Berry and Plant Tissue Monitoring Near the Eagle Mine and Humboldt Mill

Superior Watershed Partnership Community Environmental Monitoring Program

2015 - 2017 Monitoring Results and Analysis
July 2018

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Introduction

The Community Environmental Monitoring Program (CEMP) of the Eagle Mine, located in Marquette County, Michigan began in 2012 based on community concerns regarding potential environmental and cultural impacts associated with mining operations. The CEMP is implemented by two community-based organizations: the Superior Watershed Partnership (SWP) and the Community Foundation of Marquette County (CFMC) and is defined and governed by formal agreements between these organizations and Eagle Mine LLC, a subsidiary of Lundin Mining. The CEMP is designed to build a comprehensive and accurate picture of environmental impacts that may be a result of Eagle Mine's operations at the mine site, the Humboldt Mill, and along the designated transportation route. The CEMP is independent, transparent, and based on the highest scientific standards. Monitoring results of Eagle Mine's environmental performance are made available to the public on the CEMP website www.swpcemp.org.

During 2015, CEMP monitoring was expanded to evaluate concerns raised by the Keweenaw Bay Indian Community (KBIC) and other community members regarding potential impacts from mining operations on nearby edible plant species and species of high cultural value. Fruit bearing plants located near the Eagle Mine and the Humboldt Mill were identified as a priority for the study. They included; blueberry, juneberry, chokecherry, pin cherry, raspberry, blackberry, strawberry, thimbleberry, cranberry, juniper berry, and wild rice. Specific objectives of the monitoring program included:

- Locate and identify edible and culturally-important plant species in the immediate vicinity/adjacent to the Eagle Mine and Humboldt Mill sites.
- Obtain plant tissue (berries, leaves, and/or roots) for analysis at a certified laboratory.
- Evaluate concentrations of various metals observed in tissue samples and compare them to US Environmental Protection Agency's (US EPA) oral tolerable intake values (TDI), and/or the Food and Drug Administration's (FDA) recommended Daily Values (DV).
- Use data/results to monitor short-term and long-term changes that may indicate impacts from mining activities.

Methods, Results and Discussion

Study methods and activities included the following:

1) *Selection of test and control site locations including culturally important plant species*
   Monitoring locations consisted of two test sites that were established within a two mile radius of the Eagle Mine and the Humboldt Mill. Following reconnaissance efforts, a third site (control site) was established in an area that is unlikely to be impacted by mining activities (Appendix A). Exact sample locations within each designated two mile radius varied according to the distribution of each species. Sample dates and collection site coordinates are provided in Table 1.

2) *Plant tissue collection from test and control sites*
   Samples were collected over a three year period from 2015-2017. Plant tissue specimens were identified in the field and collected by experienced SWP/CEMP staff in accordance with guidelines established by White Water Associates, Inc. Plant species identified and collected included: blueberry fruit (*Vaccinium spp*; 2015-2017), blueberry plant tissue (stems, leaves, and roots; 2015), raspberry fruit (Rubus idaeus; 2015-2016), blackberry fruit (*Rubus spp*.; 2016-2017), strawberry plant tissue (*Fragaria spp*.; stems, leaves, and roots; 2017), and wintergreen plant tissue (*Gaultheria procumbens*; stems, leaves, and roots; 2017) (Tables 1 and 2). Sample collection occurred during the peak fruit maturation period for each species each year. During 2015, raspberry and blueberry plant tissue (roots, stems, leaves) was collected in addition to berries in order to provide sufficient material for the analysis of parameters including mercury and uranium.

A total of three species (nine total samples) were sampled each year during both 2015 and 2016. Four species (eleven total samples) were collected and analyzed during 2017. With the exception of wintergreen (collected only at the mine and control sites during 2017), sample sets for each targeted species each year consisted of one sample each from areas near the Eagle Mine, Humboldt Mill, and control sites (Tables 1 and 2). At each collection site, approximately 100 grams of each sample were collected for analysis. Samples were collected while wearing clean nitrile gloves, placed in labelled plastic bags, and stored on ice. Samples were shipped overnight to White Water Associates, Inc. for general chemistry and trace metal analysis.

3) *Laboratory analysis of plant tissue*
   Analytical services were conducted by White Water Associates, Inc. using analytical QA/QC and reporting protocols of NELAP, USEPA, CLP, DoD QSM, SW846, 40 CFR Part 136, ASTM, Standard Methods, and in-house Standard Operating Procedures (SOPs).

   Parameters and analytical methods for each sample type are listed in Appendix B. Plant tissue was dried and ground with a mortar and pestle before undergoing the sample digestion process and subsequent sample analysis. Detailed digestion process protocols as provided by White Water Associates, Inc. are provided in Appendix C.

Analytical Tests

Analytical test results for each sample are noted by species, location, and year in Tables 3-14 and Figures 1-6. Sample parameters were considered to be present if detected at values greater than the method detection limit (MDL) and results were considered to be non-detect (i.e. not present) if below the MDL. Non-detect sample results are reported as less than the respective MDL in Tables 3-14. For example, if the MDL for a given parameter was listed as 1.0 mg/kg and the parameter was not detected, the result would be listed as <1.0 mg/kg. The MDL is a value derived from a statistical calculation in which the lab is 99% confident that the result is greater than zero.

The laboratory also calculates a value known as the method quantitation limit (MQL). The MQL is higher than the MDL and is a value in which precision and accuracy limits can be reliably achieved (greater than 99% confidence). In the event that a sample result is detected above the MDL, but is not greater than the MQL, the sample result is considered estimated because the laboratory can only say with 99% confidence that the result is greater than zero. In these situations, the sample result is denoted with a "J" in Tables 3-14 indicating that it is an estimated value. Sample results greater than the MQL do not require any qualification since the laboratory can reliably test to those levels. The MDLs and MQLs for each parameter and sample type are summarized in Appendix B.

With a small sample size and insufficient length of study, it is difficult to determine whether any parameter values are trending at any of the sample sites. However, some observed values do stand out. For each species and tissue type (berry or plant tissue) collected during the three year study period, Tables 15-20 note when parameters recorded greater levels at one or both test sites (Eagle Mine and/or Humboldt Mill) than at the control site. When considering only the samples that were collected for a minimum of two consecutive years (blueberries, raspberries, and blackberries), three parameters recorded elevated levels consistently over time for certain species. Blueberry test site samples recorded elevated levels of iron each year (2015-2017), raspberry test site samples recorded elevated levels of manganese (2015-2016), and blackberry test site samples recorded elevated levels of sulfate (2016-2017) (Tables 15, 17, and 18). Alternatively, many parameters tested for were not detected among any of the three sample groups (mine, mill, control sites) over time. Such parameters varied by species tested and are noted in Table 21.

Additionally, some parameters recorded exceptionally elevated levels during one (or more) sampling events. For example, sulfate levels were elevated among all blueberry samples collected near the mill site. During 2017, sulfate in blueberries collected near the mill site was measured at 50,000 mg/kg. The second highest occurrence of sulfate for all sampling events was recorded at 16,000 mg/kg in blueberries collected near the mill site dur-

ing 2016. Sulfate was not detected in samples collected near the mill site during 2015 (Tables 4-6, Figure 2). The large increases observed in sulfate levels among blueberries collected at the mill site suggest that sulfate at that location may be trending upward; however, a larger sample size and longer sample duration would be necessary to draw any definitive conclusions. Sulfates often occur naturally in mineral deposits and are not uncommon in drinking water. When present at elevated levels, sulfates are sometimes associated with unpleasant taste and may contribute to adverse effects including diarrhea and dehydration. The World Health Organization (2004) has noted that food and drinking water can be major sources of sulfate, and the average daily intake from drinking water, air, and food is 500 mg.

One unexpected metal detected during 2017 sampling events was uranium. Uranium was detected in blackberries and strawberry plant samples collected near the mill site (0.045 mg/kg and 0.012 mg/kg, respectively) as well as wintergreen sampled at the mine site (0.0035 mg/kg) (Tables 11, 13, and 14; Figures 4-6). Notably, the uranium result observed in blackberries was also detected in the associated sample blank (0.00694 mg/kg) and thus may indicate laboratory contamination of the mill blackberry sample. Additionally, all three detected uranium levels are considered estimated values (flagged with a "J" in Tables 11, 13, and 14) because the results were less than the MQL but greater than the MDL. Uranium can occur naturally in some mineral deposits; however, its presence in water, air, and food may also result from release in tailings, nuclear emissions, dissolution in phosphate fertilizers, or coal combustion (Weir, 2004).

Tolerable Daily Intake Values (TDI)

Also listed in Tables 3-14 are non-carcinogen oral tolerable intake values (TDI) for some parameters tested (Persistent Organic Pollutants Toolkit, adapted from US EPA). Tolerable daily intake refers to the estimated amount of a potentially harmful substance in food or drinking water that can be ingested daily over a lifetime without appreciable health risk. For parameters in which a TDI value exists, equations were used to calculate the amount of berries (blueberries, raspberries, or blackberries) that would need to be ingested on a daily basis (in both kilograms and cups of berries) in order to exceed the TDI. For berry samples, these values were calculated using the following formulas:

Kg needed to ingest to exceed TDI = (TDI x 70 kg) / (Parameter test result)
Equivalent in cups of blueberries = (kg needed to exceed TDI) / (0.140 kg)
Equivalent in cups of raspberries = (kg needed to exceed TDI) / (0.125 kg)
Equivalent in cups of blackberries = (kg needed to exceed TDI) / (0.144 kg)

In the above formulas, 70 kg, equal to approximately 154 pounds, was used to represent the mass of the average adult, while 0.140 kg, 0.125 kg, 0.144 kg were used to represent the average mass of one cup of blueberries, raspberries, or blackberries, respectively.

Table 22 lists parameters that recorded measured values (in one or more sampling events) sufficient to surpass TDI values by ingesting less than one cup of blueberries, raspberries, and/or blackberries per day (TDI values for specific parameters are included in Tables 4-12). Parameters included antimony, cadmium, chromium, manganese, selenium sulfur, and vanadium. Many of the parameters listed occur naturally and in some cases are considered essential to plant and/or animal health and function (Table 23). However, negative health effects may be associated with long term exposure at elevated levels for some of the above listed parameters (Table 22).

Conclusions and Recommendations

The sample set collected during the 2015-2017 field seasons provides baseline data regarding metal concentrations in blueberry, raspberry, blackberry, strawberry, and wintergreen plants and/or berries collected near the Eagle Mine and Humboldt Mill sites. Referencing these data in future years may help to support whether or not bioaccumulation of metals is occurring in these plant species. Due to a small sample size and various other potential confounding factors including regional variation, species specific differences, insufficient length of study, and potential alternate sources of pollution, any differences noted between control and test samples cannot be reliably attributed to mining activities at this time. However, some test results did stand out and should continue to be tracked for continued trends in future years. Such results include:

- Parameters that consistently over the study period were measured in higher concentrations in test site samples (near both mill and mine sites) than in control samples:
  - Blueberries: Iron
  - Raspberries: Manganese
  - Blackberries: Sulfate
- Higher concentrations of sulfate observed in blueberry samples collected near the mill site than in blueberry samples collected near the mine and control sites.
- Detections of uranium in 2017 mill blackberry and strawberry plant samples as well as 2017 mine wintergreen samples. The uranium in the blackberry sample may be due to laboratory contamination.
- Parameters whose measured values (in one or more sampling events) were sufficient to surpass TDI values by ingesting less than one cup of blueberries, raspberries, and/or blackberries per day over a lifetime. Parameters included: antimony, cadmium, chromium, manganese, selenium sulfur, and vanadium

Recommendations for Future Sampling

Continued collection is recommended in order to expand the data set and provide more accurate support as to whether or not changes attributable to mining practices are occurring over time. Based upon initial findings and the difficulties experienced in locating and collecting sufficient quantities for some priority species at all three collection locations, CEMP staff recommend the continued annual collection of blueberries from each collection site to serve as an "indicator" sample species. While it is recognized that species specific differences do occur, blueberries were the most readily observed species at each sample site throughout the study. Streamlining sampling to include only one culturally significant species may serve to eliminate unnecessary and costly analysis fees yet still provide valuable data. As opposed to varying the species collected at each site, collection of multiple replicates of the same species (blueberries, if available) within each two mile sampling radius may provide added value to the study.

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TABLES AND FIGURES

Table 1. Summary of species sampled by date and location

Date	Species	Sample Location (Mine, Mill, Control)	Latitude	Longitude
7/17/2015	Blueberry	Mill	46.491366	-87.928213
7/22/2015	Blueberry	Mine	46.748434	-87.892364
7/23/2015	Blueberry	Control	46.630398	-87.48711
8/11/2015	Raspberry	Mill	46.491556	-87.927188
8/11/2015	Raspberry	Mine	45.75103	-87.90131
8/11/2015	Raspberry	Control	46.62634	-87.495252
7/20/2016	Blueberry	Mill	46.491366	-87.928213
7/21/2016	Blueberry	Mine	46.749817	-87.89633
7/21/2016	Blueberry	Control	46.630398	-87.48711
8/2/2016	Raspberry	Mill	46.490892	-87.928651
8/1/2016	Raspberry	Mine	45.75103	-87.90131
8/1/2016	Raspberry	Control	46.62634	-87.495252
8/15/2016	Blackberry	Mill	46.490892	-87.928651
8/15/2016	Blackberry	Mine	46.76169 46.75422	-87.86613 -87.86905
8/15/2016	Blackberry	Control	46.58628	-87.47905
8/2/2017	Blueberry	Mill	46.491366	-87.928213
8/2/2017	Blueberry	Mine	46.748434	-87.892364
8/3/2017	Blueberry	Control	46.630398	-87.48711
8/8/2017	Wintergreen plant	Mine	46.746264	-87.883007
8/24/2017	Wintergreen plant	Control	46.617179	-87.506946
8/24/2017	Strawberry Plant	Mill	46.491366	-87.928213
8/24/2017	Strawberry Plant	Mine	46.76169	-87.86613
8/24/2017	Strawberry Plant	Control	46.630398	-87.48711
8/24/2017	Blackberry	Mine	46.76169	-87.86613
8/24/2017	Blackberry	Control	46.58628	-87.47905
9/6/2017	Blackberry	Mill	46.490892	-87.928651

Table 2. Summary of species sampled by year

2015			2016			2017		
Blueberries	1	Mine	**Blueberries**	1	Mine	**Blueberries**	1	Mine
	2	Mill		2	Mill		2	Mill
	3	Control		3	Control		3	Control
Raspberries	4	Mine	**Raspberries**	4	Mine	**Blackberries**	4	Mine
	5	Mill		5	Mill		5	Mill
	6	Control		6	Control		6	Control
Blueberry Plant	7	Mine	**Blackberries**	7	Mine	**Strawberry Plant**	7	Mine
	8	Mill		8	Mill		8	Mill
	9	Control		9	Control		9	Control
						Wintergreen Plant	10	Mine
							11	Control

Table 3. Laboratory test results for blueberry plants by parameter and sample location

PARAMETER	MINE RESULT (mg/kg)	MILL RESULT (mg/kg)	CONTROL RESULT (mg/kg)
Aluminum	110	410	62
Ammonia-N	<54	<56	<46
Antimony	<2	<2	<1.9
Arsenic	<2	<2	<1.9
Barium	130	160	59
Beryllium	<0.04	<0.04	<0.037
Boron	23	30	48
Cadmium	<0.1	<0.1	<0.093
Calcium	7100	10000	6200
Chromium	2.6	4	2.3
Cobalt	<0.2	0.35 J	0.27 J
Copper	10	9	6.9
Iron	150	650	72
Lead	<1	<1	<0.93
Lithium	0.91 J	1.4 J	0.65 J
Magnesium	1900 J	3100	2100
Manganese	1.1	1.4 J	1.7 J
Molybdenum	<0.3	<0.3	<0.28
Mercury	<0.02	<0.023	<0.034
Nickel	1.6 J	1.3 J	<0.93
Nitrate/Nitrite-N	57	3900	52
Potassium	4300	5300	3100
Selenium	2.1 J	2.6 J	<1.9
Silver	0.94 J	1.6	0.89 J
Sodium	<50	<50	<46
Strontium	6.2	15	6.2
Sulfate	<3200	5500 J	3100 J
Sulfur (mg/L)*	639	986	228
Thallium	<2	<2	<1.9
Total Kjeldahl N	8000	7400	4400
Total Phosphorus	960	890	700
Uranium	<9.5	<11.3	<17.1
Vanadium	<0.4	1.3 J	<0.37
Zinc	29	35	33

* Test results for Sulfur measured in mg/L

"**J**" Indicates that the quantitation is an estimated value because the result is less than the sample method quantitation limit (MQL) but greater than the method detection limit (MDL)

All parameters that were not detected in a sample are listed as < the respective MDL

Figure 1 a-f. Bar graphs comparing test results (mg/kg) for blueberry plant samples collected near all three sample sites (mine, mill, control) during 2015 for aluminum, barium, boron, calcium, chromium, and cobalt (respectively).

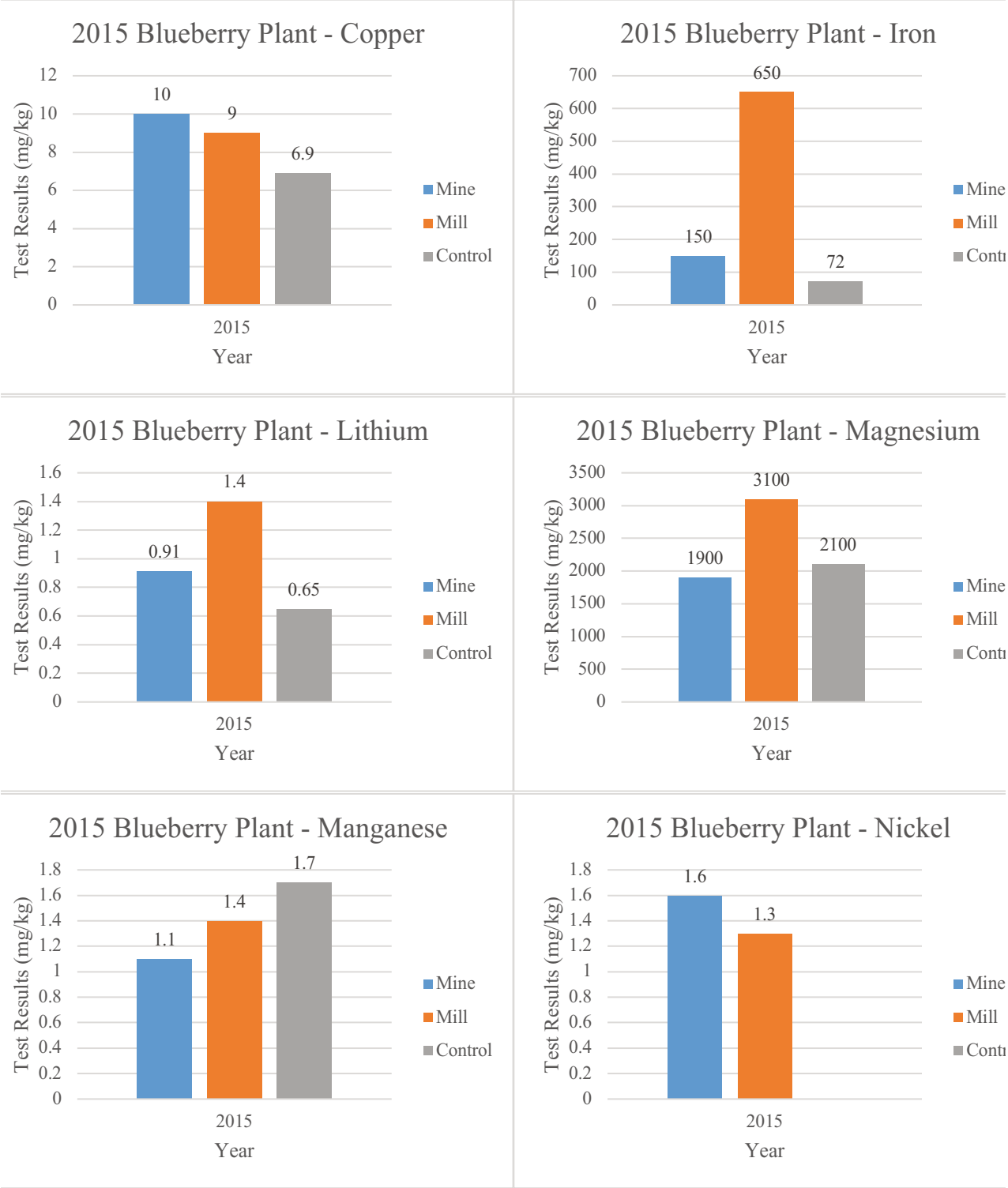


Figure 1 g-l. Bar graphs comparing test results (mg/kg) for blueberry plant samples collected near all three sample sites (mine, mill, control) during 2015 for copper, iron, lithium, magnesium, manganese, and nickel (respectively).

Figure 1 m-r. Bar graphs comparing test results (mg/kg) for blueberry plant samples collected near all three sample sites (mine, mill, control) during 2015 for nitrate/nitrite, potassium, selenium, silver, strontium, and sulfate (respectively).

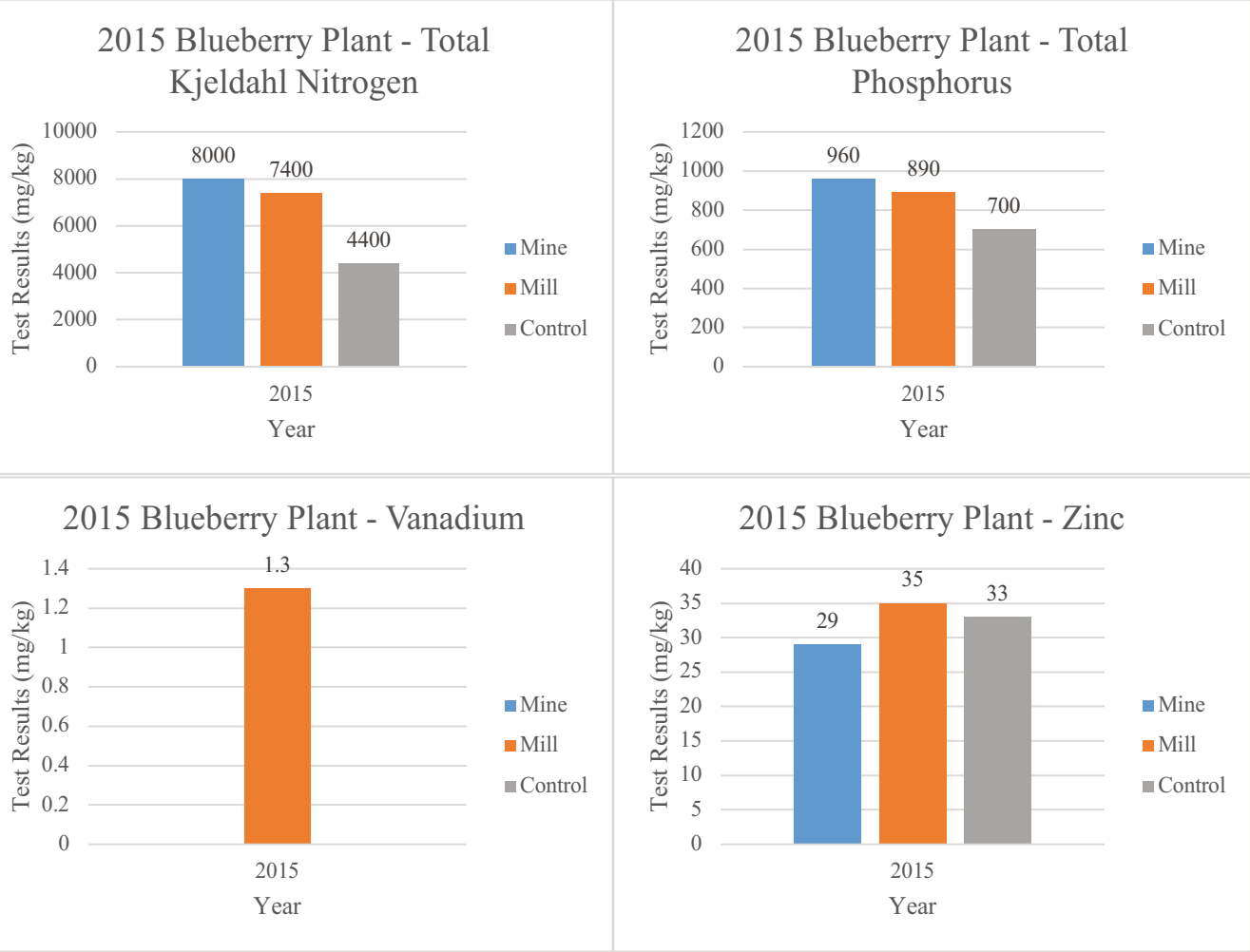


Figure 1 s-v. Bar graphs comparing test results (mg/kg) for blueberry plant samples collected near all three sample sites (mine, mill, control) during 2015 for total Kjeldahl nitrogen, phosphorus, vanadium, and zinc (respectively).

