3.71	0.56	0.63	12.24	15.65	0.06	15.01	0.79	14.75	45.07
2001 Mean - Routine Control Sites	4.66	0.49	0.77	12.03	14.08	0.05	12.26	5.11	13.85	44.51
2002 Mean - Routine Sites	3.5	0.62	NA	11.96	16.4	0.07	13.71	0.83	16.08	41.02
2002 Mean - Routine Control Sites	3.3	NA	NA	11.99	11.43	0.04	11.46	0.51	14.24	42.87
2003 Mean - Routine Sites	3.35	NA	0.56	11.65	10	0.05	12.17	NA	14.32	36.08
2003 Mean - Routine Control Sites	2.87	NA	0.53	15.24	8.76	NA	10.29	NA	15.08	36.26
2004 Mean - Routine Sites	4.83	1.03	NA	13.1	16.6	NA	15.12	0.91	16.34	48.79
2004 Mean - Routine Control Sites	4.11	NA	NA	8.26	11.15	NA	8.67	0.75	12.58	43.23
2005 Mean - Routine Sites	5.34	1.11	2.75	13.51	20.64	0.1	16.98	0.77	16.94	50.34
2005 Mean - Routine Control Sites	4.65	NA	NA	9.85	13.97	NA	10.2	0.93	13.87	51.55
2006 Mean - Routine Sites	5.07	NA	NA	14.16	19.92	NA	17.2	0.9	18.68	55.98
2006 Mean - Routine Control Sites	4.52	NA	NA	9.72	13.67	NA	10.6	0.89	14.93	49.46
2007 Mean - Routine Sites	5.11	1.05	NA	14.13	17.15	0.08	17.14	1.21	17.01	50.95
2007 Mean - Routine Control Sites	4.42	NA	NA	9.42	12.91	0.06	9.46	1.18	13.62	52.5
2008 Mean - Routine Sites	5.81	1.14	NA	14.16	52.02	0.1	18.16	1.33	18.08	72.83
2008 Mean - Routine Control Sites	4.96	NA	NA	8.36	11.67	NA	8.87	NA	13.73	38.1
2009 Mean- Routine Sites	5.1	1.13	NA	12.99	16.66	0.07	16.69	1.14	16.73	53.85
2009 Mean- Routine Control Sites	4.45	NA	NA	9.33	13.01	NA	10.56	NA	13.97	51.28
2010 Mean-Routine Sites	5.75	1.13	NA	14.08	24.9	0.08	17.8	1.14	18.6	57.91
2010 Mean- Routine Control Sites	4.93	NA	NA	30.5	13.2	NA	17.7	1.2	15.5	54.8
2011 Mean-Routine Sites	5.57	0.56	0.21	14.32	19.8	0.06	16.9	0.8	19.7	65.75
2011 Mean- Routine Control Sites	4.9	0.4	0.16	10.6	13.8	NA	10.6	0.82	15.3	53.3
2012 Mean-Routine Sites	5.23	0.54	0.51	14.2	17.4	0.07	16.7	NA	18.5	51.4
2012 Mean-Routine Control Sites	5.1	0.42	0.51	9.8	13.1	0.06	10.6	NA	15	54.5

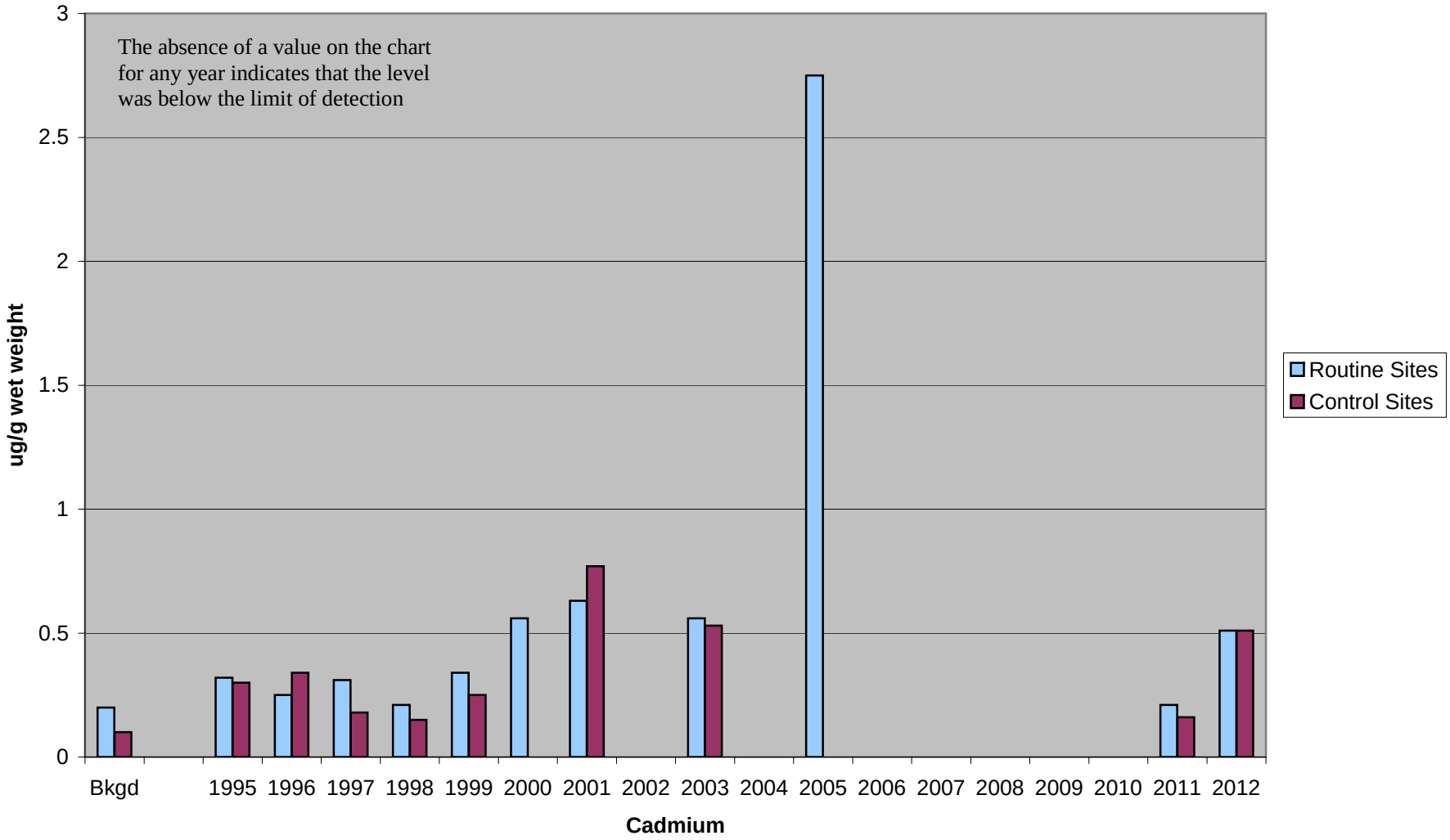
VII.A. Comparison of Annual Mean Values
Routine and Routine Control Sites



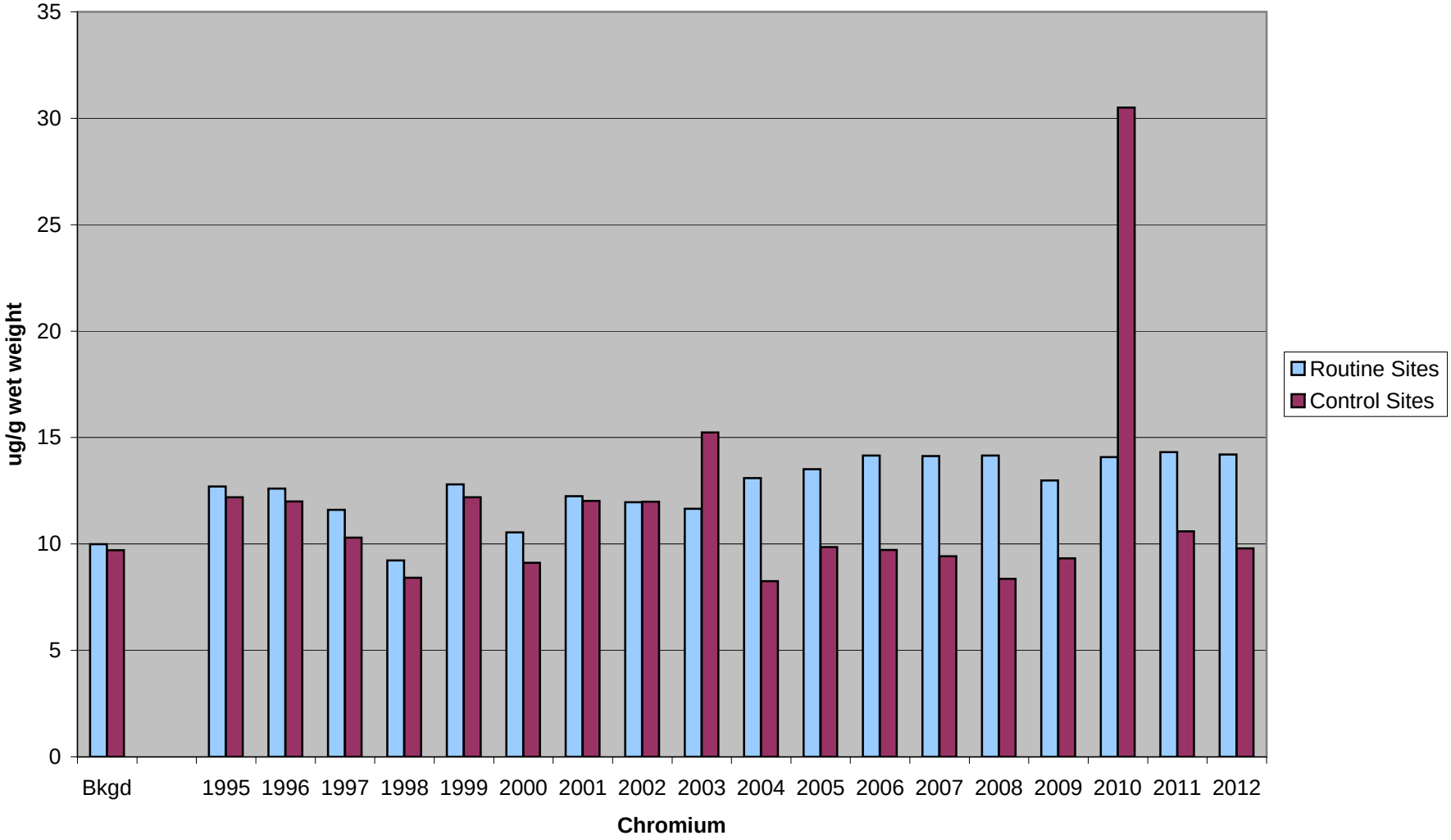
VII.B. Comparison of Annual Mean Values
Routine and Control Sites



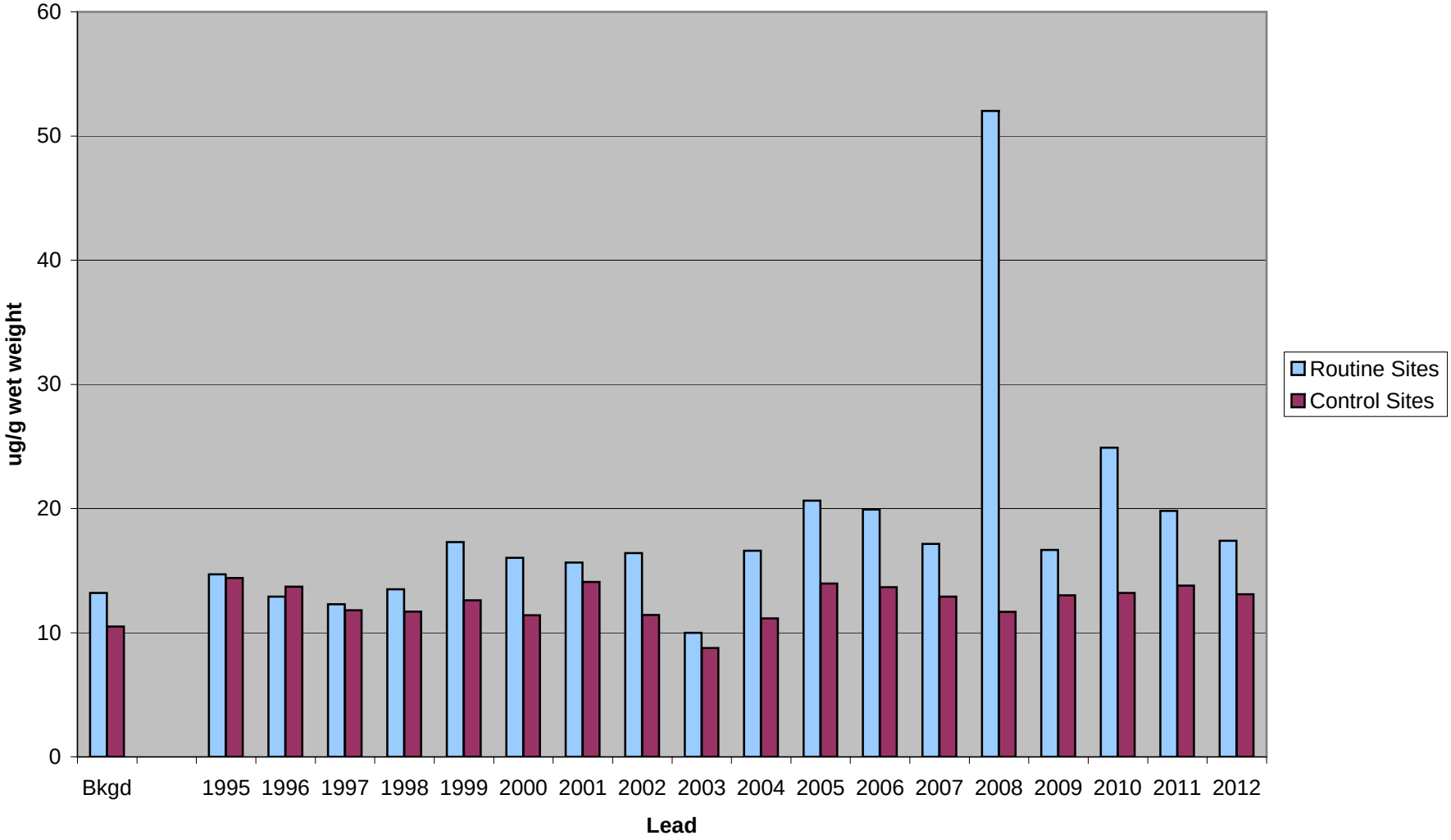
VII.C. Comparison of Annual Mean Values
Routine and Control Sites



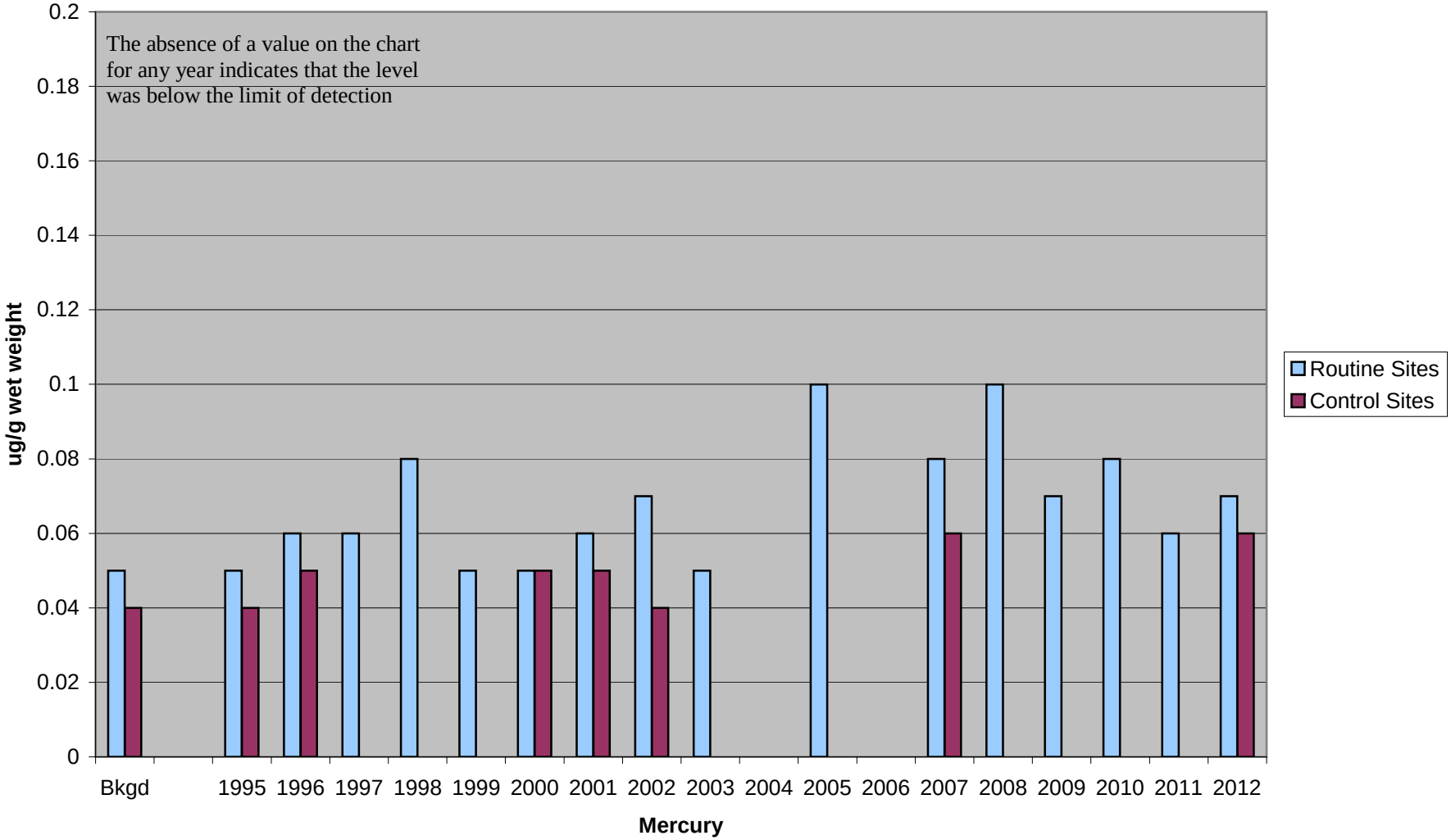
VII.D. Comparison of Annual Mean Values
Routine and Control Sites



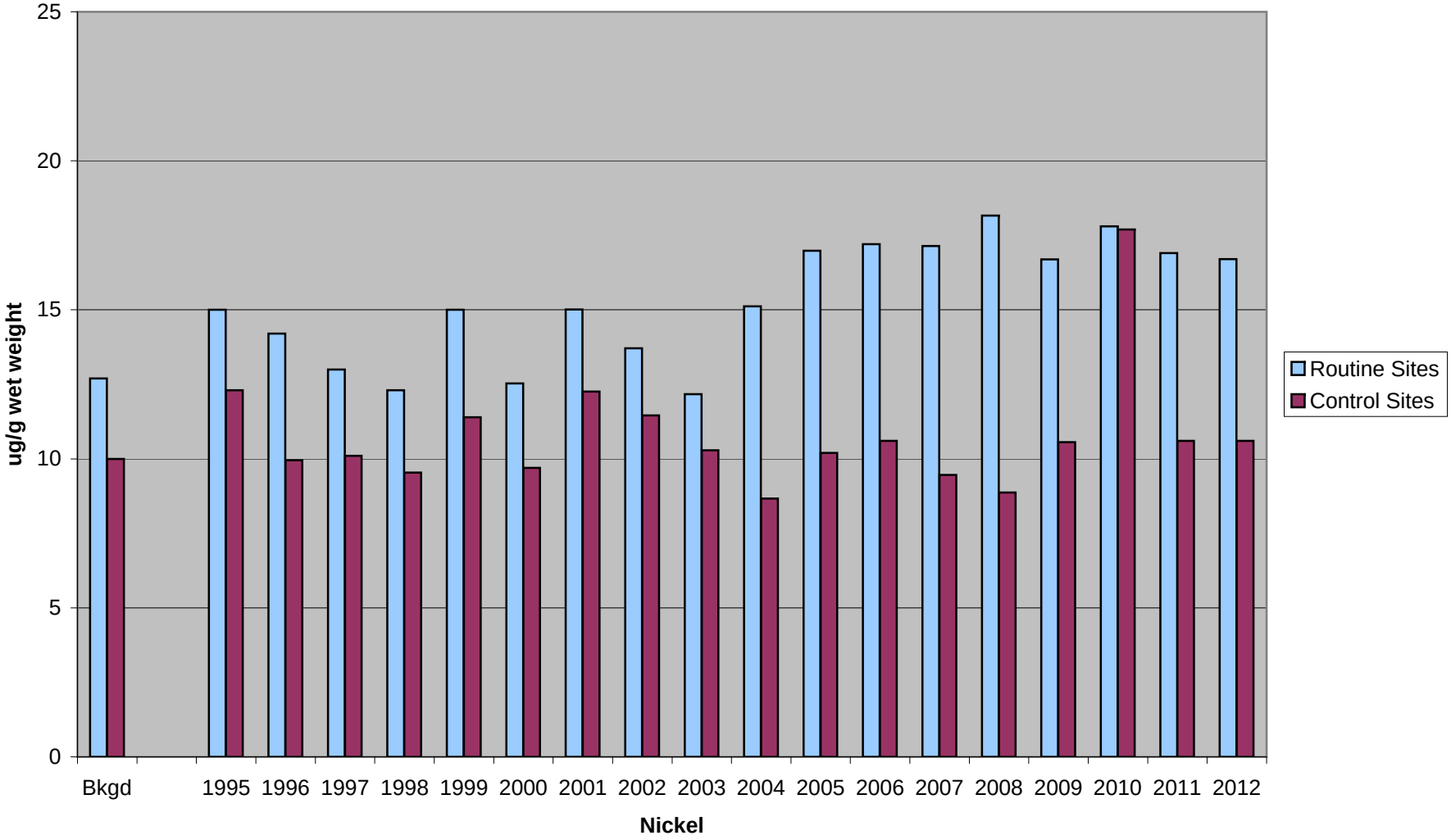
VII.E. Comparison of Annual Mean Values
Routine and Control Sites



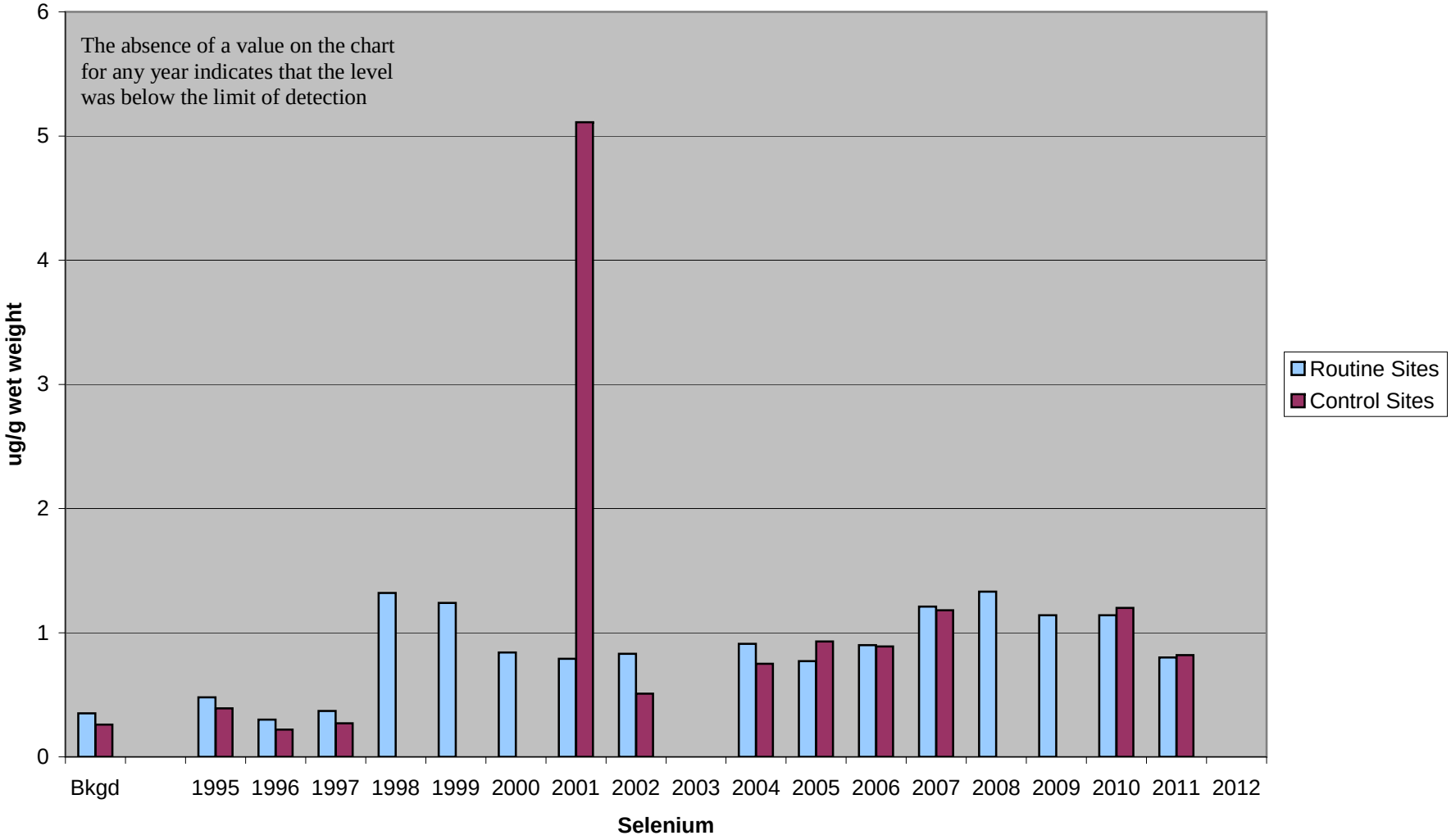
VII.F. Comparison of Annual Mean Values
Routine and Control Sites