Parameter	US EPA Oral Tolerable Daily Intake Values (TDI), mg/kg-d	**Table 4.** Laboratory test results for blueberries sampled near the mine site from 2015-2017								
		2015 Result (mg/kg)	kg needed to ingest to exceed TDI*	Equivalent in cups of berries**	2016 Result (mg/kg)	kg needed to ingest to exceed (TDI)*	Equivalent in cups of berries**	2017 Result (mg/kg)	kg needed to ingest to exceed TDI*	Equivalent in cups of berries**
Aluminum	1	**21 J**	3.33	23.8	**34 J**	2.06	14.71	**32 J**	2.19	15.6
Ammonia-N	-	**<130**	-	-	**2.2**	-	-	**2.2 J**	-	-
Antimony	0.0004	**<1.8**	-	-	**<2.0**	-	-	**2.8 J**	0.01	0.1
Arsenic	0.0003	**<1.8**	-	-	**<3.5**	-	-	**<4.3**	-	-
Barium	0.2	**32**	0.44	3.1	**21**	0.67	4.76	**14**	1.00	7.1
Beryllium	0.002	**<0.036**	-	-	**<0.039**	-	-	**<0.040**	-	-
Boron	0.2	**9 J**	1.56	11.1	**8 J**	1.75	12.50	**4 J**	3.50	25.0
Cadmium	0.001	**<0.091**	-	-	**0.51**	0.14	0.98	**<0.13**	-	-
Calcium		**2100**	-	-	**1400**	-	-	**910**	-	-
Chromium	0.003	**0.94**	0.22	1.6	**<0.098**	-	-	**0.26 J**	0.81	5.8
Cobalt	-	**0.25 J**	-	-	**<0.20**	-	-	**<0.22**	-	-
Copper	0.04	**4.7**	0.60	4.3	**3.2**	0.88	6.25	**4.2**	0.67	4.8
Iron	0.7	**35**	1.40	10.0	**56**	0.88	6.25	**53**	0.92	6.6
Lead	-	**<0.91**	-	-	**<0.98**	-	-	**<1.5**	-	-
Lithium	0.02	**<0.6**	-	-	**<3.9**	-	-	**<5.0**	-	-
Magnesium	-	**630**	-	-	**670**	-	-	**490**	-	-
Manganese	0.14	**260**	0.04	0.3	**130**	0.08	0.54	**170**	0.06	0.4
Molybdenum	0.005	**<0.3**	-	-	**<0.49**	-	-	**<6.8**	-	-
Mercury	-	**-**	-	-	**<0.074**	-	-	**<0.023**	-	-
Nickel	0.02	**0.93 J**	1.51	10.8	**1.6 J**	0.88	6.25	**1.3 J**	1.08	7.7
Nitrate/Nitrite-N	-	**110 J**	-	-	**85 J**	-	-	**<150**	-	-
Potassium	-	**5900**	-	-	**4600**	-	-	**4900**	-	-
Selenium	0.005	**<1.8**	-	-	**<4.9**	-	-	**6 J**	0.06	0.4
Silver	0.005	**<0.27**	-	-	**-**	-	-	**-**	-	-
Sodium	-	**<45**	-	-	**<49**	-	-	**<72**	-	-
Strontium	0.6	**2.2**	19.09	136.4	**2.2**	19.09	136.36	**1.4**	30.00	214.3

Parameter	US EPA Oral Tolerable Daily Intake Values (TDI), mg/kg-d	2015 Result (mg/kg)	kg needed to ingest to exceed TDI*	Equivalent in cups of berries**	2016 Result (mg/kg)	kg needed to ingest to exceed (TDI)*	Equivalent in cups of berries**	2017 Result (mg/kg)	kg needed to ingest to exceed TDI*	Equivalent in cups of berries**
Table 4. Laboratory test results for blueberries sampled near the mine site from 2015-2017										
Sulfate	-	**2800 J**	-	-	**2600J**	-	-	**13000**	-	-
Thallium	0.00007	**<1.8**	-	-	**<4.9**	-	-	**<4.2**	-	-
Total Kjeldahl N	-	**4400**	-	-	**1500**	-	-	**3900**	-	-
Total Phosphorus	-	**760**	-	-	**650**	-	-	**660**	-	-
Uranium	0.0002	**-**	-	-	**-**	-	-	**-**	-	-
Vanadium	0.001	**<0.36**	-	-	**<0.59**	-	-	**<0.58**	-	-
Zinc	0.3	**11**	1.91	13.6	**6.6**	3.18	22.73	**6.8**	3.09	22.1

* Based on body weight of 70 kg (approximately 154 lb), and 1 cup of blueberries = 140 grams = 0.140 kg

Calculated using the formula: (TDI x 70 kg)/Test Result

** Based on 1 cup of blueberries = 140 grams = 0.140 kg

Calculated using the formula: (kg needed to exceed TDI)/(0.140 kg)

"**J**" Indicates that the quantitation is an estimated value because the result is less than the sample method quantitation limit (MQL) but greater than the method detection limit (MDL)

All parameters that were not detected in a sample are listed as < the respective MDL

Parameter	**Table 5.** Laboratory test results for blueberries sampled near the mill site from 2015-2017									
	US EPA Oral Tolerable Daily Intake Values (TDI), mg/kg-d	**2015 Result (mg/kg)**	**kg needed to ingest to exceed TDI***	**Equivalent in cups of berries****	**2016 Result (mg/kg)**	**kg needed to ingest to exceed (TDI)***	**equivalent in cups of berries****	**2017 Result (mg/kg)**	**kg needed to ingest to exceed TDI***	**Equivalent in cups of berries****
Aluminum	1	**16 J**	4.38	31.3	**16 J**	4.38	31.25	**14 J**	5.00	35.7
Ammonia-N	-	**<160**	-	-	**2.2**	-	-	**<2.0**	-	-
Antimony	0.0004	**<1.9**	-	-	**<2.0**	-	-	**3.5 J**	0.01	0.1
Arsenic	0.0003	**<1.9**	-	-	**<3.7**	-	-	**<4.3**	-	-
Barium	0.2	**20**	0.70	5.0	**13**	1.08	7.69	**14**	1.00	7.1
Beryllium	0.002	**<0.037**	-	-	**<0.041**	-	-	**<0.040**	-	-
Boron	0.2	**6 J**	2.33	16.7	**5 J**	2.80	20.00	**5 J**	2.80	20.0
Cadmium	0.001	**<0.093**	-	-	**0.37 J**	0.19	1.35	**<0.13**	-	-
Calcium	-	**1400**	-	-	**1200**	-	-	**1100**	-	-
Chromium	0.003	**1.2**	0.18	1.3	**<0.10**	-	-	**0.31**	0.68	4.8
Cobalt	-	**<0.19**	-	-	**<0.20**	-	-	**<0.22**	-	-
Copper	0.04	**5.7**	0.49	3.5	**3.2**	0.88	6.25	**3.9**	0.72	5.1
Iron	0.7	**24**	2.04	14.6	**33**	1.48	10.61	**20**	2.45	17.5
Lead	-	**<0.93**	-	-	**<1.0**	-	-	**<1.5**	-	-
Lithium	0.02	**<0.56**	-	-	**<4.1**	-	-	**<5.0**	-	-
Magnesium	-	**630**	-	-	**540**	-	-	**500**	-	-
Manganese	0.14	**160**	0.06	0.4	**120**	0.08	0.58	**200**	0.05	0.4
Molybdenum	0.005	**<0.28**	-	-	**<0.51**	-	-	**<6.8**	-	-
Mercury	-	**-**	-	-	**<0.077**	-	-	**<0.019**	-	-
Nickel	0.02	**2.6 J**	0.54	3.8	**2.4 J**	0.58	4.17	**1.9 J**	0.74	5.3
Nitrate/Nitrite-N	-	**220**	-	-	**89 J**	-	-	**<130**	-	-
Potassium	-	**5300**	-	-	**4300**	-	-	**4600**	-	-
Selenium	0.005	**<1.9**	-	-	**<5.1**	-	-	**<5.9**	-	-
Silver	0.005	**<0.28**	-	-	**-**	-	-	**-**	-	-
Sodium	-	**<46**	-	-	**<51**	-	-	**<72**	-	-
Strontium	0.6	**3.6**	11.67	83.3	**2.5**	16.80	120	**2.9**	14.48	103.4

Table 5. Laboratory test results for blueberries sampled near the mill site from 2015-2017

Parameter	US EPA Oral Tolerable Daily Intake Values (TDI), mg/kg-d	2015 Result (mg/kg)	kg needed to ingest to exceed TDI*	Equivalent in cups of berries**	2016 Result (mg/kg)	kg needed to ingest to exceed (TDI)*	equivalent in cups of berries**	2017 Result (mg/kg)	kg needed to ingest to exceed TDI*	Equivalent in cups of berries**
Sulfate	-	**<2400**	-	-	**16000**	-	-	**50000**	-	-
Thallium	0.00007	**<1.9**	-	-	**<5.1**	-	-	**<4.2**	-	-
Total Kjeldahl Nitrogen	-	**2800**	-	-	**5000**	-	-	**5100**	-	-
Total Phosphorus	-	**440**	-	-	**700**	-	-	**900**	-	-
Uranium	0.0002	**-**	-	-	**-**	-	-	**-**	-	-
Vanadium	0.001	**<0.37**	-	-	**<0.61**	-	-	**<0.58**	-	-
Zinc	0.3	**11**	1.91	13.6	**7.4**	2.84	20.27	**7.6**	2.76	19.7

* Based on body weight of 70 kg (approximately 154 lb), and 1 cup of blueberries = 140 grams = 0.140 kg

Calculated using the formula: (TDI x 70 kg)/Test Result

** Based on 1 cup of blueberries = 140 grams = 0.140 kg

Calculated using the formula: (kg needed to exceed TDI)/(0.140 kg)

"**J**" Indicates that the quantitation is an estimated value because the result is less than the sample method quantitation limit (MQL) but greater than the method detection limit (MDL)

All parameters that were not detected in a sample are listed as < the respective MDL

Parameter	**Table 6.** Laboratory test results for blueberries sampled at the control site from 2015-2017									
	US EPA Oral Tolerable Daily Intake Values (TDI), mg/kg-d	**2015 Result (mg/kg)**	**kg needed to ingest to exceed TDI***	**Equivalent in cups of berries****	**2016 Result (mg/kg)**	**kg needed to ingest to exceed (TDI)***	**equivalent in cups of berries****	**2017 Result (mg/kg)**	**kg needed to ingest to exceed TDI***	**Equivalent in cups of berries****
Aluminum	1	**<8.9**	-	-	**<10**	-	-	**16 J**	-	-
Ammonia-N	-	**<110**	-	-	**<2.0**	-	-	**<2.0**	-	-
Antimony	0.0004	**<1.8**	-	-	**<2.0**	-	-	**<2.5**	-	-
Arsenic	0.0003	**<1.8**	-	-	**<3.6**	-	-	**<4.0**	-	-
Barium	0.2	**7.5**	1.87	13.3	**15**	0.93	6.67	**13**	1.08	7.7
Beryllium	0.002	**<0.036**	-	-	**<0.040**	-	-	**<0.037**	-	-
Boron	0.2	**6 J**	2.33	16.7	**9 J**	1.56	11.11	**6 J**	2.33	16.7
Cadmium	0.001	**<0.089**	-	-	**0.4 J**	0.18	1.25	**<0.12**	-	-
Calcium	-	**840**	-	-	**1200**	-	-	**1200**	-	-
Chromium	0.003	**0.66**	0.32	2.3	**0.22 J**	0.95	6.82	**0.27 J**	0.78	5.6
Cobalt	-	**0.26 J**	-	-	**<0.20**	-	-	**<0.20**	-	-
Copper	0.04	**4.6**	0.61	4.3	**4.9**	0.57	4.08	**3.3**	0.85	6.1
Iron	0.7	**17**	2.88	20.6	**24**	2.04	14.58	**19**	2.58	18.4
Lead	-	**<0.89**	-	-	**<1.0**	-	-	**<1.4**	-	-
Lithium	0.02	**<0.54**	-	-	**<4.0**	-	-	**<4.6**	-	-
Magnesium	-	**510**	-	-	**630**	-	-	**530**	-	-
Manganese	0.14	**130**	0.08	0.5	**140**	0.07	0.50	**210**	0.05	0.3
Molybdenum	0.005	**<0.27**	-	-	**<0.50**	-	-	**<6.8**	-	-
Mercury (9/22/15)	-	**-**	-	-	**<0.071**	-	-	**<0.035**	-	-
Nickel	0.02	**<0.89**	-	-	**1.6 J**	0.88	6.25	**<1.2**	-	-
Nitrate/Nitrite-N	-	**82**	-	-	**<110**	-	-	**<150**	-	-
Potassium	-	**3300**	-	-	**5200**	-	-	**5000**	-	-
Selenium	0.005	**2 J**	0.18	1.25	**8 J**	0.04	0.31	**7.4 J**	0.05	0.3
Silver	0.005	**<0.27**	-	-	**-**	-	-	**-**	-	-
Sodium	-	**<45**	-	-	**<50**	-	-	**<67**	-	-

Strontium	0.6	**2**	21.00	150.0	**3.8**	11.05	78.95	**1.8**	23.33	166.7
Sulfate	-	**2200 J**	-	-	**5900 J**	-	-	**6700 J**	-	-
Thallium	0.00007	**<1.8**	-	-	**<5.0**	-	-	**<3.9**	-	-
Total Kjeldahl Nitrogen	-	**2500**	-	-	**3700**	-	-	**3700**	-	-
Total Phosphorus	-	**450**	-	-	**950**	-	-	**850**	-	-
Uranium (9/22/15)	0.0002	**-**	-	-	**-**	-	-	**-**	-	-
Vanadium	0.001	**<0.36**	-	-	**<0.60**	-	-	**<0.54**	-	-
Zinc	0.3	**10**	2.10	15.0	**9.6**	2.19	15.63	**6.8**	3.09	22.1

* Based on body weight of 70 kg (approximately 154 lb), and 1 cup of blueberries = 140 grams = 0.140 kg

Calculated using the formula: (TDI x 70 kg)/Test Result

** Based on 1 cup of blueberries = 140 grams = 0.140 kg

Calculated using the formula: (kg needed to exceed TDI)/(0.140 kg)

"**J**" Indicates that the quantitation is an estimated value because the result is less than the sample method quantitation limit (MQL) but greater than the method detection limit (MDL)

All parameters that were not detected in a sample are listed as < the respective MDL

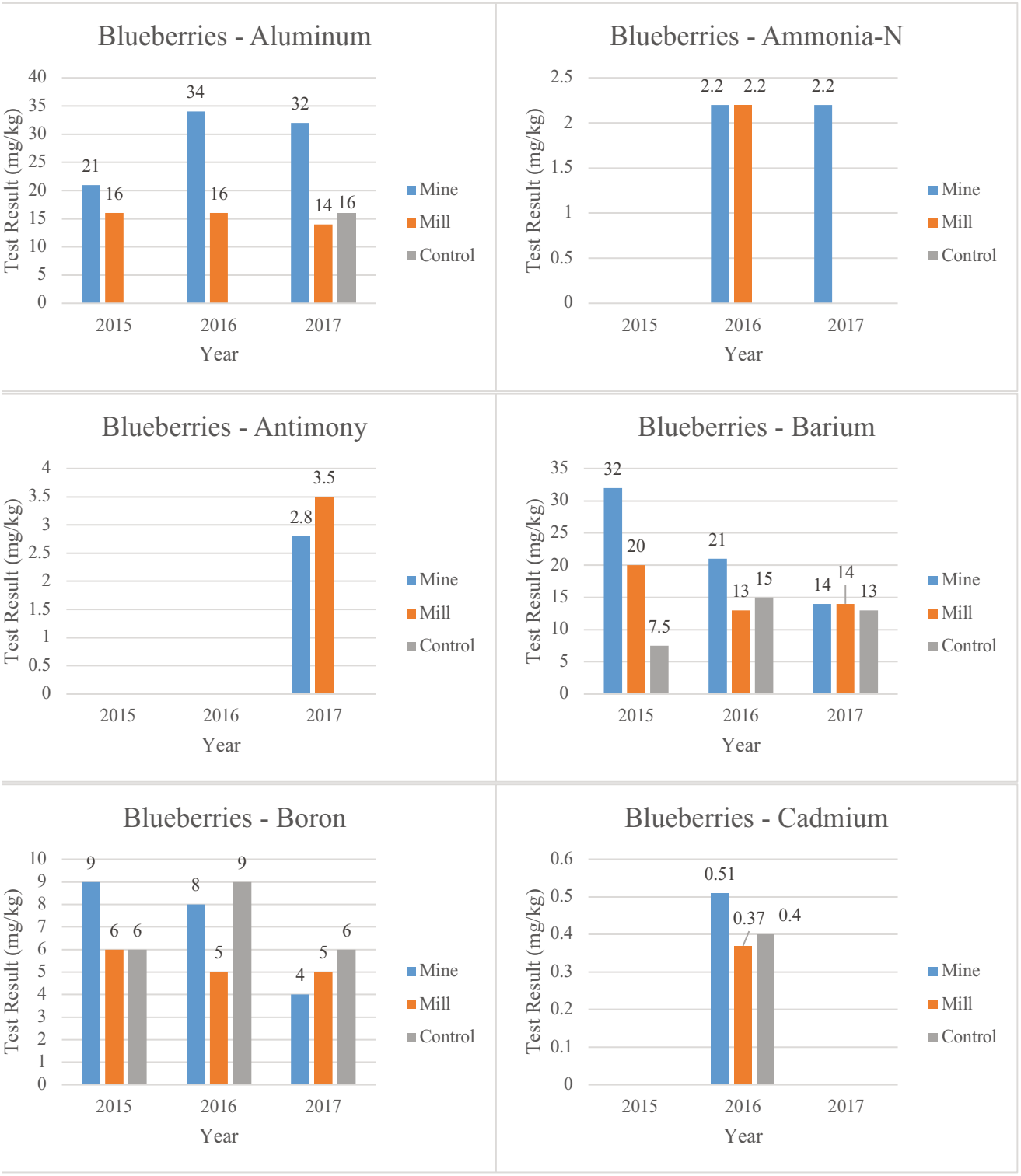


Figure 2 a-f. Bar graphs comparing test results (mg/kg) for blueberry samples collected near all three sample sites (mine, mill, control) from 2015-2017 aluminum, ammonia, antimony, barium, boron, and cadmium (respectively).

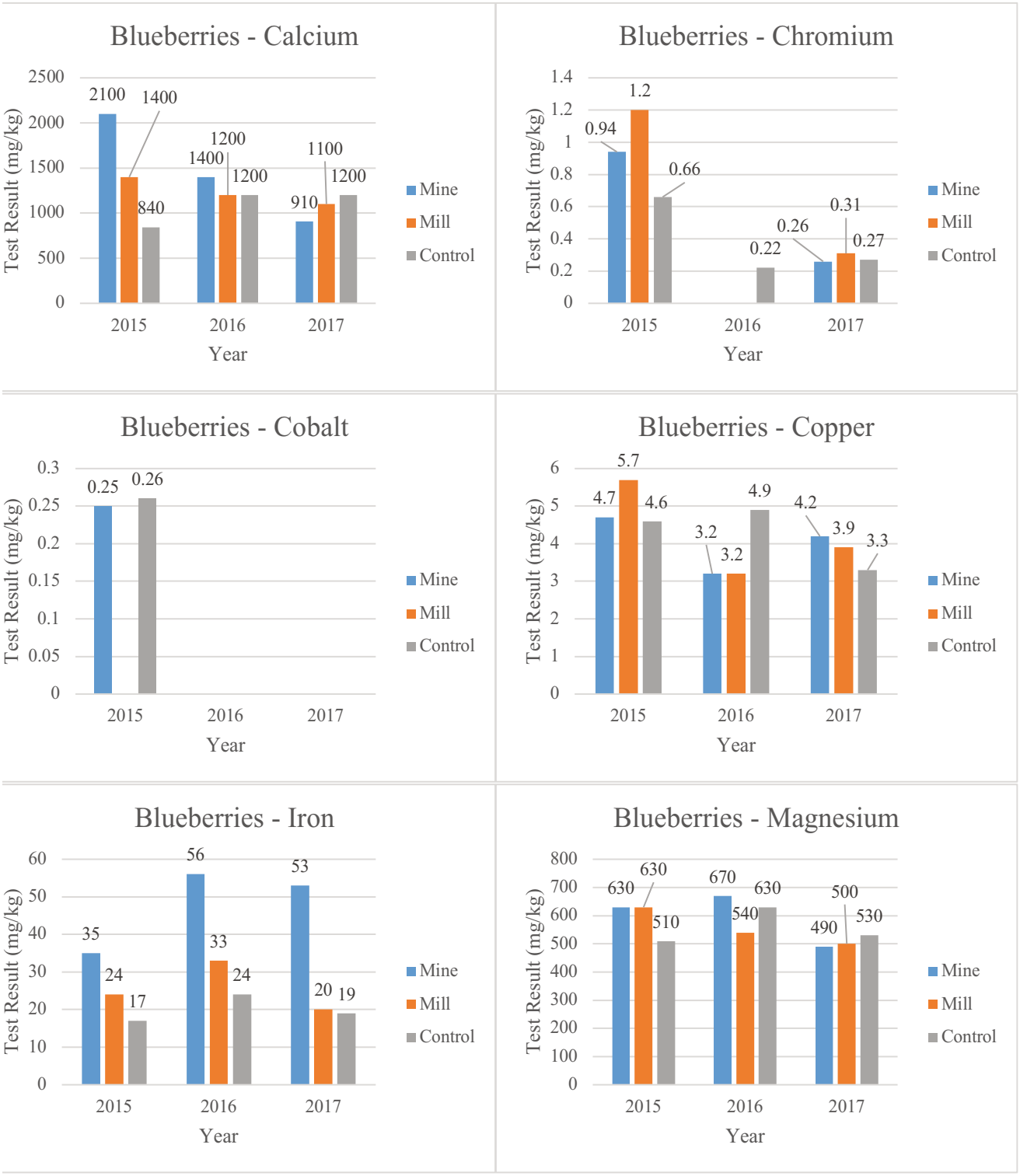
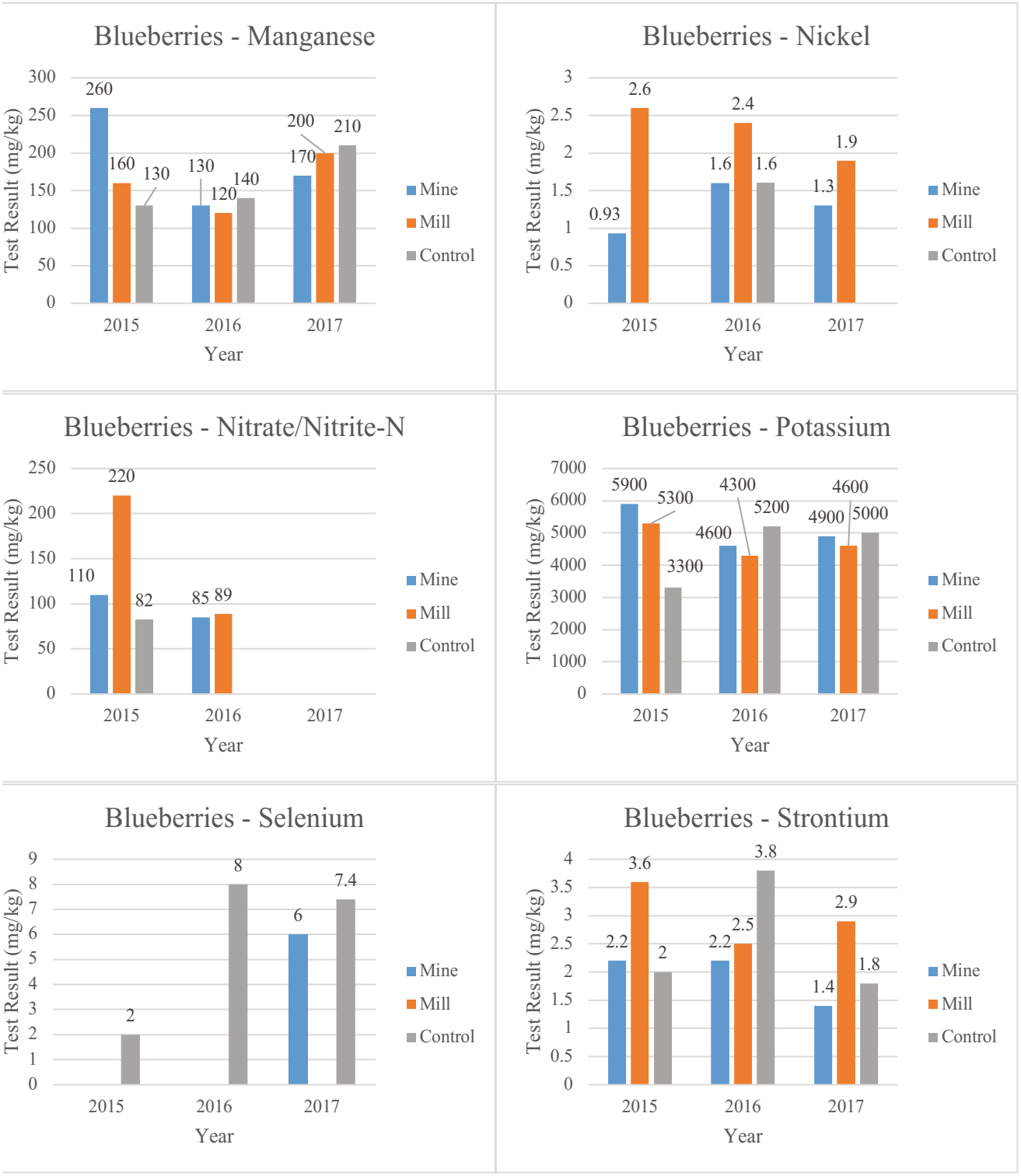


Figure 2 g-l. Bar graphs comparing test results (mg/kg) for blueberry samples collected near all three sample sites (mine, mill, control) from 2015-2017 calcium, chromium, cobalt, copper, iron, and magnesium (respectively).



ure 2 m-r. Bar graphs comparing test results (mg/kg) for blueberry samples collected near all three sample sites ne, mill, control) from 2015-2017 manganese, nickel, nitrate/nitrite, potassium, selenium, and strontium spectively).

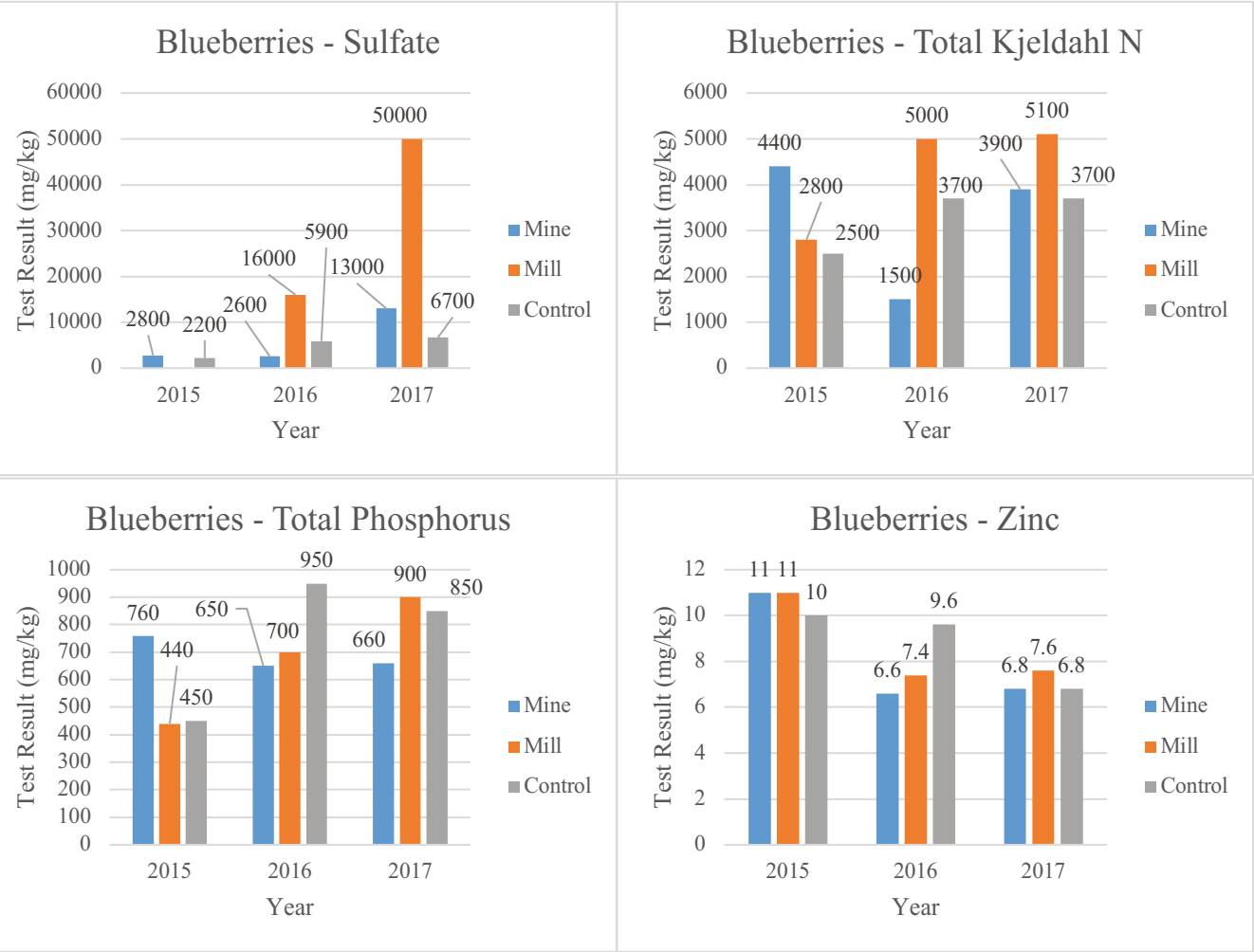


Figure 2 s-v. Bar graphs comparing test results (mg/kg) for blueberry samples collected near all three sample sites (mine, mill, control) from 2015-2017 sulfate, total kjeldahl nitrogen, phosphorus, and zinc (respectively).

Table 7. Laboratory test results for raspberries sampled near the mine site from 2015-2016

Parameter	US EPA Oral Tolerable Daily Intake Values (TDI), mg/kg-d	2015 Result (mg/kg)	kg needed to ingest to exceed TDI*	Equivalent in cups of berries**	2016 Result (mg/kg)	kg needed to ingest to exceed TDI*	Equivalent in cups of berries**
Aluminum	1	**<9.6**	-	-	**<10**	-	-
Ammonia-N	-	**<130**	-	-	**-**	-	-
Antimony	0.0004	**<2.0**	-	-	**<2.0**	-	-
Arsenic	0.0003	**<2.0**	-	-	**<3.6**	-	-
Barium	0.2	**14**	1.0	8.0	**22**	0.64	5.09
Beryllium	0.002	**<0.040**	-	-	**<0.040**	-	-
Boron	0.2	**15**	0.9	7.5	**20**	0.70	5.60
Cadmium	0.001	**<0.10**	-	-	**1.1**	0.06	0.51
Calcium	-	**2000**	-	-	**2700**	-	-
Chromium	0.003	**0.81**	0.3	2.1	**<0.10**	-	-
Cobalt	-	**<0.20**	-	-	**<0.20**	-	-
Copper	0.04	**9.3**	0.3	2.4	**4**	0.70	5.60
Iron	0.7	**54**	0.9	7.3	**43**	1.14	9.12
Lead	-	**<1.0**	-	-	**<1.0**	-	-
Lithium	0.02	**<0.58**	-	-	**<2.2**	-	-
Magnesium	-	**1800**	-	-	**1700**	-	-
Manganese	0.14	**320**	0.0	0.2	**170**	0.1	0.46
Molybdenum	0.005	**<0.29**	-	-	**0.88 J**	0.40	3.18
Mercury (Raspberry Plant)	-	**0.024**	-	-	**-**	-	-
Nickel	0.02	**2.4**	0.6	4.7	**1.7 J**	0.82	6.59
Nitrate/Nitrite-N	-	**78 J**	-	-	**110 J**	-	-
Potassium	-	**12000**	-	-	**9200**	-	-
Selenium	0.005	**<3.0**	-	-	**<5.0**	-	-
Silver	0.005	**<0.30**	-	-	**-**	-	-
Sodium	-	**<48**	-	-	**<50**	-	-
Strontium	0.6	**4.9**	8.6	68.6	**8**	5.25	42.0
Sulfate	-	**3200 J**	-	-	**3900 J**	-	-
Thallium	0.00007	**<2.0**	-	-	**<5.0**	-	-
Total Kjeldahl N	-	**8700**	-	-	**6400**	-	-
Total Phosphorus	-	**1600**	-	-	**2000**	-	-
Total Solids	-	**-**	-	-	**17**		
Uranium (raspberry plant)	-	**<10.6**	-	-	**-**	-	-
Vanadium	0.001	**<0.60**	-	-	**<0.60**	-	-
Zinc	0.3	**39**	0.5	4.3	**25**	0.84	6.72

* Based on body weight of 70 kg (approximately 154 lb); Calculated using the formula: (TDI x 70 kg)/Test Result
** Based on 1 cup of raspberries = 125 grams = 0.125 kg; Calculated as follows: (kg needed to exceed TDI) /(0.125 kg)
"J" = quantitation is an estimated value because the result is less than the sample method quantitation limit (MQL) but greater than the method detection limit (MDL); Parameters that were not detected in a sample are listed as < the respective MDL

Table 8. Laboratory test results for raspberries sampled near the mill site from 2015-2016

Parameter	US EPA Oral Tolerable Daily Intake Values (TDI), mg/kg-d	2015 Result (mg/kg)	kg needed to ingest to exceed TDI*	Equivalent in cups of berries**	2016 Result (mg/kg)	kg needed to ingest to exceed TDI*	Equivalent in cups of berries**
Aluminum	1	**<9.8**	-	-	**<9.6**	-	-
Ammonia-N	-	**130 J**	-	-	**-**	-	-
Antimony	0.0004	**<2.0**	-	-	**<1.9**	-	-
Arsenic	0.0003	**<2.0**	-	-	**<3.5**	-	-
Barium	0.2	**12**	1.17	9.33	**12**	1.17	9.33
Beryllium	0.002	**<0.040**	-	-	**<0.038**	-	-
Boron	0.2	**15**	0.93	7.47	**17**	0.824	6.59
Cadmium	0.001	**<0.10**	-	-	**1**	0.07	0.56
Calcium	-	**2500**	-	-	**2200**	-	-
Chromium	0.003	**0.87**	0.24	1.93	**<0.096**	-	-
Cobalt	-	**<0.20**	-	-	**<0.19**	-	-
Copper	0.04	**6.7**	0.42	3.34	**4.3**	0.651	5.21
Iron	0.7	**44**	1.11	8.91	**29**	1.69	13.52
Lead	-	**<1.0**	-	-	**<0.96**	-	-
Lithium	0.02	**<0.59**	-	-	**<2.1**	-	-
Magnesium	-	**1900**	-	-	**1500**	-	-
Manganese	0.14	**98**	0.10	0.80	**110**	8.91E-02	0.7
Molybdenum	0.005	**<0.29**	-	-	**<0.29**	-	-
Mercury* Raspberry Plant**	-	**<0.028**	-	-	**-**	-	-
Nickel	0.02	**1.5 J**	0.93	7.47	**5.8**	0.241	1.93
Nitrate/Nitrite-N	-	**380**	-	-	**78 J**	-	-
Potassium	-	**13000**	-	-	**10000**	-	-
Selenium	0.005	**3.8 J**	0.09	0.74	**5.6 J**	0.063	0.5
Silver	0.005	**<0.30**	-	-	**-**	-	-
Sodium	-	**51 J**	-	-	**<48**	-	-
Strontium	0.6	**6.6**	6.36	50.91	**9.1**	4.62	36.92
Sulfate	-	**2800 J**	-	-	**3000 J**	-	-
Thallium	0.00007	**<2.0**	-	-	**<4.8**	-	-
Total Kjeldahl N	-	**10000**	-	-	**7600**	-	-
Total Phosphorus	-	**2000**	-	-	**1600**	-	-
Total Solids	-	**-**	-	-	**17**	-	-
Uranium (Raspberry Plant)	-	**<13.5**	-	-	**-**	-	-
Vanadium	0.001	**<0.60**	-	-	**<0.58**	-	-
Zinc	0.3	**43**	0.49	3.91	**24**	0.875	7

* Based on body weight of 70 kg (approximately 154 lb); Calculated using the formula: (TDI x 70 kg)/Test Result
** Based on 1 cup of raspberries = 125 grams = 0.125 kg; Calculated as follows: (kg needed to exceed TDI) /(0.125 kg)
"J" = quantitation is an estimated value because the result is less than the sample method quantitation limit (MQL) but greate than the method detection limit (MDL)
Parameters that were not detected in a sample are listed as < the respective MDL

Table 9. Laboratory test results for raspberries sampled at the control site from 2015-2016

Parameter	US EPA Oral Tolerable Daily Intake Values (TDI), mg/kg-d	2015 Result (mg/kg)	kg needed to ingest to exceed TDI*	Equivalent in cups of berries**	2016 Result (mg/kg)	kg needed to ingest to exceed TDI*	Equivalent in cups of berries**
Aluminum	1	**<10**	-	-	**12 J**	5.83	46.67
Ammonia-N	-	**<140**	-	-	**-**	-	-
Antimony	0.0004	**<2.0**	-	-	**<2.0**	-	-
Arsenic	0.0003	**<2.0**	-	-	**<3.6**	-	-
Barium	0.2	**13**	1.08	8.62	**9.1**	1.54	12.31
Beryllium	0.002	**<0.040**	-	-	**<0.040**	-	-
Boron	0.2	**14**	1.00	8.00	**18**	0.78	6.22
Cadmium	0.001	**<0.10**	-	-	**0.95**	0.07	0.59
Calcium	-	**3000**	-	-	**2400**	-	-
Chromium	0.003	**0.87**	0.24	1.93	**<0.10**	-	-
Cobalt	-	**<0.20**	-	-	**<0.20**	-	-
Copper	0.04	**5.4**	0.52	4.15	**4.4**	0.64	5.09
Iron	0.7	**51**	0.96	7.69	**45**	1.09	8.71
Lead	-	**<1.0**	-	-	**<1.0**	-	-
Lithium	0.02	**<0.62**	-	-	**<2.2**	-	-
Magnesium	-	**1700**	-	-	**1600**	-	-
Manganese	0.14	**39**	0.25	2.01	**29**	0.34	2.70
Molybdenum	0.005	**<0.31**	-	-	**0.35 J**	1.00	8.00
Mercury (Raspberry Plant)	-	**0.033**	-	-	**-**	-	-
Nickel	0.02	**1.1 J**	1.27	10.18	**1.9 J**	0.74	5.89
Nitrate/Nitrite-N	-	**73 J**	-	-	**<95**	-	-
Potassium	-	**10000**	-	-	**9700**	-	-
Selenium	0.005	**<3.0**	-	-	**<5.0**	-	-
Silver	0.005	**<0.30**	-	-	**-**	-	-
Sodium	-	**<52**	-	-	**56 J**	-	-
Strontium	0.6	**5.7**	7.37	58.95	**5.4**	7.78	62.22
Sulfate	-	**3400 J**	-	-	**3000 J**	-	-
Thallium	0.00007	**<2.0**	-	-	**<5.0**	-	-
Total Kjeldahl	-	**4600**	-	-	**8500**	-	-
Total Phosphorus	-	**1700**	-	-	**2400**	-	-
Total Solids	-	**-**	-	-	**16**	-	-
Uranium (Raspberry Plant)	-	**<16.8**	-	-	**-**	-	-
Vanadium	0.001	**<0.60**	-	-	**0.65 J**	0.11	0.86
Zinc	0.3	**26**	0.81	6.46	**25**	0.84	6.72

* Based on body weight of 70 kg (approximately 154 lb); Calculated using the formula: (TDI x 70 kg)/Test Result
** Based on 1 cup of raspberries = 125 grams = 0.125 kg; Calculated as follows: (kg needed to exceed TDI) /(0.125 kg)
"J" = quantitation is an estimated value because the result is less than the sample method quantitation limit (MQL) but greater than the method detection limit (MDL)
Parameters that were not detected in a sample are listed as < the respective MDL

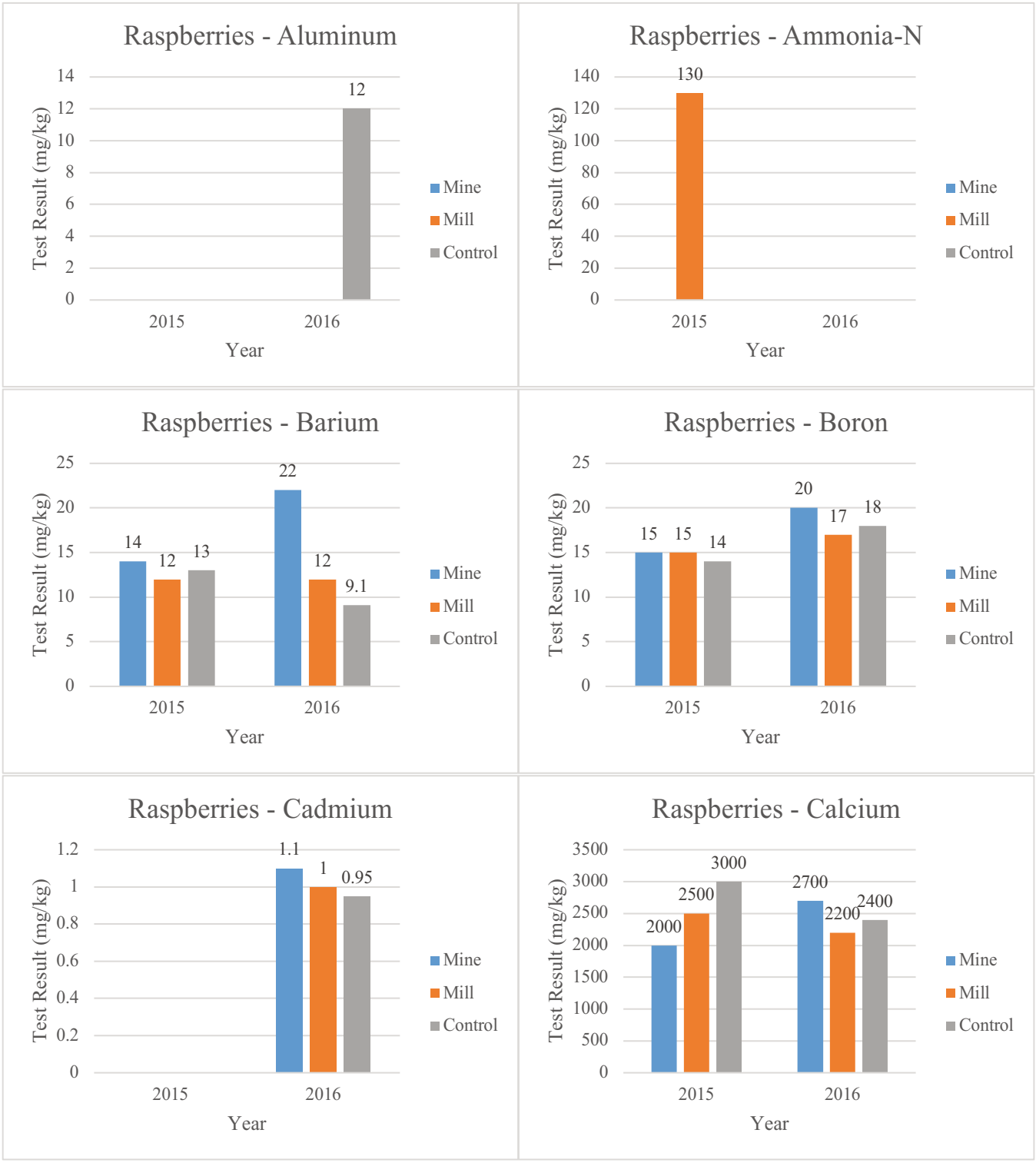


Figure 3 a-f. Bar graphs comparing test results (mg/kg) for raspberry samples collected near all three sample sites (mine, mill, control) from 2015-2016 for aluminum, ammonia, barium, boron, cadmium, and calcium (respectively).