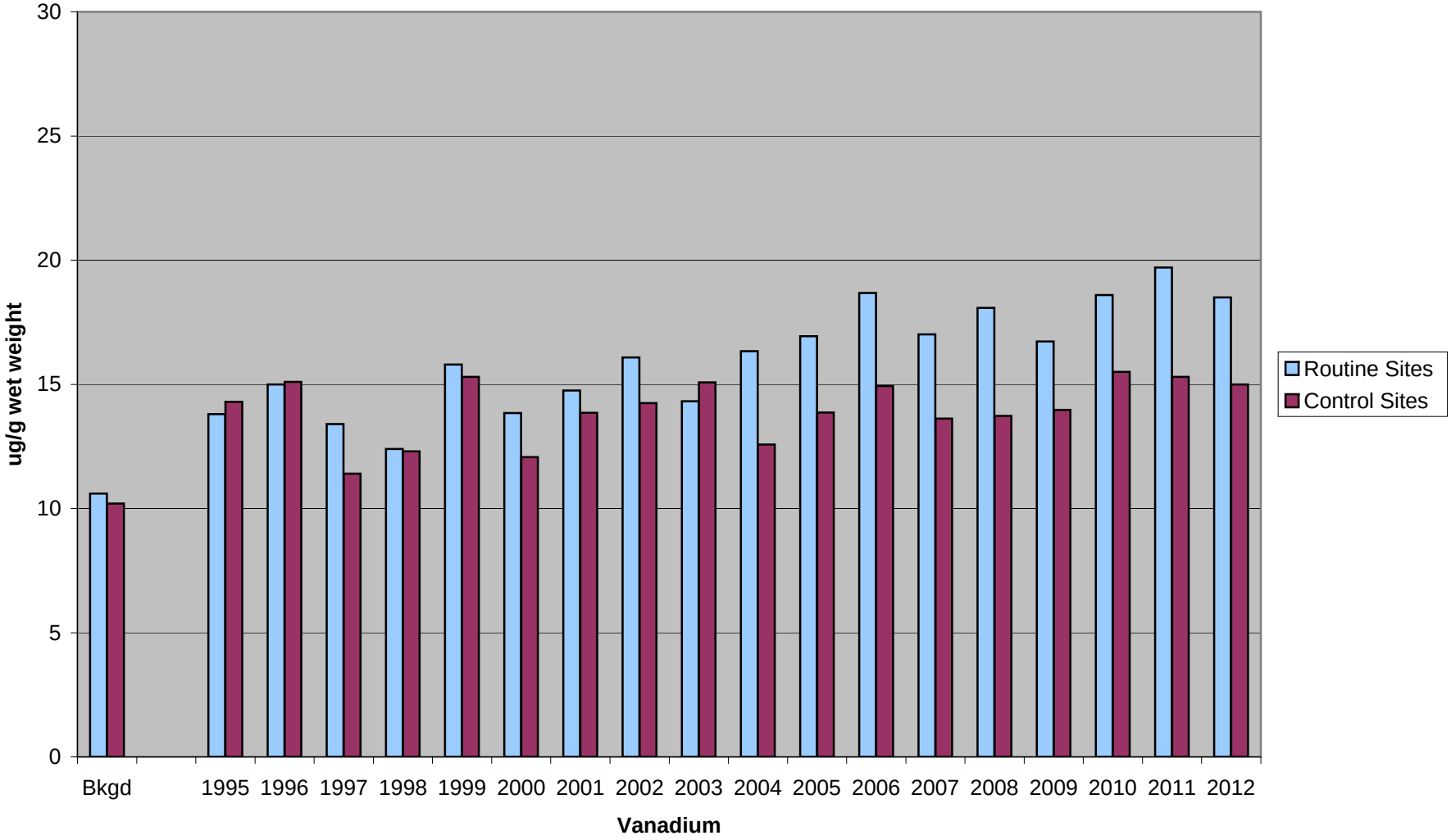
VII.G. Comparison of Annual Mean Values
Routine and Control Sites



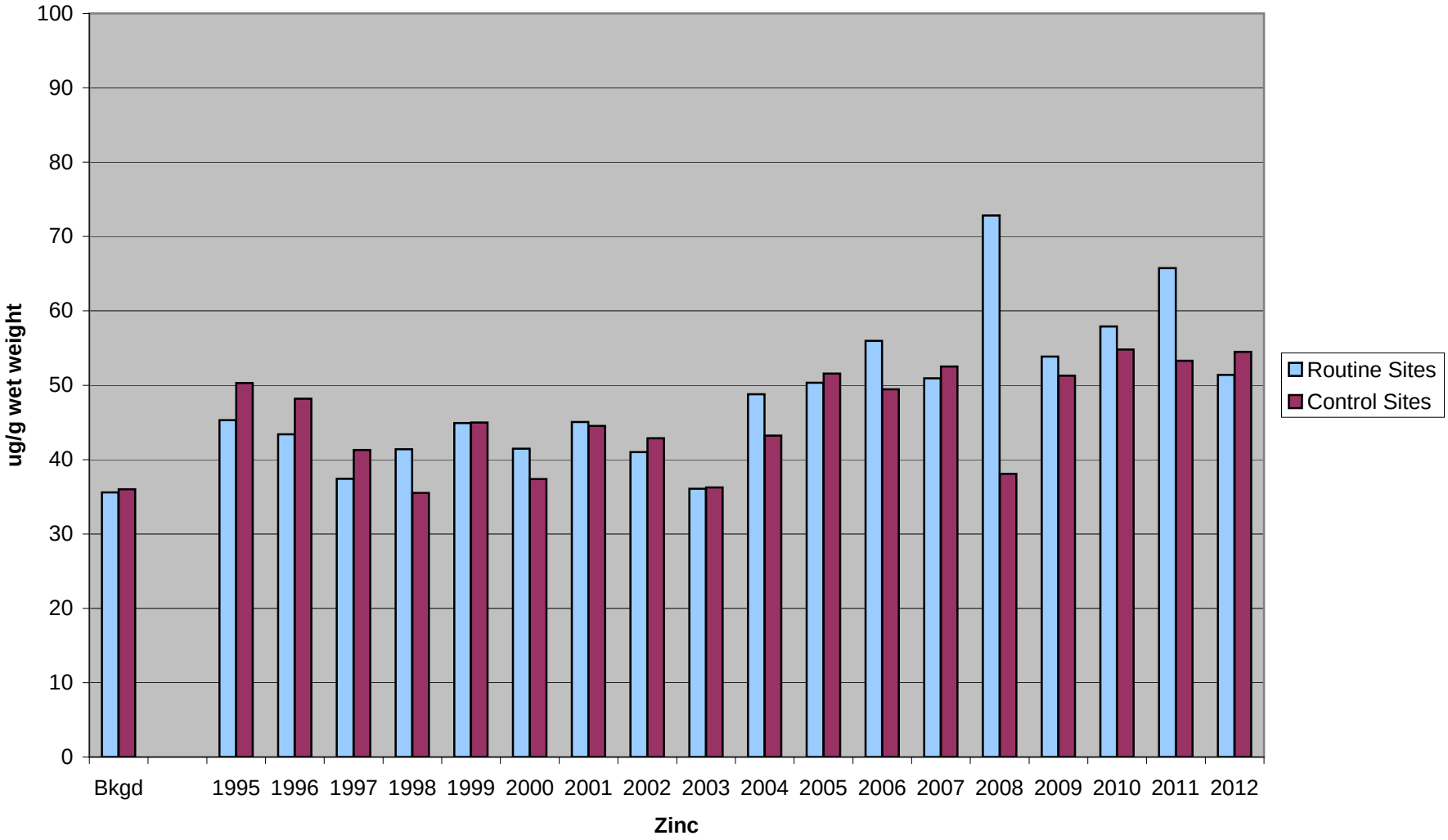
VII.H. Comparison of Annual Mean Values
Routine and Control Sites



VII.I. Comparison of Annual Mean Values
Routine and Control Sites



VII.J. Comparison of Annual Mean Values
Routine and Routine Control Sites



Metal	NYS SCO's for restricted use residential (ppm)	Rural Soil Survey (ppm)	USEPA Soil Screening levels for residential (ppm)
Arsenic	16 (0.21)	16	0.39
Beryllium	14	1.2	160
Cadmium	2.5 (0.86)	2.5	70
Chromium	36	30	280
Lead	400	133	400
Mercury	0.81	0.3	6.7
Nickel	140	29.5	1600
Selenium	36	4	390
Vanadium	NA	38	390
Zinc	2,200	180	23,000

New York State Department of Environmental Conservation Soil Cleanup Objectives. The Health Based SCO's were calculated considering all exposure pathways:ingestion, inhalation, dermal, carcinogenic (1 in a million cancer risk), and non-carcinogenic (using risk reference doses). The final health based SCO is based on the most conservative pathway calculation. In some cases the SCO has been modified to match background if the rural background levels for NYS are above the calculated SCO (the health based SCO is in parenthesis). Restricted use means no livestock or animal product consumption.

NYS Statewide Rural Surface Soil Survey (2005)-determined concentration ranges for 170 commonly assessed analytes in discrete surface soil samples collected at randomly selected rural NYS properties.

USEPA Soil Screening Levels for residential–Values were calculated based on the ingestion-dermal exposure pathway for residential soils. These screening levels are not action levels or clean up levels, they are a tool for further evaluation.

Onondaga County Health Department
Division of Environmental Health
421 Montgomery Street
Syracuse, New York 13202

Incinerator Monitoring Program

2012 Ash Characterization Summary

June 1, 2013

Submitted To: **Cynthia B. Morrow, M.D., M.P.H.**
Commissioner of Health

Submitted By: **Kevin L. Zimmerman**
Director, Division of Environmental Health

Contents:

I . Table of Abbreviations

The following abbreviations may be used throughout this report:

As	Arsenic.
Be	Beryllium.
Cd	Cadmium.
CES	Certified Environmental Services.
Cr	Chromium.
CV	Coefficient of Variation.
ELAP	Environmental Laboratory Approval Program.
ELS	Environmental Laboratory Services.
Hg	Mercury.
LD	Limit of Detection.
Ni	Nickel.
NYSDEC	New York State Department of Environmental Conservation.
OCHD	Onondaga County Health Department.
Pb	Lead.
ppm	parts per million.
ug/g	micrograms per gram (= ppm).
SD	Standard Deviation.
Se	Selenium.
V	Vanadium.
WTE	Waste To Energy Facility.
Zn	Zinc.
~	approximately.
<	Less than.
>	Greater than.
NA	Not applicable.

Note: Values <LD were not included in average, SD and CV calculations.

II. Executive Summary

Sample analyses for the 2012 ash characterization study were conducted by Life Science's Laboratories, Inc. (formerly O'Brien and Gere Laboratories, Inc.). As has been the format since the Fall 1998 reporting period, the year 2012 results have been reported on both a wet weight and dry weight basis. Results through the Spring 1998 reporting period were reported exclusively on a wet weight basis. Each of these reported values provides important information regarding ash metal data. Wet weight values will be used for historical comparison relative to the conditions of the ash as it leaves the WTE Facility. Dry weight values will allow for better comparison with future metal concentrations, removing the variability of ash moisture content. Dry weight values will tend to be higher than wet weight since the weight of the "inert" water is removed in the concentration calculations.

This report uses the individual metal "mean plus three standard deviations" as a benchmark for consistent results. Calculations include all wet weight data through the Fall 2012 sampling period. This standard is supported by the NYSDEC data in which at least 95% of the individual metal results are within the "mean plus three standard deviations" for the respective metals. It is evident by looking at the data from this report and the NYSDEC data that there will be occasional results outside of this benchmark. Occasional outlying sample results are not considered to be of significance. Such results may be due to the fact that, while every effort is used to create a homogeneous combined ash sample, it is not feasible to obtain such a sample because of the presence of incombustible "chunks" in the bottom ash.

Ash collection and compositing continues to be the responsibility of Covanta Energies Systems of Onondaga under NYSDEC protocols. The Health Department and Covanta Energies utilize split samples to ensure the most accurate results.

III. Introduction

The purpose of this study is to provide part of an ongoing evaluation of ash generated at the Onondaga County Resource Recovery Agency Waste-To-Energy facility. The results summarized in this report reflect analysis of combined fly and bottom ash samples from Fall 1995 through Fall 2012. The ash samples were analyzed for total metal concentration for arsenic, beryllium, cadmium, chromium, lead, mercury, nickel, selenium, vanadium and zinc.

In 2011, due to improvements in laboratory equipment, the detection limits for beryllium, cadmium, and selenium have been lowered. Therefore there are detectable levels of these metals in many of the ash samples starting in 2011 as compared to previous years.

As part of our evaluation of the metals content of the ash samples, the average value concentrations from each semiannual sampling period are compared to the analogous values from the combined ash samples from the NYSDEC "Ash Residue Characterization Project" (1992). Average and standard deviation calculations do not include those results less than a limit of detection.

The results in this report represent total metal content in the combined fly and bottom ash from the WTE Facility. The standard test for determining the leachability of constituents of combined ash is the TCLP protocol established by the USEPA and accepted by the NYSDEC. Total metal content is not necessarily indicative of the leachability of contaminants from the ash.

IV. Element Specific Summary

Arsenic

Ash sample values in the 2012 study varied from 22.0 ppm wet weight (43.0 ppm dry wt) to a high value of 93.0 ppm wet weight (120.0 ppm dry wt). There were no arsenic results above the mean + 3SD level of 106 ppm wet weight.

The distribution and average for arsenic during the 2012 sampling period is consistent with the NYSDEC mean arsenic value of 19.1 ppm.

Beryllium

Ash sample values in the 2012 study varied from 0.34 ppm wet weight (0.46 ppm dry wt) to a high value of 1.0 ppm wet weight (1.4 ppm dry wt). One ash sample had a beryllium value above the mean + 3SD level of 0.87 ppm wet weight.

Beryllium was not evaluated in the DEC study.

Cadmium

Ash sample values in the 2012 study varied from 27.0 ppm wet weight (32.0 ppm dry wt) to a high value of 64.0 ppm wet weight (78.0 ppm dry wt). There were no cadmium results above the mean + 3SD level of 84.7 ppm wet weight.

The distribution and average for cadmium during the 2012 sampling period is consistent with the NYSDEC mean cadmium value of 33.6 ppm.

Chromium

Ash sample values in the 2012 study varied from 43.0 ppm wet weight (57.0 ppm dry wt) to a high value of 180.0 ppm wet weight (230.0 ppm dry wt). One ash sample had a chromium value above the mean + 3SD level of 152.7 ppm wet weight.

The distribution and average for chromium during the 2012 sampling period is very consistent with the NYSDEC mean chromium value of 259 ppm. The DEC average value of 259 ppm is skewed by a single outlying sample result.

Lead

Ash sample values in the 2012 study varied from 400 ppm wet weight (530 ppm dry wt) to a high value of 2,000 ppm wet weight (2,400 ppm dry wt). There were no lead results above the mean + 3SD level of 2,195 ppm wet weight.

The distribution and average for lead during the 2012 sampling period is consistent with the NYSDEC mean lead value of 1,558 ppm.

Mercury

Ash sample values in the 2012 study varied from 1.4 ppm wet weight (1.8 ppm dry wt) to a high value of 6.4 ppm wet weight (8.7 ppm dry wt). There were no mercury results above the mean + 3SD level of 7.3 ppm wet weight.

The distribution and average for mercury during the 2012 sampling period is very consistent with the NYSDEC mean mercury value of 10.9 ppm.

Nickel

Ash sample values in the 2012 study varied from 23.0 ppm wet weight (31.0 ppm dry wt) to a high value of 95.0 ppm wet weight (120.0 ppm dry wt). There were no nickel results above the mean + 3SD level of 110 ppm wet weight.

The distribution and average for nickel during the 2012 sampling period is significantly lower than the NYSDEC mean nickel value of 658 ppm.

Selenium

Ash sample values in the 2012 study varied from 0.5 ppm wet weight (0.62 ppm dry wt) to a high value of 2.7 ppm wet weight (3.6 ppm dry wt). There were no selenium results above the mean + 3SD level of 2.73 ppm wet weight.

The distribution and average for selenium during the 2012 sampling period is very consistent with the NYSDEC mean selenium value of 2.66 ppm.

Vanadium

Ash sample values in the 2012 study varied from 23.0 ppm wet weight (31.0 ppm dry wt) to a high value of 45.0 ppm wet weight (55.0 ppm dry wt). There were no vanadium results above the mean + 3SD level of 45.1 ppm wet weight.

Vanadium was not evaluated in the DEC study.

Zinc

Ash sample values in the 2012 study varied from 2,800 ppm wet weight (3,700 ppm dry wt) to a high value of 17,000 ppm wet weight (21,000 ppm dry wt). One ash sample had a zinc value above the mean + 3SD level of 14,174 ppm wet weight.

The distribution and average for zinc during the 2012 sampling period is consistent with the NYSDEC mean zinc value of 3,666 ppm.

V. Summary and Conclusions

The data contained in this report indicates consistent levels for all metals in the combined ash residue throughout the first seventeen years of operation. The samples from the Fall 1995 to Fall 2012 sampling periods are also consistent with those of the NYSDEC "Ash Residue Characterization Project".

The Health Department recognizes that there are inherent difficulties in using the NYSDEC study for comparison. The DEC study uses several different ash producing sources for their data. Also, the data is from a very specific time period. It does not take into account changes in the municipal solid waste stream due to time of year, increased recycling efforts, etc. However, results from the Health Department's study have shown that these variables have little significant effect on the total metal concentration in the ash. This is apparent when looking at the individual results and the sampling period averages over time. Well over 95% of the individual results from the ash characterization studies to date are within the "mean plus three standard deviation" criteria. Additionally, average metal values for each of the sampling periods show little relative change throughout the time frame of this report.

VI.

1995 ASH METAL ANALYSIS
ALL RESULTS IN UG/G (ppm) - Wet Weight

SAMPLE COLLECTION DATE	LAB #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
11/15 - 16/95	951158	18.7	<.1	42.3	49.2	1189	5.87	44.8	2.09	10.02	3771
11/16 - 17/95	951159	18.7	0.13	36.7	42.2	866	4.26	50.3	1.69	10.97	3200
11/17/95	951160	16.8	0.15	37.7	41.1	1095	3.27	43.9	1.88	9.72	3593
11/17/95	951161	14.1	<.1	45.0	51.0	1164	5.19	38.3	1.85	9.74	3994
11/17 - 18/95	951162	12.5	<.1	30.7	58.7	1067	3.94	42.5	1.83	10.06	8225
11/18/95	951163	11.9	0.12	54.3	41.2	1174	3.61	54.3	2.16	9.74	3120
11/18/95	951164	7.8	<.1	39.4	48.1	1080	4.97	51.2	2.12	9.42	3709
11/18 - 19/95	951165	18.8	<.1	44.1	38.8	1236	5.34	73.6	1.76	8.52	4070
11/19/95	951166	19.3	<.1	42.7	51.1	1307	4.38	65.2	2.04	9.96	4577
11/19/95	951167	14.6	0.20	29.1	39.7	1036	3.40	63.0	1.55	10.60	4517
AVERAGE		15.3	0.15	40.2	46.1	1121	4.42	52.7	1.90	9.88	4277
STANDARD DEVIATION		3.6	0.03	6.9	6.2	116	0.84	10.8	0.19	0.62	1393
COEFFICIENT OF VARIATION		23.7%	20.5%	17.3%	13.4%	10.4%	19.1%	20.4%	10.1%	6.3%	32.6%

Analyses performed by OCHD.

1996 ASH METAL ANALYSES
ALL RESULTS IN UG/G (ppm) - Wet Weight

SAMPLE COLLECTION DATE	LAB #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
03/08 - 19/1996	960129	22.0	0.150	33.9	32.7	897	4.83	24.7	2.25	8.21	2031
03/08 - 19/1996	960130	13.6	0.160	41.3	33.3	894	7.82	27.7	2.73	8.84	2038
03/08 - 19/1996	960131	10.9	0.220	34.9	30.0	1127	6.70	37.7	1.97	9.87	2191
03/08 - 19/1996	960132	10.0	<.100	26.6	25.2	543	4.73	16.2	1.76	8.63	1821
03/08 - 19/1996	960133	11.8	0.320	20.1	52.0	478	5.13	35.5	1.76	9.70	1101
03/08 - 19/1996	960134	5.6	<.100	29.8	27.0	1022	5.23	25.6	1.97	7.02	2135
03/08 - 19/1996	960135	10.5	<.100	31.0	31.6	910	5.04	57.4	2.51	7.54	2010
03/08 - 19/1996	960136	13.3	<.100	22.4	29.1	622	5.20	32.5	1.94	6.81	1448
03/08 - 19/1996	960137	14.0	0.210	21.0	26.2	616	4.44	18.4	2.33	15.6	1230
03/08 - 19/1996	960138	19.6	<.100	24.0	24.5	1062	4.69	22.8	2.45	8.09	1724
AVERAGE		13.1	0.21	28.5	31.1	817	5.38	29.8	2.17	9.04	1773
STANDARD DEVIATION		4.5	0.11	6.6	7.5	221	1.00	11.3	0.32	2.40	368
COEFFICIENT OF VARIATION		34.3%	53.9%	23.0%	24.2%	27.0%	18.6%	37.9%	14.6%	26.6%	20.8%

Analyses performed by OCHD.

09/16/1996	960667	33.1	<.100	46.3	50.8	2028	3.16	59.0	2.45	13.1	4802
09/16/1996	960668	25.9	<.100	49.7	43.1	1604	13.8	39.2	2.18	14.5	4507
09/17/1996	960669	29.9	<.100	39.0	46.3	1590	8.38	29.5	2.64	16.3	3883
09/17/1996	960670	32.3	<.100	43.1	45.6	1582	4.10	40.9	2.63	17.9	2290
09/18/1996	960671	30.5	<.100	37.7	47.3	940	4.98	59.1	2.31	13.1	4552
09/18/1996	960672	25.4	<.100	45.1	341.9	899	5.18	373.7	2.27	12.9	4481
09/19/1996	960673	30.4	<.100	37.1	45.3	1275	3.86	125.5	2.84	15.9	3803
09/19/1996	960674	35.5	<.100	29.2	55.0	1811	8.13	47.3	2.53	15.7	8196
09/20/1996	960675	31.0	<.100	35.6	62.8	1246	6.83	53.7	3.05	17.7	6757
09/20/1996	960676	20.0	<.100	49.2	66.9	731	4.41	55.4	1.90	15.7	4732
09/21/1996	960677	25.7	<.100	29.2	44.4	751	6.38	69.8	1.35	10.6	2904
09/21/1996	960678	30.5	<.100	38.2	50.8	1110	5.90	40.9	2.02	11.8	3278
09/22/1996	960679	37.2	<.100	38.2	87.0	1320	5.50	54.2	2.43	22.3	11168
09/22/1996	960680	30.8	<.100	33.0	57.9	697	4.33	36.7	2.00	11.9	3666
AVERAGE		29.9	N/A	39.3	74.6	1256	6.07	77.5	2.33	15.0	4930
STANDARD DEVIATION		4.3	N/A	6.4	75.0	409	2.62	85.1	0.41	3.0	2256
COEFFICIENT OF VARIATION		14.4%	N/A	16.2%	100.5%	32.5%	43.1%	109.8%	17.8%	19.8%	45.8%

Analyses performed by OCHD.

1997 ASH METAL ANALYSES
ALL RESULTS IN UG/G (ppm) - Wet Weight

SAMPLE COLLECTION DATE	LAB #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
03/10/97	970134	22.9	0.110	49.6	35.7	660	8.24	30.7	1.85	17.7	4322
03/10/97	970135	17.5	<.100	29.0	30.2	622	5.66	30.3	1.60	14.8	4220
03/11/97	970136	14.2	0.600	24.0	41.1	828	6.55	38.5	1.18	14.9	4308
03/11/97	970137	12.9	0.170	30.3	36.3	717	6.28	35.4	1.28	11.9	2450
03/12/97	970138	15.0	0.160	33.9	41.4	841	9.45	30.3	1.50	12.4	3658
03/12/97	970139	12.2	<.100	48.2	74.4	1009	5.15	60.9	1.23	96.4	1943
03/13/97	970140	16.3	<.100	29.0	44.2	502	5.81	37.1	1.60	13.3	3563
03/13/97	970141	14.1	<.100	28.5	42.4	682	7.34	31.1	1.04	10.0	2906
03/14/97	970142	14.2	0.110	29.8	46.9	668	4.16	36.3	1.55	12.2	3377
03/14/97	970143	12.5	<.100	28.1	59.8	530	8.19	58.4	0.88	16.4	3648
03/15/97	970144	17.7	<.100	32.9	60.7	684	7.73	60.7	1.37	15.0	3832
03/15/97	970145	16.5	0.140	26.0	56.0	629	5.4	56.0	0.75	16.0	7786
03/16/97	970146	14.9	<.100	20.4	41.3	495	7.14	49.5	1.70	9.8	5291
03/16/97	970147	11.5	<.100	35.8	64.5	1047	6.54	64.5	0.67	14.6	5576
AVERAGE		15.2	0.22	31.8	48.2	708	6.69	44.3	1.30	19.7	4063
STANDARD DEVIATION		2.8	0.16	7.9	12.3	164	1.37	12.8	0.35	21.4	1398
COEFFICIENT OF VARIATION		18.7%	72.4%	24.9%	25.5%	23.1%	20.5%	28.9%	26.9%	108.8%	34.4%

Analyses performed by OCHD.

09/15/97	970698	43.3	<.100	34.1	54.9	3932	5.84	42.2	1.20	21.2	4982
09/15/97	970699	21.7	<.100	33.4	45.5	923	4.40	26.7	0.64	12.5	3820
09/16/97	970700	32.5	0.290	30.2	53.2	1012	3.61	32.5	0.92	20.7	4634
09/16/97	970701	22.9	<.100	26.2	37.3	1023	5.18	19.4	0.67	16.3	3834
09/17/97	970702	40.5	<.100	31.8	44.1	968	5.72	28.1	0.86	17.8	4583
09/17/97	970703	22.1	<.100	33.4	40.4	1051	4.91	36.8	0.61	10.5	4584
09/18/97	970704	22.2	<.100	27.1	69.5	1014	5.33	32.9	0.86	17.5	3617
09/18/97	970705	24.5	<.100	21.8	34.7	1084	12.5	14.7	0.82	11.8	3296
09/19/97	970706	25.3	<.100	32.6	46.7	1911	7.91	33.6	0.72	14.8	4041
09/19/97	970707	22.2	0.140	30.4	60.2	1481	6.75	28.7	0.60	13.0	4152
AVERAGE		27.7	0.22	30.1	48.7	1440	6.21	29.6	0.79	15.6	4154
STANDARD DEVIATION		7.7	0.09	3.7	10.2	880	2.38	7.6	0.18	3.5	504
COEFFICIENT OF VARIATION		27.8%	42.9%	12.4%	21.1%	61.1%	38.2%	25.8%	22.2%	22.5%	12.1%

Analyses performed by OCHD.