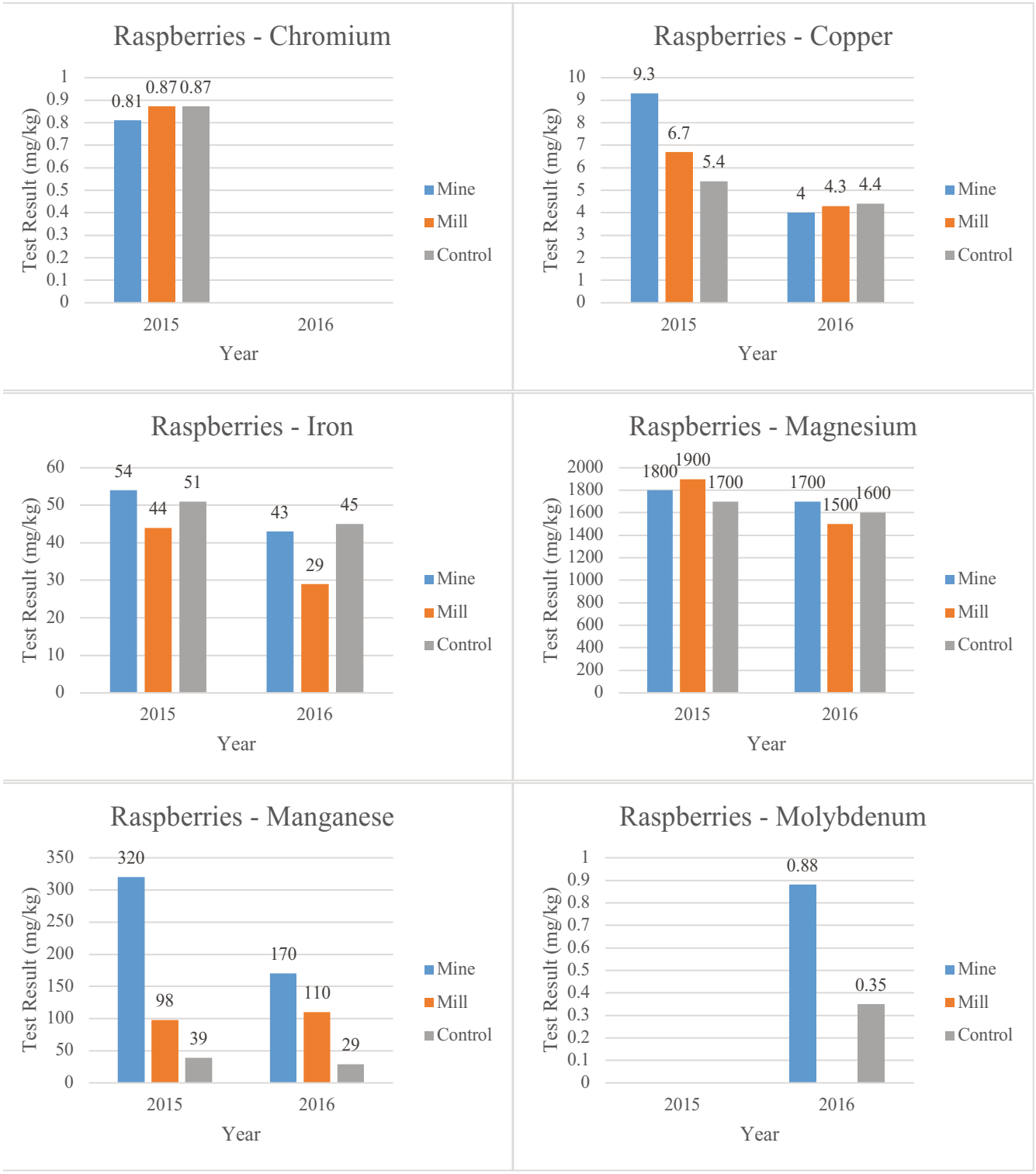


Figure 3 g -l. Bar graphs comparing test results (mg/kg) for raspberry samples collected near all three sample sites (mine, mill, control) from 2015-2016 for chromium, copper, iron, magnesium, manganese, and molybdenum (respectively).

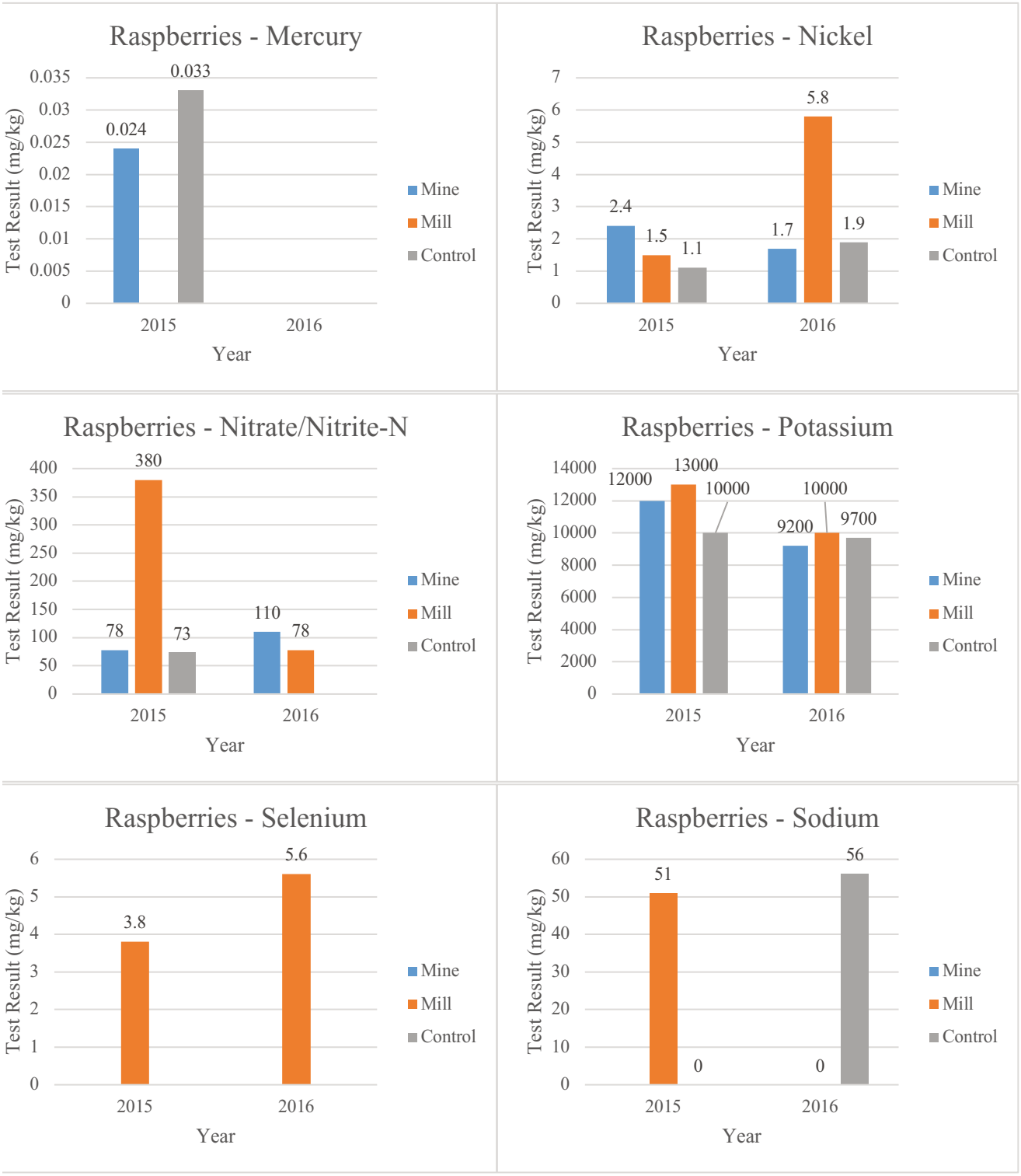


Figure 3 m-r. Bar graphs comparing test results (mg/kg) for raspberry samples collected near all three sample sites (mine, mill, control) from 2015-2016 for mercury, nickel, nitrate/nitrite, potassium, selenium, and sodium (respectively).

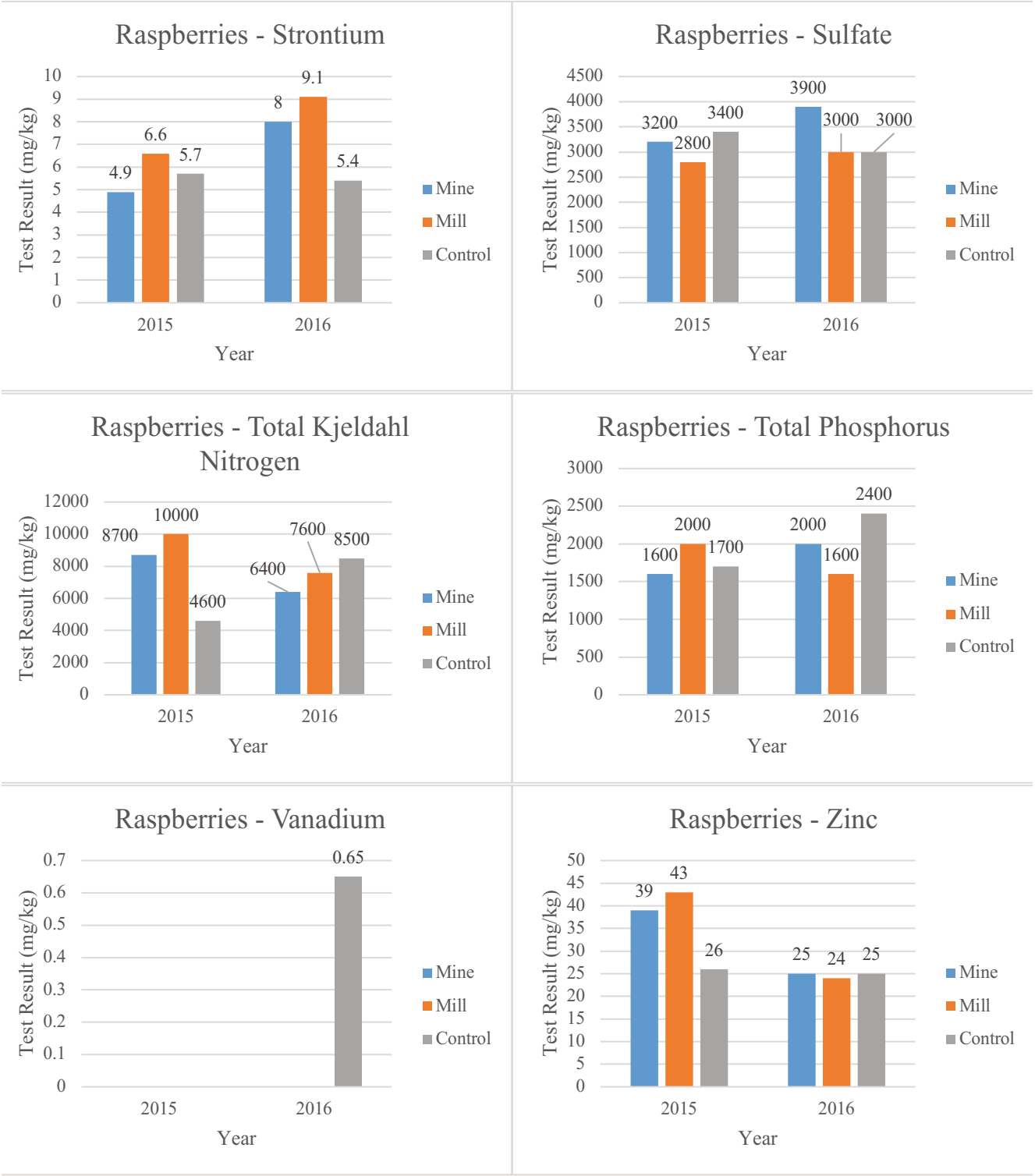


Figure 3 s-x. Bar graphs comparing test results (mg/kg) for raspberry samples collected near all three sample sites (mine, mill, control) from 2015-2016 for strontium, sulfate, total Kjeldahl nitrogen, phosphorus, vanadium, and zinc (respectively).

Table 10. Laboratory test results for blackberries sampled near the mine site from 2016-2017

Parameter	US EPA Oral Tolerable Daily Intake Values (TDI), mg/kg-d	2016 Result (mg/kg)	kg needed to ingest to exceed TDI*	Equivalent in cups of berries**	2017 Result (mg/kg)	kg needed to ingest to exceed TDI*	Equivalent in cups of berries**
Aluminum	1	**45**	1.556	10.80	**<4.6**	-	-
Ammonia-N	-	**<2.0**	-	-	**3.7 J**	-	-
Antimony	0.0004	**<2.0**	-	-	**<0.42**	-	-
Arsenic	0.0003	**<3.6**	-	-	**<0.42**	-	-
Barium	0.2	**32**	0.438	3.04	**4**	3.50	24.31
Beryllium	0.002	**<0.040**	-	-	**<0.029**	-	-
Boron	0.2	**16**	0.875	6.08	**2.5**	5.60	38.89
Cadmium	0.001	**1.1**	0.064	0.44	**0.045 J**	1.56	10.80
Calcium	-	**2100**	-	-	**377**	-	-
Chromium	0.003	**<0.10**	-	-	**0.36 J**	0.58	4.05
Cobalt	-	**<0.20**	-	-	**<0.052**	-	-
Copper	0.04	**6**	0.467	3.24	**1.5**	1.87	12.96
Iron	0.7	**40**	1.225	8.51	**6.9 J**	7.10	49.32
Lead	-	**<1.0**	-	-	**<0.25**	-	-
Lithium	0.02	**<2.2**	-	-	**<0.52**	-	-
Magnesium	-	**1700**	-	-	**281**	-	-
Manganese	0.14	**120**	0.08	0.57	**19.9**	0.49	3.42
Molybdenum	0.005	**0.92 J**	0.380	2.64	**0.25 J**	1.40	9.72
Mercury	-	**<0.0083**	-	-	**<0.0080**	-	-
Nickel	0.02	**1.2 J**	1.167	8.10	**<0.24**	-	-
Nitrate/Nitrite-N	-	**<65**	-	-	**<1.3**	-	-
Potassium	-	**13000**	-	-	**1920**	-	-
Selenium	0.005	**5.3 J**	0.066	0.46	**0.48 J**	0.73	5.06
Sodium	-	**<50**	-	-	**<13.6**	-	-
Strontium	0.6	**11**	3.818	26.52	**1.7**	24.71	171.57
Sulfate	-	**8800**	-	-	**70.1**	-	-
Sulfur	0.00007	**200**	0.000	0.00	**152**	0.00	0.00
Thallium	-	**<5.0**	-	-	**<0.31**	-	-
Total Kjeldahl N	-	**5100**	-	-	**2180**	-	-
Total Phosphorus	-	**1200**	-	-	**162**	-	-
Uranium	0.001	**<0.018**	-	-	**<0.0028**	-	-
Vanadium	0.3	**<0.60**	-	-	**<0.11**	-	-
Zinc	13.00	**13**	70	486.11	**2.8**	325.00	2256.94

* Based on body weight of 70 kg (approximately 154 lb); Calculated using the formula: (TDI x 70 kg)/Test Result

** Based on 1 cup of blackberries = 144 grams = 0.144 kg; Calculated as follows: (kg needed to exceed TDI)/(0.125 kg

"J" = quantitation is an estimated value because the result is less than the sample method quantitation limit (MQL) but greater than the method detection limit (MDL)

Parameters that were not detected in a sample are listed as < the respective MDL

Table 11. Laboratory test results for blackberries sampled near the mill site from 2016-2017

Parameter	US EPA Oral Tolerable Daily Intake Values (TDI), mg/kg-d	2016 Result (mg/kg)	kg needed to ingest to exceed TDI*	Equivalent in cups of berries**	2017 Result (mg/kg)	kg needed to ingest to exceed TDI*	Equivalent in cups of berries**
Aluminum	1	**94**	0.745	5.17	**<33.8**	-	-
Ammonia-N	-	**5.5**	-	-	**142**	-	-
Antimony	0.0004	**<2.0**	-	-	**<3.1**	-	-
Arsenic	0.0003	**<3.5**	-	-	**<3.1**	-	-
Barium	0.2	**9.9**	1.414	9.82	**13.8**	1.01	7.05
Beryllium	0.002	**<0.039**	-	-	**<0.22**	-	-
Boron	0.2	**19**	0.737	5.12	**16.9**	0.83	5.75
Cadmium	0.001	**0.79**	0.089	0.62	**0.28 J**	0.25	1.74
Calcium	-	**1300**	-	-	**2150**	-	-
Chromium	0.003	**<0.29**	-	-	**11.7**	0.02	0.12
Cobalt	-	**<0.20**	-	-	**<0.38**	-	-
Copper	0.04	**9.7**	0.289	2.00	**10.7**	0.26	1.82
Iron	0.7	**43**	1.140	7.91	**161**	0.30	2.11
Lead	-	**<0.98**	-	-	**<1.8**	-	-
Lithium	0.02	**3.8 J**	0.368	2.56	**<3.8**	-	-
Magnesium	-	**1400**	-	-	**1670**	-	-
Manganese	0.14	**150**	0.07	0.45	**285**	0.03	0.24
Molybdenum	0.005	**0.77 J**	0.455	3.16	**<1.0**	-	-
Mercury	-	**<0.0067**	-	-	**<0.066**	-	-
Nickel	0.02	**7.8**	0.179	1.25	**2.4 J**	0.58	4.05
Nitrate/Nitrite-N	-	**<71**	-	-	**<1.5**	-	-
Potassium	-	**13000**	-	-	**16400**	-	-
Selenium	0.005	**5 J**	0.070	0.49	**<3.1**	-	-
Silver		**-**	-	-	**-**	-	-
Sodium	-	**<49**	-	-	**<00.0**	-	-
Strontium	0.6	**6.3**	6.667	46.30	**7.7**	5.45	37.88
Sulfate	-	**25000**	-	-	**1610**	-	-
Sulfur	0.00007	**159**	3.08E-05	0.00	**1300**	0.00	0.00
Thallium	-	**<4.9**	-	-	**<2.3**	-	-
Total Kjeldahl N	-	**8700**	-	-	**12700**	-	-
Total Phosphorus	-	**1700**	-	-	**755**	-	-
Uranium	0.001	**<0.017**	-	-	**0.045 J*** **	1.56	10.80
Vanadium	0.3	**<0.59**	-	-	**<0.84**	-	-
Zinc	13.00	**22**	41.36	287.25	**13.3 J**	68.42	475.15

* Based on body weight of 70 kg (approximately 154 lb); Calculated using the formula: (TDI x 70 kg)/Test Result
** Based on 1 cup of blackberries = 144 grams = 0.144 kg; Calculated as follows: (kg needed to exceed TDI)/(0.125 kg)
*** Uranium was also detected in the sample blank at a level of 0.00694 mg/kg. The method blank result was above the MDL, indicating potential contamination; however, the result was less than half the MQL. Laboratory criteria requires the method blank result be less than ½ the MQL, which is consistent with NELAP Quality Control. Samples associated with a method blank with a result greater than ½ the MQL are re-extracted or re-analyzed.
"J" = quantitation is an estimated value because the result is less than the sample method quantitation limit (MQL) but greater than the method detection limit (MDL); Parameters that were not detected in a sample are listed as < the MDL

Table 12. Laboratory test results for blackberries sampled at the control site from 2016-2017

Parameter	US EPA Oral Tolerable Daily Intake Values (TDI), mg/kg-d	2016 Result	kg needed to ingest to exceed TDI*	Equivalent in cups of berries**	2017 Result	kg needed to ingest to exceed TDI*	Equivalent in cups of berries**
Aluminum	1	**29 J**	2.414	16.76	**<4.5**	-	-
Ammonia-N	-	**62.5**	-	-	**8.4**	-	-
Antimony	0.0004	**<2.0**	-	-	**<0.41**	-	-
Arsenic	0.0003	**<3.6**	-	-	**<0.41**	-	-
Barium	0.2	**36**	0.389	2.70	**4.9**	2.86	19.84
Beryllium	0.002	**<0.040**	-	-	**<0.029**	-	-
Boron	0.2	**16**	0.875	6.08	**2.1**	6.67	46.30
Cadmium	0.001	**1.2**	0.058	0.41	**<0.031**	-	-
Calcium	-	**2700**	-	-	**432**	-	-
Chromium	0.003	**<0.10**	-	-	**<0.21**	-	-
Cobalt	-	**<0.20**	-	-	**<0.051**	-	-
Copper	0.04	**7.7**	0.364	2.53	**2**	1.40	9.72
Iron	0.7	**40**	1.225	8.51	**7.5 J**	6.53	45.37
Lead	-	**<1.0**	-	-	**<0.25**	-	-
Lithium	0.02	**<2.2**	-	-	**<0.51**	-	-
Magnesium	-	**1800**	-	-	**338**	-	-
Manganese	0.14	**140**	0.07	0.49	**15.7**	0.62	4.33
Molybdenum	0.005	**0.88 J**	0.398	2.76	**<0.13**	-	-
Mercury	-	**<0.0077**	-	-	**<0.0075**	-	-
Nickel	0.02	**1.9 J**	0.737	5.12	**<0.24**	-	-
Nitrate/Nitrite-N	-	**<57**	-	-	**<1.4**	-	-
Potassium	-	**12000**	-	-	**2490**	-	-
Selenium	0.005	**<5.0**	-	-	**<0.41**	-	-
Silver		**-**	-	-	**-**	-	-
Sodium	-	**<50**	-	-	**<13.4**	-	-
Strontium	0.6	**15**	2.800	19.44	**2.2**	19.09	132.58
Sulfate	-	**8500**	-	-	**58.6**	-	-
Sulfur	0.00007	**219**	2.237E-05	0.00	**147**	0.00	0.00
Thallium	-	**<5.0**	-	-	**<0.31**	-	-
Total Kjeldahl N	-	**6400**	-	-	**2480**	-	-
Total Phosphorus	-	**1400**	-	-	**157**	-	-
Total Solids	-	**17**	-	-	**-**	-	-
Uranium	0.001	**<0.019**	-	-	**<0.0028**	-	-
Vanadium	0.3	**<0.60**	-	-	**<0.11**	-	-
Zinc	13.00	**15**	60.67	421.30	**4**	227.50	1579.86

* Based on body weight of 70 kg (approximately 154 lb)
Calculated using the formula: (TDI x 70 kg)/Test Result
** Based on 1 cup of blackberries = 144 grams = 0.144 kg
Calculated using the formula: (kg needed to exceed TDI)/(0.125 kg)
"J" = quantitation is an estimated value because the result is less than the sample method quantitation limit (MQL) but greater than the method detection limit (MDL); Parameters that were not detected in a sample are listed as < the MDL