1998 ASH METAL ANALYSES
ALL RESULTS IN UG/G (ppm) - Wet Weight

SAMPLE COLLECTION DATE	LAB #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
02/23/98	980126	14.8	<0.50	26.6	41.3	700	11.6	95.0	<0.25	25.0	3100
02/23/98	980127	16.6	<0.50	30.1	36.9	1760	6.50	75.8	<0.25	15.6	9140
02/24/98	980128	12.6	<0.50	24.2	28.4	740	7.70	23.8	<0.25	13.4	2820
02/24/98	980129	9.60	<0.50	23.0	35.8	610	9.30	23.8	<0.25	16.8	2610
02/25/98	980130	7.60	<0.50	23.8	44.2	510	5.30	46.7	<0.25	17.2	2520
02/25/98	980131	6.70	<0.50	21.6	32.5	540	9.70	26.2	<0.25	13.4	3050
02/26/98	980132	12.4	<0.50	24.8	68.2	730	10.0	42.7	<0.25	22.4	3350
02/26/98	980133	6.60	<0.50	19.7	44.2	580	5.44	47.0	<0.25	12.1	2210
02/27/98	980134	7.60	<0.50	27.4	39.4	460	2.93	46.4	<0.25	13.8	2220
02/27/98	980135	7.40	<0.50	21.4	41.2	7200	10.5	35.8	<0.25	12.6	2310
02/27/98**	980135-RPT					761					
AVERAGE		10.2	N/A	24.3	41.2	1383	7.90	46.3	N/A	16.2	3333
STANDARD DEVIATION		3.5	N/A	3.0	10.2	1971	2.64	21.9	N/A	4.1	1971
COEFFICIENT OF VARIATION		34%	N/A	12%	25%	143%	33%	47%	N/A	25%	59%

Analyses performed by CES.

SAMPLE COLLECTION DATE	LAB #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
10/26/98	980808	29.8	0.80	26.6	47.7	852	6.95	49.9	<0.99	33.0	3558
10/26/98	980809	23.6	0.52	26.4	47.1	776	6.40	41.6	<1.00	31.6	3926
10/27/98	980810	36.0	0.74	28.0	138.6	1417	6.90	199.4	<2.47	36.2	3565
10/27/98	980811	25.3	0.66	31.9	49.3	14800	6.88	40.2	<0.98	26.3	4024
10/28/98	980812	32.9	0.65	30.6	42.7	1525	8.01	32.7	<0.98	30.7	3311
10/28/98	980813	22.8	0.44	29.1	52.4	1184	7.18	61.3	<0.96	30.1	3604
10/29/98	980814	37.8	0.64	33.2	62.5	996	9.20	54.0	<1.00	32.0	1429
10/29/98	980815	31.1	0.69	30.4	44.9	2633	14.0	17.0	<0.98	26.3	3788
10/30/98	980816	29.8	0.52	22.8	37.1	740	7.32	41.1	<2.51	41.6	3110
10/30/98	980817	30.6	0.51	22.1	34.6	1100	6.14	58.0	<1.00	27.4	3892
AVERAGE		30.0	0.62	28.1	55.7	2602	7.90	59.5	N/A	31.5	3421
STANDARD DEVIATION		4.7	0.11	3.5	28.6	4100	2.20	48.2	N/A	4.5	716
COEFFICIENT OF VARIATION		16%	18%	12%	51%	158%	28%	81%	N/A	14%	21%

Analyses performed by ELS.

1999 ASH METAL ANALYSES
ALL RESULTS IN UG/G (ppm) - Wet Weight

SAMPLE COLLECTION DATE	LAB #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
04-19-99	990215	30.4	<0.50	29.4	50.1	760	4.56	73.0	1.28	30.9	2864
04-19-99	990216	22.7	<0.50	32.8	114	1860	3.83	33.9	1.16	36.5	9523
04-20-99	990217	26.0	<0.50	29.3	47.0	728	3.83	62.1	1.28	32.3	2730
04-20-99	990218	20.8	<0.49	34.2	49.0	652	5.60	31.8	1.36	20.0	2920
04-21-99	990219	28.6	<0.50	36.2	51.4	885	5.77	1509	1.50	27.7	3863
04-21-99	990220	29.6	<0.49	44.2	227	828	5.24	44.0	1.75	32.3	3808
04-22-99	990221	24.1	<0.49	35.3	44.5	1029	4.13	39.0	0.89	31.5	2916
04-22-99	990222	26.8	<0.49	38.9	58.0	1123	5.04	30.7	1.15	23.6	3362
04-23-99	990223	30.2	<0.50	40.2	51.6	848	4.80	29.3	1.68	30.0	3360
04-23-99	990224	23.9	<0.49	33.6	53.1	939	5.54	43.0	1.31	23.4	3303
AVERAGE		26.3	N/A	35.4	74.6	965	4.83	190	1.34	28.8	3865
STANDARD DEVIATION		3.2	N/A	4.4	54.4	327	0.69	440	0.24	4.8	1922
COEFFICIENT OF VARIATION		12.2%	N/A	12.6%	72.9%	33.8%	14.3%	232.1%	18.2%	16.7%	49.7%

Analyses performed by ELS.

11-08-99	990747	29.6	<2.53	29.9	60.1	789	5.73	241	<2.53	37.0	3176
11-08-99	990748	30.9	<2.56	30.2	48.6	802	5.47	268	3.48	30.6	3302
11-09-99	990749	33.1	<2.43	31.5	53.4	1026	4.70	64.7	<2.43	48.6	3139
11-09-99	990750	24.0	<2.45	32.1	60.1	698	5.44	48.9	<2.45	34.6	2923
11-10-99	990751	25.2	<2.48	30.5	64.2	848	4.51	60.0	<2.48	40.4	3308
11-10-99	990752	25.8	<2.48	36.2	51.8	1425	5.30	43.7	<2.48	27.0	3383
11-11-99	990753	28.2	<2.42	31.2	45.7	928	5.12	38.1	<2.42	48.0	3042
11-11-99	990754	24.4	<2.41	33.3	49.3	876	7.45	43.1	<2.41	30.1	3416
11-12-99	990755	23.5	<2.45	27.5	50.0	700	6.22	39.5	<2.45	28.9	2743
11-12-99	990756	25.4	<2.43	38.8	42.4	920	6.85	171	<2.43	24.8	3815
AVERAGE		27.0	N/A	32.1	52.6	901	5.68	102	3.48	35.0	3225
STANDARD DEVIATION		3.1	N/A	3.1	6.6	200	0.88	85	0.00	8.0	281
COEFFICIENT OF VARIATION		11.5%	N/A	9.7%	12.5%	22.2%	15.4%	83.7%	0.0%	22.8%	8.7%

Analyses performed by ELS.

2000 ASH METAL ANALYSES
ALL RESULTS IN UG/G (ppm) - Wet Weight

SAMPLE COLLECTION DATE	LAB #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
05/08/00	2000-0243	38.8	<0.49	35.5	58.8	1053.0	7.0	101.4	1.2	32.9	3120.0
05/08/00	2000-0244	28.6	<0.50	34.9	63.8	708.1	5.4	58.2	1.2	25.1	3385.2
05/09/00	2000-0245	73.4	<0.50	38.6	65.9	1112.0	8.6	247.2	2.6	24.9	5576.0
05/09/00	2000-0246	25.2	<0.50	31.4	92.8	761.3	6.2	117.8	0.9	23.1	3681.6
05/10/00	2000-0247	30.7	<0.25	33.5	55.9	693.8	6.1	39.8	0.9	23.4	5844.3
05/10/00	2000-0248	26.3	<0.50	34.5	61.4	792.0	6.6	47.2	1.1	22.8	2944.0
05/11/00	2000-0249	53.8	<0.50	39.5	106.1	721.7	10.4	290.0	1.5	31.9	3078.0
05/11/00	2000-0250	33.9	<0.50	32.4	51.6	850.2	5.7	29.6	<0.50	30.9	3954.6
05/12/00	2000-0251	25.5	<0.49	28.7	55.5	673.9	7.6	282.0	1.3	26.4	3649.8
05/12/00	2000-0252	35.1	<0.50	38.7	67.4	757.5	6.8	42.3	1.4	26.0	3157.5
AVERAGE		37.1	NA	34.8	67.9	812	7.02	126	1.23	26.7	3839
STANDARD DEVIATION		14.6	NA	3.3	16.7	144	1.42	101	0.62	3.6	984
COEFFICIENT OF VARIATION		39.2%	NA	9.5%	24.6%	17.7%	20.2%	80.1%	50.5%	13.4%	25.6%

Analyses performed by ELS.

12/10/00	2000-0785	27.8	<0.51	28.1	42.2	1014.0	9.4	32.8	1.1	44.5	3127.8
12/11/00	2000-0786	15.8	<0.49	18.7	39.1	669.1	5.4	29.3	1.0	22.5	1903.5
12/11/00	2000-0787	23.1	<0.49	26.3	49.0	732.6	3.8	44.4	1.3	36.6	2656.6
12/12/00	2000-0788	21.1	<0.50	31.2	46.1	628.5	4.9	38.0	1.2	26.4	2956.5
12/12/00	2000-0789	14.3	<0.50	27.2	69.5	810.0	4.4	314.3	1.4	20.2	3630.0
12/13/00	2000-0790	14.9	<0.50	26.6	50.3	858.4	5.6	47.8	1.3	28.4	2634.4
12/13/00	2000-0791	14.5	<0.50	26.7	51.5	694.1	6.1	28.2	1.2	17.9	2190.4
12/14/00	2000-0792	21.1	<0.50	24.0	53.0	858.4	5.5	47.5	1.3	26.1	2205.2
12/14/00	2000-0793	19.1	<0.51	27.5	41.4	976.8	5.0	54.4	1.6	22.4	3414.4
12/15/00	2000-0794	21.0	<0.51	21.1	36.1	7528.0	4.3	26.1	1.3	20.7	2160.0
AVERAGE		19.3	NA	25.7	47.8	1477	5.44	66.3	1.26	26.6	2688
STANDARD DEVIATION		4.2	NA	3.4	9.0	2021	1.47	83.2	0.16	7.8	553
COEFFICIENT OF VARIATION		21.7%	NA	13.2%	18.8%	136.8%	27.0%	125.5%	12.6%	29.4%	20.6%

Analyses performed by ELS.

2001 ASH METAL ANALYSES
ALL RESULTS IN UG/G (ppm) - Wet Weight

SAMPLE COLLECTION DATE	LAB #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
03/19/01	01-0167	8.2	0.24	20.6	40.7	627.8	2.3	36.6	0.6	18.6	1941.8
03/19/01	01-0168	6.0	0.35	14.5	48.7	777.6	2.1	21.1	0.7	16.6	1764.0
03/20/01	01-0169	9.2	0.21	20.2	36.6	609.8	3.8	23.5	1.2	15.2	1672.5
03/20/01	01-0170	11.2	0.22	17.3	38.6	427.4	2.0	34.6	1.1	15.1	1686.3
03/21/01	01-0171	9.0	<0.10	17.7	25.9	352.7	3.2	24.8	1.0	11.8	1601.6
03/21/01	01-0172	7.7	0.25	19.6	33.6	419.0	4.1	26.8	1.2	19.7	4737.7
03/22/01	01-0173	10.9	0.24	29.0	61.5	522.2	3.3	67.2	0.8	22.0	1981.0
03/22/01	01-0174	6.7	0.30	18.0	36.5	413.9	3.8	51.5	1.0	21.8	1701.0
03/23/01	01-0175	8.6	<0.10	13.7	28.9	674.3	2.9	36.0	2.6	21.4	2010.0
03/23/01	01-0176	8.4	0.20	24.3	28.9	549.8	3.3	44.7	1.0	14.6	1990.6
AVERAGE		8.6	0.201	19.5	38.0	537.4	3.1	36.7	1.1	17.7	2108.7
STANDARD DEVIATION		1.5	0.1	4.3	10.0	128.7	0.7	13.7	0.5	3.4	888.3
COEFFICIENT OF VARIATION		18.0%	19.1%	22.0%	26.4%	24.0%	23.2%	37.4%	47.2%	19.0%	42.1%

Analyses performed by ELS.

12/10/01	01-0777	35.3	<0.5005	44.9	33.0	2895.2	5.9	40.0	2.9	29.0	3757.6
12/10/01	01-0778	18.5	<0.4928	25.9	30.5	517.4	6.0	21.3	1.5	24.8	2610.3
12/11/01	01-0779	20.7	<0.4968	42.5	45.6	864.0	6.7	35.6	2.0	22.3	3340.8
12/11/01	01-0780	21.8	<1.28	33.9	48.0	755.2	4.9	38.6	2.3	22.8	4032.0
12/12/01	01-0781	19.8	<0.5106	27.6	39.9	591.3	4.1	48.0	2.7	30.9	2812.0
12/12/01	01-0782	24.9	<0.5022	37.9	33.9	781.7	6.2	35.2	3.2	23.3	3677.4
12/13/01	01-0783	25.0	<0.504	40.5	30.7	652.0	5.3	32.6	2.2	26.8	3112.0
12/13/01	01-0784	24.1	<0.5175	35.0	33.7	1305.0	2.1	40.0	2.2	21.1	2925.0
12/14/01	01-0785	33.8	<0.5041	73.8	35.4	1178.6	1.9	27.3	2.9	28.7	3968.9
12/14/01	01-0786	13.7	<0.4964	24.1	43.4	1080.4	1.3	32.3	1.6	39.3	2233.8
AVERAGE		23.8	NA	38.6	37.4	1062.1	4.4	35.1	2.4	26.9	3247.0
STANDARD DEVIATION		6.3	NA	13.5	6.0	658.2	1.9	7.0	0.6	5.2	577.5
COEFFICIENT OF VARIATION		26.5%	NA	35.0%	16.1%	62.0%	42.2%	19.9%	23.5%	19.2%	17.8%

Analyses performed by ELS.

2002 ASH METAL ANALYSES
ALL RESULTS IN UG/G (ppm) - Wet Weight

SAMPLE COLLECTION DATE	LAB #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
05/06/02	02-0241	23.9	<0.4836	29.3	48.7	710.6	4.5	71.3	1.4	30.3	2581.8
05/06/02	02-0242	19.7	<0.4928	22.3	44.3	563.6	2.2	61.2	1.2	24.1	2795.1
05/07/02	02-0243	38.8	<0.5002	42.6	45.6	768.3	4.5	38.8	1.6	24.0	3526.0
05/07/02	02-0244	22.8	<0.5124	41.7	95.8	646.0	6.8	55.7	1.2	27.6	3368.4
05/08/02	02-0245	22.2	<0.5025	43.0	59.3	900.0	5.8	52.7	1.5	28.5	3825.0
05/08/02	02-0246	18.6	<0.5135	24.1	52.8	659.7	1.9	60.8	0.6	24.2	2449.0
05/09/02	02-0247	29.2	<0.4977	26.9	55.9	770.3	3.4	29.8	0.9	23.9	2180.4
05/09/02	02-0248	18.6	<0.4898	18.7	36.7	593.3	2.3	28.1	0.9	18.5	2061.9
05/10/02	02-0249	34.1	<0.4940	32.2	41.9	693.1	5.7	26.8	1.8	23.8	2781.6
05/10/02	02-0250	43.6	<0.5092	45.5	55.6	731.1	5.2	29.9	1.9	24.5	3792.4
AVERAGE		27.2	NA	32.6	53.6	703.6	4.2	45.5	1.3	24.9	2936.2
STANDARD DEVIATION		8.5	NA	9.3	15.5	92.3	1.6	15.8	0.4	3.1	616.5
COEFFICIENT OF VARIATION		31.1%	NA	28.6%	29.0%	13.1%	38.5%	34.7%	30.7%	12.3%	21.0%

Analyses performed by ELS.

12/02/02	02-0767	33.5	<1.005	43.2	45.7	982.5	4.5	42.6	1.8	34.0	4035.0
12/02/02	02-0768	16.6	<1.0184	24.6	35.6	716.7	4.1	66.2	<1.0184	29.0	2295.2
12/03/02	02-0769	23.2	<1.0164	24.3	30.7	890.4	9.1	26.5	1.1	29.5	2041.2
12/03/02	02-0770	16.8	<0.9860	26.6	32.6	590.2	6.0	22.9	<0.986	55.8	2638.4
12/04/02	02-0771	26.0	<0.4964	29.5	42.1	1649.8	4.7	36.1	1.5	22.7	2460.1
12/04/02	02-0772	23.2	<0.4968	31.3	33.5	1255.8	13.7	38.4	1.5	21.3	2187.3
12/05/02	02-0773	23.7	<0.5112	43.8	35.8	1605.6	8.8	39.2	2.0	23.5	3038.4
12/05/02	02-0774	22.3	<0.5256	31.8	38.9	1357.8	7.2	42.1	1.5	23.7	2438.2
12/06/02	02-0775	23.5	<0.5166	28.7	41.2	1082.4	7.0	32.2	1.1	25.7	2214.0
12/06/02	02-0776	15.7	<0.4914	15.7	35.4	251.2	2.6	28.3	1.0	23.0	1154.4
AVERAGE		22.4	NA	29.9	37.1	1038.2	6.8	37.4	1.1	28.8	2450.2
STANDARD DEVIATION		5.0	NA	8.1	4.5	423.8	3.0	11.5	0.6	9.7	699.2
COEFFICIENT OF VARIATION		22.3%	NA	26.9%	12.0%	40.8%	45.0%	30.7%	56.0%	33.8%	28.5%

Analyses performed by ELS.

2003 - 2004 ASH METAL ANALYSES
ALL RESULTS IN UG/G (ppm) - Wet Weight

SAMPLE COLLECTION DATE	LAB #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
06/02/03	15503164	15.1	<0.504	15.1	100.8	5460.0	1.3	226.8	<0.504	23.5	1428.0
06/02/03	15503165	22.8	<0.501	22.8	44.6	637.0	1.3	91.0	<0.501	26.4	13650.0
06/03/03	15503166	11.4	<0.502	14.1	20.2	1056.0	1.1	11.4	<0.502	10.6	1320.0
06/04/03	16103027	22.3	<0.501	25.4	30.8	700.7	2.5	100.1	<0.501	23.1	2926.0
06/04/03	16103028	16.2	<0.502	15.3	28.9	272.0	7.0	22.1	<0.502	11.9	1445.0
06/05/03	16103029	37.2	<0.502	33.4	47.1	661.2	3.9	35.7	<0.502	36.5	3876.0
06/05/03	16103030	28.1	<0.503	24.8	48.2	522.6	5.2	20.1	<0.503	20.8	2345.0
06/06/03	16103031	30.4	<0.504	30.4	43.2	600.0	3.4	40.0	<0.504	33.6	2800.0
06/06/03	16103032	34.2	<0.502	35.0	50.9	699.2	4.3	64.6	<0.502	21.3	5472.0
06/07/03	16103026	58.2	<0.500	31.2	53.3	680.6	3.7	76.3	<0.500	32.0	4674.0
AVERAGE		27.6	NA	24.7	46.8	1128.9	3.4	68.8	NA	24.0	3993.6
STANDARD DEVIATION		13.0	NA	7.4	20.7	1455.2	1.8	60.2	NA	8.1	3484.5
COEFFICIENT OF VARIATION		47.0%	NA	30.1%	44.2%	128.9%	52.9%	87.5%	NA	34.0%	87.3%

Analyses performed by Upstate Laboratories Inc.

06/14/04	E1540	32.1	<1.0152	26.2	44.8	829.1	3.0	39.8	0.8	27.1	3553.2
06/14/04	E1541	25.9	<0.9812	22.3	42.8	651.2	1.2	25.0	0.7	20.5	2586.8
06/15/04	E1542	38.2	<1.0188	28.0	66.2	1273.5	2.5	55.2	1.1	43.3	3226.2
06/15/04	E1543	43.4	<10.2	38.3	85.0	935.0	6.5	102.0	<5.015	<50.2	3400.0
06/16/04	E2029	33.0	<1.0164	38.1	52.5	931.7	5.0	52.5	1.3	30.5	3642.1
06/16/05	E2030	31.2	<1.014	37.4	45.2	1014.0	3.0	319.8	2.0	22.6	3978.0
06/17/05	E2031	26.0	<1.0068	32.7	56.2	662.8	3.6	36.9	1.3	25.2	3523.8
06/23/04	E2626	27.5	<0.9984	31.6	56.6	807.0	3.8	35.8	1.8	25.0	3244.8
06/25/04	E2627	45.8	<0.975	73.5	63.8	1425.0	5.6	82.5	1.7	25.5	5850.0
06/27/04	E2628	44.7	<0.9924	65.3	62.0	992.4	3.2	48.0	1.7	34.7	3721.5
AVERAGE		34.8	NA	39.4	57.5	952.2	3.8	79.7	1.2	25.4	3672.6
STANDARD DEVIATION		7.3	NA	15.9	12.0	233.1	1.5	83.0	0.6	10.6	806.8
COEFFICIENT OF VARIATION		21.1%	NA	40.5%	20.9%	24.5%	39.5%	104.1%	46.4%	41.5%	22.0%

Analyses performed by O' Brien & Gere Laboratories, Inc

12/23/04	F1433	15.0	<1.027	28.4	34.8	576.7	4.3	29.2	0.7	22.1	4029.0
12/23/04	F1434	17.3	<0.9802	35.4	49.0	1885.0	5.4	27.9	1.1	21.1	3468.4
12/27/04	F1513	23.7	<0.9647	38.6	43.9	1052.4	14.0	38.6	0.9	36.8	4034.2
12/27/04	F1514	20.2	<0.9672	28.2	47.6	660.9	7.3	104.8	1.5	24.2	4836.0
12/28/04	F1515	14.9	<0.9698	29.8	74.6	1119.0	4.6	33.6	0.7	32.8	3058.6
12/28/04	F1516	17.9	<1.0024	35.8	48.0	615.8	4.2	70.2	1.0	17.2	3150.4
12/29/04	F1517	19.0	<0.9888	33.8	39.6	824.0	3.5	28.8	1.0	33.8	3213.6
12/29/04	F1518	21.5	<1.0374	42.3	51.9	1436.4	4.5	46.3	1.3	28.7	3670.8
12/30/04	F1519	14.6	<0.9756	35.0	33.3	626.0	4.9	27.6	0.8	18.7	2926.8
12/30/04	F1520	18.6	<0.9684	34.7	51.6	637.5	3.4	45.2	1.4	22.6	3470.1
AVERAGE		18.3	NA	34.2	47.4	943.4	5.6	45.2	1.44	25.8	3585.8
STANDARD DEVIATION		2.8	NA	4.2	11.0	412.6	3.0	23.4	0.2	6.5	550.9
COEFFICIENT OF VARIATION		15.5%	NA	12.3%	23.2%	43.7%	53.4%	51.8%	17.1%	25.0%	15.4%

Analyses performed by O' Brien & Gere Laboratories, Inc

2005 ASH METAL ANALYSES
ALL RESULTS IN UG/G (ppm) - Wet Weight

SAMPLE COLLECTION DATE	LAB #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
05/16/05	0505100-001A	46.3	<0.9977	46.3	58.0	1542	3.6	39.0	1.4	47.2	5623
05/16/05	0505100-002A	45.0	<0.9648	39.4	59.5	1045	3.5	39.4	1.4	37.0	4904
05/17/05	0505100-003A	44.9	<0.9867	50.2	71.8	1704	3.9	82.5	1.5	29.6	5292
05/17/05	0505100-004A	61.5	<1.0104	63.2	69.9	2021	4.0	64.8	1.8	31.2	6399
05/18/05	0505131-001A	48.9	<0.9614	54.2	73.4	1311	4.1	81.3	1.6	34.1	5419
05/18/05	0505131-002A	37.9	<1.0104	52.2	60.6	1768	4.0	41.3	1.7	26.9	4968
05/19/05	0505131-003A	36.7	<0.9996	48.3	54.1	1166	4.1	40.8	1.2	29.2	4498
05/19/05	0505131-004A	47.7	<0.9708	55.0	57.4	1294	4.8	44.5	1.4	29.1	5663
05/20/05	0505131-005A	40.1	<0.9612	48.1	48.1	1282	0.6	48.9	0.9	37.6	4886
05/20/05	0505131-006A	42.6	<0.9636	61.8	112.4	1445	4.9	216.8	1.5	24.1	6103
AVERAGE		45.1	NA	51.9	66.5	1457.9	3.7	69.9	1.4	32.6	5376
STANDARD DEVIATION		6.7	NA	6.8	17.1	285.6	1.1	51.5	0.2	6.3	559
COEFFICIENT OF VARIATION		14.8%	NA	13.1%	25.7%	19.6%	30.2%	73.7%	16.6%	19.4%	10.4%

Analyses performed by Life Science Laboratories, Inc

SAMPLE COLLECTION DATE	LAB #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
12/12/05	0512118-001A	24.1	<0.9972	40.7	50.7	997	4.1	58.2	1.1	<99.72	6814
12/12/05	0512118-002A	18.3	<0.9932	28.3	45.8	1452	2.4	37.4	1.2	19.9	2903
12/13/05	0512118-003A	16.9	<1.0152	41.5	45.7	1184	3.3	195	0.7	31.3	3976
12/13/05	0512118-004A	20.9	<1.002	30.9	68.5	1086	<0.100	61.0	1.1	<50.1	3340
12/14/05	0603017-001A	13.6	<0.9789	27.1	39.9	1280	2.9	35.4	0.5	30.9	3313
12/14/05	0512118-006A	20.0	<0.9984	30.8	56.6	599	2.7	42.4	0.7	<49.92	3245
12/15/05	0512142-001A	13.5	<1.0309	23.8	38.9	492	1.7	79.3	0.8	<49.96	2775
12/15/05	0512142-002A	21.8	<0.9684	40.4	47.6	1049	4.4	29.9	1.1	27.4	3793
12/16/05	0512142-003A	18.6	<1.0024	29.4	48.0	859	3.4	35.8	1.4	<50.12	2936
12/16/05	0512142-004A	19.7	<0.9854	41.7	40.9	834	4.2	30.3	1.7	25.8	4321
AVERAGE		18.7	NA	33.4	48.3	983.2	3.2	60.4	1.0	27.0	3742
STANDARD DEVIATION		3.2	NA	6.5	8.4	281.1	0.8	47.2	0.3	4.2	1127
COEFFICIENT OF VARIATION		17.1%	NA	19.5%	17.4%	28.6%	25.0%	78.1%	32.3%	15.6%	30.1%