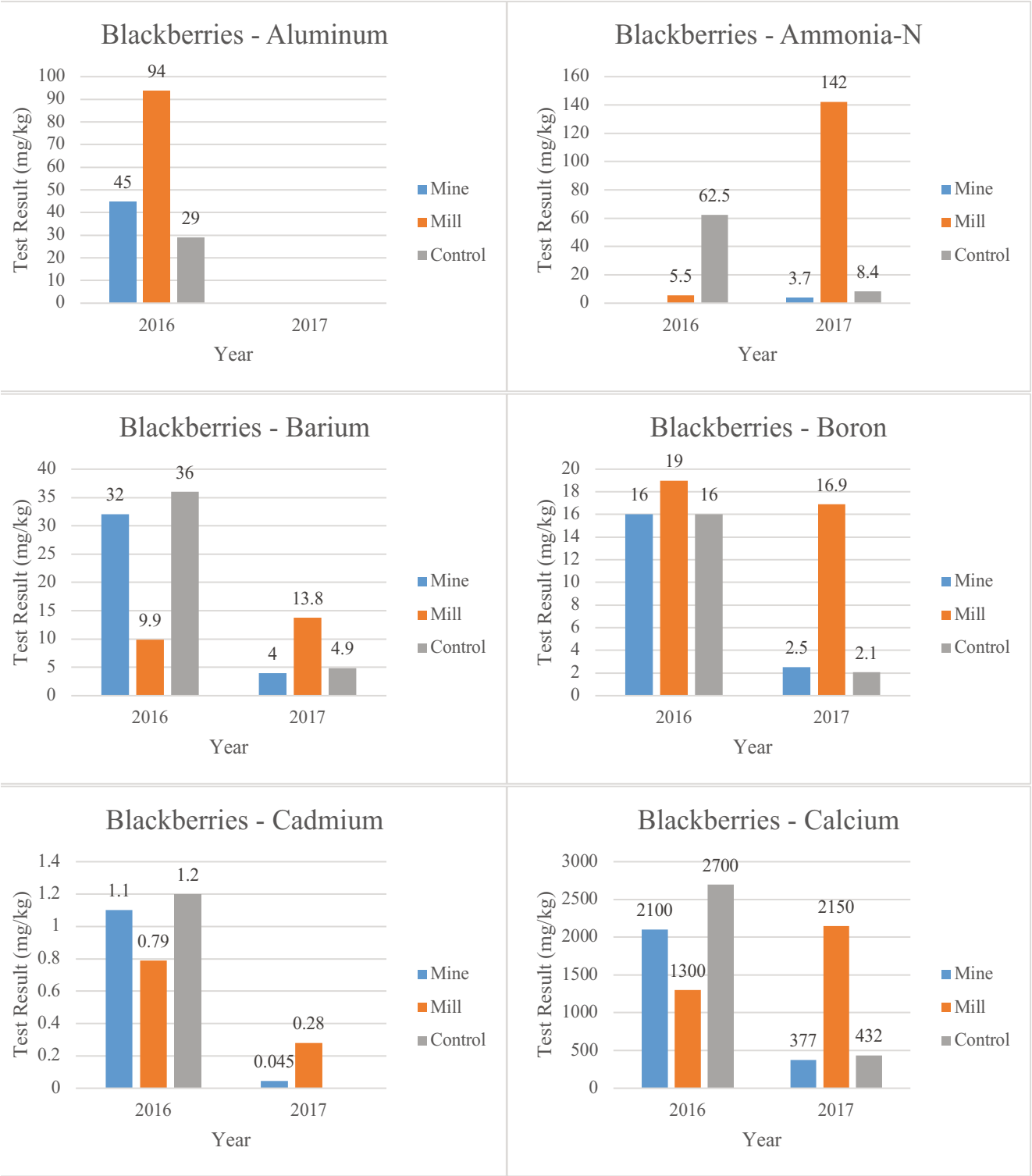


Figure 4 a-f. Bar graphs comparing test results (mg/kg) for blackberry samples collected near all three sample sites (mine, mill, control) from 2016-2017 for aluminum, ammonia, barium, boron, cadmium, and calcium (respectively).

Figure 4 g-l. Bar graphs comparing test results (mg/kg) for blackberry samples collected near all three sample sites (mine, mill, control) from 2016-2017 for chromium, copper, iron, lithium, magnesium, and manganese (respectively).

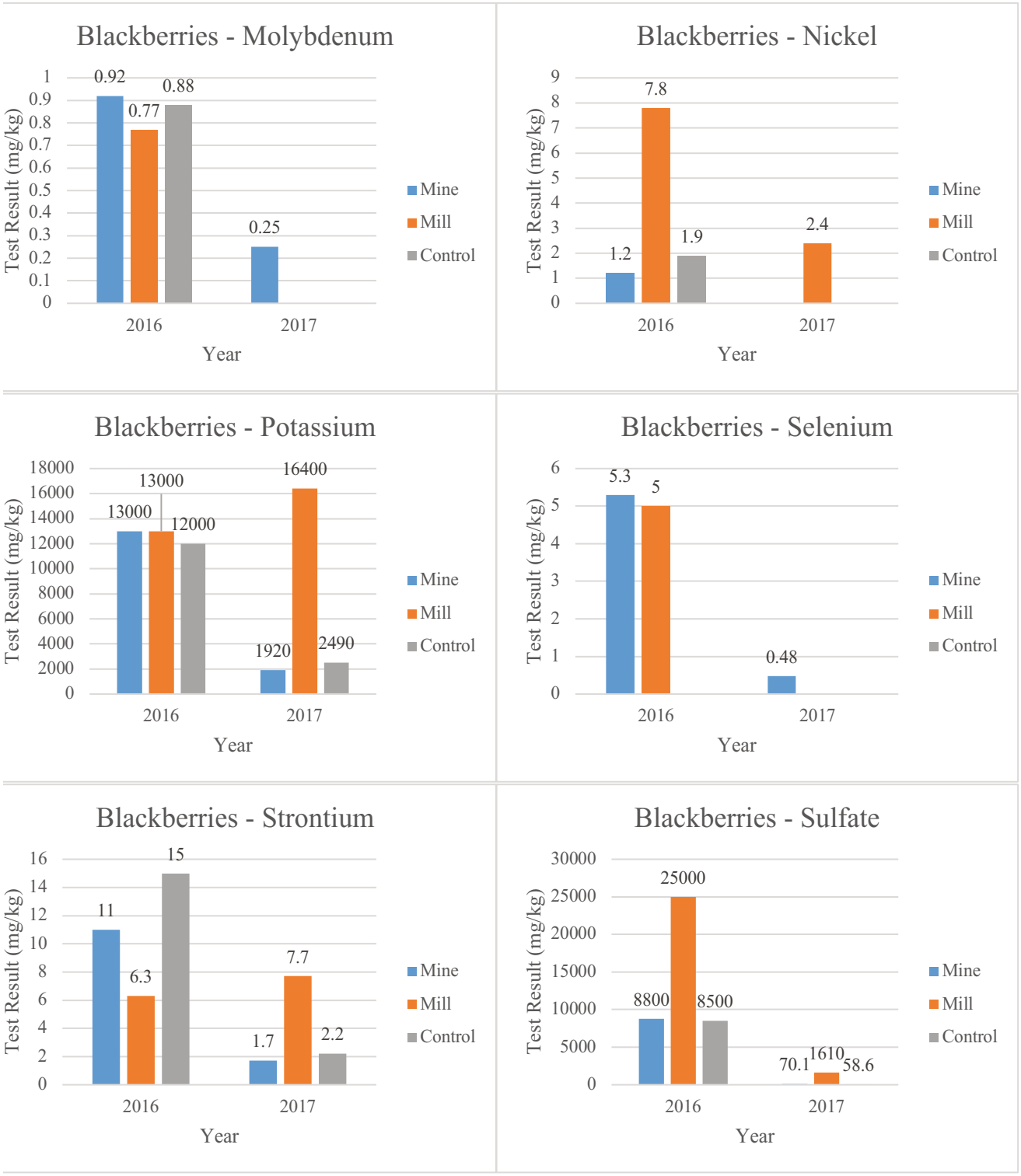


Figure 4 m-r. Bar graphs comparing test results (mg/kg) for blackberry samples collected near all three sample sites (mine, mill, control) from 2016-2017 for molybdenum, nickel, potassium, selenium, strontium, and sulfate (respectively).

Figure 4 s-w. Bar graphs comparing test results (mg/kg) for blackberry samples collected near all three sample sites (mine, mill, control) from 2016-2017 for sulfur, total Kjeldahl nitrogen, phosphorus, uranium, and zinc (respectively). The uranium result should be considered estimated. The result of the laboratory method blank indicated contamination may have been introduced in the laboratory.

Table 13. Laboratory test results for strawberry plants sampled near the mine, mill, and control site during 2017

	Mine Site	Mill Site	Control Site
Parameter	2017 Result (mg/kg)	2017 Result (mg/kg)	2017 Result (mg/kg)
Aluminum	1540	310	185
Ammonia-N	8.6	5	<1.9
Antimony	<0.40	<0.38	<0.43
Arsenic	0.43 J	<0.38	1.3 J
Barium	125	71	49.6
Beryllium	0.045 J	<0.027	<0.030
Boron	8.9	4.6	10.6
Cadmium	0.28	0.18 J	0.074 J
Calcium	15100	4320	6880
Chromium	1.8	0.76	1
Cobalt	0.31 J	0.19 J	<0.054
Copper	5.7	2.4	5.2
Iron	1610	559	284
Lead	1.2	2.3	4.2
Lithium	<0.50	<0.48	<0.54
Magnesium	721	756	1040
Manganese	117	46.6	21.7
Mercury	<0.0081	0.0089 J	<0.0083
Molybdenum	<0.13	0.15 J	1.5
Nickel	1.7 J	1.4 J	<0.25
Nitrate/Nitrite-N	2.4 J	3.6 J	<0.63
Potassium	2000	1910	2950
Selenium	<0.40	<0.38	<0.43
Sodium	15 J	39.8 J	19.1 J
Strontium	86.9	38.1	43.8
Sulfate	10.1 J	<3.5	<3.0
Sulfur	153	341	398
Thallium	<0.30	<0.29	<0.32
Total Kjeldahl N	3480	3010	2580
Total Phosphorus	410	220	554
Uranium	<0.0028	0.012 J	<0.0028
Vanadium	3.4	1	0.58
Zinc	70.2	82.4	32.7

"J" = quantitation is an estimated value because the result is less than the sample method quantitation limit (MQL) but greater than the method detection limit (MDL); Parameters that were not detected in a sample are listed as < the MDL

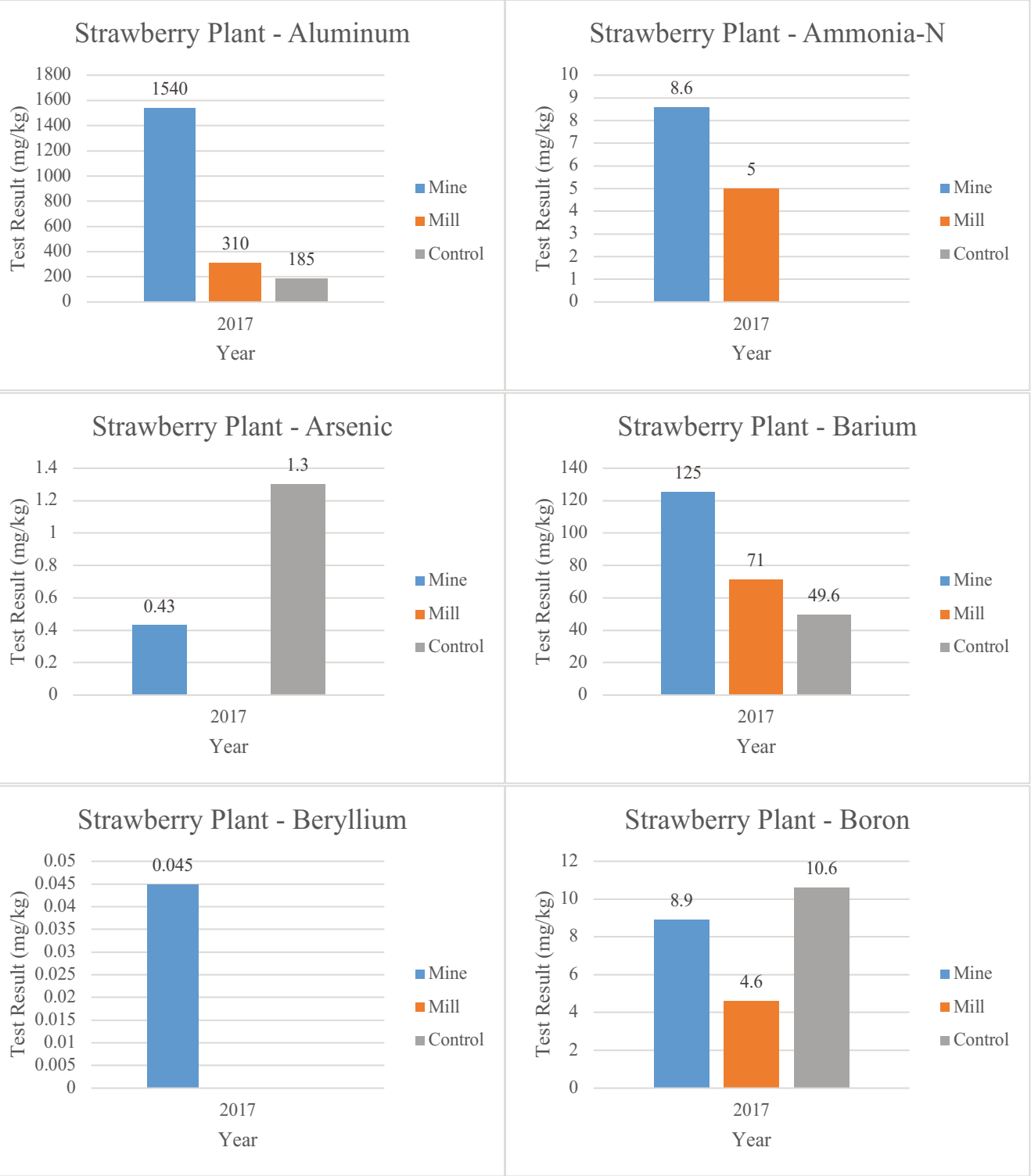


Figure 5 a-f. Bar graphs comparing test results (mg/kg) for strawberry plant samples collected near all three sample sites (mine, mill, control) during 2017 for aluminum, ammonia, arsenic, barium, beryllium, and boron (respectively).

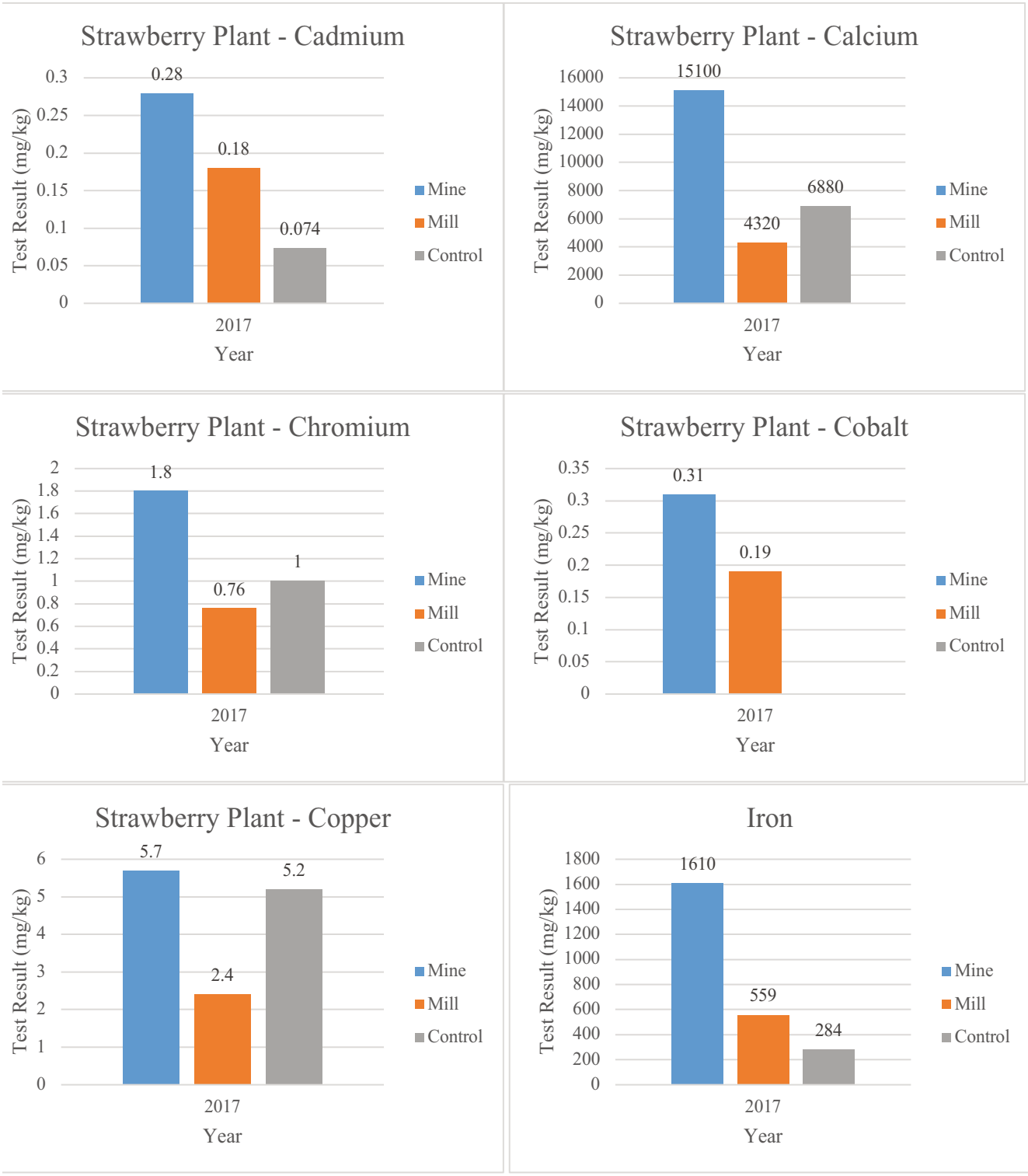


Figure 5 g-l. Bar graphs comparing test results (mg/kg) for strawberry plant samples collected near all three sample sites (mine, mill, control) during 2017 for cadmium, calcium, chromium, cobalt, copper, and iron (respectively).

Figure 5 m-r. Bar graphs comparing test results (mg/kg) for strawberry plant samples collected near all three sample sites (mine, mill, control) during 2017 for lead, magnesium, manganese, mercury, molybdenum, and nickel (respectively).

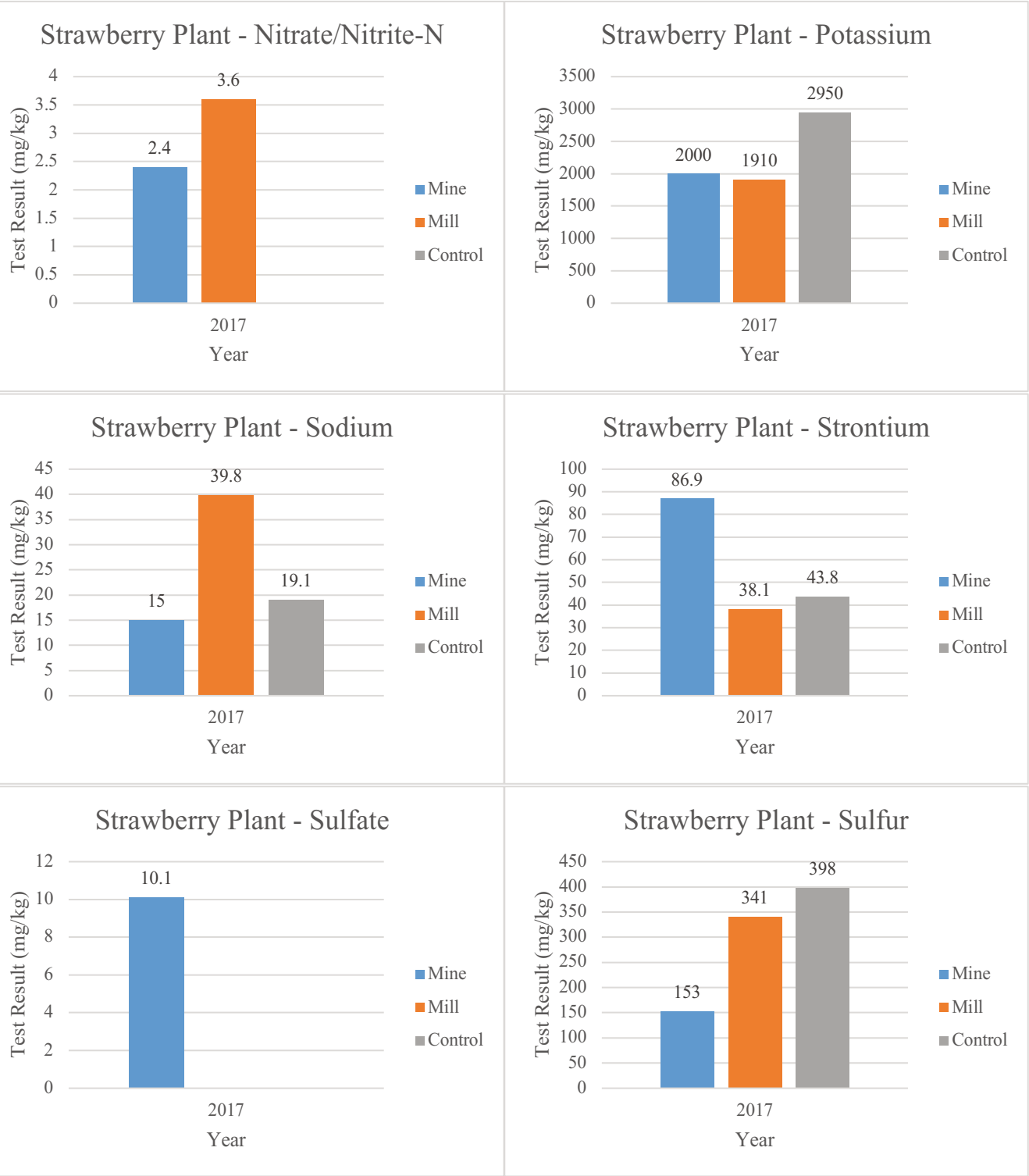


Figure 5 s-x. Bar graphs comparing test results (mg/kg) for strawberry plant samples collected near all three sample sites (mine, mill, control) during 2017 for nitrate/nitrite, potassium, sodium, strontium, sulfate, and sulfur (respectively).

Figure 5 y-2c. Bar graphs comparing test results (mg/kg) for strawberry plant samples collected near all three sample sites (mine, mill, control) during 2017 for total Kjeldahl nitrogen, phosphorus, uranium, vanadium, and zinc (respectively).