Analyses performed by Life Science Laboratories, Inc

2006 ASH METAL ANALYSES
ALL RESULTS IN UG/G (ppm) - Wet Weight

SAMPLE COLLECTION DATE	LAB #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
04/10/06	0604077-001A	40.8	<0.978	67.6	46.5	1467	2.0	35.9	1.47	27.7	5216
04/11/06	0604077-002A	47.5	<1.02	63.3	59.3	1345	6.0	36.4	1.11	24.5	4825
04/12/06	0604090-001A	27.9	<0.986	32.1	78.9	904	1.0	18.1	1.1	38.6	4274
04/13/06	0604090-002A	39.0	<0.995	50.6	42.3	995	3.3	69.6	1.58	45.6	4477
04/14/06	0604090-003A	40.5	<1.03	68.0	52.5	1292	8.5	38.7	1.21	25.8	4994
NA	NA										
NA	NA										
NA	NA										
NA	NA										
NA	NA										

AVERAGE	39.1	NA	56.3	55.9	1200.4	4.2	39.7	1.3	32.5	4757
STANDARD DEVIATION	6.3	NA	13.7	12.9	214.6	2.7	16.7	0.2	8.2	341
COEFFICIENT OF VARIATION	16.1%	NA	24.3%	23.0%	17.9%	65.8%	42.0%	15.6%	25.4%	7.2%

Analyses performed by Life Science Laboratories, Inc

SAMPLE COLLECTION DATE	LAB #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
08/07/06	0608136-001A	42.7	<1.01	39.4	38.5	838	2.8	117.3	1.01	28.5	3687
08/08/06	0608136-002A	41.3	<0.972	43.7	41.3	1133	4.0	35.6	1.21	27.5	4288
08/09/06	0608136-003A	22.0	<0.984	25.7	28.8	477	3.0	22.7	0.72	25.0	2271
08/10/06	0608136-004A	33.3	<1.00	40.0	47.5	1583	2.4	108.3	1.00	37.5	3332
08/11/06	0608136-005A	28.2	<0.968	33.9	57.3	888	1.0	36.3	0.61	48.4	3389
08/14/06	0608136-006A	35.0	<1.03	35.0	54.9	795	2.4	67.6	0.95	42.9	3101
08/15/06	0608136-007A	28.9	<0.965	26.3	68.4	509	0.3	149.1	0.59	78.9	2806
08/16/06	0608136-008A	23.3	<0.962	24.9	28.9	553	<0.096	44.9	0.54	30.5	3449
08/17/06	0608136-009A	27.9	<0.960	35.8	48.0	960	<0.096	37.5	0.66	34.9	6635
08/18/06	0608136-010A	21.8	<0.970	26.7	46.1	2262	2.1	63.0	0.65	36.4	2747

AVERAGE	30.4	NA	33.1	46.0	999.8	3.2	68.2	0.8	27.0	3570
STANDARD DEVIATION	7.1	NA	6.5	11.8	524.2	0.8	40.3	0.2	4.2	1149
COEFFICIENT OF VARIATION	23.4%	NA	19.6%	25.6%	52.4%	25.0%	59.0%	27.5%	15.6%	32.2%

Analyses performed by Life Science Laboratories, Inc

2007 ASH METAL ANALYSES
ALL RESULTS IN UG/G (ppm) - Wet Weight

SAMPLE COLLECTION DATE	LAB #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
04/23/07	0704181-001A	33.2	<0.996	42.3	51.5	1079	7.4	65.6	<0.996	27.4	3901
04/23/07	0704181-002A	30.5	<1.0152	54.1	43.1	1100	4.5	39.8	<1.0152	16.9	4315
04/24/07	0704181-003A	32.6	<1.0032	58.5	49.3	1338	6.0	37.6	<1.0032	21.7	11704
04/24/07	0704181-004A	40.8	<0.9646	89.0	54.9	1336	5.0	39.3	1.558	17.8	6233
04/25/07	0704181-005A	45.0	<1.015	94.3	54.4	1450	6.9	44.2	1.667	17.4	6018
04/25/07	0704181-006A	36.2	<1.0244	62.3	63.8	1340	3.6	62.3	<1.0244	21.3	4728
04/26/07	0704186-001A	40.8	<0.9997	100	47.7	1615	5.9	56.1	1.307	17.7	6537
04/26/07	0704186-002A	34.4	<0.9945	66.6	65.8	1301	3.7	133.1	0.995	19.9	5508
04/27/07	0704186-003A	34.1	<1.0088	59.8	201.8	1009	7.1	85.4	<1.0088	34.9	4501
04/27/07	0704186-004A	33.1	<0.9684	42.8	75.1	968	3.7	145.3	<0.9684	29.1	3874
AVERAGE		36.1	NA	67.0	70.7	1253	5.4	70.9	1.4	22.4	5732
STANDARD DEVIATION		4.4	NA	19.6	44.6	197	1.4	37.0	0.3	5.8	2192
COEFFICIENT OF VARIATION		12.1%	NA	29.2%	63.1%	15.7%	25.8%	52.3%	18.7%	25.7%	38.2%

Analyses performed by Life Science Laboratories, Inc

SAMPLE COLLECTION DATE	LAB #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
08/09/07	0708082-001A	38.9	<0.972	38.9	52.7	2187	3.5	56.7	1.46	39.7	3240
08/10/07	0708082-002A	39.3	<1.0032	30.1	275.9	828	2.4	242	2.17	41.0	3344
08/14/07	0708121-001A	36.7	<1.002	45.9	43.4	919	4.3	91.9	1.67	30.9	3925
08/14/07	0708121-002A	36.0	<0.96	45.6	55.2	1120	5.1	40.8	2.16	36.8	4160
08/15/07	0708121-003A	31.7	<0.9768	32.6	154.7	2035	2.4	130.2	1.79	34.2	3337
08/15/07	0708121-004A	50.7	<1.014	85.8	38.2	140	6.4	28.9	1.79	25.7	5694
08/16/07	0708121-005A	46.4	<5.031	54.2	44.1	759	5.6	92.9	<5.031	<24.768	4102
08/16/07	0708121-006A	63.5	<1.0332	88.6	36.2	2509	8.9	26.6	1.99	22.9	6494
08/17/07	0708121-007A	37.9	<1.0257	46.6	41.8	1026	4.6	31.6	1.81	32.3	4655
08/17/07	0708121-008A	49.4	<1.0005	52.7	35.4	934	4.9	23.3	1.47	19.3	4402
AVERAGE		43.0	NA	52.1	77.7	1246	3.2	76.5	1.8	27.0	4335
STANDARD DEVIATION		9.0	NA	19.0	74.2	708	0.8	65.0	0.2	4.2	1002
COEFFICIENT OF VARIATION		20.8%	NA	36.5%	95.4%	56.8%	25.0%	84.9%	13.6%	15.6%	23.1%

Analyses performed by Life Science Laboratories, Inc

2008 ASH METAL ANALYSES
ALL RESULTS IN UG/G (ppm) - Wet Weight

SAMPLE COLLECTION DATE	LAB #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
04/25/08	0805009-001A	56.4	<1.0036	131.2	46.3	1775.6	10.0	26.2	1.2	27.0	7642.8
04/28/08	0805009-002A	76.3	<1.0068	83.9	42.0	1342.4	5.5	52.0	1.5	21.8	6040.8
04/29/08	0805009-003A	43.5	<0.966	37.8	58.0	885.5	2.4	161.0	<1.2	35.4	3783.5
04/29/08	0805009-004A	71.3	<1.0192	87.4	61.9	1674.4	7.1	56.8	1.4	27.7	5896.8
04/30/08	0805021-001A	37.8	<1.0244	48.1	69.3	1024.4	2.9	65.4	<1.3	38.6	3861.2
04/30/09	0805021-002A	60.6	<0.9841	83.3	83.3	1135.5	9.1	27.3	1.5	24.2	5904.6
05/01/08	0805021-003A	38.6	<0.9864	42.7	56.7	813.8	2.5	33.7	<1.2	36.2	3945.6
05/01/08	0805021-004A	71.8	<0.9828	98.3	43.8	1512.0	7.1	24.9	2.0	18.9	7560.0
05/02/08	0805021-005A	30.7	<0.9684	36.3	58.1	677.9	2.8	37.9	<1.2	31.5	5326.2
05/02/08	0805021-006A	56.6	<1.0218	69.2	52.7	1179.0	4.9	36.2	1.3	41.7	6523.8
AVERAGE		54.4	NA	71.8	57.2	1202	5.4	52.1	1.5	30.3	5649
STANDARD DEVIATION		15.2	NA	29.3	11.8	351	2.7	38.6	0.7	7.2	1355
COEFFICIENT OF VARIATION		28.0%	NA	40.8%	20.7%	29.2%	49.0%	74.0%	16.8%	23.7%	24.0%

Analyses performed by Life Science Laboratories, Inc

SAMPLE COLLECTION DATE	LAB #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
12/19/08	0812217-001A	23.7	<1.0066	48.9	65.4	1006.6	7.9	42.4	1.1	20.1	4242.1
12/19/08	0812217-002A	20.5	<1.0231	50.4	55.1	1495.3	6.1	60.6	1.2	18.1	3777.6
12/20/08	0812217-003A	25.7	<1.029	58.8	28.7	808.5	6.1	52.9	1.5	17.6	4851.0
12/22/08	0812217-004A	25.3	<0.9792	23.7	62.0	546.7	4.8	39.2	<0.9792	49.8	2366.4
12/23/08	0812217-005A	<20.331	<20.331	45.2	143.1	753.0	10.5	143.1	<20.331	42.9	3087.3
12/23/08	0812217-006A	20.4	<0.9828	25.7	42.3	831.6	3.1	34.0	<0.9828	24.2	2268.0
12/24/08	0812217-007A	18.0	<0.9776	32.3	112.8	511.4	4.9	195.5	1.2	34.6	3008.0
12/29/08	0901008-001A	38.3	<0.975	66.8	43.5	2700.0	5.6	28.5	1.3	18.0	4800.0
12/30/08	0901008-002A	17.9	<0.9685	48.4	41.0	1192.0	5.6	24.6	1.1	13.4	3650.5
12/30/08	0901008-003A	14.4	<0.988	36.5	44.1	912.0	3.6	38.8	<0.988	22.8	2812.0
AVERAGE		22.7	NA	43.7	63.8	1076	5.8	66.0	1.2	26.2	3486
STANDARD DEVIATION		6.5	NA	13.3	34.3	608	2.0	53.9	0.2	11.5	886
COEFFICIENT OF VARIATION		28.7%	NA	30.4%	53.8%	56.5%	34.7%	81.8%	12.3%	44.1%	25.4%

Analyses performed by Life Science Laboratories, Inc

2009 ASH METAL ANALYSES
ALL RESULTS IN UG/G (ppm) - Wet Weight

Sample Collection Date	Lab #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
5/11/2009	0905077-001A	38.8	<1.0	32.9	69.2	1012.8	2.6	50.6	1.1	41.4	3798
5/11/2009	0905077-002A	48.4	<1.0	60.0	72.3	999.7	2.9	35.4	3.8	32.3	4537.1
5/12/2009	0905077-003A	64.2	<1.0	70.6	58.5	1203.0	3.4	27.3	5.1	36.1	5453.6
5/12/2009	0905077-004A	80.6	<1.0	80.6	61.3	3707.6	5.6	96.7	5.3	26.6	6931.6
5/13/2009	0905106-001A	51.2	<1.0	56.2	62.8	1156.4	3.7	65.3	2.5	38.0	4790.8
5/13/2009	0905106-002A	39.7	<1.0	33.2	137.7	972.0	1.9	170.1	1.1	55.1	4131
5/14/2009	0905106-003A	45.4	<1.0	57.0	50.8	1463.0	4.4	54.7	2.0	29.3	7700
5/14/2009	0905106-004A	39.4	<1.0	41.1	53.4	985.2	2.7	55.0	1.7	34.5	4269.2
5/15/2009	0905106-005A	37.3	<1.0	51.1	57.6	1703.1	3.2	51.9	1.2	31.6	4217.2
5/15/2009	905106-006A	35.6	<1.0	34.7	59.5	769.1	1.8	78.6	<1.0	39.7	4217.7
Average		48.1	NA	51.7	68.3	1397.2	3.2	68.6	2.7	36.4	5004.6
Standard Deviation		14.3	NA	16.3	26.2	855.2	1.1	40.8	1.7	8.0	1309.9
Coefficient of variation		29.7%	NA	31.6%	36.9%	61.2%	34.8%	59.5%	63.1%	22.0%	26.2%

Sample Collection Date	Lab #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
10/16/2009	0910091-006A	29	<1.0	44	58	620	3.2	48	2	26	26000
10/10/19/09	0910091-007A	50	<1.0	86	38	1500	5.7	23	1.1	27	6300
10/20/2009	0910091-008A	35	<1.0	51	37	710	4.1	29	<1.0	23	4200
10/20/2009	0910091-009A	50	<1.0	88	41	1300	7.4	45	1.2	21	6100
10/21/2009	0910113-008A	46	<1.0	74	48	1300	2.6	32	1.1	36	5600
10/21/2009	0910113-009A	45	<1.0	87	36	1100	2.8	23	1.2	25	6200
10/22/2009	0910113-010A	29	<1.0	43	37	680	7.9	24	<1.0	30	3900
10/22/2009	0910113-011A	30	<1.0	64	78	900	3.8	55	2.5	26	5100
10/23/2009	0910113-012A	33	<1.0	77	43	1000	8.9	40	2.6	18	6000
10/24/2009	0910113-013A	40	<1.0	100	35	1400	7.9	32	2.7	15	7700
Average		38.7	NA	71.4	45.1	1051	5.43	35.1	1.8	24.7	7710
Standard Deviation		8.6	NA	20.0	13.5	318.8	2.4	11.3	0.7	6.0	6518.4
Coefficient of variation		22.1%	NA	28.1%	30.0%	30.3%	44.5%	32.3%	40.3%	24.1%	84.50%

Analysis performed by Life Science Laboratories, Inc.

2010 ASH METAL ANALYSES
ALL RESULTS IN UG/G (ppm) - Wet Weight

Sample Collection Date	Lab #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
5/24/2010	1006054-013A	45.0	<1.0	63.0	55.0	1000.0	3.4	47.0	1.8	38.0	5200
5/25/2010	1006054-014A	34.0	<1.0	44.0	48.0	660.0	2.5	44.0	1.1	35.0	3800
5/25/2010	1006054-015A	43.0	<1.0	72.0	47.0	1000.0	4.1	31.0	1.6	21.0	6300
5/26/2010	1006054-016A	24.0	<1.0	36.0	35.0	820.0	2.4	26.0	<1.0	28.0	3400
5/26/2010	1006054-017A	30.0	<1.0	49.0	46.0	1500.0	3.3	43.0	<1.0	35.0	4300
5/27/2010	1006054-018A	27.0	<1.0	39.0	40.0	530.0	4.5	57.0	<1.0	27.0	3000
5/27/2010	1006054-019A	34.0	<1.0	54.7	53.0	1100.0	5.8	38.0	1.3	28.0	4200
5/28/2010	1006054-020A	32.0	<1.0	32.0	57.0	560.0	3.5	27.0	<1.0	54.0	3300
5/28/2010	1006054-021A	37.0	<1.0	45.0	56.0	720.0	3.3	46.0	<1.0	33.0	4300
5/29/2010	1006054-022A	54.0	<1.0	46.0	56.0	800.0	5.3	28.0	<1.0	34.0	4100
Average		36.0	NA	48.1	49.3	869.0	3.8	38.7	1.5	33.3	4190.0
Standard Deviation		9.1	NA	12.3	7.5	292.4	1.1	10.4	0.3	8.8	971.2
Coefficient of variation		25.2%	NA	25.5%	15.2%	33.6%	29.3%	26.9%	21.4%	26.6%	23.2%

Sample Collection Date	Lab #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
9/27/2010	1010020-013A	64	<1.0	66	67	990	4.6	160	3.9	26	5200
9/28/2010	1010020-014A	30	<0.94	73	82	660	2.6	36	1.7	39	4100
9/28/2010	1010020-015A	26	<0.94	70	33	870	6.6	26	1.1	21	4400
9/29/2010	1010020-016A	30	<1.0	55	52	840	4.1	74	1.3	31	4800
9/29/2010	1010020-017A	49	<0.98	71	48	990	6.8	32	1.9	34	5500
9/30/2010	1010020-018A	38	<0.96	72	55	1200	3.8	49	2.3	25	5100
9/30/2010	1010020-019A	45	<1.0	110	37	1300	2.5	40	2.2	22	6600
10/1/2010	1010020-020A	21	<0.94	33	69	1300	2.4	60	1.1	49	3100
10/1/2010	1010020-021A	27	<1.0	38	58	820	1.6	56	1.4	46	3700
10/2/2010	1010020-022A	26	<1.0	54	59	1100	3.9	32	1.7	32	4100
Average		35.6	NA	64.2	56	1007	3.89	56.5	1.86	32.5	4660
Standard Deviation		13.4	NA	21.5	14.7	216.1	1.7	39.3	0.8	9.7	1001.3
Coefficient of variation		37.6%	NA	33.5%	26.3%	21.5%	44.9%	69.6%	44.6%	29.8%	21.5%

Analysis performed by Life Science Laboratories, Inc.

2011 ASH METAL ANALYSIS
ALL RESULTS IN UG/G (ppm) - Wet Weight

Sample Collection Date	Lab #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
6/7/2011	K1106170-013A	51.0	0.4	56.0	57.0	1400.0	3.1	29.0	1.8	35.0	4800
6/7/2011	K1106170-014A	46.0	0.3	76.0	49.0	1000.0	5.5	23.0	1.7	27.0	5200
6/8/2011	K1106170-015A	45.0	0.4	53.0	56.0	850.0	2.5	65.0	1.7	32.0	4900
6/8/2011	K1106170-016A	52.0	0.3	81.0	59.0	1700.0	7.0	34.0	1.5	29.0	5600
6/9/2011	K1106170-017A	39.0	0.3	61.0	50.0	1100.0	3.6	50.0	1.6	29.0	5200
6/9/2011	K1106170-018A	41.0	0.4	61.0	46.0	710.0	4.0	32.0	2.3	30.0	5100
6/10/2011	K1106170-019A	22.0	0.6	31.0	57.0	500.0	6.4	32.0	3.1	33.0	3300
6/10/2011	K1106170-020A	34.0	0.4	52.0	52.0	980.0	3.3	40.0	1.9	34.0	4300
6/11/2011	K1106170-021A	29.0	0.5	37.0	53.0	600.0	4.8	36.0	1.4	44.0	5000
6/11/2011	K1106170-022A	35.0	0.4	54.0	51.0	920.0	4.2	32.0	1.2	30.0	5000
Average		39.4	0.4	56.2	53.0	996.0	4.4	37.3	1.9	32.3	4840.0
Standard Deviation		9.6	0.1	15.2	4.2	343.7	1.5	12.0	0.5	4.8	634.6
Coefficient of variation		24.4%	19.4%	27.1%	7.9%	34.5%	33.1%	32.3%	27.7%	14.9%	13.1%

Sample Collection Date	Lab #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
10/18/2011	K1110337-013A	34	0.28	64	44	870	3.9	33	1.4	32	6600
10/18/2011	K1110337-014A	33	0.33	240	95	1600	4.5	28	1.3	35	4400
10/19/2011	K1110337-015A	32	0.39	46	58	830	2.3	50	1.4	33	3900
10/19/2011	K1110337-016A	36	0.41	58	61	880	4.3	38	2	36	5000
10/20/2011	K1110337-017A	39	0.34	92	59	1100	13	42	1.9	28	6900
10/20/2011	K1110337-018A	29	0.32	72	54	1000	11	34	1.6	32	5300
10/21/2011	K1110337-019A	28	0.33	62	52	890	5.4	29	4.1	28	6300
10/21/2011	K1110337-020A	35	0.41	88	48	1500	7	26	2.7	30	5800
10/26/2011	K1110337-021A	26	0.52	35	59	690	3.2	45	1.3	33	4000
10/26/2011	K1110337-022A	43	0.27	75	41	960	3.7	28	1.8	32	5400
Average		33.5	0.36	83.2	57.1	1032	5.83	35.3	1.95	31.9	5360
Standard Deviation		5.1	0.1	57.8	14.9	294.3	3.5	8.2	0.9	2.6	1055.4
Coefficient of variation		15.4%	20.7%	69.4%	26.2%	28.5%	60.4%	23.2%	44.5%	8.3%	19.7%

Analysis performed by Life Science Laboratories, Inc.

2012 ASH METAL ANALYSES
ALL RESULTS IN UG/G (ppm) - Wet Weight

Sample Collection Date	Lab #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
6/12/2012	K1206354-001A	93	0.43	53	83	600	3	73	1.2	29	3800
6/12/2012	K1206354-002A	70	0.42	50	61	620	5	27	0.58	31	3400
6/13/2012	K1206354-003A	82	0.45	60	76	1100	3.5	35	0.92	26	4000
6/13/2012	K1206354-004A	60	0.44	45	66	420	2.5	42	0.84	29	3400
6/20/2012	K1206354-005A	42	1	29	43	830	1.8	37	0.71	26	2800
6/14/2012	K1206354-006A	53	0.38	59	53	1200	4.7	23	1.6	25	3600
6/15/2012	K1206354-007A	46	0.59	27	77	2000	2.5	53	0.87	45	3400
6/12/2012	K1206354-008A	66	0.37	55	57	400	4.8	27	1.6	32	4700
6/19/2012	K1206354	75	0.39	56	56	1300	3.2	25	1.4	28	4800
6/19/2012	K1206354-010A	68	0.42	45	180	1200	2.6	76	1	26	7400

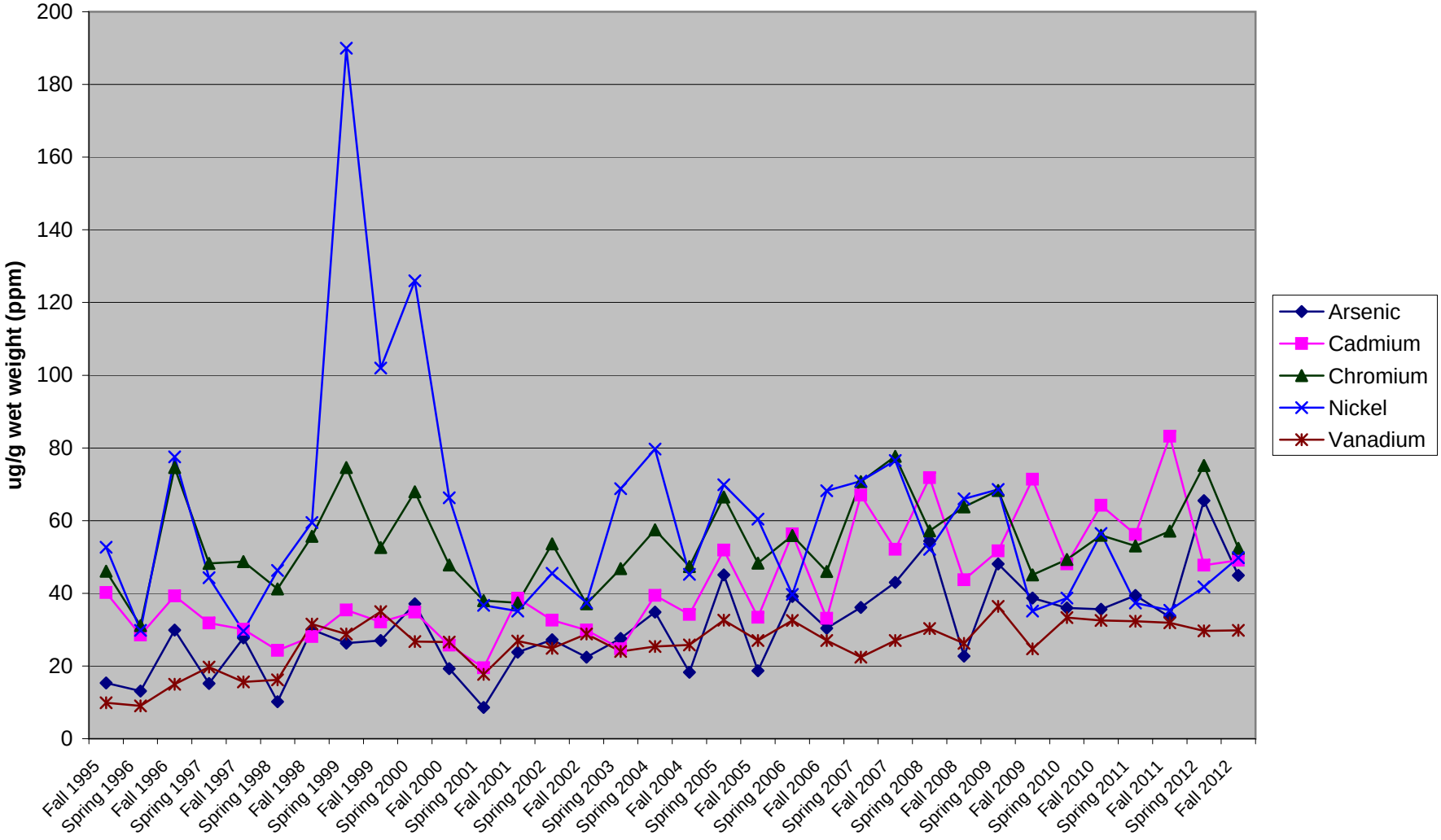
Average	65.5	0.5	47.9	75.2	967.0	3.4	41.8	1.1	29.7	4130.0
Standard Deviation	15.9	0.2	11.7	38.8	494.3	1.1	19.5	0.4	5.9	1301.3
Coefficient of variation	24.2%	38.8%	24.4%	51.6%	51.1%	33.2%	46.6%	33.7%	19.7%	31.5%