Table 14. Laboratory test results for wintergreen plants sampled at the mine and control site during 2017

		Mine Site			Control Site		
Parameter	**US EPA Oral Tolerable Daily Intake Values (TDI), mg/kg-d**	**2017 Result (mg/kg)**	**kg needed to ingest to exceed TDI***	**pounds needed to ingest to exceed TDI**	**2017 Result (mg/kg)**	**kg needed to ingest to exceed TDI***	**Pounds needed to ingest to exceed TDI**
Aluminum	1	**88**	0.80	1.76	**63.4**	1.10	2.43
Ammonia-N	-	**<2.0**	-	-	**<1.9**	-	-
Antimony	0.0004	**4.2 J**	0.01	0.02	**<0.37**	-	-
Arsenic	0.0003	**<4.4**	-	-	**<0.37**	-	-
Barium	0.2	**76**	0.18	0.39	**63.4**	0.22	0.49
Beryllium	0.002	**<0.041**	-	-	**<0.026**	-	-
Boron	0.2	**13**	1.08	2.38	**5.9**	2.37	5.22
Cadmium	0.001	**<0.13**	-	-	**0.046 J**	1.52	3.35
Calcium	-	**8600**	-	-	**3510**	-	-
Chromium	0.003	**0.85**	0.25	0.55	**<0.18**	-	-
Cobalt	-	**0.63 J**	-	-	**<0.046**	-	-
Copper	0.04	**12**	0.23	0.51	**1.2**	2.33	5.14
Iron	0.7	**280**	0.18	0.40	**49.5**	0.99	2.18
Lead	-	**<1.5**	-	-	**0.55 J**	-	-
Lithium	0.02	**<5.1**	-	-	**<0.46**	-	-
Magnesium	-	**6100**	-	-	**938**	-	-
Manganese	0.14	**20**	0.49	1.08	**138**	0.07	0.15
Mercury	-	**0.07**	-	-	**<0.0079**	-	-
Molybdenum	0.005	**<6.8**	-	-	**<0.12**	-	-
Nickel	0.02	**20**	0.07	0.15	**<0.21**	-	-
Nitrate/Nitrite-N	-	**<43**	-	-	**<0.60**	-	-
Potassium	-	**3500**	-	-	**1760**	-	-
Selenium	0.005	**8 J**	0.04	0.09	**0.41 J**	0.85	1.87
Sodium	-	**<73**	-	-	**<12**	-	-
Strontium	0.6	**21**	2.00	4.41	**5.9**	7.12	15.69
Sulfate	-	**9800**	-	-	**<3.2**	-	-
Sulfur	0.00007	**303**	0.00	0.00	**317**	0.00	0.00
Thallium	-	**<4.3**	-	-	**<0.28**	-	-
Total Kjeldahl N	-	**3800**	-	-	**2100**	-	-
Total Phosphorus	-	**630**	-	-	**223**	-	-
Uranium	0.001	**0.0035 J**	20.00	44.10	**<0.0029**	-	-
Vanadium	0.3	**<0.59**	-	-	**<0.10**	-	-
Zinc	13.00	**7.1**	128.17	282.57	**5.2**	175.00	385.81

* Based on body weight of 70 kg (approximately 154 lb)
Calculated using the formula: (TDI x 70 kg)/Test Result
"J" = quantitation is an estimated value because the result is less than the sample method quantitation limit (MQL) but greater than the method detection limit (MDL); Parameters that were not detected in a sample are listed as < the MDL

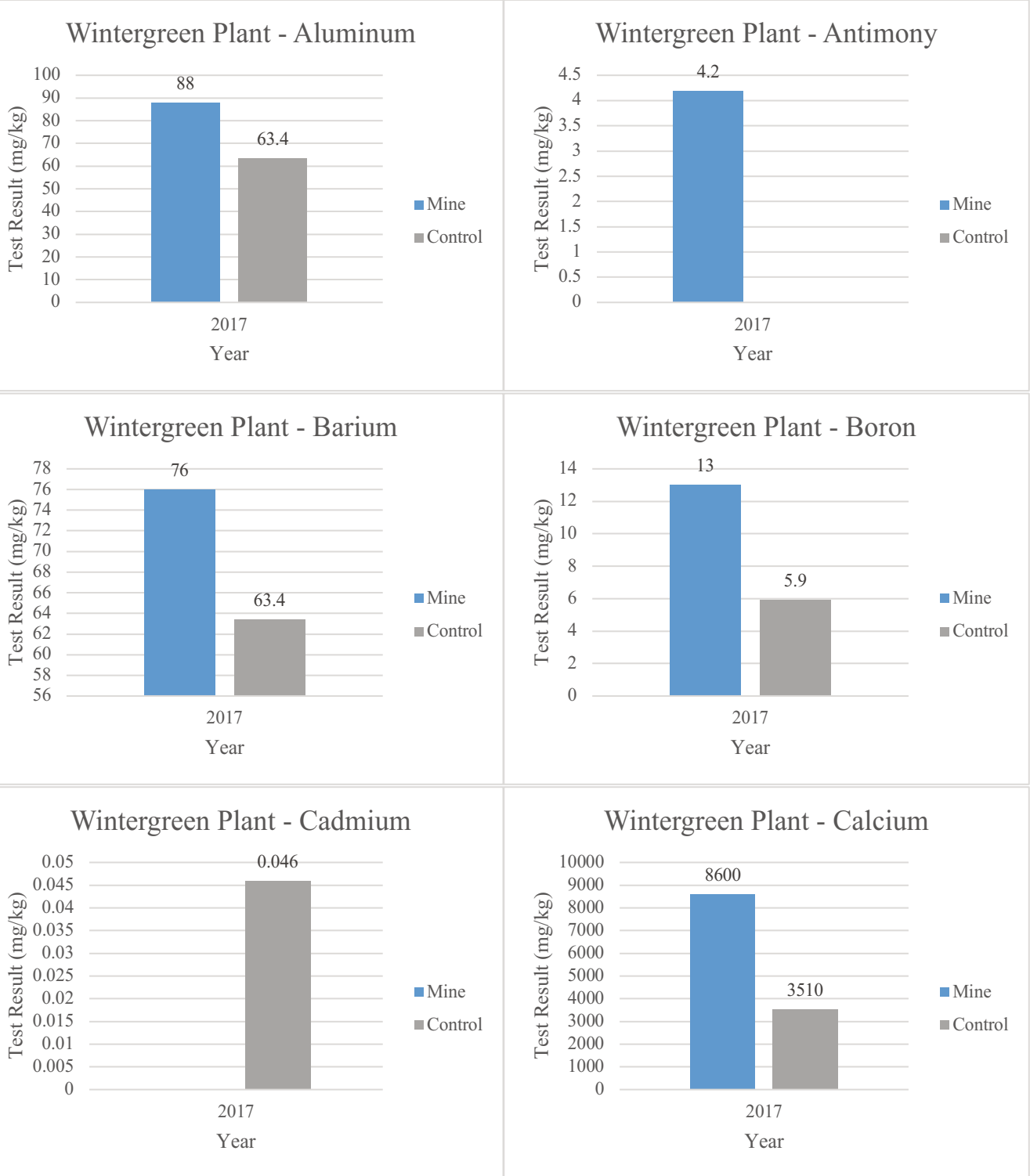


Figure 6 a-f. Bar graphs comparing test results (mg/kg) for wintergreen plant samples collected at the mine and control sites during 2017 for aluminum, antimony, barium, boron, cadmium, and calcium (respectively).

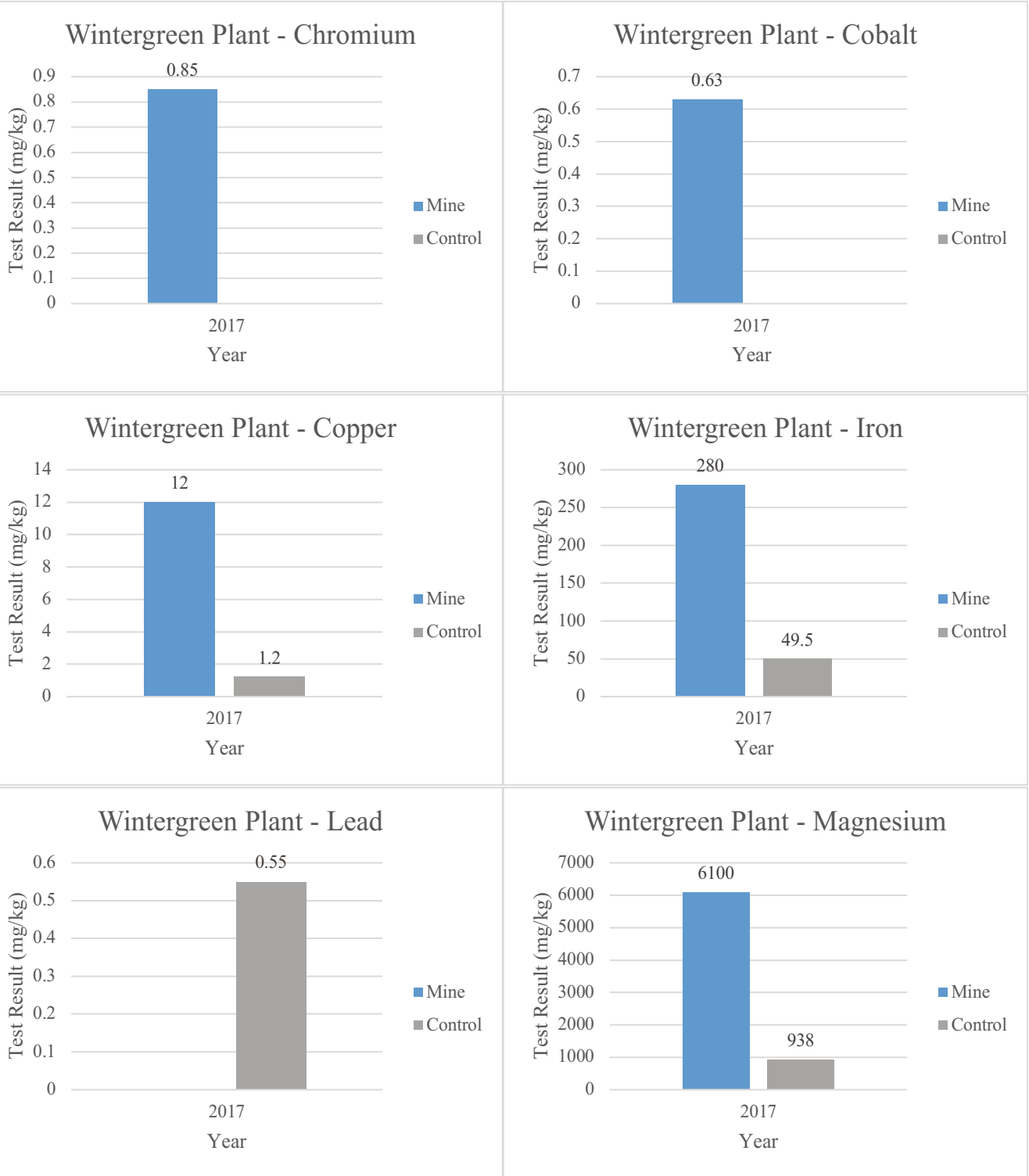


Figure 6 g-l. Bar graphs comparing test results (mg/kg) for wintergreen plant samples collected at the mine and control sites during 2017 for chromium, cobalt, copper, iron, lead, and magnesium (respectively).

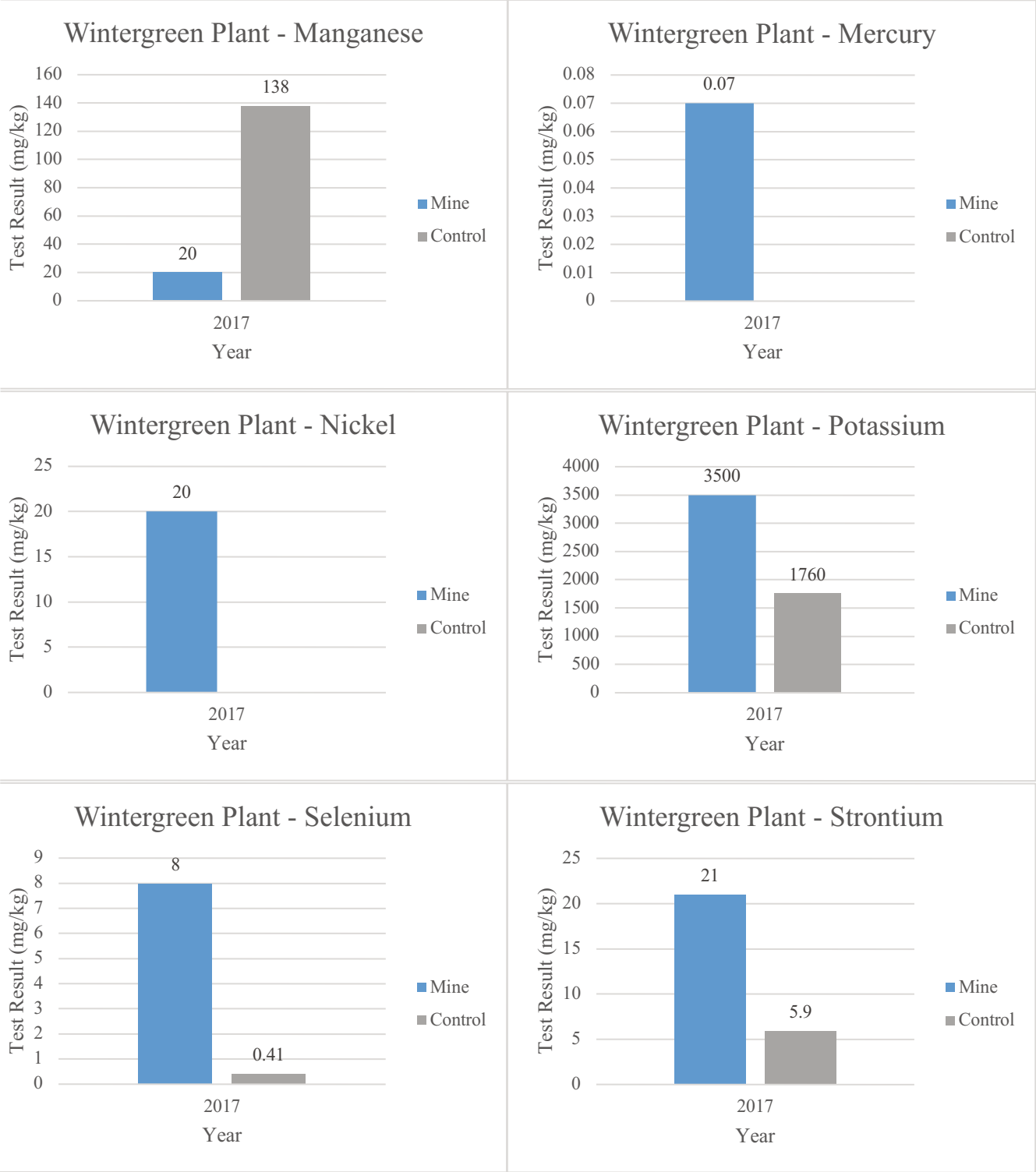


Figure 6 m-r. Bar graphs comparing test results (mg/kg) for wintergreen plant samples collected at the mine and control sites during 2017 for manganese, mercury, nickel, potassium, selenium, and strontium (respectively).

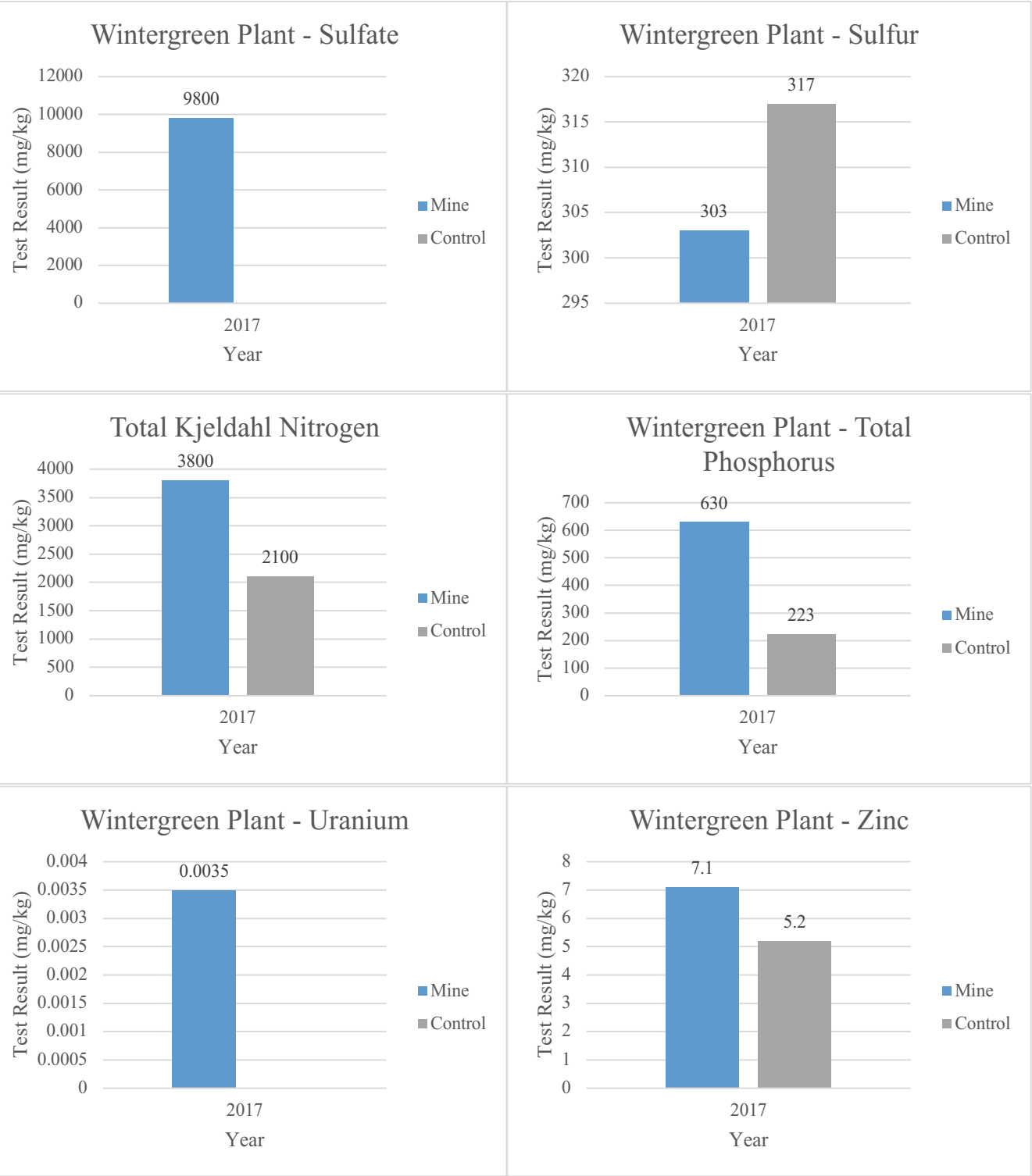


Figure 6 s-x. Bar graphs comparing test results (mg/kg) for wintergreen plant samples collected at the mine and control sites during 2017 for sulfate, sulfur, total Kjeldahl nitrogen, phosphorus, uranium, and zinc (respectively). The uranium result should be considered estimated. The result of the laboratory method blank indicated contamination may have been introduced in the laboratory.

Table 15. Parameters where blueberry samples obtained from test sites (near the Eagle Mine and Humboldt Mill) recorded greater level(s) than control samples

Check Indicates that the Test Sample Recorded a Level Greater than the Control Sample						
	2015 Blueberry Fruit		2016 Blueberry Fruit		2017 Blueberry Fruit	
Parameter	Mine	Mill	Mine	Mill	Mine	Mill
Aluminum	X	X	X	X	X	
Ammonia-N			X	X	X	
Antimony					X	X
Barium	X	X	X		X	X
Boron	X					
Cadmium			X			
Calcium	X	X	X			
Chromium	X	X				X
Copper	X	X			X	X
Iron	X	X	X	X	X	X
Magnesium	X	X	X			
Manganese	X	X				
Nickel	X	X		X	X	X
Nitrate/Nitrite-N	X	X	X	X		
Potassium	X	X				
Strontium	X	X				X
Sulfate	X			X	X	X
Thallium						
Total Kjeldahl N	X	X		X	X	X
Total Phosphorus	X					X
Zinc						X

Gold indicates elevated levels (greater than control) for all test samples across all years tested.

Table 16. Parameters where blueberry plant samples obtained from test sites (near the Eagle Mine and Humboldt Mill) recorded greater level(s) than control samples

Check Indicates that the Test Sample Recorded a Level Greater than the Control Sample		
Blueberry Plant 2015		
Parameter	**Mine**	**Mill**
Aluminum	X	X
Barium	X	X
Calcium	X	X
Chromium	X	X
Cobalt		X
Copper	X	X
Iron	X	X
Lithium	X	X
Magnesium		X
Nickel	X	X
Nitrate/Nitrite-N	X	X
Potassium	X	X
Selenium	X	X
Silver	X	X
Strontium		X
Sulfate		X
Total Kjeldahl Nitrogen	X	X
Total Phosphorus	X	X
Vanadium		X
Zinc		X

Gold indicates elevated levels (greater than control) for all test samples across all years tested.

Table 17. Parameters where raspberry samples obtained from test sites (near the Eagle Mine and Humboldt Mill) recorded greater level(s) than control samples

Check Indicates that the Test Sample Recorded a Level Greater than the Control Sample				
	2015 Raspberries		2016 Raspberries	
Parameter	Mine	Mill	Mine	Mill
Ammonia		X		
Barium	X		X	X
Boron	X	X	X	
Cadmium			X	X
Calcium			X	
Copper	X	X		
Iron	X			
Magnesium	X	X	X	
Manganese	X	X	X	X
Molybdenum			X	
Nickel	X	X		X
Nitrate/Nitrite-N	X	X	X	X
Potassium	X	X		X
Selenium		X		X
Strontium		X	X	X
Sulfate			X	
Total Kjeldahl Nitrogen	X	X		
Total Phosphorus		X		
Zinc	X	X		

Gold indicates elevated levels (greater than control) for all test samples across all years tested.

Table 18. Parameters where blackberry samples obtained from test sites (near the Eagle Mine and Humboldt Mill) recorded greater level(s) than control samples

Check Indicates that the Test Sample Recorded a Level Greater than the Control Sample

	2016 Blackberries		2017 Blackberries	
Parameter	**Mine**	**Mill**	**Mine**	**Mill**
Aluminum	X	X		
Ammonia-N				X
Barium				X
Boron		X	X	X
Cadmium			X	X
Calcium				X
Chromium			X	X
Copper		X		X
Iron		X		X
Lithium		X		
Magnesium				X
Manganese		X	X	X
Molybdenum	X			
Nickel		X		X
Nitrate/Nitrite-N				
Potassium	X	X		X
Selenium	X	X	X	
Strontium				X
Sulfate	X	X	X	X
Sulfur			X	X
Total Kjeldahl N		X		X
Total Phosphorus		X	X	X
Uranium				X
Zinc		X		X

Gold indicates elevated levels (greater than control) for all test samples across all years tested.