Sample Collection Date	Lab #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
9/25/2012	K1210235-001A	65	0.38	48	50	1000	2.4	45	0.64	28	5,000
9/26/2012	K1210235-002A	30	0.36	28	47	490	1.9	37	2.7	25	2900
9/27/2012	K1210235-003A	39	0.4	34	46	480	1.6	68	0.5	38	3400
10/2/2012	K1210235-004A	41	0.39	58	52	1500	4.2	29	0.5	30	5000
10/2/2012	K1210235-005A	41	0.34	54	49	660	2.7	29	1.4	23	6400
10/3/2012	K1210235-006A	44	0.4	61	48	1200	4.4	28	1.1	26	4800
10/4/2012	K1210235-007A	48	0.51	64	74	1100	3.7	82	0.65	34	5100
10/5/2012	K1210235-008A	43	0.4	48	52	1000	1.4	95	0.59	30	17000
10/5/2012	K1210235-009A	65	0.39	62	53	1100	6.4	52	1.2	34	5200
10/6/2012	K1210235-010A	33	0.35	34	53	470	4	33	0.5	30	3200

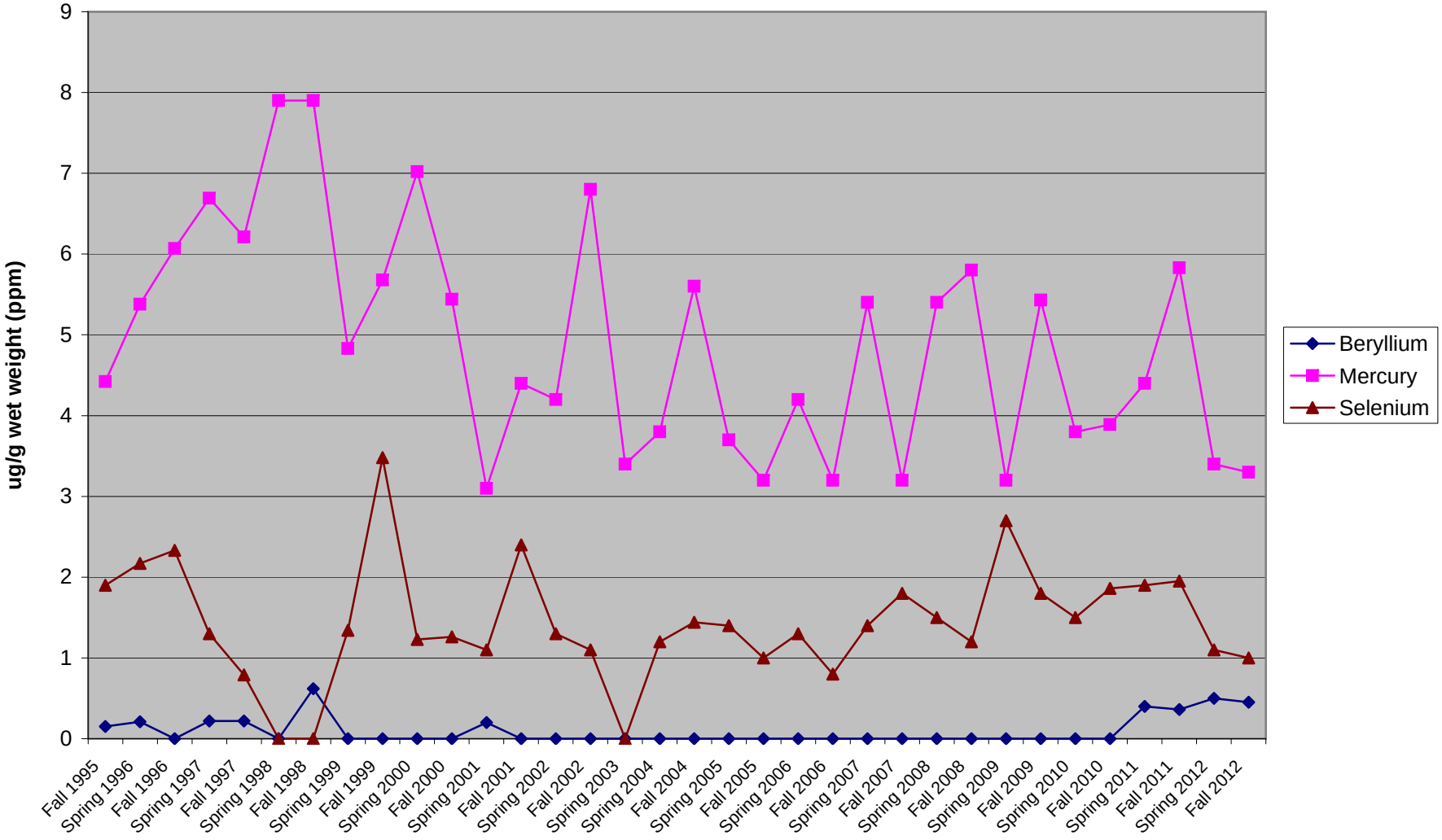
Average	44.9	0.45	49.1	52.4	900	3.27	49.8	1.0	29.8	5800
Standard Deviation	11.8	0.0	13.1	8.0	355.4	1.6	24.1	0.7	4.6	4080.6
Coefficient of variation	26.3%	10.4%	26.6%	15.2%	39.5%	47.7%	48.4%	70.4%	15.4%	70.4%

Analysis performed by Life Science Laboratories, Inc.

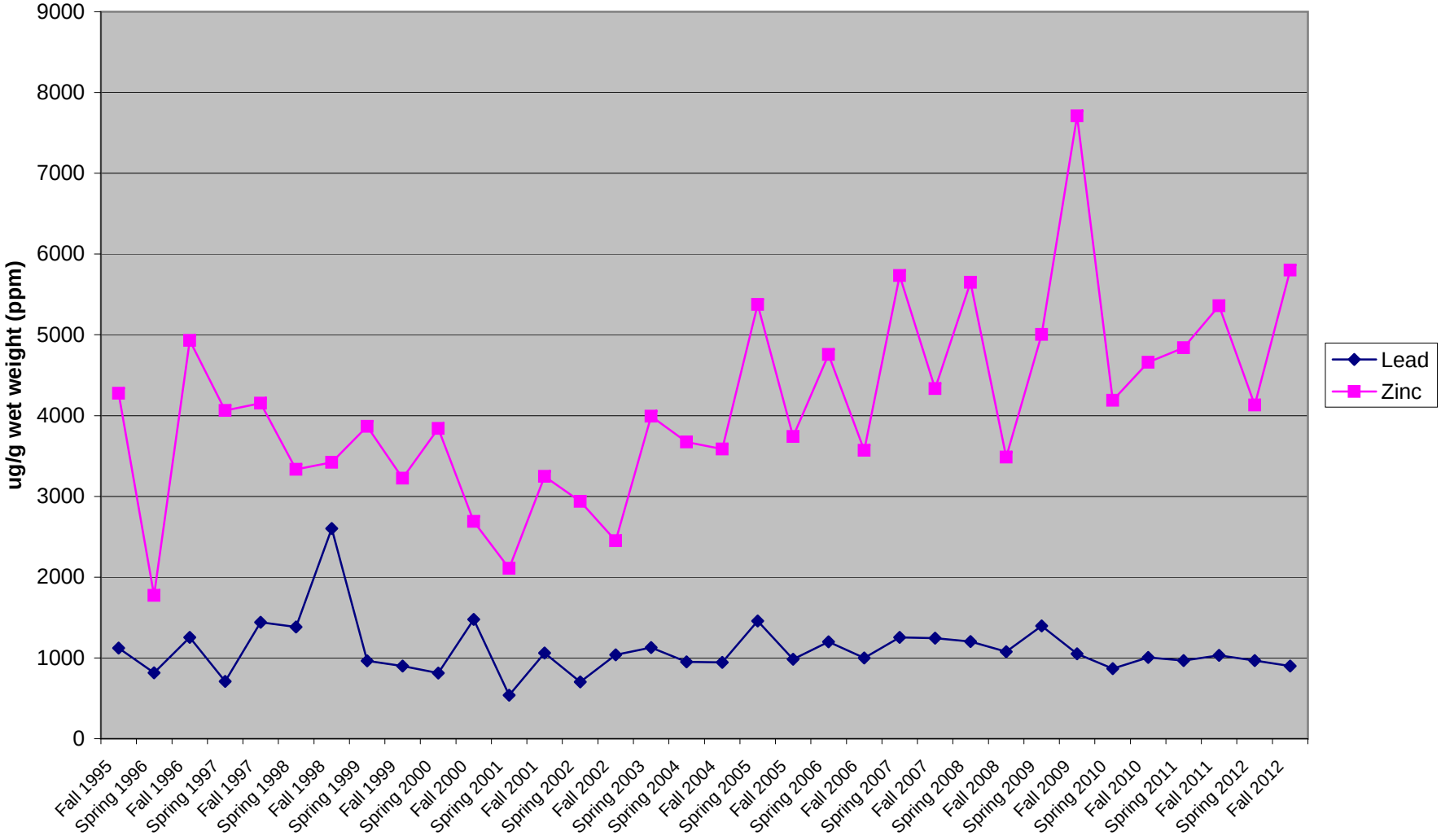
VI.A. Mean Values Ash Data
Wet Weight



VI.B. Mean Values Ash Data
Wet Weight



VI.C. Mean Values Ash Data
Wet Weight



VII.

1998 ASH METAL ANALYSIS
ALL RESULTS IN UG/G (ppm) - Dry Weight

SAMPLE COLLECTION DATE	LAB #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
10/26/98	980808	34.2	0.92	30.6	54.8	979	7.99	57.3	<1.14	37.9	4090
10/26/98	980809	29.9	0.66	33.4	59.6	982	8.10	52.7	<1.27	40.0	4970
10/27/98	980810	46.8	0.96	36.4	180	1840	8.96	259	<3.21	47.0	4630
10/27/98	980811	31.6	0.83	39.9	61.6	18500	8.60	50.2	<1.23	32.9	5030
10/28/98	980812	42.7	0.84	39.7	55.4	1980	10.4	42.5	<1.27	39.9	4300
10/28/98	980813	36.2	0.70	46.2	83.1	1880	11.4	97.3	<1.53	47.8	5720
10/29/98	980814	49.8	0.85	43.7	82.2	1310	12.1	71.1	<1.31	42.1	1880
10/29/98	980815	41.4	0.92	40.5	59.8	3510	18.7	22.6	<1.31	35.1	5050
10/30/98	980816	36.8	0.65	28.2	45.8	914	9.04	50.7	<3.10	51.4	3840
10/30/98	980817	39.2	0.65	28.3	44.3	1410	7.87	74.4	<1.28	35.1	4990
AVERAGE		38.9	0.80	36.7	72.7	3331	10.3	77.8	N/A	40.9	4450
STANDARD DEVIATION		6.1	0.12	6.0	37.8	5108	3.1	63.3	N/A	5.8	1002
COEFFICIENT OF VARIATION		15.7%	14.7%	16.4%	52%	153.4%	30.2%	81%	N/A	14.2%	22.5%

Analyses performed by ELS.

1999 ASH METAL ANALYSES
ALL RESULTS IN UG/G (ppm) - Dry Weight

SAMPLE COLLECTION DATE	LAB #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
04-19-99	990215	38.0	<0.62	36.8	62.6	950	5.70	91.2	1.60	38.6	3580
04-19-99	990216	25.5	<0.56	36.8	128.0	2090	4.30	38.1	1.30	41.0	10700
04-20-99	990217	34.6	<0.66	39.1	62.6	970	5.10	82.8	1.70	43.0	3640
04-20-99	990218	26.0	<0.61	42.7	61.3	815	7.00	39.8	1.70	25.0	3650
04-21-99	990219	36.2	<0.63	45.8	65.0	1120	7.30	1910.0	1.90	35.0	4890
04-21-99	990220	39.0	<0.65	58.2	299.0	1090	6.90	57.9	2.30	42.5	5010
04-22-99	990221	29.7	<0.61	43.6	54.9	1270	5.10	48.2	1.10	38.9	3600
04-22-99	990222	37.2	<0.68	54.0	80.5	1560	7.00	42.7	1.60	32.8	4670
04-23-99	990223	37.7	<0.62	50.2	64.5	1060	6.00	36.6	2.10	37.5	4200
04-23-99	990224	31.1	<0.64	43.6	68.9	1220	7.20	55.9	1.70	30.4	4290
AVERAGE		33.5	N/A	45.1	94.7	1215	6.16	240	1.70	36.5	4823
STANDARD DEVIATION		4.8	N/A	6.8	70.9	350	1.01	557	0.33	5.4	2027
COEFFICIENT OF VARIATION		14.3%	N/A	15.1%	74.8%	28.8%	16.5%	231.7%	19.5%	14.9%	42.0%

Analyses performed by ELS.

11-08-99	990747	37.5	<3.2	37.9	76.1	999	7.25	305.0	<3.2	46.8	4020
11-08-99	990748	43.5	<3.6	42.6	68.5	1130	7.71	378.0	4.90	43.1	4650
11-09-99	990749	43.5	<3.2	41.4	70.2	1350	6.18	85.1	<3.2	63.9	4130
11-09-99	990750	30.4	<3.1	40.6	76.1	883	6.88	61.9	<3.1	43.8	3700
11-10-99	990751	33.6	<3.3	40.7	85.6	1130	6.01	80.0	<3.3	53.8	4410
11-10-99	990752	34.4	<3.3	48.3	69.0	1900	7.06	58.2	<3.3	36.0	4510
11-11-99	990753	36.2	<3.1	40.0	58.6	1190	6.57	48.9	<3.1	61.6	3900
11-11-99	990754	33.4	<3.3	45.6	67.6	1200	10.20	59.0	<3.3	41.2	4680
11-12-99	990755	32.6	<3.4	38.2	69.4	972	8.64	54.8	<3.4	40.1	3810
11-12-99	990756	33.4	<3.2	51.1	55.8	1210	9.01	225.0	<3.2	32.6	5020
AVERAGE		35.9	N/A	42.6	69.7	1196	7.55	136	4.90	46.3	4283
STANDARD DEVIATION		4.2	N/A	4.1	8.1	267	1.28	115	0.00	9.9	413
COEFFICIENT OF VARIATION		11.8%	N/A	9.7%	11.6%	22.4%	16.9%	84.9%	0.0%	21.3%	9.6%

Analyses performed by ELS.

2000 ASH METAL ANALYSES
ALL RESULTS IN UG/G (ppm) - Dry Weight

SAMPLE COLLECTION DATE	LAB #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
05/08/00	2000-0243	49.7	<0.63	45.5	75.4	1350	9.00	130.0	1.50	42.2	4000
05/08/00	2000-0244	34.1	<0.60	41.5	75.9	843	6.40	69.3	1.40	29.9	4030
05/09/00	2000-0245	91.8	<0.63	48.3	82.4	1390	10.70	309.0	3.30	31.1	6970
05/09/00	2000-0246	32.3	<0.65	40.3	119.0	976	8.00	151.0	1.20	29.6	4720
05/10/00	2000-0247	39.9	<0.33	43.5	72.6	901	7.90	51.7	1.20	30.4	7590
05/10/00	2000-0248	32.9	<0.62	43.1	76.8	990	8.20	59.0	1.40	28.5	3680
05/11/00	2000-0249	66.4	<0.62	48.8	131.0	891	12.80	358.0	1.90	39.4	3800
05/11/00	2000-0250	43.4	<0.64	41.6	66.2	1090	7.30	38.0	<0.64	39.6	5070
05/12/00	2000-0251	32.3	<0.62	36.3	70.3	853	9.60	357.0	1.70	33.4	4620
05/12/00	2000-0252	46.8	<0.67	51.6	89.8	1010	9.00	56.4	1.90	34.7	4210
AVERAGE		47.0	NA	44.1	85.9	1029	8.89	158	1.55	33.9	4869
STANDARD DEVIATION		18.0	NA	4.3	20.6	185	1.73	125	0.78	4.7	1280
COEFFICIENT OF VARIATION		38.4%	NA	9.8%	24.0%	18.0%	19.5%	79.3%	50.1%	13.7%	26.3%

Analyses performed by ELS.

12/10/00	2000-0785	35.6	<0.65	36.0	54.1	1300	12.00	42.0	1.40	57.0	4010
12/11/00	2000-0786	19.5	<0.61	23.1	48.3	826	6.71	36.2	1.20	27.8	2350
12/11/00	2000-0787	31.2	<0.66	35.5	66.2	990	5.09	60.0	1.80	49.5	3590
12/12/00	2000-0788	28.9	<0.68	42.7	63.1	861	6.72	52.1	1.60	36.1	4050
12/12/00	2000-0789	19.1	<0.67	36.2	92.6	1080	5.84	419.0	1.80	26.9	4840
12/13/00	2000-0790	20.2	<0.68	35.9	68.0	1160	7.50	64.6	1.80	38.4	3560
12/13/00	2000-0791	19.6	<0.67	36.1	69.6	938	8.31	38.1	1.60	24.2	2960
12/14/00	2000-0792	28.5	<0.68	32.4	71.6	1160	7.44	64.2	1.80	35.3	2980
12/14/00	2000-0793	21.7	<0.58	31.3	47.1	1110	5.70	61.8	1.80	25.4	3880
12/15/00	2000-0794	26.2	<0.64	26.4	45.1	9410	5.37	32.6	1.60	25.9	2700
AVERAGE		25.1	NA	33.6	62.6	1884	7.07	87	1.64	34.7	3492
STANDARD DEVIATION		5.5	NA	5.3	13.8	2513	1.91	111	0.20	10.6	710
COEFFICIENT OF VARIATION		22.1%	NA	15.7%	22.0%	133.4%	27.1%	127.8%	11.9%	30.5%	20.3%

Analyses performed by ELS.

2001 ASH METAL ANALYSES
ALL RESULTS IN UG/G (ppm) - Dry Weight

SAMPLE COLLECTION DATE	LAB #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
03/19/01	01-0167	11.3	0.3	28.2	55.7	860	3.15	50.1	0.86	25.5	2660
03/19/01	01-0168	8.3	0.490	20.1	67.6	1080	2.85	29.3	1.00	23.1	2450
03/20/01	01-0169	12.2	0.280	26.9	48.8	813	5.00	31.3	1.60	20.3	2230
03/20/01	01-0170	14.6	0.280	22.5	50.1	555	2.59	44.9	1.40	19.6	2190
03/21/01	01-0171	11.7	<0.19	23.0	33.7	458	4.10	32.2	1.30	15.3	2080
03/21/01	01-0172	10.6	0.340	26.8	46.0	574	5.63	36.7	1.70	27.0	6490
03/22/01	01-0173	15.5	0.350	41.4	87.8	746	4.73	96.0	1.20	31.4	2830
03/22/01	01-0174	8.3	0.370	22.2	45.1	511	4.72	63.6	1.20	26.9	2100
03/23/01	01-0175	11.4	<0.19	18.3	38.5	899	3.84	48.0	3.50	28.5	2680
03/23/01	01-0176	11.3	0.270	32.9	39.0	743	4.41	60.4	1.30	19.7	2690
AVERAGE		11.5	0.271	26.2	51.2	723.9	4.1	49.3	1.5	23.7	2840.0
STANDARD DEVIATION		2.2	0.1	6.5	15.2	187.6	0.9	19.2	0.7	4.7	1244.0
COEFFICIENT OF VARIATION		18.9%	19.7%	24.7%	29.7%	25.9%	22.9%	39.1%	46.9%	19.9%	43.8%

Analyses performed by ELS.

12/10/01	01-0777	45.8	<0.65	58.3	42.8	3760	7.60	51.9	3.80	37.7	4880
12/10/01	01-0778	24.0	<0.64	33.6	39.6	672	7.80	27.7	1.90	32.2	3390
12/11/01	01-0779	28.8	<0.69	59.0	63.3	1200	9.30	49.4	2.80	31.0	4640
12/11/01	01-0780	27.2	<1.6	42.4	60.0	944	6.10	48.2	2.90	28.5	5040
12/12/01	01-0781	26.8	<0.69	37.3	53.9	799	5.60	64.8	3.70	41.7	3800
12/12/01	01-0782	30.7	<0.62	46.8	41.9	965	7.60	43.5	4.00	28.8	4540
12/13/01	01-0783	31.3	<0.63	50.6	38.4	815	6.60	40.7	2.80	33.5	3890
12/13/01	01-0784	32.1	<0.69	46.6	44.9	1740	2.80	53.3	2.90	28.1	3900
12/14/01	01-0785	47.6	<0.71	104.0	49.9	1660	2.70	38.5	4.10	40.4	5590
12/14/01	01-0786	18.7	<0.68	33.0	59.5	1480	1.80	44.3	2.20	53.8	3060
AVERAGE		31.3	NA	51.2	49.4	1403.5	5.8	46.2	3.1	35.6	4273.0
STANDARD DEVIATION		8.6	NA	19.6	8.7	862.0	2.4	9.4	0.7	7.7	752.2
COEFFICIENT OF VARIATION		27.3%	NA	38.4%	17.7%	61.4%	41.6%	20.4%	23.1%	21.5%	17.6%

Analyses performed by ELS.

2002 ASH METAL ANALYSES
ALL RESULTS IN UG/G (ppm) - Dry Weight

SAMPLE COLLECTION DATE	LAB #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
05/06/02	02-0241	30.7	<0.62	37.6	62.4	911	5.80	91.4	1.80	38.8	3310
05/06/02	02-0242	25.6	<0.64	29.0	57.5	732	2.80	79.5	1.50	31.3	3630
05/07/02	02-0243	47.3	<0.61	52.0	55.6	937	5.50	47.3	1.90	29.3	4300
05/07/02	02-0244	27.1	<0.61	49.6	114.0	769	8.10	66.3	1.40	32.8	4010
05/08/02	02-0245	29.6	<0.67	57.3	79.0	1200	7.70	70.2	2.00	38.0	5100
05/08/02	02-0246	23.5	<0.65	30.5	66.8	835	2.40	76.9	0.71	30.6	3100
05/09/02	02-0247	37.0	<0.63	34.0	70.7	975	4.30	37.7	1.20	30.2	2760
05/09/02	02-0248	23.6	<0.62	23.7	46.5	751	2.90	35.6	1.20	23.4	2610
05/10/02	02-0249	44.9	<0.65	42.4	55.1	912	7.50	35.3	2.40	31.3	3660
05/10/02	02-0250	57.4	<0.67	59.9	73.1	962	6.80	39.3	2.50	32.2	4990
AVERAGE		34.7	NA	41.6	68.1	898.4	5.4	58.0	1.7	31.8	3747.0
STANDARD DEVIATION		11.0	NA	12.0	17.9	131.5	2.1	20.1	0.5	4.1	815.4
COEFFICIENT OF VARIATION		31.8%	NA	28.7%	26.3%	14.6%	38.2%	34.7%	32.2%	13.0%	21.8%

Analyses performed by ELS.

12/02/02	02-0767	44.7	<1.34	57.6	60.9	1310	6.02	56.8	2.35	45.3	5380
12/02/02	02-0768	21.8	<1.34	32.4	46.8	943	5.37	87.1	<1.34	38.2	3020
12/03/02	02-0769	27.6	<1.21	28.9	36.6	1060	10.80	31.5	1.26	35.1	2430
12/03/02	02-0770	24.7	<1.45	39.1	47.9	868	8.80	33.7	<1.45	82.1	3880
12/04/02	02-0771	35.6	<0.68	40.4	57.7	2260	6.47	49.4	2.11	31.1	3370
12/04/02	02-0772	33.6	<0.72	45.3	48.5	1820	19.90	55.6	2.19	30.9	3170
12/05/02	02-0773	32.9	<0.71	60.9	49.7	2230	12.20	54.4	2.72	32.7	4220
12/05/02	02-0774	30.6	<0.72	43.6	53.3	1860	9.91	57.7	2.11	32.5	3340
12/06/02	02-0775	28.6	<0.63	35.0	50.3	1320	8.52	39.3	1.35	31.3	2700
12/06/02	02-0776	20.1	<0.63	20.1	45.4	322	3.31	36.3	1.30	29.5	1480
AVERAGE		30.0	NA	40.3	49.7	1399.3	9.1	50.2	1.5	38.9	3299.0
STANDARD DEVIATION		6.9	NA	11.8	6.4	600.0	4.4	15.6	0.9	15.1	1002.0
COEFFICIENT OF VARIATION		22.8%	NA	29.2%	12.8%	42.9%	48.2%	31.1%	58.2%	38.8%	30.4%

Analyses performed by ELS.

2003 - 2004 ASH METAL ANALYSES
ALL RESULTS IN UG/G (ppm) - Dry Weight

SAMPLE COLLECTION DATE	LAB #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
06/02/03	15503164	18.0	<0.60	18.0	120.0	6500	1.60	270.0	<0.60	28.0	1700
06/02/03	15503165	25.0	<0.55	25.0	49.0	700	1.40	100.0	<0.55	29.0	15000
06/03/03	15503166	13.0	<0.57	16.0	23.0	1200	1.30	13.0	<0.57	12.0	1500
06/04/03	16103027	29.0	<0.65	33.0	40.0	910	3.20	130.0	<0.65	30.0	3800
06/04/03	16103028	19.0	<0.59	18.0	34.0	320	8.20	26.0	<0.59	14.0	1700
06/05/03	16103029	49.0	<0.66	44.0	62.0	870	5.10	47.0	<0.66	48.0	5100
06/05/03	16103030	42.0	<0.75	37.0	72.0	780	7.70	30.0	<0.75	31.0	3500
06/06/03	16103031	38.0	<0.63	38.0	54.0	750	4.30	50.0	<0.63	42.0	3500
06/06/03	16103032	45.0	<0.66	46.0	67.0	920	5.70	85.0	<0.66	28.0	7200
06/07/03	16103026	71.0	<0.61	38.0	65.0	830	4.50	93.0	<0.61	39.0	5700
AVERAGE		34.9	NA	31.3	58.6	1378.0	4.3	84.4	NA	30.1	4870.0
STANDARD DEVIATION		16.8	NA	10.6	25.3	1720.0	2.4	71.3	NA	10.7	3809.7
COEFFICIENT OF VARIATION		48.1%	NA	34.0%	43.2%	124.8%	54.7%	84.5%	NA	35.5%	78.2%

Analyses performed by Upstate Laboratories Inc.