Table 19. Parameters where strawberry plant samples obtained from test sites (near the Eagle Mine and Humboldt Mill) recorded greater level(s) than control samples

Check Indicates that the Test Sample Recorded a Level Greater than the Control Sample		
2017 Strawberry Plant		
Parameter	**Mine**	**Mill**
Aluminum	X	X
Ammonia-N	X	X
Barium	X	X
Beryllium	X	
Cadmium	X	X
Calcium	X	
Chromium	X	
Cobalt	X	
Copper	X	
Iron	X	X
Manganese	X	X
Mercury		X
Nickel	X	X
Nitrate/Nitrite-N	X	X
Sodium		X
Strontium	X	
Sulfate	X	
Total Kjeldahl Nitrogen	X	X
Uranium		X
Vanadium	X	X
Zinc	X	X

Gold indicates elevated levels (greater than control) for all test samples.

Table 20. Parameters where wintergreen samples obtained from the Eagle Mine site recorded greater level(s) than control samples

Check Indicates that the Test Sample Recorded a Level Greater than the Control Sample	
Wintergreen Plant	
Parameter	**Mine**
Aluminum	X
Antimony	X
Barium	X
Boron	X
Calcium	X
Chromium	X
Cobalt	X
Copper	X
Iron	X
Magnesium	X
Mercury	X
Nickel	X
Potassium	X
Selenium	X
Strontium	X
Sulfate	X
Total Kjeldahl N	X
Total Phosphorus	X
Uranium	X
Zinc	X

Table 21. Parameters not detected at sample sites

Check indicates that a parameter was not detected at any sample site (near the mine, mill, control) across all years tested						
	Blueberries	Blueberry Plant	Raspberries	Blackberries	Strawberry Plant	Wintergreen
Parameter	All Sites, 2015-2017	All Sites, 2015	All sites, 2015-2016	All Sites, 2016-2017	All Sites, 2017	All Sites, 2017
Aluminum						
Ammonia-N		X				X
Antimony		X	X	X	X	
Arsenic	X	X	X	X		X
Barium						
Beryllium	X	X	X	X		X
Boron						
Cadmium		X				
Calcium						
Chromium						
Cobalt			X	X		
Copper						
Iron						
Lead	X	X	X	X		
Lithium	X		X		X	X
Magnesium						
Manganese						
Mercury	X	X		X		
Molybdenum	X	X				X
Nickel						
Nitrate/Nitrite-N				X		X
Potassium						
Selenium					X	
Silver						
Sodium						X
Strontium						
Sulfate						
Sulfur						
Thallium		X		X	X	X
Total Kjeldahl N						
Total Phosphorus						
Uranium*	X	X	X			
Vanadium	X			X		X
Zinc						

*Uranium was not tested in blueberries or raspberries collected during 2016 due to insufficient sample volume. Uranium was tested using blueberry and raspberry plant tissue (not berries) during 2015.

Table 22. Parameters that recorded levels in one or more sampling events high enough to surpass the respective TDI value in less than one cup of berries

Parameter	Species Observed	Sites Observed	Potential Health Effects from Long-Term Exposure*	Sources of Contaminant in Drinking Water*
Antimony	Blueberries	Mine	Increase in blood cholesterol; decrease in blood sugar	Discharge from petroleum refineries; fire retardants; ceramics; electronics; solder
		Mill		
Cadmium	Blueberries	Mine	Kidney damage	Corrosion of galvanized pipes; erosion of natural deposits; discharge from metal refineries; runoff from waste batteries and paints
	Raspberries	Mine		
		Mill		
		Control		
	Blackberries	Mine		
		Mill		
		Control		
Chromium	Blackberries	Mill	Allergic dermatitis	Discharge from steel and pulp mills; erosion of natural deposits
Manganese	Blueberries	Mine	-	-
		Mill		
		Control		
	Raspberries	Mine		
		Mill		
	Blackberries	Mine		
		Mill		
		Control		
Selenium	Blueberries	Mine	Hair or fingernail loss; numbness in fingers or toes; circulatory problems	Discharge from petroleum refineries; erosion of natural deposits; dishcarge from mines
		Control		
	Raspberries	Mill		
	Blackberries	Mine		
		Mill		
Sulfur	Blackberries	Mine	-	-
		Mill		
		Control		
Vanadium	Raspberries	Control	Decreases in red blood cells, increased blood pressure, mild neurological effects, developmental effects in animals, cancer**	-

*Unless otherwise noted, content sourced from US EPA's National Primary Drinking Water Regulations (Organic Chemicals) (2009)

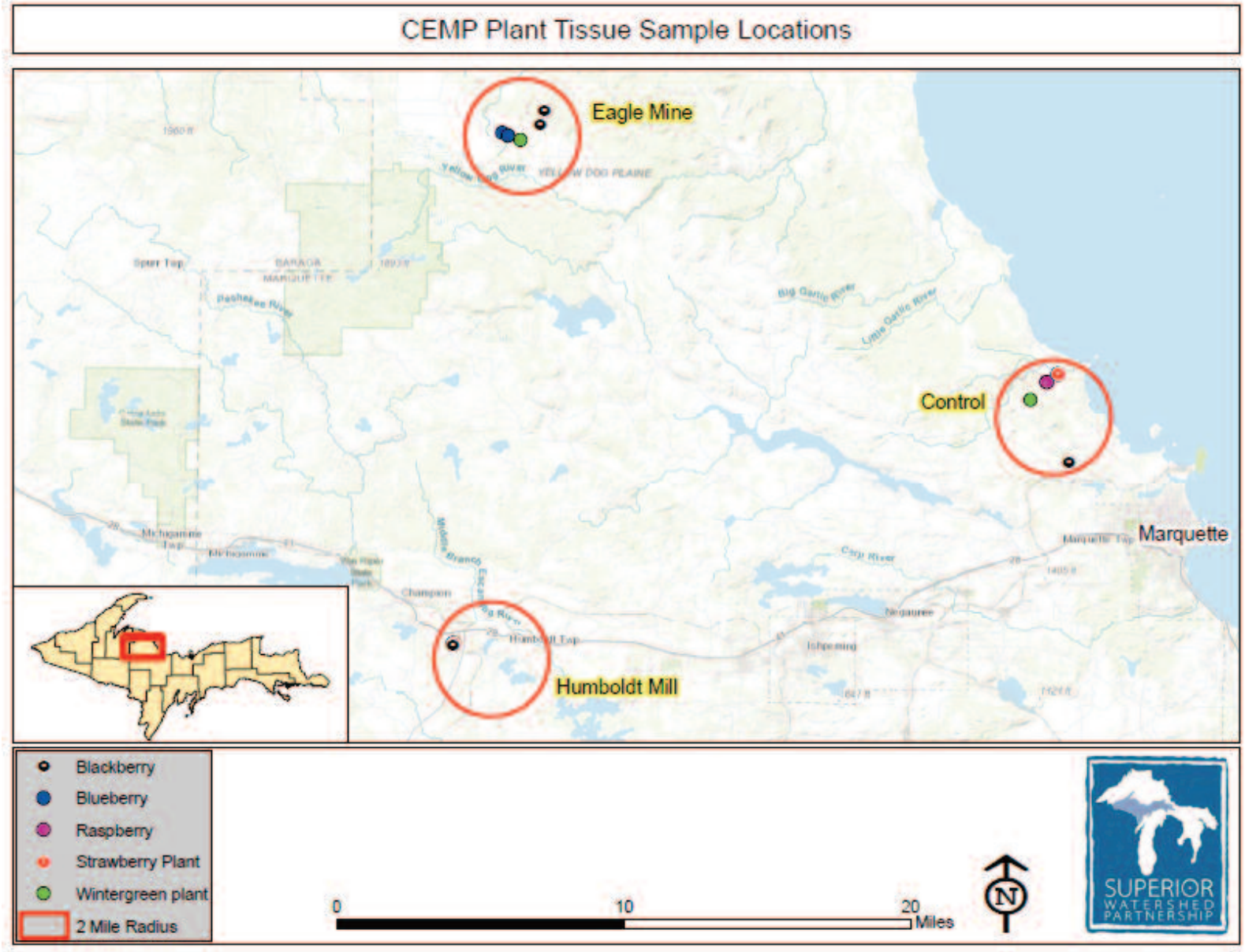
** Source: ATSDR's Public Health Statement: Vanadium (2012); effects observed in laboratory animals.

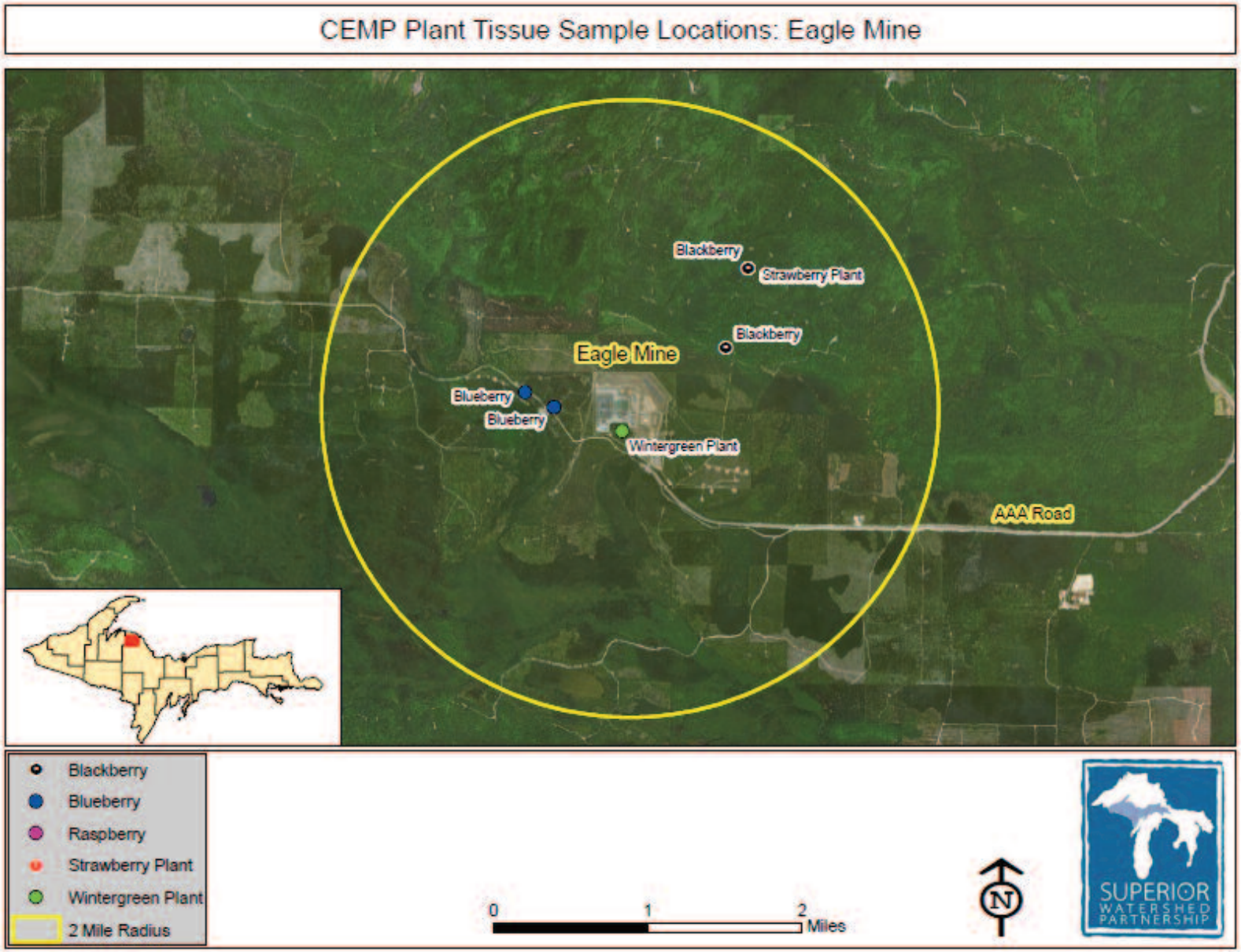
Table 23. US EPA's Metals Risk Assessment - Metals Classified by their Known Essentiality

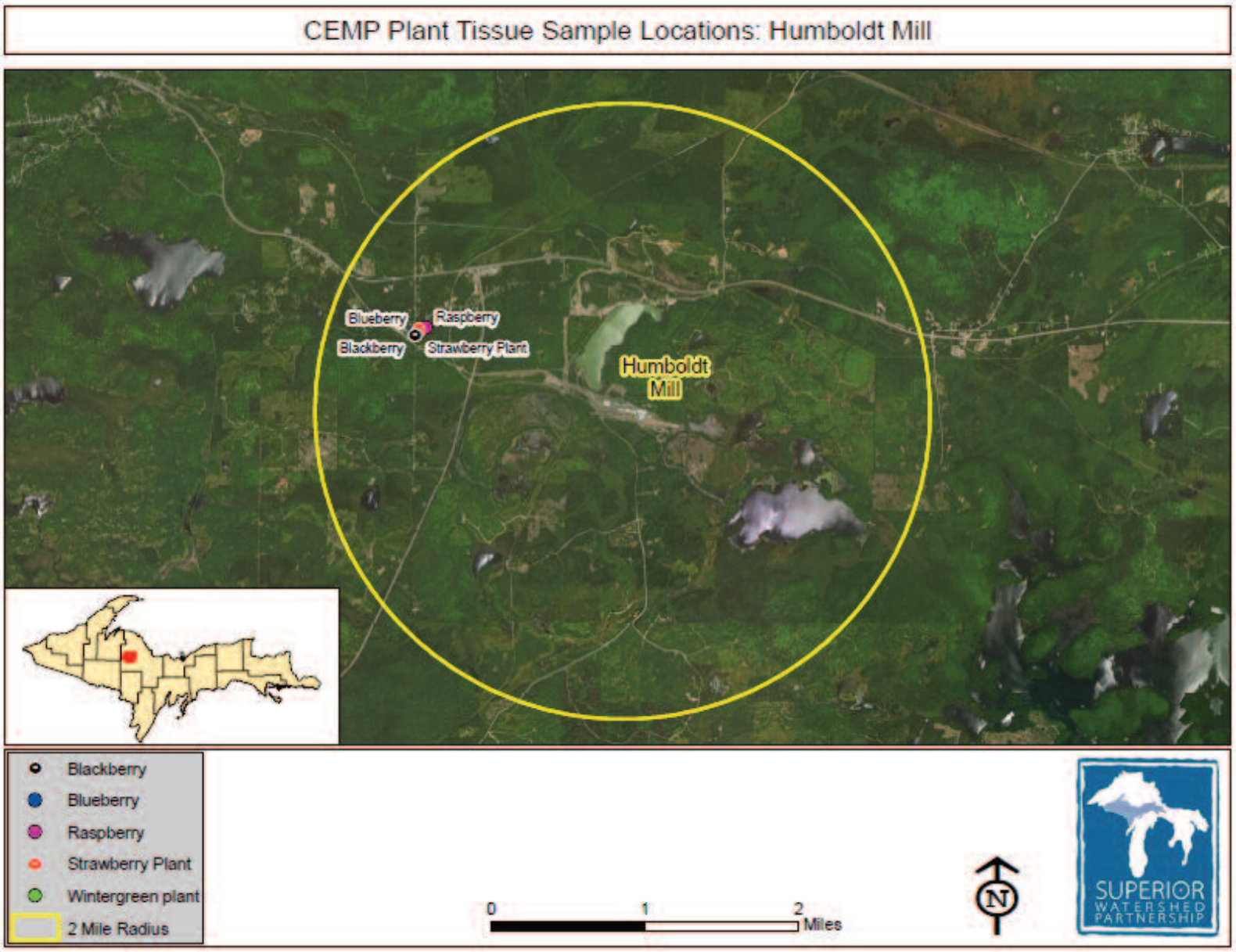
Metals Classified by their Known Essentiality					
	Essential (Known requirement for Health and Function)		Beneficial (But Not Known to be Essential)		Nonessential (and not known to be beneficial)
Metal	Plants	Animals	Plants	Animals	
Aluminum					x
Antimony					x
Arsenic				x	
Barium					x
Beryllium					x
Cadmium					x
Chromium		x			
Cobalt		x	x		
Copper	x	x			
Lead					x
Manganese	x	x			
Mercury					x
Molybdenum	x	x			
Nickel	x	x			
Selenium		x	x		
Silver					x
Strontium					x
Thallium					x
Vanadium				x	
Zinc	x	x			

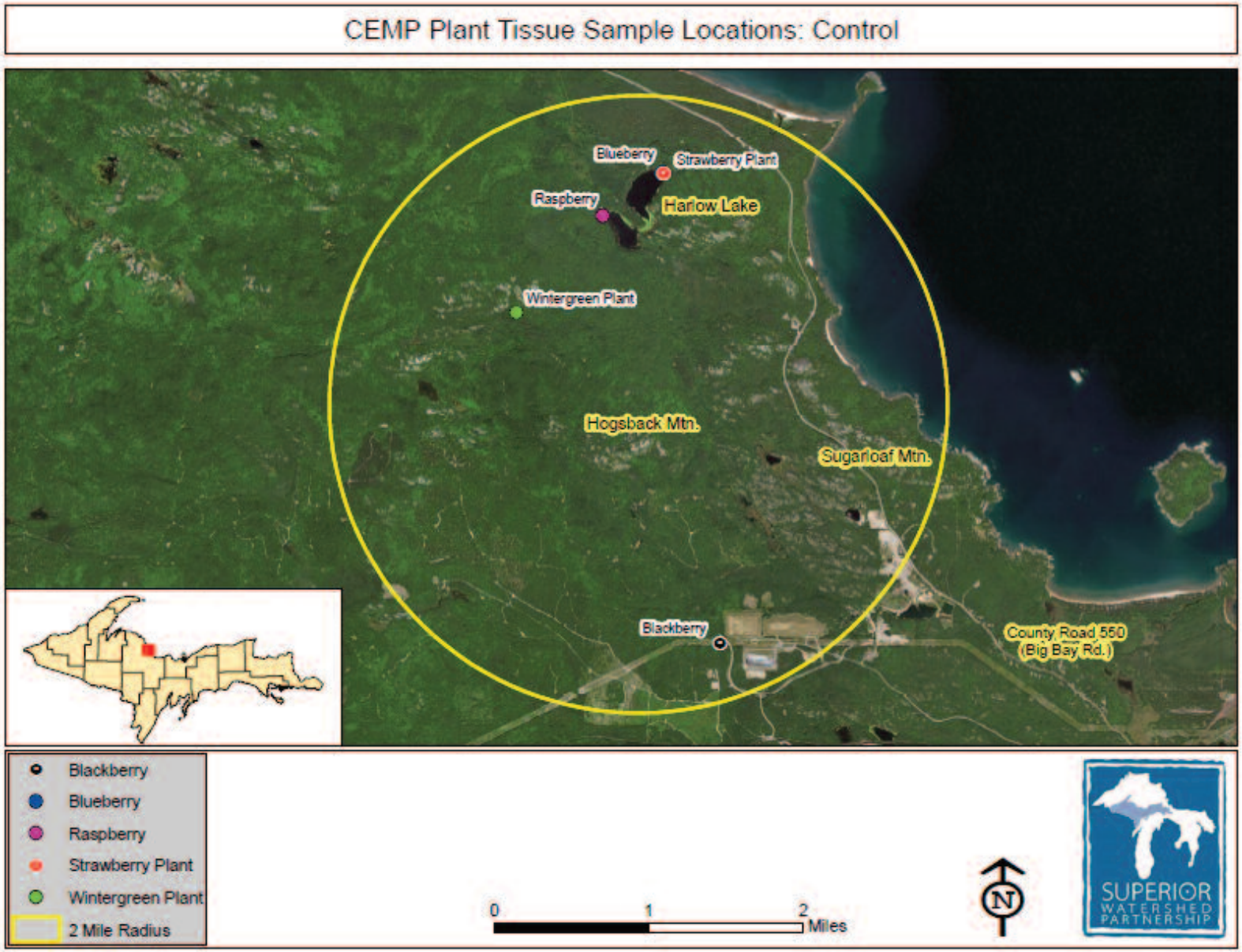
Source: US EPA's Framework for Metals Risk Assessment (2007).