SAMPLE COLLECTION DATE	LAB #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
06/14/04	E1540	38.0	<1.2	31.0	53.0	980	3.60	47.0	1.00	32.0	4200
06/14/04	E1541	29.0	<1.1	25.0	48.0	730	1.40	28.0	0.83	23.0	2900
06/15/04	E1542	45.0	<1.2	33.0	78.0	1500	2.90	65.0	1.30	51.0	3800
06/15/04	E1543	51.0	<12	45.0	100.0	1100	7.70	120.0	<5.9	<59	4000
06/16/04	E2029	39.0	<1.2	45.0	62.0	1100	5.90	62.0	1.50	36.0	4300
06/16/05	E2030	40.0	<1.3	48.0	58.0	1300	3.90	410	2.60	29.0	5100
06/17/05	E2031	31.0	<1.2	39.0	67.0	790	4.30	44.0	1.50	30.0	4200
06/23/04	E2626	33.0	<1.2	38.0	68.0	970	4.60	43.0	2.20	30.0	3900
06/25/04	E2627	61.0	<1.3	98.0	85.0	1900	7.50	110.0	2.20	34.0	7800
06/27/04	E2628	54.0	<1.2	79.0	75.0	1200	3.90	58.0	2.10	42.0	4500
AVERAGE		42.1	NA	48.1	69.4	1157.0	4.6	98.7	1.5	30.7	4470.0
STANDARD DEVIATION		10.0	NA	21.7	14.8	328.9	1.9	107.4	0.7	12.6	1229.7
COEFFICIENT OF VARIATION		23.7%	NA	45.1%	21.4%	28.4%	40.9%	108.8%	46.8%	41.0%	27.5%

Analyses performed by O' Brien & Gere Laboratories, Inc

SAMPLE COLLECTION DATE	LAB #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
12/23/04	F1433	19.0	<1.3	36.0	44.0	730	5.50	37.0	0.93	28.0	5100
12/23/04	F1434	23	<1.3	47.0	65.0	2500	7.10	37.0	1.50	28.0	4600
12/27/04	F1513	27.0	<1.1	44.0	50.0	1200	16.00	44.0	1.00	42.0	4600
12/27/04	F1514	25.0	<1.2	35.0	59.0	820	9.10	130.0	1.80	30.0	6000
12/28/04	F1515	20.0	<1.3	40.0	100.0	1500	6.10	45.0	1.00	44.0	4100
12/28/04	F1516	25.0	<1.4	50.0	67.0	860	5.80	98.0	1.40	24.0	4400
12/29/04	F1517	23.0	<1.2	41.0	48.0	1000	4.30	35.0	1.20	41.0	3900
12/29/04	F1518	27.0	<1.3	53.0	65.0	1800	5.70	58.0	1.60	36.0	4600
12/30/04	F1519	18.0	<1.2	43.0	41.0	770	6.00	34.0	1.00	23.0	3600
12/30/04	F1520	23.0	<1.2	43.0	64.0	790	4.20	56.0	1.70	28.0	4300
AVERAGE		23.0	NA	43.2	60.3	1197.0	7.0	57.4	1.3	32.4	4520.0
STANDARD DEVIATION		3.0	NA	5.4	16.1	549.0	3.3	30.2	0.3	7.3	633.7
COEFFICIENT OF VARIATION		13.0%	NA	12.5%	26.6%	45.9%	47.0%	52.7%	23.7%	22.6%	14.0%

Analyses performed by O' Brien & Gere Laboratories, Inc

2005 ASH METAL ANALYSES
ALL RESULTS IN UG/G (ppm) - Dry Weight

SAMPLE COLLECTION DATE	LAB #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
05/16/05	0505100-001A	51.0	<1.1	51.0	64.0	1700	4.00	43.0	1.50	52.0	6200
05/16/05	0505100-002A	56.0	<1.2	49.0	74.0	1300	4.30	49.0	1.70	46.0	6100
05/17/05	0505100-003A	50.0	<1.1	56.0	80.0	1900	4.30	92.0	1.70	33.0	5900
05/17/05	0505100-004A	73.0	<1.2	75.0	83.0	2400	4.70	77.0	2.10	37.0	7600
05/18/05	0505131-001A	56.0	<1.1	62.0	84.0	1500	4.70	93.0	1.80	39.0	6200
05/18/05	0505131-002A	45.0	<1.2	62.0	72.0	2100	4.70	49.0	2.00	32.0	5900
05/19/05	0505131-003A	44.0	<1.2	58.0	65.0	1400	4.90	49.0	1.50	35.0	5400
05/19/05	0505131-004A	59.0	<1.2	68.0	71.0	1600	5.90	55.0	1.70	36.0	7000
05/20/05	0505131-005A	50.0	<1.2	60.0	60.0	1600	0.75	61.0	1.10	47.0	6100
05/20/05	0505131-006A	53.0	<1.2	77.0	140	1800	6.10	270	1.90	30.0	7600
AVERAGE		53.7	NA	61.8	79.3	1730.0	4.4	83.8	1.7	38.7	6400.0
STANDARD DEVIATION		7.8	NA	8.8	21.6	316.4	1.4	64.4	0.3	6.9	707.1
COEFFICIENT OF VARIATION		14.6%	NA	14.3%	27.3%	18.3%	31.2%	76.9%	16.0%	17.8%	11.0%

Analyses performed by Life Science Laboratories, Inc

SAMPLE COLLECTION DATE	LAB #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
12/12/05	0512118-001A	29.0	<1.2	49.0	61.0	1200	4.90	70.0	1.30	<120	8200
12/12/05	0512118-002A	24.0	<1.3	37.0	60.0	1900	3.10	49.0	1.60	26.0	3800
12/13/05	0512118-003A	20.0	<1.2	49.0	54.0	1400	3.90	230	0.86	37.0	4700
12/13/05	0512118-004A	25.0	<1.2	37.0	82.0	1300	<0.12	73.0	1.30	<60	4000
12/14/05	0603017-001A	18.0	<1.3	36.0	53.0	1700	3.80	47.0	0.67	41.0	4400
12/14/05	0512118-006A	24.0	<1.2	37.0	68.0	720	3.30	51	0.89	<60	3900
12/15/05	0512142-001A	17.0	<1.3	30.0	49.0	620	2.20	100	1.00	<63	3500
12/15/05	0512142-002A	27.0	<1.2	50.0	59.0	1300	5.40	37.0	1.40	34.0	4700
12/16/05	0512142-003A	26.0	<1.4	41.0	67.0	1200	4.80	50.0	2.00	<70	4100
12/16/05	0512142-004A	26.0	<1.3	55.0	54.0	1100	5.50	40.0	2.20	34.0	5700
AVERAGE		23.6	NA	42.1	60.7	1244.0	4.1	74.7	1.3	34.4	4700.0
STANDARD DEVIATION		3.8	NA	7.7	9.1	368.4	1.1	54.8	0.5	4.9	1306.9
COEFFICIENT OF VARIATION		16.0%	NA	18.2%	15.1%	29.6%	26.8%	73.3%	35.8%	14.2%	27.8%

Analyses performed by Life Science Laboratories, Inc

2006 ASH METAL ANALYSES
ALL RESULTS IN UG/G (ppm) - Dry Weight

SAMPLE COLLECTION DATE	LAB #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
04/10/06	0604077-001A	50.0	<1.2	83.0	57.0	1800	2.50	44.0	1.80	34.0	6400
04/11/06	0604077-002A	60.0	<1.3	80.0	75.0	1700	7.60	46.0	1.40	31.0	6100
04/12/06	0604090-001A	34.0	<1.2	39.0	96.0	1100	1.20	22.0	1.30	47.0	5200
04/13/06	0604090-002A	47.0	<1.2	61.0	51.0	1200	4.00	84.0	1.90	55.0	5400
04/14/06	0604090-003A	47.0	<1.2	79.0	61.0	1500	9.90	45.0	1.40	30.0	5800
NA	NA										
NA	NA										
NA	NA										
NA	NA										
NA	NA										

AVERAGE	47.6	NA	68.4	68.0	1460.0	5.0	48.2	1.6	39.4	5780.0
STANDARD DEVIATION	8.3	NA	16.6	16.1	272.8	3.2	20.0	0.2	9.9	440.0
COEFFICIENT OF VARIATION	17.5%	NA	24.3%	23.6%	18.7%	64.3%	41.5%	15.5%	25.1%	7.6%

Analyses performed by Life Science Laboratories, Inc

SAMPLE COLLECTION DATE	LAB #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
08/07/06	0608136-001A	51.0	<1.2	47.0	46.0	1000	3.30	140.0	1.20	34.0	4400
08/08/06	0608136-002A	51.0	<1.2	54.0	51.0	1400	4.90	44.0	1.50	34.0	5300
08/09/06	0608136-003A	29.0	<1.3	34.0	38.0	630	4.00	30	0.95	33.0	3000
08/10/06	0608136-004A	40.0	<1.2	48.0	57.0	1900	2.90	130.0	1.20	45.0	4000
08/11/06	0608136-005A	35.0	<1.2	42.0	71.0	1100	1.30	45.0	0.75	60.0	4200
08/14/06	0608136-006A	44.0	<1.3	44.0	69.0	1000	3.00	85	1.20	54.0	3900
08/15/06	0608136-007A	33.0	<1.1	30.0	78.0	580	0.29	170	0.67	90.0	3200
08/16/06	0608136-008A	29.0	<1.2	31.0	36.0	690	<0.12	56.0	0.67	38.0	4300
08/17/06	0608136-009A	32.0	<1.1	41.0	55.0	1100	<0.11	43.0	0.76	40.0	7600
08/18/06	0608136-010A	27.0	<1.2	33.0	57.0	2800	2.60	78.0	0.80	45.0	3400

AVERAGE	37.1	NA	40.4	55.8	1220.0	2.2	82.1	1.0	47.3	4330.0
STANDARD DEVIATION	8.5	NA	7.7	13.2	644.6	1.6	46.0	0.3	16.5	1259.4
COEFFICIENT OF VARIATION	22.9%	NA	19.1%	23.6%	52.8%	73.9%	56.0%	28.1%	35.0%	29.1%

Analyses performed by Life Science Laboratories, Inc

2007 ASH METAL ANALYSES
ALL RESULTS IN UG/G (ppm) - Dry Weight

SAMPLE COLLECTION DATE	LAB #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
04/23/07	0704181-001A	40.0	<1.2	51.0	62.0	1300	8.90	79.0	<1.2	33.0	4700
04/23/07	0704181-002A	36.0	<1.2	64.0	51.0	1300	5.30	47.0	<1.2	20.0	5100
04/24/07	0704181-003A	39.0	<1.2	70.0	59.0	1600	7.20	45.0	<1.2	26.0	14000
04/24/07	0704181-004A	55.0	<1.3	120	74.0	1800	6.80	53.0	2.10	24.0	8400
04/25/07	0704181-005A	62.0	<1.4	130	75.0	2000	9.50	61.0	2.30	24.0	8300
04/25/07	0704181-006A	46.0	<1.3	79.0	81.0	1700	4.60	79.0	<1.3	27.0	6000
04/26/07	0704186-001A	53.0	<1.3	130	62.0	2100	7.70	73.0	1.70	23.0	8500
04/26/07	0704186-002A	45.0	<1.3	87.0	86.0	1700	4.90	174	1.30	26.0	7200
04/27/07	0704186-003A	44.0	<1.3	77.0	260	1300	9.10	110	<1.3	45.0	5800
04/27/07	0704186-004A	41.0	<1.2	53.0	93	1200	4.60	180	<1.2	36.0	4800
AVERAGE		46.1	NA	86.1	90.3	1600	6.9	90.1	1.9	28.4	7280
STANDARD DEVIATION		7.8	NA	28.7	57.9	300	1.8	47.1	0.4	7.1	2652
COEFFICIENT OF VARIATION		16.8%	NA	33.3%	64.1%	18.8%	26.7%	52.3%	20.8%	25.1%	36.4%

Analyses performed by Life Science Laboratories, Inc

SAMPLE COLLECTION DATE	LAB #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
08/09/07	0708082-001A	48.0	<1.2	48.0	65.0	2700	4.30	70.0	1.80	49.0	4000
08/10/07	0708082-002A	47.0	<1.2	36.0	330	990	2.90	290	2.60	49.0	4000
08/14/07	0708121-001A	44.0	<1.2	55.0	52.0	1100	5.20	110	2.00	37.0	4700
08/14/07	0708121-002A	45.0	<1.2	57.0	69.0	1400	6.40	51.0	2.70	46.0	5200
08/15/07	0708121-003A	39.0	<1.2	40.0	190	2500	2.90	160	2.20	42.0	4100
08/15/07	0708121-004A	65.0	<1.3	110	49.0	180	8.20	37	2.30	33.0	7300
08/16/07	0708121-005A	60.0	<6.5	70.0	57.0	980	7.20	120	<6.5	<32	5300
08/16/07	0708121-006A	86.0	<1.4	120	49.0	3400	12.00	36.0	2.70	31.0	8800
08/17/07	0708121-007A	48.0	<1.3	59.0	53.0	1300	5.80	40.0	2.30	41.0	5900
08/17/07	0708121-008A	74.0	<1.5	79.0	53.0	1400	7.40	35.0	2.20	29.0	6600
AVERAGE		55.6	NA	67.4	96.7	1595	6.2	94.9	2.3	39.7	5590
STANDARD DEVIATION		14.4	NA	26.8	87.7	919	2.6	76.9	0.3	7.2	1505
COEFFICIENT OF VARIATION		26.0%	NA	39.7%	90.7%	57.6%	41.4%	81.0%	12.6%	18.1%	26.9%

Analyses performed by Life Science Laboratories, Inc

2008 ASH METAL ANALYSES
ALL RESULTS IN UG/G (ppm) - Dry Weight

SAMPLE COLLECTION DATE	LAB #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
04/25/08	0805009-001A	73.0	<1.3	170.0	60.0	2300	13.00	34.0	1.50	35.0	9900
04/28/08	0805009-002A	91.0	<1.2	100.0	50.0	1600	6.50	62.0	1.80	26.0	7200
04/29/08	0805009-003A	54.0	<1.2	47.0	72.0	1100	3.00	200.0	<1.2	44.0	4700
04/29/08	0805009-004A	98.0	<1.4	120	85.0	2300	9.80	78.0	1.90	38.0	8100
04/30/08	0805021-001A	48.0	<1.3	61	88.0	1300	3.70	83.0	<1.3	49.0	4900
04/30/09	0805021-002A	80.0	<1.3	110.0	110.0	1500	12.00	36.0	2.00	32.0	7800
05/01/08	0805021-003A	47.0	<1.2	52	69.0	990	3.10	41.0	<1.2	44.0	4800
05/01/08	0805021-004A	95.0	<1.3	130.0	58.0	2000	9.40	33	2.60	25.0	10000
05/02/08	0805021-005A	38.0	<1.2	45.0	72	840	3.50	47	<1.2	39.0	6600
05/02/08	0805021-006A	72.0	<1.3	88.0	67	1500	6.20	46	1.70	53.0	8300
AVERAGE		69.6	NA	92.3	73.1	1543	7.0	66.0	1.9	38.5	7230
STANDARD DEVIATION		20.6	NA	39.4	16.5	492	3.6	47.8	0.3	8.8	1875
COEFFICIENT OF VARIATION		29.6%	NA	42.7%	22.5%	31.9%	51.3%	72.4%	17.9%	22.9%	25.9%

Analyses performed by Life Science Laboratories, Inc

SAMPLE COLLECTION DATE	LAB #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
12/19/08	0812217-001A	33.0	<1.4	68.0	91.0	1400	11.00	59.0	1.50	28.0	5900
12/19/08	0812217-002A	26.0	<1.3	64.0	70	1900	7.80	77	1.50	23.0	4800
12/20/08	0812217-003A	35.0	<1.4	80.0	39.0	1100	8.30	72	2.10	24.0	6600
12/22/08	0812217-004A	31.0	<1.2	29.0	76.0	670	5.90	48.0	<1.2	61.0	2900
12/23/08	0812217-005A	<27	<27	60.0	190	1000	14.00	190	<27	57.0	4100
12/23/08	0812217-006A	27.0	<1.3	34	56.0	1100	4.10	45	<1.3	32.0	3000
12/24/08	0812217-007A	24.0	<1.3	43.0	150.0	680	6.50	260	1.60	46.0	4000
12/29/08	0901008-001A	51.0	<1.3	89	58.0	3600	7.50	38.0	1.70	24.0	6400
12/30/08	0901008-002A	24.0	<1.3	65.0	55.0	1600	7.50	33.0	1.50	18.0	4900
12/30/08	0901008-003A	19.0	<1.3	48.0	58.0	1200	4.80	51.0	<1.3	30.0	3700
AVERAGE		30.0	NA	58.0	84.3	1425	7.7	87.3	1.7	34.3	4630
STANDARD DEVIATION		8.8	NA	18.4	45.7	810	2.8	71.8	0.2	14.3	1262
COEFFICIENT OF VARIATION		29.3%	NA	31.7%	54.2%	56.8%	35.9%	82.2%	13.0%	41.6%	27.3%

Analyses performed by Life Science Laboratories, Inc

2009 ASH METAL ANALYSES
ALL RESULTS IN UG/G (ppm) - Dry Weight

Sample Collection Date	Lab #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
5/11/2009	0905077-001A	46	<1.2	39	82	1200	3.1	60	1.3	49	4500
5/11/2009	0905077-002A	63	<1.3	78	94	1300	3.8	46	5	42	5900
5/12/2009	0905077-003A	80	<1.2	88	73	1500	4.3	34	6.3	45	6800
5/12/2009	0905077-004A	100	<1.2	100	76	4600	6.9	120	6.6	33	8600
5/13/2009	0905106-001A	62	<1.2	68	76	1400	4.5	79	3	46	5800
5/13/2009	0905106-002A	49	<1.2	41	170	1200	2.4	210	1.4	68	5100
5/14/2009	0905106-003A	59	<1.3	74	66	1900	5.7	71	2.6	38	10000
5/14/2009	0905106-004A	48	<1.2	50	65	1200	3.3	67	2.1	42	5200
5/15/2009	0905106-005A	46	<1.2	63	71	2100	4	64	1.5	39	5200
5/15/2009	905106-006A	43	<1.2	42	72	930	2.2	95	<1.2	48	5100
Average		59.6	NA	64.3	84.5	1733.0	4.0	84.6	3.3	45.0	6220.0
Standard Deviation		18.1	NA	21.1	31.2	1066.3	1.4	50.2	2.1	9.4	1767.5
Coefficient of variation		30.4%	NA	32.9%	36.9%	61.5%	35.9%	59.4%	63.8%	21.0%	28.4%

Sample Collection Date	Lab #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
10/16/2009	0910091-001A	36	<1.2	55	72	770	3.9	59	2.5	32	32,000
10/19/2009	0910091-002A	67	<1.3	110	51	2000	7.6	31	1.5	36	8400
10/20/2009	0910091-003A	44	<1.3	64	47	890	5.2	37	<1.3	29	5200
10/20/2009	0910091-004A	66	<1.3	120	55	1700	9.9	60	1.6	28	8000
10/21/2009	0910113-001A	55	<1.2	89	57	1500	3.2	38	1.3	43	6800
10/21/2009	0910113-002A	60	<1.3	120	48	1500	3.8	31	1.6	33	8200
10/22/2009	0910113-003A	36	<1.2	54	46	850	9.8	30	<1.2	38	4900
10/22/2009	0910113-004A	37	<1.2	78	95	1100	4.6	67	3	31	6200
10/23/2009	0910113-005A	42	<1.3	98	55	1300	11	51	3.3	23	7600
10/23/2009	0910113-006A	54	<1.3	140	48	1900	11	44	3.7	20	10000
Average		49.7	NA	92.8	57.4	1351	7	44.8	2.3	31.3	9730
Standard Deviation		12.2	NA	29.9	15.3	441.6	3.2	13.6	0.9	6.8	7976.1
Coefficient of variation		24.6%	NA	32.2%	26.6%	32.7%	45.6%	30.4%	40.4%	21.8%	82.0%

Analysis performed by Life Science Laboratories, Inc.

2010 ASH METAL ANALYSES
ALL RESULTS IN UG/G (ppm) - Dry Weight

Sample Collection Date	Lab #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
5/24/2010	1006054-001A	55	<1.2	77	68	1300	4.1	58	2.3	47	6500
5/25/2010	1006054-002A	40	<1.2	52	57	780	2.9	52	1.3	41	4500
5/25/2010	1006054-003A	52	<1.2	87	57	1300	5	37	2	26	7600
5/26/2010	1006054-004A	28	<1.1	41	40	940	2.8	29	<1.1	32	3900
5/26/2010	1006054-006A	37	<1.3	62	58	1900	4.2	54	<1.3	44	5400
5/27/2010	1006054-007A	32	<1.2	46	46	610	5.3	66	<1.2	31	3500
5/27/2010	1006054-008A	43	<1.3	71	66	1400	7.3	48	1.6	35	5200
5/28/2010	1006054-009A	38	<1.2	39	69	680	4.3	33	<1.2	65	4000
5/28/2010	1006054-010A	46	<1.2	55	69	890	4	57	<1.2	40	5300
5/29/2010	1006054-011A	64	<1.2	54	66	960	2.2	33	<1.2	40	4900
Average		43.5	NA	58.4	59.6	1076.0	4.2	46.7	1.8	40.1	5080.0
Standard Deviation		11.0	NA	15.8	10.1	396.2	1.5	12.8	0.4	10.8	1245.3
Coefficient of variation		25.3%	NA	27.0%	16.9%	36.8%	34.7%	27.4%	24.4%	27.0%	24.5%

Sample Collection Date	Lab #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
9/27/2010	1010020-001A	79	<1.2	82	83	1200	5.7	200	4.9	33	6,400
9/28/2010	1010020-002A	38	<1.2	93	100	830	3.3	46	2.2	50	5200
9/28/2010	1010020-003A	35	<1.3	95	45	1200	9	36	1.5	29	6000
9/29/2010	1010020-004A	37	<1.2	67	64	1000	5	91	1.6	39	5800
9/29/2010	1010020-006A	58	<1.2	84	56	1200	8	38	2.2	40	6500
9/30/2010	1010020-007A	49	<1.2	93	70	1600	4.9	63	2.9	32	6600
9/30/2010	1010020-008A	61	<1.4	140	51	1800	3.3	54	3	29	9000
10/1/2010	1010020-009A	30	<1.3	48	98	1099	3.5	85	1.5	70	4400
10/1/2010	1010020-010A	35	<1.3	49	75	1100	2.1	72	1.8	60	4800
10/2/2010	1010020-011A	35	<1.3	73	80	1500	5.2	42	2.2	43	5500
Average		45.7	NA	82.4	72.2	1252.9	5	72.7	2.4	42.5	6020
Standard Deviation		15.7	NA	26.5	18.7	294.2	2.2	48.7	1.0	13.8	1277.8
Coefficient of variation		34.4%	NA	32.2%	25.9%	23.5%	43.2%	67.0%	43.4%	32.4%	21.2%

Analysis performed by Life Science Laboratories, Inc.

2011 ASH METAL ANALYSES
ALL RESULTS IN UG/G (ppm) - Dry Weight

Sample Collection Date	Lab #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
6/7/2011	K1106170-001A	62	0.46	68	69	1800	3.7	35	2.2	43	5800
6/7/2011	K1106170-002A	61	0.44	100	66	1300	7.3	30	2.2	35	7000
6/8/2011	K1106170-003A	54	0.48	63	66	1000	3	77	2	38	5800
6/8/2011	K1106170-004A	65	0.41	100	74	2100	8.7	43	1.9	37	6900
6/9/2011	K1106170-006A	46	0.4	72	59	1200	4.3	59	1.9	34	6200
6/9/2011	K1106170-007A	51	0.43	75	57	860	4.9	39	2.8	37	6300
6/10/2011	K1106170-008A	27	0.71	38	70	610	7.9	40	3.8	40	4000
6/10/2011	K1106170-009A	44	0.54	67	67	1300	4.2	51	2.4	44	5500
6/11/2011	K1106170-010A	34	0.59	46	67	1000	6	46	1.8	55	6200
6/11/2011	K1106170-011A	42	0.46	66	62	1100	5.1	30	1.4	37	6100

Average	48.6	0.5	69.5	65.7	1227.0	5.5	45.0	2.2	40.0	5980.0
Standard Deviation	12.4	0.1	19.7	5.1	439.2	1.9	14.4	0.7	6.2	837.7
Coefficient of variation	25.6%	19.6%	28.4%	7.8%	35.8%	34.6%	32.0%	29.6%	15.4%	14.0%

Sample Collection Date	Lab #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
10/18/2011	K1110337-001A	45	0.36	84	58	1200	5.2	44	1.8	42	8,600
10/18/2011	K1110337-002A	46	0.46	330	130	2200	6.3	39	1.8	48	6100
10/19/2011	K1110337-003A	40	0.5	59	74	1100	3	63	1.8	42	5000
10/19/2011	K1110337-004A	48	0.55	77	82	1200	5.8	50	2.7	48	6700
10/20/2011	K1110337-006A	53	0.47	120	80	1600	17	58	2.5	38	9400
10/20/2011	K1110337-007A	37	0.41	91	68	1300	14	43	2	41	6700
10/21/2011	K1110337-008A	31	0.36	69	57	990	6	32	4.5	31	7000
10/21/2011	K1110337-009A	47	0.56	120	65	2000	9.5	35	3.6	41	7800
10/26/2011	K1110337-010A	31	0.63	43	71	830	3.9	55	1.5	40	4900
10/26/2011	K1110337-011A	55	0.34	96	53	1200	4.7	35	2.3	40	6900

Average	43.3	0.45	108.9	73.8	1362	7.54	45.4	2.5	41.1	6910
Standard Deviation	8.4	0.1	81.4	22.0	439.5	4.6	10.7	0.9	4.8	1425.5
Coefficient of variation	19.3%	21.7%	74.8%	29.8%	32.3%	60.8%	23.5%	38.4%	11.8%	20.6%

Analysis performed by Life Science Laboratories, Inc.

2012 ASH METAL ANALYSIS
ALL RESULTS IN UG/G (ppm) - Dry Weight

Sample Collection Date	Lab #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
6/12/2012	K1206354-011A	120.0	0.6	67.0	110.0	770.0	3.8	93.0	1.6	37.0	4900
6/12/2012	K1206354-012A	90.0	0.5	64.0	78.0	790.0	6.4	35.0	0.8	40.0	4400
6/13/2012	K1206354-013A	110.0	0.6	80.0	100.0	1500.0	4.6	46.0	1.2	35.0	5200
6/13/2012	K1206354-014A	76.0	0.6	57.0	84.0	530.0	3.1	53.0	1.1	36.0	4300
6/20/2012	K1206354-015A	56.0	1.4	39.0	57.0	1100.0	0.5	49.0	1.0	35.0	3700
6/14/2012	K1206354-016A	71.0	0.5	79.0	71.0	1600.0	6.3	31.0	2.1	34.0	4800
6/15/2012	K1206354-017A	56.0	0.7	32.0	94.0	2400.0	3.1	64.0	1.1	55.0	4100
6/15/2012	K1206354-018A	87.0	0.5	73.0	75.0	530.0	6.4	35.0	2.1	42.0	6200
6/19/2012	K1206354-019A	98.0	0.5	72.0	74.0	1700.0	4.2	33.0	1.8	37.0	6300
6/19/2012	K1206354-020A	87.0	0.5	57.0	230.0	1600.0	3.3	98.0	1.3	33.0	9400

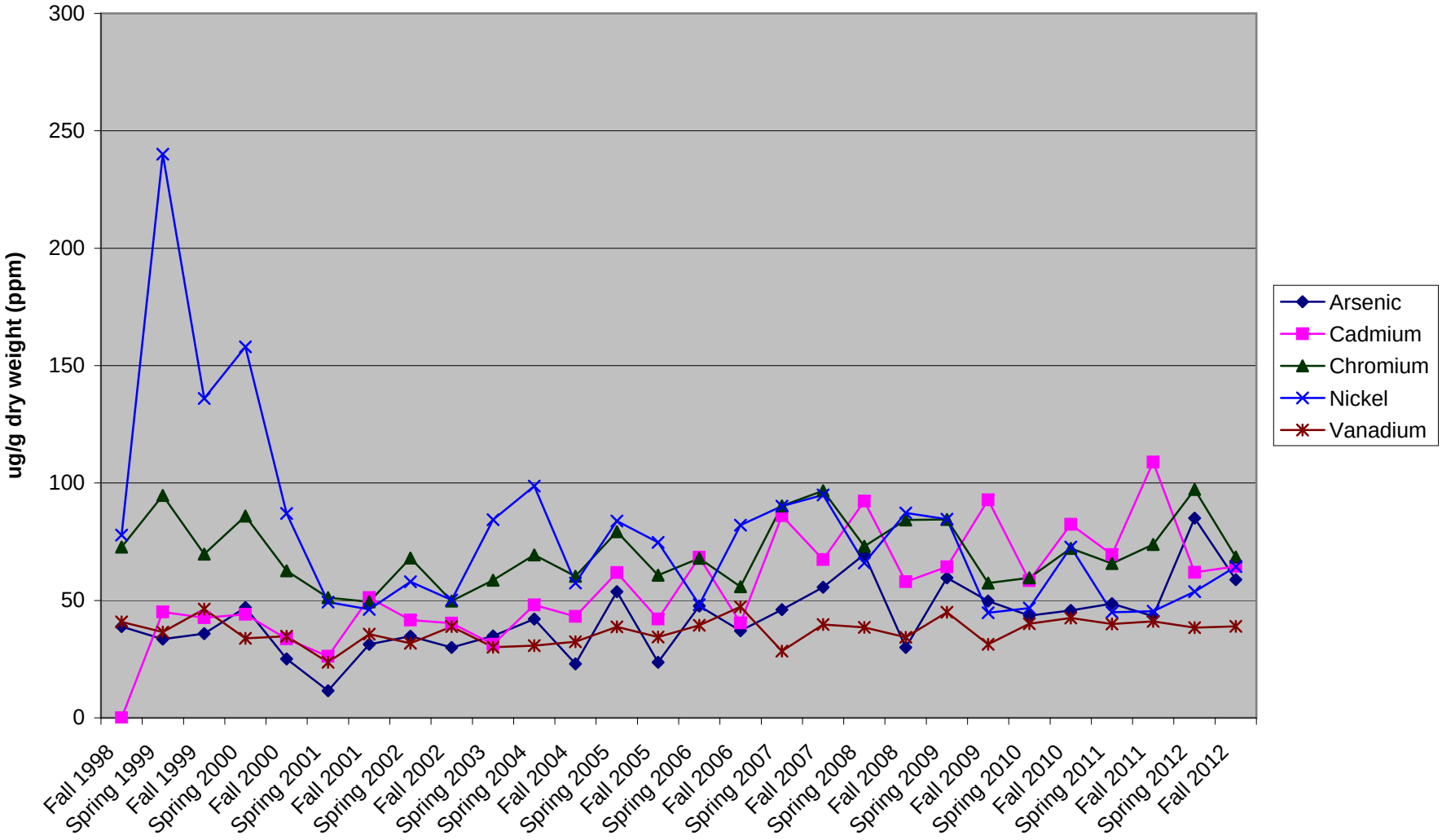
Average	85.1	0.6	62.0	97.3	1252.0	4.2	53.7	1.4	38.4	5330.0
Standard Deviation	21.1	0.3	16.1	49.1	608.6	1.9	24.4	0.5	6.4	1661.4
Coefficient of variation	24.8%	43.1%	26.0%	50.5%	48.6%	44.9%	45.4%	35.6%	16.8%	31.2%

Sample Collection Date	Lab #	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	V Vanadium	Zn Zinc
9/25/2012	k1210235-011A	87	0.5	64	66	1300	3.2	60	0.85	37	6600
9/26/2012	K1210235-012A	40	0.48	38	63	650	2.5	49	3.6	33	3800
9/27/2012	K1210235-013A	48	0.5	42	57	590	2	84	0.62	47	4200
10/2/2012	K1210235-014A	55	0.53	79	71	2100	5.6	39	0.68	41	6800
10/2/2012	K1210235-015A	55	0.46	73	66	880	3.7	40	1.9	31	8600
10/3/2012	K1210235-016A	59	0.54	83	65	1600	5.9	38	1.5	36	6500
10/4/2012	K1210235-017A	60	0.63	78	91	1300	4.6	100	0.8	42	6300
10/5/2012	K1210235-018A	54	0.5	60	66	1300	1.8	120	0.75	38	21000
10/5/2012	K1210235-019A	88	0.53	84	72	1400	8.7	71	1.6	46	7100
10/6/2012	K1210235-020A	43	0.44	44	68	600	5.2	43	0.64	39	4100

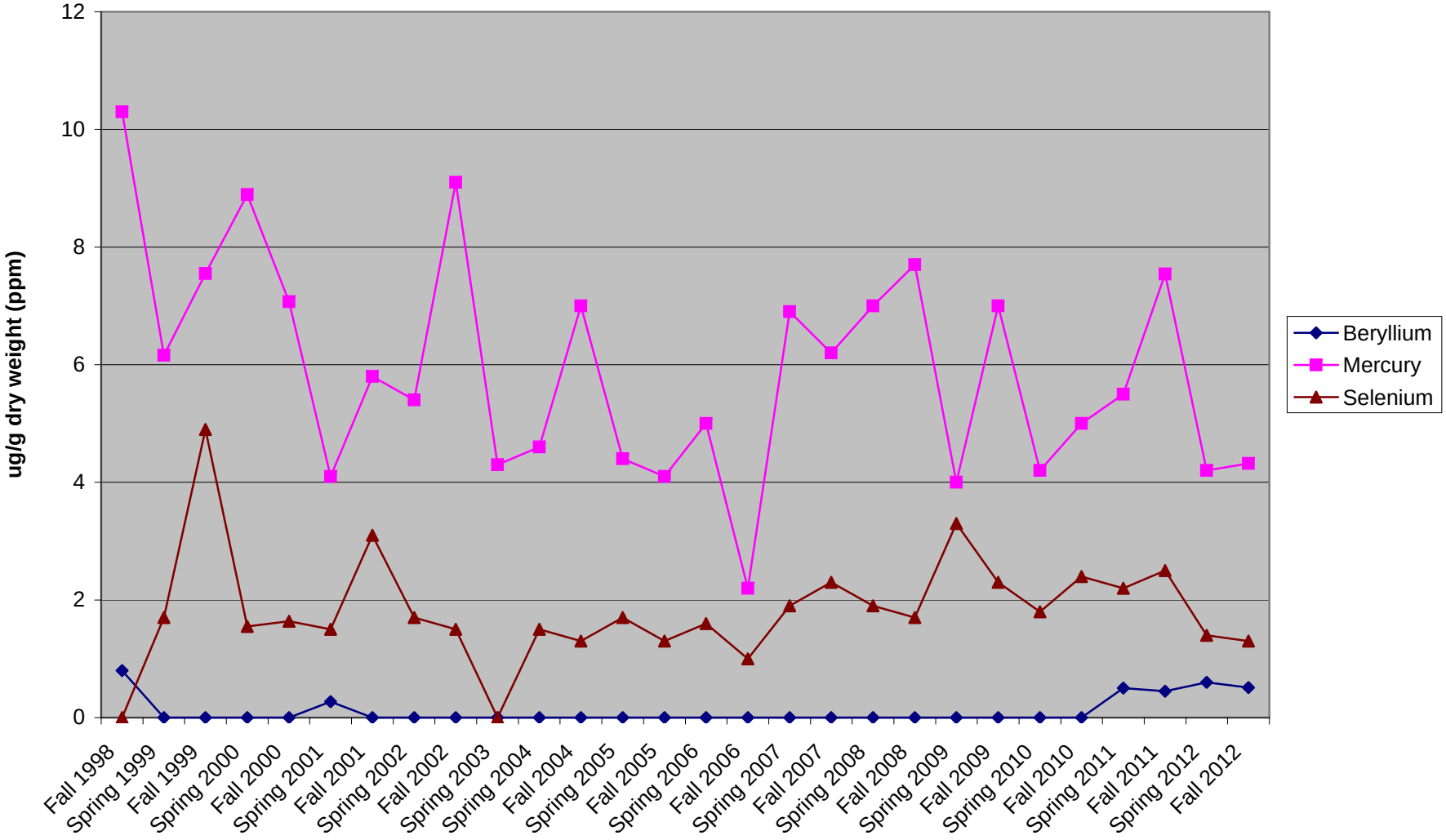
Average	58.9	0.511	64.5	68.5	1172	4.32	64.4	1.294	39	7500
Standard Deviation	16.4	0.1	17.8	8.9	490.9	2.1	28.7	0.9	5.2	4983.3
Coefficient of variation	27.8%	10.2%	27.5%	13.0%	41.9%	49.3%	44.6%	72.0%	13.2%	66.4%

Analysis performed by Life Science Laboratories, Inc.

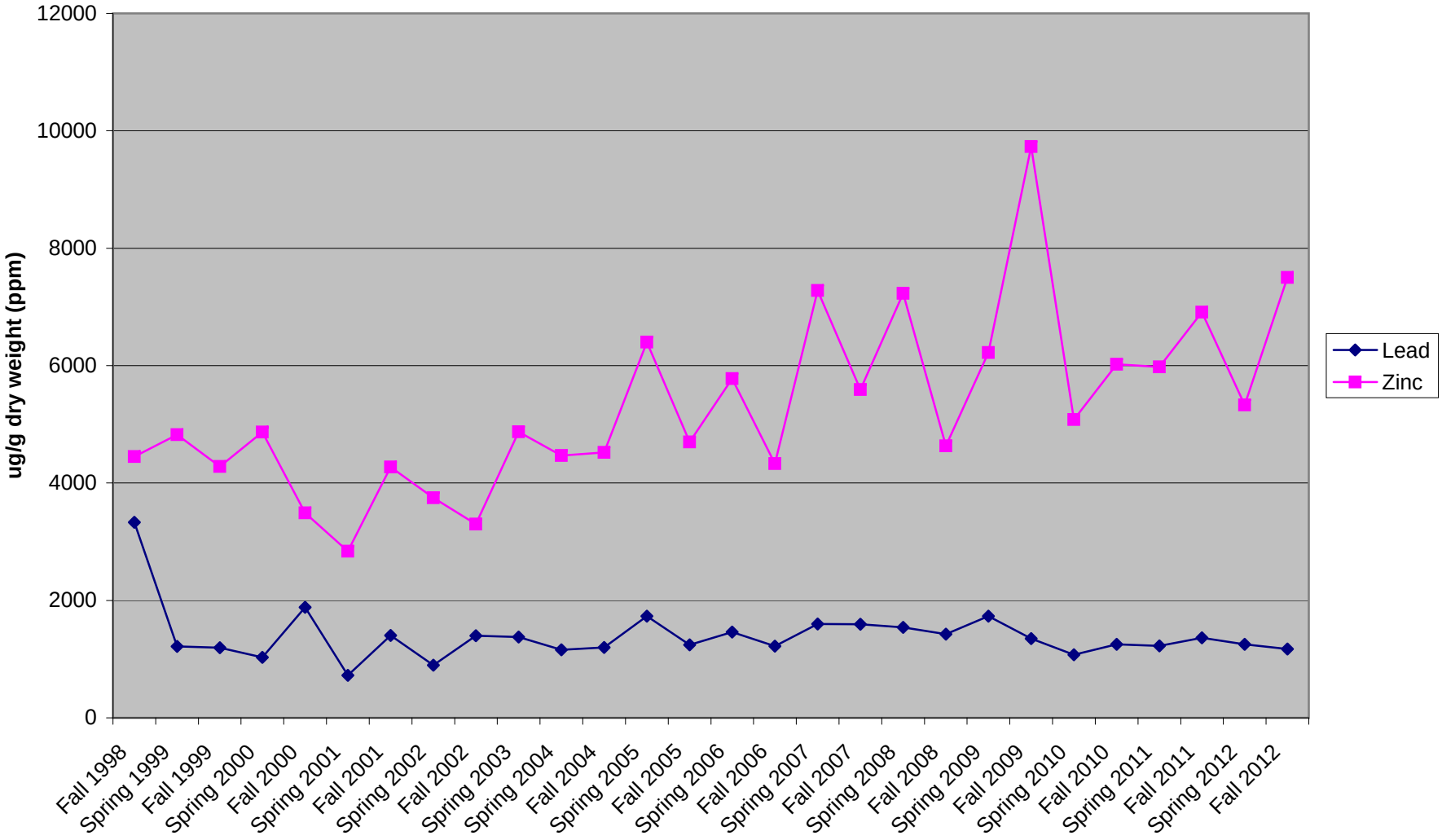
VII.A. Mean Values Ash Data
Dry Weight



VII.B. Mean Values Ash Data
Dry Weight



VII.C. Mean Values Ash Data
Dry Weight



VIII.

New York State DEC Ash Residue Characterization Project March 1992
Summary of "Combined" (Fly and Bottom) Ash Results
All Results in ug/g (ppm)

	As	Cd	Cr	Hg	Ni	Pb	Se	Zn
Site	Arsenic	Cadmium	Chromium	Mercury	Nickel	Lead	Selenium	Zinc
Hempstead	17.2	29.5	72.1	15.9	14100	1270	0.82	2440
Hempstead	17.4	29.1	43	16.9	84	1480	1.7	3020
Hempstead	15.9	31.9	48.3	16.8	49	1620	1	2440
Oneida Co.	13.6	16.4	132	0.13	193	369	<1.2	1350
Oneida Co.	<6.4	15.6	96.5	<0.13	159	571	<1.3	1270
Oneida Co.	7.7	17.7	111	0.22	211	1110	<1.3	1610
Westchester	12.6	31.8	49.9	1.9	54	3180	<1.2	2410
Westchester	18.4	32.3	77.7	1.7	49	2570	<1.3	2520
Westchester	13.3	29.1	56.6	2	47	2030	<1.2	2250
Dutchess Co.	15.7	42.9	42.5	13.4	55	1400	1.6	3530
Dutchess Co.	12.6	43.3	37.1	12.2	98	1280	1.4	3080
Dutchess Co.	14.3	39.6	30.2	31	84	1180	1.8	2820
Babylon	14.5	35.0	47	9.8	88	997	1.4	3360
Babylon	17.7	37.4	67.5	9.3	291	1080	1.2	3760
Babylon	14.6	31.5	66.6	9.8	117	844	1.4	3580
Islip	15.3	32.2	52	13	111	1480	<1.2	4870
Islip	20.4	39.5	62.8	21.5	338	1710	<1.2	12900
Islip	12.6	32.6	57.8	20.6	206	1670	<1.2	8690
Dutchess Co.	30.0	42.1	89.6	24.3	80	1510	<7.10	3940
Dutchess Co.	28.2	36.6	30.6	23.2	42	1370	<7.1	3530
Dutchess Co.	34.3	41.2	35.3	24	71	1820	<7.2	3810
Babylon	34.6	82.6	6530	6.5	3880	2960	<12.3	6940
Babylon	39.1	90.9	69.7	11.4	160	4680	<6.1	13800
Babylon	31.5	72.8	87.8	11.9	250	3490	<12.1	6960
Westchester	14.9	27.3	24.3	0.75	28.5	1040	<5.7	2240
Westchester	14.0	23.4	38.3	0.79	33.6	1050	<5.8	1960
Westchester	16.2	17.3	20.8	0.87	19.8	828	<5.8	1690
Hempstead	22.6	17.5	19	17.6	20.5	481	1.2	1120
Hempstead	32.6	30.7	202	17.4	166	686	<5.8	1850
Hempstead	23.5	32.7	24.9	13	28.4	898	12.3	2630
Oneida Co.	9.7	7.7	49	0.65	141	987	4.2	1450
Oneida Co.	13.0	9.1	68.2	0.62	156	2720	4.6	1510
Oneida Co.	31.6	9.5	111	0.95	314	1060	<9.9	1640

Average	19.1	33.6	259	10.9	658	1558	2.66	3666
Standard Deviation	8.3	18.3	1109	8.7	2463	934	3.00	2988
Coefficient. of Variation	43%	55%	428%	80%	374%	60%	113%	81%

Onondaga County Health Department

Division of Environmental Health
421 Montgomery Street
Syracuse, New York 13202

Incinerator Monitoring Program

2012
Screening Summary
for
Organic Constituents

June 1, 2013

Submitted To: **Cynthia B. Morrow, M.D., M.P.H.**
Commissioner of Health

Submitted By: **Kevin L. Zimmerman**
Director, Division of Environmental Health

Contents:

List of Tables

I. Table of Abbreviations

The following abbreviations may be used in this report:

ATSDR	Agency for Toxic Substances and Disease Registry.
PCDD/PCDF	Polychlorinated Dibenzo-p-Dioxins/Dibenzofurans.
PCB	Polychlorinated Biphenyls.
PAH	Polycyclic Aromatic Hydrocarbons.
μg/g	micrograms per gram (also denoted as ug/g).
ng/g	nanograms per gram.
ng/kg	nanograms per kilogram (pg/g equivalent).
pg/g	picograms per gram (ng/kg equivalent).
LD	Limit of Detection.
NS	Not sampled.
ND	Not detected.
OCHD	Onondaga County Health Department.
WTE	Waste to Energy.
~	approximately.
<	Less than.
>	Greater than.

II. Executive Summary

Organic sample analyses for the year 2012 of soil and ash for the Incinerator Monitoring Program have been conducted by Axys Analytical Services LTD. Analyses for this summary include PCDD/PCDF, PCB and PAH. Ash collection was conducted by Covanta Energy personnel (formerly Odgen Martin), with random oversight by the Onondaga County Health Department's Division of Environmental Health. The collection of all ambient environmental samples was, and continues to be, the responsibility of the Division of Environmental Health. Final sample composites were prepared by Life Science Laboratories, Inc. (formerly O'Brien and Gere Environmental Laboratory).

Much of the comparative background data and information referenced in this report was obtained from NYDEC Soil Cleanup Objectives, EPA Preliminary Remediation Goals and Soil Screening Levels, along with the U.S. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry's Toxilogical Profiles.

The analyses for organics completed during this monitoring period show the parameters are within the expected range for urban and rural environments. The results are below levels associated with health risk. The 2012 sampling revealed levels typical of historical data at all sites. Given the low levels detected and the corresponding variation expected as a result of sample collection, preparation, and laboratory procedures, the levels that have been determined do not allow for comparison to establish change in the environment. In the organic monitoring conducted to date, no relationship between the operation of the incinerator and increased levels of organics has been established.

III. Introduction.

In November 1994, the Onondaga County Resource Recovery Agency, in contract with the Covanta Energy Company (formerly Ogden Martin Company), commenced operation of a municipal solid waste incinerator. This undertaking was part of a multifaceted solid waste management program to achieve a reduction of volume of landfill waste, energy withdrawal and the removal of solids incompatible with incineration. Part of the management program for the reuse of materials and the removal of materials prior to the municipal waste stream had been started earlier.

The Onondaga County Health Department initiated a program in 1993 to include short and long term monitoring aspects to document any health implications to the public and environmental changes from the incinerator. Changes have been made to the monitoring program several times over the course of time in response to new information as it became available. In 2003 the monitoring program was re-evaluated to provide a more effective and efficient program. Direct interaction was established with the Onondaga County Resource Recovery Agency (OCCRA) and the New York State Department of Environmental Conservation (DEC) in providing stack monitoring results and improved assurance on reporting of adverse events and equipment failures. This allowed for effective evaluation of short-term change in the incinerator emissions rather than the previous limited scope offsite air monitoring conducted over a nine year period. Several changes were implemented in 2009 based on the low levels of organic constituents detected in the monitoring conducted to date, and the fact that there is no evidence of a trend or levels associated with health risks. The fourteen routine soil sites (which include two control sites) continue to be sampled and analyzed twice a year for metals which are documented in a separate report. Half of the sites (7, including one control) are being tested for organics once a year. The sites will be rotated so that each is tested every other year. The program includes the flexibility to test a site two years in a row if there is an elevated level of any organic constituent. The four ash route soil sites have been eliminated from the program. These sites were located along the route that trucks take to carry ash across and out of the County. To date these sites have not shown any elevation of metals or organics and the trucks are covered at all times. Ash, directly from the incinerator continues to be analyzed for metals twice a year and organics once a year. The department continues to interact directly with OCCRA and DEC in review of stack monitoring results.

This is the thirteenth report for screening of organics, analyzed for dioxin, dibenzofurans, polychlorinated biphenyls and polycyclic aromatic hydrocarbons, from samples of ambient soil and combined ash collected from the incinerator operation. The analysis of soil samples provides a useful and convenient mechanism for monitoring accumulative change of these organics in the environment. Surface soil samples can be utilized to monitor deposition of transient materials that can drop from atmospheric particulate materials, materials spilled in the area and materials spread on the land for agricultural purposes.

A program designed to monitor soil samples collected on a routine basis will provide an assessment of the organic material deposited in the sample area. The limitation of this matrix is that there are numerous sources and a normal action by nature is occurring on the soil at all times. The results reported should be utilized with other reports for studies in other areas. The soil sample analyses described in this

report are part of an ongoing program of environmental monitoring performed by the Onondaga County Health Department as part of its overall Incinerator Monitoring Program.

This report represents data from the screening of soil and ash collected during the calendar year 2012. This is the eighteenth year of operation of the WTE facility. Three samples were collected at each soil location during each sampling event. Ash sampling is conducted by Covanta Energy personnel during their semi-annual collection. Through the sampling year 2002, it was the responsibility of the Onondaga County Health Department Environmental Toxicology Laboratory to create the soil and ash composites. Beginning with 2004, the contract laboratory, Life Science Laboratories, Inc. (formerly O'Brien and Gere Environmental Laboratories) created one composite sample for each organic analysis of soil and a two-day and three-day composite of the ash for analysis.

IV. PCDD/PCDF Specific Summary.

PCDDs are a class of chlorinated tricyclic aromatic hydrocarbons. There are 75 chlorinated dioxins, all varying in toxicity. Generally, the PCDD congeners of relative toxic concern are 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD, 1,2,3,4,7,8-HxCDD, 1,2,3,6,7,8-HxCDD, 1,2,3,7,8,9-HxCDD and 1,2,3,4,6,7,8-HpCDD. PCDFs are also a class of chlorinated tricyclic aromatic hydrocarbons. There are 135 chlorinated furans, of which, approximately 10 to 12 are expected to have significant acute toxicity. The most acutely toxic isomers appear to be 2,3,7,8-TCDF, 1,2,3,7,8-PeCDF and 2,3,4,7,8-PeCDF. Each sample was tested for seventeen different congeners of PCDD/PCDF.

Each congener of PCDD/DF has associated with it a toxic equivalency factor, TEF. This factor is an indication of the toxicity of the individual congeners with respect to 2,3,7,8 TCDD, the most toxic congener. Each sample has a calculated total toxic equivalency, TEQ, shown in Tables 1 and 2. While the toxic equivalency is the main consideration for the determination of change, individual congener concentrations have also been reviewed for significance.

Table 1 displays the results of soil analyses for dioxin and dibenzofurans at the six routine sampling sites and one control site for the spring sampling period of year 2012. In general, the set of TEQ results from these samples confirmed very well the results that were presented in the previously issued "Screening Summary for Organic Constituents" reports (Refer to Attachment A). Results from both the routine sites and the control site demonstrate no distinct pattern from background through year 2012 sampling. The TEQ's for 2012 are well below the screening level of 50 pg/g used by ATSDR and the EPA preliminary remediation goal of 1000 pg/g. The levels as reported are not of health significance and are within expected levels as stated in other documents for background levels in soil.

Table 2 displays the analyses for ash from the incinerator. The TEQ result for the ash composite for day 1 & 2 and day 3-5 are consistent with previous results. Ash is not homogenous and can contain chunks of material which may account for an occasionally inconsistent result. These results are similar to reports for ash identified by other investigators and reported in published literature. All of the ash is transported in closed vehicles and buried at a Department of Environmental Conservation permitted

landfill.

Attachment A shows the historical TEQ values for routine soil sites, control sites, and ash samples.

V. PCB Specific Summary.

Polychlorinated biphenyls, PCB's, are a class of more than 200 man-made chemical compounds. PCB's were widely used in industrial applications due to the physical characteristics of the compounds. Incineration of PCB containing products can lead to a release of PCB's into the environment. Soil sampling is a strong indicator of PCB levels in the environment because of the persistence and adhesion capabilities of the substance. PCB analysis in the past had resulted in less than detectable concentrations. Axys Analytical Services, LTD lowered the limit of detection for PCB starting in 2000 so that usable concentrations are now being presented. The ATSDR Toxicological Profile for PCB (1996) indicates that typical mean PCB concentrations in background soil are <100 μg/kg (<100,000 pg/g). The NYSDEC has a Soil Cleanup Objective of 100,000 pg/g for PCB's and the EPA has a soil screening level of 240,000 pg/g for residential soil.

PCB results are presented in Tables 3 and 4. Table 3 displays results for the six routine sites within the impact area of the WTE Facility along with a control site. The mean PCB concentration for routine sites was 4,255 pg/g, with a maximum concentration of 17,400 pg/g at the Syracuse University site. In general, PCB results in this study are well below the ATSDR typical background soil level of 100,000 pg/g. Soil is not homogenous and can contain materials that can account for an occasional inconsistent result. Attachment B shows historical levels of PCB's at routine soil sites along with control sites.

Table 4 displays the results of PCB analyses of ash as collected from the WTE Facility. At 1,800 and 20,500 pg/g, the PCB levels for the year 2012 sampling are lower than the previously stated ATSDR typical background soil level.

VI. PAH Specific Summary.

Polycyclic aromatic hydrocarbons, PAH's, are primarily formed as the result of incomplete combustion of organic matter. PAH's, like PCB's, have a strong persistence and affinity to particulate matter. For this reason, soil and ash sampling are quality measures of the levels attributable to incineration. As with the PCB analyses, Axys Analytical Services, LTD has lowered the limit of detection for PAH congeners for this report so that additional usable concentrations are now being presented.

PAH results for soil are presented in Table 5. Attachment C presents NYSDEC Soil Cleanup Objectives, EPA screening levels, NYS Rural soil survey results, and Toxicological Profile levels for PAH's for rural, agricultural and urban soils. These levels can vary widely for the individual PAH's. The levels reported in the 2012 study are generally within these expected ambient levels.

PAH results for the WTE ash composites are presented in Table 6. Comparison

of the 2012 composite ash results to the averages for years 1999 through 2011 individual results exhibits little variation in PAH congener specific concentrations.

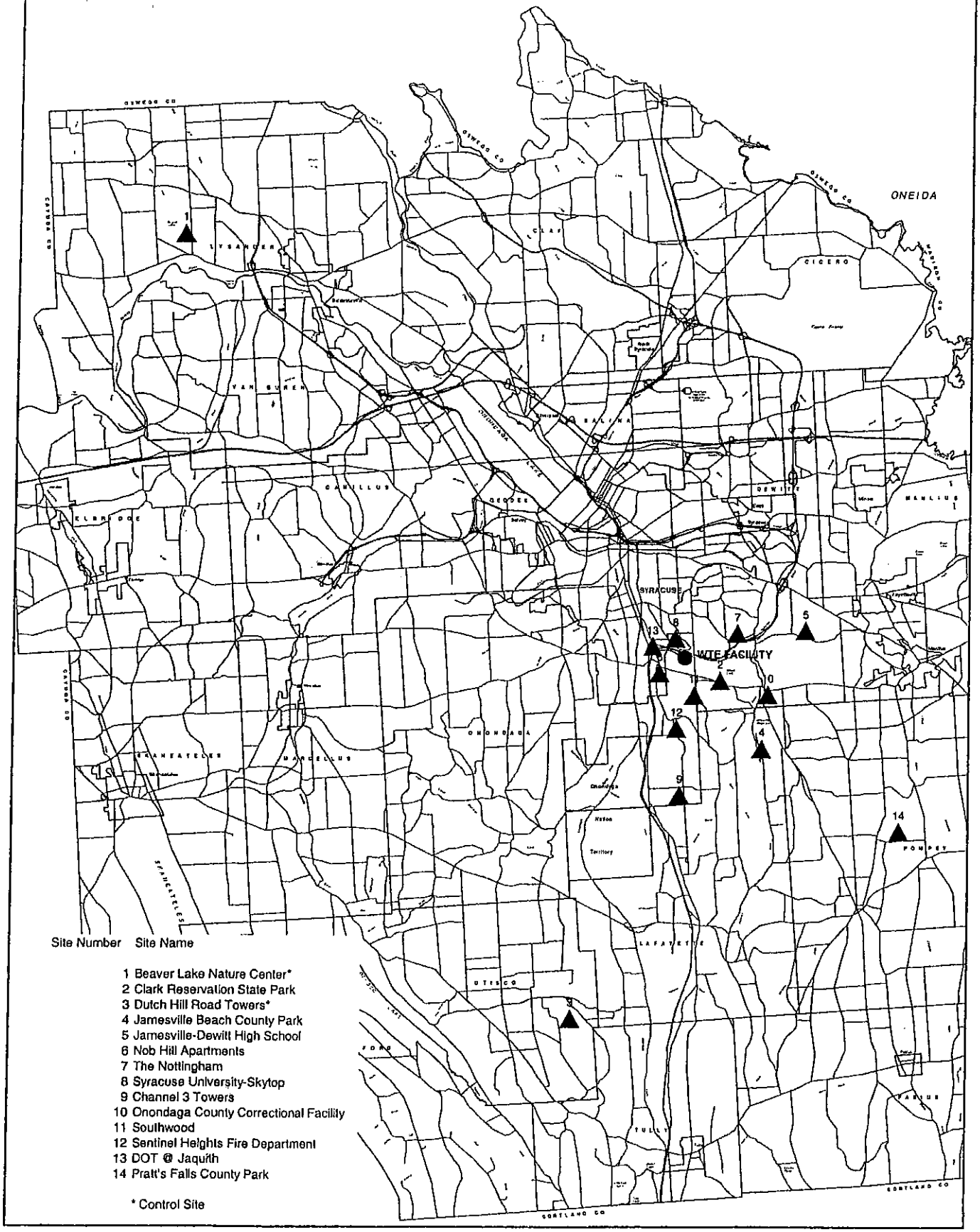
VII. Summary and Conclusions

This screening represents the organic analysis data for calendar year 2012 environmental soil and ash samples. PCDD, PCDF, PCB and PAH levels are all quality indicators of ambient conditions in the environment. By following the concentrations and trends of these compounds, two objectives are accomplished. First, ambient conditions are monitored for changes due to point sources. Second, health risks can be established for the effect of the soil concentrations.

The reported concentrations of all organic compounds in this screening are within expected levels and are below significant health risk levels. In general, little change in levels of these compounds have been observed from background through the present organic screening period.

The Onondaga County Health Department will continue to monitor soil and ash for organic compounds.

OCHD ROUTINE SOIL MONITORING SITES



Site Number Site Name

1 Beaver Lake Nature Center*
2 Clark Reservation State Park
3 Dutch Hill Road Towers*
4 Jamesville Beach County Park
5 Jamesville-Dewitt High School
6 Nob Hill Apartments
7 The Nottingham
8 Syracuse University-Skytop
9 Channel 3 Towers
10 Onondaga County Correctional Facility
11 Southwood
12 Sentinel Heights Fire Department
13 DOT @ Jaquith
14 Pratt's Falls County Park

* Control Site

Table 1

		Control Site		Routine Sites					
		Dutch Hill	Clark Reservation	Jamesville Beach	Nob Hill	Sentinel Heights	Syracuse University	J.D. High School
		15-May-12	15-May-12	15-May-12	15-May-12	15-May-12	15-May-12	15-May-12
Accession Number:		L18216-5	L18216-7	L18216-6	L18216-1	L18216-2	L18216-4	L18216-3
PCDD / PCDF	TEF							
2,3,7,8-TCDD	1	K 0.135	0.205	K 0.075	0.095	0.612	K 0.148	K 0.176
1,2,3,7,8-PeCDD	0.5	0.456	0.496	0.184	0.252	4.31	0.565	0.306
1,2,3,4,7,8-HxCDD	0.1	K 0.650	0.559	0.216	0.288	7.85	0.797	0.308
1,2,3,6,7,8-HxCDD	0.1	1.16	1	0.445	0.565	16.3	1.41	0.62
1,2,3,7,8,9-HxCDD	0.1	1.82	1.26	0.513	0.676	21.4	2.21	0.787
1,2,3,4,6,7,8-HpCDD	0.01	13.9	19.5	7.94	10	385	23.5	11.7
OCDD	0.001	64.1	114	43.1	67.4	2500	150	66
2,3,7,8-TCDF	0.1	1.76	1.47	0.47	0.679	0.667	0.989	0.776
1,2,3,7,8-PeCDF	0.05	0.653	0.515	K 0.217	0.243	0.722	0.281	0.339
2,3,4,7,8-PeCDF	0.5	1.56	0.613	K 0.246	0.343	0.68	0.411	0.408
1,2,3,4,7,8-HxCDF	0.1	2.19	0.937	0.398	0.488	4.15	0.769	0.682
1,2,3,6,7,8-HxCDF	0.1	1.93	0.733	0.233	0.336	2.95	0.676	0.467
1,2,3,7,8,9-HxCDF	0.1	0.107	K 0.085	< 0.0493	< 0.0488	0.189	< 0.0483	< 0.0498
2,3,4,6,7,8-HxCDF	0.1	3.15	0.709	0.293	0.381	2.12	0.475	0.442
1,2,3,4,6,7,8-HpCDF	0.01	11.2	5.97	3.41	3.03	73.4	5.33	4.07
1,2,3,4,7,8,9-HpCDF	0.01	0.649	0.48	0.288	0.333	4.6	0.381	0.348
OCDF	0.001	5.43	8.14	6.22	4.53	166	7.8	5.21
Total TEQ		**2.47**	**1.75**	**0.488**	**0.488**	**16**	**1.63**	**0.951**
Total Tetra-Dioxins		1.41	3.42	0.984	1.37	4.15	1.3	1.78
Total Penta-Dioxins		5.84	4.48	1.39	1.24	18.2	2.95	2.72
Total Hexa-Dioxins		13	10.7	4.62	5.72	157	15	5.77
Total Hepta-Dioxins		27.9	37.8	14.4	19.1	808	48.5	22.6
Total Tetra-Furans		8.66	11.3	2.49	3.72	5.82	7.06	5.3
Total Penta-Furans		16.2	8.32	1.89	3.26	14.6	5.69	4.97
Total Hexa-Furans		23	9.24	3.82	4.88	76.3	7.94	6.08
Total Hepta-Furans		17	11.3	7.44	5.78	226	10.4	7.25

Results reported in pg/g (ng/kg equivalent) dry weight.

Comparison Values	
EPA Action Level	1,000 ng/kg (Total TEQ)
ATSDR EMEG Value	50 ng/kg (Total TEQ)

Table 2

		Combined Ash	
		Spring 2012	
		Day 1 & 2	Day 3 - 5
Accession Number:		L18216-8	L18216-9
PCDD / PCDF	TEF		
2,3,7,8-TCDD	1	14.2	14.7
1,2,3,7,8-PeCDD	0.5	30.6	33.3
1,2,3,4,7,8-HxCDD	0.1	16.9	21.4
1,2,3,6,7,8-HxCDD	0.1	25.3	35.3
1,2,3,7,8,9-HxCDD	0.1	39.6	53.1
1,2,3,4,6,7,8-HpCDD	0.01	184	276
OCDD	0.001	527	786
2,3,7,8-TCDF	0.1	210	224
1,2,3,7,8-PeCDF	0.05	94.2	96.7
2,3,4,7,8-PeCDF	0.5	76.4	83.2
1,2,3,4,7,8-HxCDF	0.1	88.3	80.9
1,2,3,6,7,8-HxCDF	0.1	91	94.7
1,2,3,7,8,9-HxCDF	0.1	7.62	8.25
2,3,4,6,7,8-HxCDF	0.1	50.5	62.4
1,2,3,4,6,7,8-HpCDF	0.01	203	238
1,2,3,4,7,8,9-HpCDF	0.01	26.1	29.7
OCDF	0.001	109	108
Total TEQ		**116**	**127**
Total Tetra-Dioxins		216	221
Total Penta-Dioxins		277	300
Total Hexa-Dioxins		312	401
Total Hepta-Dioxins		386	576
Total Tetra-Furans		1780	1850
Total Penta-Furans		1280	1340
Total Hexa-Furans		749	805
Total Hepta-Furans		312	364

Results reported in pg/g dry weight.

Table 3

	Control Site	Routine Sites					
	Dutch Hill 15-May-12	Clark Reservation 15-May-12	Jamesville Beach 15-May-12	Nob Hill 15-May-12	Sentinel Heights 15-May-12	Syracuse University 15-May-12	J-D High School 15-May-12
Accession Number:	L18216-5	L18216-7	L18216-6	L18216-2	L18216-3	L18216-5	L18216-3
PCB							
Total Monochloro Biphenlys	1.09	7.43	1.53	1.92	1.74	9.36	2.48
Total Dichloro Biphenyls	4	14.8	3.99	9.99	4.48	59.5	9.51
Total Trichloro Biphenyls	15.3	42.4	9.97	18.9	14.2	208	26.8
Total Tetrachloro Biphenyls	106	146	29.5	66.2	63.2	490	87.8
Total Pentachloro Biphenyls	207	467	122	300	254	1610	261
Total Hexachloro Biphenyls	741	850	246	657	418	6410	452
Total Heptachloro Biphenyls	811	785	163	461	307	6470	373
Total Octachloro Biphenyls	368	402	94.8	216	148	1920	178
Total Nonachloro Biphenyls	72.3	127	27.2	64.4	36.2	177	49
Decachloro Biphenyl	26.6	43.2	8.95	26.4	14.1	21.5	12.9
Total PCB'S	2350	2890	707	1820	1260	17400	1450

Results reported in pg/g dry weight.

Comparison Value	
ATSDR Typical Mean Background Value	< 100,000 pg/g

Table 4

	Combined Ash	
	Spring 2012	
	Day 1 & 2	Day 3 - 5
Accession Number:	L18216-8	L18216-9
PCB		
Total Monochloro Biphenlys	122	183
Total Dichloro Biphenyls	143	4260
Total Trichloro Biphenyls	240	6920
Total Tetrachloro Biphenyls	334	5660
Total Pentachloro Biphenyls	419	1600
Total Hexachloro Biphenyls	255	865
Total Heptachloro Biphenyls	161	662
Total Octachloro Biphenyls	72.7	298
Total Nonachloro Biphenyls	29.7	53.8
Decachloro Biphenyl	20.2	27.1
Total PCB'S	1800	20500

Results reported in pg/g dry weight.

Table 5

	Control Site	Routine Sites					
	Dutch Hill	Clark Reservation	Jamesville Beach	Nob Hill	Sentinel Heights	Syracuse University	J.D. High School
	15-May-13	15-May-12	15-May-12	15-May-12	15-May-12	15-May-12	15-May-12
Accession Number:	L18216-5	L18216-7	L18216-6	L18216-1	L18216-2	L18216-4	L18216-3
PAH							
Naphthalene	2.52	14.4	3.35	4.17	13.7	4.24	3.99
Acenaphthylene	2.13	47.5	3.02	9.42	43.6	5.54	6.6
Acenapthene	0.888	9.4	0.938	3.16	3.48	1.75	1.97
Fluorene	0.509	8.47	0.45	2.63	1.8	2.41	0.9
Phenanthrene	11.6	217	8.82	64.1	42.9	33	25
Anthracene	2	40	1.86	11.5	27.3	6.48	6.4
Fluoranthene	20.2	379	15.7	156	119	68.7	60.7
Pyrene	17.8	331	14.1	135	129	58.6	53.7
Benzo(A)Anthracene	7.1	134	6.24	50.2	73.9	24	27.6
Chrysene	12.5	212	10.9	76.3	110	41.5	40.3
Benzo(B,J,K)Fluoranthene	20	339	18.9	119	213	62.8	70.2
Benzo(E)Pyrene	8.33	132	7.78	48	91.7	25.2	26.3
Benzo(A)Pyrene	14.6	176	10.8	65.9	133	31.2	39.6
Perylene	1.88	32.4	1.56	14.4	27.7	6.71	7.91
Dibenzo(A,H)Anthracene	K 1.73	27.8	K 1.64	10.2	20.3	5.41	6.54
Indeno(1,2,3-CD)Pyrene	9.24	132	7.98	48.4	95.9	23.9	27.8
Benzo(G,H,I)Perylene	8.4	121	7.93	45.1	94.6	23.4	27.8
2-Methylnaphthalene	2.45	14.8	3.51	3.91	7.12	5.25	3.38
2-Chloronaphthalene				0.06		0.062	

Results reported in ng/g dry weight.

Table 6

	Combined Ash Spring 2012 Day 1 & 2	Day 3 - 5
Accession Number:	L18216-8	L18612-9
PAH		
Naphthalene	71.3	107
Acenaphthylene	24.7	29.7
Acenapthene	220	328
Fluorene	101	63.1
Phenanthrene	131	382
Anthracene	27.6	71.9
Fluoranthene	135	408
Pyrene	107	374
Benzo(A)Anthracene	51.9	190
Chrysene	60.9	215
Benzo(B,J,K)Fluoranthene	90.1	335
Benzo(E)Pyrene	272	240
Benzo(A)Pyrene	61.2	227
Perylene	14.1	64.7
Dibenzo(A,H)Anthracene	7.55	34.5
Indeno(1,2,3-CD)Pyrene	34.6	160
Benzo(G,H,I)Perylene	33.8	163
2-Methylnaphthalene	23.2	37.7
2-Chloronaphthalene	0.857	0.797

Results reported in ng/g dry weight.

Attachment A

Dioxin/Furnan TEQ Soil Results through Year 2012 (pg/g dry weight)

Routine Soil Sites

Site	Year													
	1994	1999	2000	2001	2002	2004	2005	2006	2007	2008	2009	2010	2011	2012
Clark Reservation	1.8	1.2	2.27	1.42	1.23	2.03	1.90	1.76	1.73	1.26	***	1.64	***	1.75
Jamesville Beach	0.6	0.5	1.09	0.82	0.70	0.71	0.97	0.86	0.93	0.77	***	0.52	***	0.488
OCCF	0.79	2.2	1.68	1.47	1.26	1.38	5.54	1.52	1.94	1331.72@	1.72	***	2.13	***
DOT @ Jaquith	2		1.5	1.64	3.41	2.41	3.78	3.38	1.73	39.90@	2.62	***	3.95	***
Dutch Hill *	**0.77**		**1.41**	**1.16**	**1.40**	**1.03**	**1.26**	**1.02**	**1.02**	**0.64**	***	**0.73**	***	**2.44**
Erie - Poolsbrook*	**1.39**		**1.5**	**1.14**	**1.86**	**	**	**	**	**	**	**	**	**
Nottingham	0.51		0.78	0.79	0.80	0.70	0.94	0.85	0.84	0.74	0.76	***	0.43	***
SHFD	12		8.02	9.89	9.72	7.02	8.09	6.27	7.20	10.74	***	7.12	***	16
Sevier Rd	1.8		2.07	2.58	2.56	**	**	**	**	**	**	**	**	**
Beaver Lake *			**0.51**	**0.53**	**0.85**	**0.70**	**0.72**	**0.64**	**0.69**	**0.65**	**0.38**	***	**0.5**	***
Ch. 3 Towers			3.36	3.88	3.35	9.66	7.79	7.69	5.39	2.44	3.72	***	0.45	***
Gen.Crushed Stone			2.77	1.98	2.13	**	**	**	**	**	**	**	**	**
Highland Forest			1.18	1.24	0.96	**	**	**	**	**	**	**	**	**
JD High School			1.32	1.29	1.12	1.10	1.48	1.16	1.06	1.28	***	1.13	***	0.951
Nob Hill			0.93	0.91	0.90	6.83	1.01	1.00	1.07	1.05	***	0.78	***	0.488
Pratts Falls			0.91	0.98	0.77	0.87	0.98	0.83	0.94	1.17	0.82	***	0.94	***
Southwood			0.6	1.14	1.01	1.08	1.05	0.97	1.09	1.01	0.80	***	0.93	***
Syracuse University			3.11	6.97	9.47	13.89	3.14	3.66	12.96	0.67	***	2.45	***	1.63

* Denotes Control Sites

** Site no longer sampled due to program re-evaluation

*** Site not sampled this year. Sites are sampled every other year.

@ A single elevated value will not be assumed to be indicative of a change at a specific site, rather a pattern of values must demonstrate a statistically significant difference.

Combined Ash

Site	Year													
	1999-Spring	1999-Fall	2000-Fall	2001-Fall	2002-Fall	2004-Spring	2005-Spring	2006-Spring	2007-Spring	2008-Spring	2009-Spring	2010-Spring	2011-Spring	2012-Spring
Day 1 and 2	256	153	109	123	177	72	191	246	250	243	168	200	197	116
Day 3, 4, and 5	242	205	154	137	220	445	142	148	276	240	126	172	129	127

Note: For reference purposes, the ATSDR investigation level for Dioxin/Furan TEQ is 50 pg/g and the EPA clean up level is 1,000 pg/g.

Attachment B

PCB Results through Year 2012 (pg/g dry weight)

Routine Soil Sites

Site	2000	2001	2002	2004	2005	2006	2007	2008	2009	2010	2011	2012
Clark Reservation	6010	2360	3150	2780	3610	2770	4110	2640	***	2960	***	2980
Jamesville Beach	1260	644	683	703	1110	781	1220	1610	***	589	***	707
OCCF	3080	5230	2000	2310	6940	3120	6320	2190	2810	***	2650	***
DOT @ Jaquith	16100	15400	45100	9220	67100	49100	18000	14200	34700	***	31800	***
Dutch Hill *	**2210**	**1170**	**1400**	**1200**	**1380**	**1140**	**1450**	**1340**	*******	**1060**	*******	**2350**
Erie - Poolsbrook *	**2620**	**1400**	**2020**	**	**	**	**	**	**	**	**	**
Nottingham	2140	2280	3610	1640	7380	2850	3050	2110	4200	***	2020	***
SHFD	3080	2970	1760	1900	2730	1610	2510	1730	***	2240	***	1260
Sevier Rd	1870	1600	2250	**	**	**	**	**	**	**	**	**
Beaver Lake *	**1970**	**1210**	**5250**	**2650**	**1420**	**1360**	**1360**	**1370**	**2450**	*******	**1110**	*******
Ch. 3 Towers	3360	2310	2490	1620	1830	1730	2220	1400	1510	***	723	***
General Crushed Stone	9430	3160	5450	**	**	**	**	**	**	**	**	**
Highland Forest	2120	1210	1270	**	**	**	**	**	**	**	**	**
JD High School	3580	1780	1732	1810	2640	1780	1720	2720	***	1750	***	1450
Nob Hill	3500	2480	2500	3440	2810	2970	2830	2950	***	2510	***	1820
Pratts Falls	1890	1840	1440	1620	1650	1220	1450	2050	1230	***	1910	***
Southwood	2240	2160	1150	1480	1470	1470	2750	1640	1640	***	1120	***
Syracuse University	10700	114000	11000	9510	6940	11400	10900	1170	***	78600	***	17400

* Denotes Control Sites
** Site no longer sampled due to program re-evaluation
*** Site not sampled this year. Sites are sampled every other year.

Combined Ash

Site	2000-Fall	2001-Fall	2002-Fall	2004-Spring	2005-Spring	2006-Spring	2007-Spring	2008-Spring	2009-Spring	2010-Spring	2011-Spring	2012-Spring
Day 1 and 2	79000	22000	13600	7850	2470	5770	3080	23000	3100	5930	1260	1800
Day 3, 4, and 5	4700	7020	6580	38000	33000	57000	3060	5550	51900	8840	6060	20500

PCB results prior to 2000 were all less than detection limits. Starting in 2000 detection limits were lowered so that usable concentrations were available.

Note: For reference purposes, the ATSDR indicates that typical mean PCB concentrations in background soil are less than 100,000 pg/g

Results reported in ng/g dry weight. Attachment C.

PAH	NYSDEC SCO[1] unrestricted	NYSDEC SCO[2] restricted	EPA screening level[3]	NYS Rural soil survey[4]	Tox.[5] Profile Rural soil background	Tox.[6] Profile Agr. Soil background	Tox.[7] Profile Urban soil background
Napthalene	12,000	100,000	3,900	17-24	NA	NA	NA
Acenaphthylene	100,000	100,000	3,400,000	110-500	NA	5	NA
Acenapthene	20,000	100,000	NA	150	1.7	6	NA
Fluorene	30,000	100,000	2,300,000	580	NA	9.7	NA
Phenanthrene	100,000	100,000	NA	8,500	30	48-140	NA
Anthracene	100,000	100,000	17,000,000	620	NA	11-13	NA
Fluoranthene	100,000	100,000	2,300,000	7,400	0.3-40	120-210	200-166,000
Pyrene	100,000	100,00	1,700,000	8,700	1-19.7	99-150	145-147,000
Benzo(A)Anthracene	1,000	1,000	150	2,900	5-20	56-110	169-59,000
Chrysene	1,000	1,000	15,000	1,300	38.3	78-120	251-640
Benzo(B,K)Fluoranthene	1,000	1,000	150-1500	1,500-3,300	10-110	58-250	15,000-62,000
Benzo(E)Pyrene	NA	NA	NA	NA	NA	53-130	60-14,000
Benzo(A)Pyrene	1,000	1,000	15	2,400	2-1,300	4.6-900	165-220
Perylene	NA	NA	NA	8,700	NA	NA	NA
Dibenzo(A,H)Anthracene	330	330	15	NA	NA	NA	NA
Indeno(1,2,3-CD)Pyrene	500	500	150	660	10-15	63-100	8,000-61,000
Benzo(G,H,I)Perylene	100,000	100,000	NA	630	10-70	66	900-47,000
2-Methylnaphthalene	NA	NA	310,000	NA	NA	NA	NA
2-Chloronaphthalene	NA	NA	NA	NA	NA	NA	NA

Sources:
1,2. New York State Department of Environmental Soil Cleanup Objectives, 9/06. Unrestricted use accounts for the use of the land for raising livestock.
3. USEPA residential soil screening levels (SSL's), September, 2008/
4. NYS Rural Soil Survey, NYSDEC, 2005.
5,6,7. Agency for Toxic Substances and Disease Registry (ATSDR), Toxicological Profiles, 1995/