APPENDIX A – Sample Location Maps




CEMP Plant Tissue Sample Locations: Eagle Mine
Blackberry
Strawberry Plant
Blackberry
Eagle Mine
Blueberry
Blueberry
Wintergreen Plant
AAA Road
Blackberry
Blueberry
Raspberry
Strawberry Plant
Wintergreen Plant
2 Mile Radius
0
1
2
Miles
N
SUPERIOR
WATERSHED
PARTNERSHIP


CEMP Plant Tissue Sample Locations: Humboldt Mill
Blueberry
Raspberry
Blackberry
Strawberry Plant
Humboldt Mill
Blackberry
Blueberry
Raspberry
Strawberry Plant
Wintergreen plant
2 Mile Radius
0
1
2
Miles
N
SUPERIOR WATERSHED PARTNERSHIP


CEMP Plant Tissue Sample Locations: Control
Blueberry
Strawberry Plant
Raspberry
Harlow Lake
Wintergreen Plant
Hogsback Mtn.
Sugarloaf Mtn.
Blackberry
County Road 550
(Big Bay Rd.)
Blackberry
Blueberry
Raspberry
Strawberry Plant
Wintergreen Plant
2 Mile Radius
0
1
2
Miles
N
SUPERIOR
WATERSHED
PARTNERSHIP

APPENDIX B

Sample Methods, MDL, and MQL Values Used in Analyses

B.1 Sample method, MDL, and MQL values used for 2015 blueberry analysis

			2015 BLUEBERRY SAMPLES					
			Mine Site Sample		Mill Site Sample		Control Site Sample	
PARAMETER	METHOD	UNITS	MDL	MQL	MDL	MQL	MDL	MQL
Aluminum	200.7	mg/kg	9.1	36	9.3	37	8.9	36
Ammonia-N	350.1	mg/kg	130	260	160	320	110	220
Antimony	200.7	mg/kg	1.8	5.5	1.9	5.6	1.8	5.4
Arsenic	200.7	mg/kg	1.8	5.5	1.9	5.6	1.8	5.4
Barium	200.7	mg/kg	0.018	0.091	0.018	0.093	0.018	0.089
Beryllium	200.7	mg/kg	0.036	0.18	0.037	0.19	0.036	0.18
Boron	200.7	mg/kg	4	10	4	9	4	9
Cadmium	200.7	mg/kg	0.091	0.27	0.093	0.28	0.089	0.27
Calcium	200.7	mg/kg	3.6	9.1	3.7	9.3	3.6	8.9
Chromium	200.7	mg/kg	0.073	0.27	0.074	0.28	0.071	0.27
Cobalt	200.7	mg/kg	0.18	0.91	0.19	0.93	0.18	0.89
Copper	200.7	mg/kg	0.27	0.91	0.28	0.93	0.27	0.89
Iron	200.7	mg/kg	0.9	2.7	0.9	2.8	0.9	2.7
Lead	200.7	mg/kg	0.91	2.7	0.93	2.8	0.89	2.7
Lithium	200.7	mg/kg	0.6	3	0.56	2.8	0.54	2.7
Magnesium	200.7	mg/kg	1.8	9.1	1.9	9.3	1.8	8.9
Manganese	200.7	mg/kg	0.05	0.09	0.05	0.09	0.04	0.09
Molybdenum	200.7	mg/kg	0.3	1	0.28	0.93	0.27	0.89
Nickel	200.7	mg/kg	0.91	2.7	0.93	2.8	0.89	2.7
Nitrate/Nitrite-N	4500-NO3- F	mg/kg	72	140	78	160	60	120
Potassium	200.7	mg/kg	9.1	36	9.3	37	8.9	36
Selenium	200.7	mg/kg	1.8	9.1	1.9	9.3	1.8	8.9
Silver	200.7	mg/kg	0.27	1.1	0.28	1.1	0.27	1.1
Sodium	200.7	mg/kg	45	150	46	150	45	140
Strontium	200.7	mg/kg	0.02	0.06	0.02	0.06	0.02	0.05
Sulfate	4500-SO4- E	mg/kg	2200	4300	2400	4700	2000	4100
Sulfur	200.7	mg/kg	20	50.1	19.8	49.4	19.7	49.2
Thallium	200.7	mg/kg	1.8	5.5	1.9	5.6	1.8	5.4
Total Kjeldahl Nitrogen	351.2	mg/kg	45	130	54	150	47	130
Total Phosphorus	365.4	mg/kg	32	130	38	150	33	130
Vanadium	200.7	mg/kg	0.36	1.8	0.37	1.9	0.36	1.8
Zinc	200.7	mg/kg	0.91	2.7	0.93	2.8	0.89	2.7

B.2 Sample method, MDL, and MQL values used for 2015 blueberry plant analysis

			2015 BLUEBERRY PLANT SAMPLES					
			Mine Site Sample		Mill Site Sample		Control Site Sample	
PARAMETER	METHOD	UNITS	MDL	MQL	MDL	MQL	MDL	MQL
Aluminum	200.7	mg/kg	10	40	10	40	9.3	37
Ammonia-N	350.1	mg/kg	54	110	56	110	46	92
Antimony	200.7	mg/kg	2	6	2	6	1.9	5.6
Arsenic	200.7	mg/kg	2	6	2	6	1.9	5.6
Barium	200.7	mg/kg	0.02	0.1	0.02	0.1	0.018	0.093
Beryllium	200.7	mg/kg	0.04	0.2	0.04	0.2	0.037	0.19
Boron	200.7	mg/kg	4	10	4	10	4	9
Cadmium	200.7	mg/kg	0.1	0.3	0.1	0.3	0.093	0.28
Calcium	200.7	mg/kg	4	10	4	10	3.7	9.3
Chromium	200.7	mg/kg	0.08	0.3	0.08	0.3	0.074	0.28
Cobalt	200.7	mg/kg	0.2	1	0.2	1	0.19	0.93
Copper	200.7	mg/kg	0.3	1	0.3	1	0.28	0.93
Iron	200.7	mg/kg	1	3	1	3	0.9	2.8
Lead	200.7	mg/kg	1	3	1	3	0.93	2.8
Lithium	200.7	mg/kg	0.6	3	0.6	3	0.56	2.8
Magnesium	200.7	mg/kg	2	10	2	10	1.9	9.3
Manganese	200.7	mg/kg	0.5	2	0.5	2	0.46	1.9
Molybdenum	200.7	mg/kg	0.3	1	0.3	1	0.28	0.93
Mercury	7471B	mg/kg	0.02	0.059	0.023	0.068	0.034	0.1
Nickel	200.7	mg/kg	1	3	1	3	0.93	2.8
Nitrate/Nitrite-	4500-NO3- F	mg/kg	27	54	27	54	23	47
Potassium	200.7	mg/kg	10	40	10	40	9.3	37
Selenium	200.7	mg/kg	2	10	2	10	1.9	9.3
Silver	200.7	mg/kg	0.3	1.2	0.3	1.2	0.28	1.1
Sodium	200.7	mg/kg	50	160	50	160	46	150
Strontium	200.7	mg/kg	0.02	0.06	0.02	0.06	0.02	0.06
Sulfate	4500-SO4- E	mg/kg	3200	6500	3200	6500	2800	5600
Sulfur	200.7	mg/kg	20	49.9	19.9	49.7	19.5	48.8
Thallium	200.7	mg/kg	2	6	2	6	1.9	5.6
Total Kjeldahl Nitrogen	351.2	mg/kg	98	280	94	270	33	96
Total	365.4	mg/kg	14	56	13	54	12	48
Uranium	6010C	mg/kg	9.5	167	11.3	200	17.1	301
Vanadium	200.7	mg/kg	0.4	2	0.4	2	0.37	1.9
Zinc	200.7	mg/kg	1	3	1	3	0.93	2.8

B.3 Sample method, MDL, and MQL Values used for 2015 raspberry analysis

			2015 RASPBERRY SAMPLES					
			Mine Site Sample		Mill Site Sample		Control Site Sample	
PARAMETER	METHOD	UNITS	MDL	MQL	MDL	MQL	MDL	MQL
Aluminum	200.7	mg/kg	9.6	38	9.8	39	10	42
Ammonia-N	350.1	mg/kg	130	260	130	260	140	280
Antimony	200.7	mg/kg	2	6	2	6	2	6
Arsenic	200.7	mg/kg	2	6	2	6	2	6
Barium	200.7	mg/kg	0.03	0.2	0.03	0.2	0.03	0.2
Beryllium	200.7	mg/kg	0.04	0.2	0.04	0.2	0.04	0.2
Boron	200.7	mg/kg	4	10	4	10	4	10
Cadmium	200.7	mg/kg	0.1	0.3	0.1	0.3	0.1	0.3
Calcium	200.7	mg/kg	3.8	9.6	3.9	9.8	4.2	10
Chromium	200.7	mg/kg	0.12	0.3	0.12	0.3	0.12	0.3
Cobalt	200.7	mg/kg	0.2	1	0.2	1	0.2	1
Copper	200.7	mg/kg	0.3	2.5	0.3	2.5	0.3	2.5
Iron	200.7	mg/kg	1	2.9	1	2.9	1	3.1
Lead	200.7	mg/kg	1	3	1	3	1	3
Lithium	200.7	mg/kg	0.58	2.9	0.59	2.9	0.62	3.1
Magnesium	200.7	mg/kg	1.9	9.6	2	9.8	2.1	10
Manganese	200.7	mg/kg	0.05	0.1	0.05	0.1	0.05	0.1
Molybdenum	200.7	mg/kg	0.29	0.96	0.29	0.98	0.31	1
Mercury*	7471B	mg/kg	0.0047	0.021	0.028	0.085	0.031	0.093
Nickel	200.7	mg/kg	1	3	1	3	1	3
Nitrate/Nitrite-N	4500-NO3-	mg/kg	64	130	64	130	70	140
Potassium	200.7	mg/kg	48	190	49	200	52	210
Selenium	200.7	mg/kg	3	10	3	10	3	10
Silver	200.7	mg/kg	0.3	2.5	0.3	2.5	0.3	2.5
Sodium	200.7	mg/kg	48	150	49	160	52	170
Strontium	200.7	mg/kg	0.02	0.06	0.02	0.06	0.02	0.06
Sulfate	4500-SO4-	mg/kg	1900	3800	1900	3800	2100	4200
Thallium	200.7	mg/kg	2	6	2	6	2	6
Total Kjeldahl	351.2	mg/kg	100	260	100	260	56	140
Total	365.4	mg/kg	70	320	70	320	77	350
Uranium*	6010C	mg/kg	10.6	187	13.5	239	16.8	297
Vanadium	200.7	mg/kg	0.6	2	0.6	2	0.6	2
Zinc	200.7	mg/kg	1	3	1	3	1	3
*** Samples included plant tissue, not berries.**								

B.4 Sample method, MDL, and MQL Values used for 2016 blueberry analysis

			2016 BLUEBERRY SAMPLES					
			Mine Site Sample		Mill Site Sample		Control Site Sample	
PARAMETER	METHOD	UNITS	MDL	MQL	MDL	MQL	MDL	MQL
Aluminum	200.7	mg/kg	9.8	39	10	41	10	40
Ammonia-N	4500-NH3 G	mg/kg	1.9	3.8	2	3.9	2	4
Antimony	200.7	mg/kg	2	5.9	2	6.1	2	6
Arsenic	200.7	mg/kg	3.5	9.8	3.7	10	3.6	10
Barium	200.7	mg/kg	0.029	0.098	0.031	0.1	0.03	0.1
Beryllium	200.7	mg/kg	0.039	0.2	0.041	0.2	0.04	0.2
Boron	200.7	mg/kg	4	10	4	10	4	10
Cadmium	200.7	mg/kg	0.15	0.49	0.15	0.51	0.15	0.5
Calcium	200.7	mg/kg	3.9	9.8	4.1	10	4	10
Chromium	200.7	mg/kg	0.098	0.29	0.1	0.31	0.1	0.3
Cobalt	200.7	mg/kg	0.2	0.98	0.2	1	0.2	1
Copper	200.7	mg/kg	0.2	0.98	0.2	1	0.2	1
Iron	200.7	mg/kg	1	2.9	1	3.1	1	3
Lead	200.7	mg/kg	0.98	2.9	1	3.1	1	3
Lithium	200.7	mg/kg	3.9	9.8	4.1	10	4	10
Magnesium	200.7	mg/kg	2.9	9.8	3.1	10	3	10
Manganese	200.7	mg/kg	0.05	0.1	0.05	0.1	0.05	0.1
Mercury	7471A	mg/kg	0.074	0.22	0.077	0.23	0.071	0.21
Molybdenum	200.7	mg/kg	0.49	2	0.51	2	0.5	2
Nickel	200.7	mg/kg	0.98	2.9	1	3.1	1	3
Nitrate/Nitrite-N	4500-NO3- F	mg/kg	82	330	80	320	110	420
Potassium	200.7	mg/kg	9.8	39	10	41	10	40
Selenium	200.7	mg/kg	4.9	15	5.1	15	5	15
Sodium	200.7	mg/kg	49	160	51	160	50	160
Strontium	200.7	mg/kg	0.02	0.06	0.02	0.06	0.02	0.06
Sulfate	4500-SO4-E	mg/kg	2500	4900	2400	4800	3200	6300
Sulfur	200.7	mg/kg	183	351	186	358		
Thallium	200.7	mg/kg	4.9	15	5.1	15	5	15
Total Kjeldahl Nitrogen	351.2	mg/kg	89	220	79	200	120	290
Total Phosphorus	365.4	mg/kg	58	290	68	340	68	340
Uranium	200.8	mg/kg	0.12	0.59	0.14	0.71	0.13	0.63
Vanadium	200.7	mg/kg	0.59	2	0.61	2	0.6	2
Zinc	200.7	mg/kg	0.98	2.9	1	3.1	1	3

B.5 Sample method, MDL, and MQL Values used for 2016 raspberry analysis

			2016 RASPBERRY SAMPLES					
			Mine Site Sample		Mill Site Sample		Control Site Sample	
PARAMETER	METHOD	UNITS	MDL	MQL	MDL	MQL	MDL	MQL
Aluminum	200.7	mg/kg	10	40	9.6	38	10	40
Antimony	200.7	mg/kg	2	6	1.9	5.8	2	6
Arsenic	200.7	mg/kg	3.6	10	3.5	9.6	3.6	10
Barium	200.7	mg/kg	0.03	0.1	0.029	0.096	0.03	0.1
Beryllium	200.7	mg/kg	0.04	0.2	0.038	0.19	0.04	0.2
Boron	200.7	mg/kg	4	10	4	10	4	10
Cadmium	200.7	mg/kg	0.15	0.5	0.14	0.48	0.15	0.5
Calcium	200.7	mg/kg	4	10	3.8	9.6	4	10
Chromium	200.7	mg/kg	0.1	0.3	0.096	0.29	0.1	0.3
Cobalt	200.7	mg/kg	0.2	1	0.19	0.96	0.2	1
Copper	200.7	mg/kg	0.2	1	0.19	0.96	0.2	1
Iron	200.7	mg/kg	1	3	1	2.9	1	3
Lead	200.7	mg/kg	1	3	0.96	2.9	1	3
Lithium	200.7	mg/kg	2.2	5	2.1	4.8	2.2	5
Magnesium	200.7	mg/kg	3	10	2.9	9.6	3	10
Manganese	200.7	mg/kg	0.05	0.1	0.05	0.1	0.05	0.1
Molybdenum	200.7	mg/kg	0.3	1	0.29	0.96	0.3	1
Nickel	200.7	mg/kg	1	3	0.96	2.9	1	3
Nitrate/Nitrite-N	4500-NO3- F	mg/kg	96	390	75	300	95	380
Potassium	200.7	mg/kg	10	40	19	77	10	40
Selenium	200.7	mg/kg	5	15	4.8	14	5	15
Sodium	200.7	mg/kg	50	160	48	150	50	160
Strontium	200.7	mg/kg	0.01	0.06	0.01	0.06	0.01	0.06
Sulfate	4500-SO4- E	mg/kg	2900	5800	2300	4500	2800	5700
Thallium	200.7	mg/kg	5	15	4.8	14	5	15
Total Kjeldahl Nitrogen	351.2	mg/kg	90	220	110	280	110	290
Total Phosphorus	365.4	mg/kg	17	110	21	140	22	140
Total Solids	2540G	%	0.1	0.1	0.1	0.1	0.1	0.1
Vanadium	200.7	mg/kg	0.6	2	0.58	1.9	0.6	2
Zinc	200.7	mg/kg	1	3	0.96	2.9	1	3

B.6 Sample method, MDL, and MQL Values used for 2016 blackberry analysis

			2016 BLACKBERRY SAMPLES					
			Mine Site Sample		Mill Site Sample		Control Site Sample	
PARAMETER	METHOD	UNITS	MDL	MQL	MDL	MQL	MDL	MQL
Aluminum	200.7	mg/kg	10	40	9.8	39	10	40
Ammonia-N	ASTM Leach	mg/kg	2	4	1.9	3.9	3.8	7.6
Antimony	200.7	mg/kg	2	6	2	5.9	2	6
Arsenic	200.7	mg/kg	3.6	10	3.5	9.8	3.6	10
Barium	200.7	mg/kg	0.03	0.1	0.029	0.098	0.03	0.1
Beryllium	200.7	mg/kg	0.04	0.2	0.039	0.2	0.04	0.2
Boron	200.7	mg/kg	4	10	4	10	4	10
Cadmium	200.7	mg/kg	0.15	0.5	0.15	0.49	0.15	0.5
Calcium	200.7	mg/kg	4	10	3.9	9.8	4	10
Chromium	200.7	mg/kg	0.1	0.3	0.098	0.29	0.1	0.3
Cobalt	200.7	mg/kg	0.2	1	0.2	0.98	0.2	1
Copper	200.7	mg/kg	0.2	1	0.2	0.98	0.2	1
Iron	200.7	mg/kg	1	3	1	2.9	1	3
Lead	200.7	mg/kg	1	3	0.98	2.9	1	3
Lithium	200.7	mg/kg	2.2	5	2.2	4.9	2.2	5
Magnesium	200.7	mg/kg	3	10	2.9	9.8	3	10
Manganese	200.7	mg/kg	0.05	0.1	0.05	0.1	0.05	0.1
Mercury	7471B	mg/kg	0.0083	0.02	0.0067	0.017	0.0077	0.019
Molybdenum	200.7	mg/kg	0.3	1	0.29	0.98	0.3	1
Nickel	200.7	mg/kg	1	3	0.98	2.9	1	3
Nitrate/Nitrite-N	4500-NO3- F	mg/kg	65	130	71	140	57	110
Potassium	200.7	mg/kg	20	80	20	78	20	80
Selenium	200.7	mg/kg	5	15	4.9	15	5	15
Sodium	200.7	mg/kg	50	160	49	160	50	160
Strontium	200.7	mg/kg	0.01	0.06	0.01	0.06	0.01	0.06
Sulfate	4500-SO4- E	mg/kg	1900	3900	2100	4300	1700	3400
Sulfur	6010C	mg/kg	25.6	49.3	26.2	50.4	25.2	48.4
Thallium	200.7	mg/kg	5	15	4.9	15	5	15
Total Kjeldahl Nitrogen	351.2	mg/kg	52	130	110	280	91	230
Total Phosphorus	365.4	mg/kg	19	130	21	140	17	110
Total Solids	2540G	%	0.1	0.1	0.1	0.1	0.1	0.1
Uranium	6020A	mg/kg	0.018	0.09	0.017	0.086	0.019	0.095
Vanadium	200.7	mg/kg	0.6	2	0.59	2	0.6	2
Zinc	200.7	mg/kg	1	3	0.98	2.9	1	3

B.7 Sample method, MDL, and MQL Values used for 2017 blueberry analysis

			2017 BLUEBERRY SAMPLES					
			Mine Site Sample		Mill Site Sample		Control Site Sample	
PARAMETER	**METHOD**	**UNITS**	**MDL**	**MQL**	**MDL**	**MQL**	**MDL**	**MQL**
Aluminum	200.7	mg/kg	4	40	4	40	3.7	37
Ammonia-N	350.1	mg/kg	2	3.9	2	4	2	3.9
Antimony	200.7	mg/kg	2.7	6	2.7	6	2.5	5.6
Arsenic	200.7	mg/kg	4.3	10	4.3	10	4	9.3
Barium	200.7	mg/kg	0.2	1	0.2	1	0.19	0.93
Beryllium	200.7	mg/kg	0.04	0.2	0.04	0.2	0.037	0.19
Boron	200.7	mg/kg	4	10	4	10	4	9
Cadmium	200.7	mg/kg	0.13	0.3	0.13	0.3	0.12	0.28
Calcium	200.7	mg/kg	4	30	4	30	3.7	28
Chromium	200.7	mg/kg	0.1	0.3	0.1	0.3	0.093	0.28
Cobalt	200.7	mg/kg	0.22	1	0.22	1	0.2	0.93
Copper	200.7	mg/kg	0.29	1	0.29	1	0.27	0.93
Iron	200.7	mg/kg	0.9	5	0.9	5	0.8	4.6
Lead	200.7	mg/kg	1.5	10	1.5	10	1.4	9.3
Lithium	200.7	mg/kg	5	15	5	15	4.6	14
Magnesium	200.7	mg/kg	4	20	4	20	3.7	19
Manganese	200.7	mg/kg	0.04	0.2	0.04	0.2	0.04	0.19
Mercury	7471B	mg/kg	0.023	0.056	0.019	0.048	0.035	0.086
Molybdenum	200.7	mg/kg	6.8	20	6.8	20	6.8	20
Nickel	200.7	mg/kg	1.3	3	1.3	3	1.2	2.8
Nitrate/Nitrite-N	4500-NO3- F	mg/kg	150	340	130	290	150	340
Potassium	200.7	mg/kg	30	120	30	120	28	110
Selenium	200.7	mg/kg	5.9	30	5.9	30	5.5	28
Sodium	200.7	mg/kg	72	160	72	160	67	150
Strontium	200.7	mg/kg	0.01	0.06	0.01	0.06	0.01	0.06
Sulfate	4500-SO4-E	mg/kg	5100	10000	8800	18000	5100	10000
Sulfur	6010C	mg/kg	75	144	64.2	124	108	208
Thallium	200.7	mg/kg	4.2	10	4.2	10	3.9	9.3
Total Kjeldahl Nitrogen	351.2	mg/kg	63	160	52	130	53	130
Total Phosphorus	365.4	mg/kg	31	160	26	130	27	130
Vanadium	200.7	mg/kg	0.58	2	0.58	2	0.54	1.9
Zinc	200.7	mg/kg	0.34	3	0.34	3	0.32	2.8

B.8 Sample method, MDL, and MQL Values used for 2017 blackberry analysis

			2017 BLACKBERRY SAMPLES					
			Mine Site Sample		Mill Site Sample		Control Site Sample	
PARAMETER	METHOD	UNITS	MDL	MQL	MDL	MQL	MDL	MQL
Aluminum	6010C	mg/kg	4.6	10.4	33.8	76.8	4.5	10.3
Ammonia-N	350.1	mg/kg	1.9	3.8	15.1	30.1	1.9	3.8
Antimony	6010C	mg/kg	0.42	15.6	3.1	115	0.41	15.4
Arsenic	6010C	mg/kg	0.42	2.1	3.1	15.4	0.41	2.1
Barium	6010C	mg/kg	0.11	0.52	0.84	3.8	0.11	0.51
Beryllium	6010C	mg/kg	0.029	0.21	0.22	1.5	0.029	0.21
Boron	6010C	mg/kg	0.2	2.1	1.5	15.4	0.2	2.1
Cadmium	6010C	mg/kg	0.031	0.21	0.23	1.5	0.031	0.21
Calcium	6010C	mg/kg	3.4	52.2	25.3	384	3.4	51.4
Chromium	6010C	mg/kg	0.21	0.52	1.5	3.8	0.21	0.51
Cobalt	6010C	mg/kg	0.052	0.52	0.38	3.8	0.051	0.51
Copper	6010C	mg/kg	0.22	1	1.6	7.7	0.22	1
Iron	6010C	mg/kg	3.7	10.4	26.4	75.5	3.6	10.3
Lead	6010C	mg/kg	0.25	1	1.8	7.7	0.25	1
Lithium	6010C	mg/kg	0.52	5.2	3.8	37.8	0.51	5.1
Magnesium	6010C	mg/kg	0.97	20.9	7.1	154	0.95	20.6
Manganese	6010C	mg/kg	0.033	0.21	0.25	1.5	0.033	0.21
Mercury	7471B	mg/kg	0.008	0.02	0.066	0.16	0.0075	0.019
Molybdenum	6010C	mg/kg	0.14	1	1	7.7	0.13	1
Nickel	6010C	mg/kg	0.24	5.2	1.8	38.4	0.24	5.1
Nitrate/Nitrite-N	353.2	mg/kg	1.3	3.4	1.5	3.8	1.4	3.5
Potassium	6010C	mg/kg	20.9	31.3	154	230	20.6	30.9
Selenium	6010C	mg/kg	0.42	4.2	3.1	30.7	0.41	4.1
Sodium	6010C	mg/kg	13.6	146	99.9	1080	13.4	144
Strontium	6010C	mg/kg	0.045	0.52	0.33	3.8	0.044	0.51
Sulfate	300.0	mg/kg	3.3	18.9	260	1490	3.1	17.9
Sulfur	6010C	mg/kg	24.8	47.6	203	391	25.1	48.4
Thallium	6010C	mg/kg	0.31	6.3	2.3	46.1	0.31	6.2
Total Kjeldahl Nitrogen	351.2	mg/kg	77.7	179	326	750	80.1	184
Total Phosphorus	4500 P E	mg/kg	1.4	3.4	11.1	27.7	1.3	3.3
Uranium	6020	mg/kg	0.0028	0.19	0.011	0.74	0.0028	0.19
Vanadium	6010C	mg/kg	0.11	0.52	0.84	3.8	0.11	0.51
Zinc	6010C	mg/kg	0.67	2.1	4.9	15.4	0.66	2.1

B.9 Sample method, MDL, and MQL Values used for 2017 strawberry plant analysis

			2017 STRAWBERRY PLANT SAMPLES					
			Mine Site Sample		Mill Site Sample		Control Site Sample	
PARAMETER	METHOD	UNITS	MDL	MQL	MDL	MQL	MDL	MQL
Aluminum	6010C	mg/kg	4.4	10	4.2	9.6	4.8	10.8
Ammonia-N	350.1	mg/kg	2	3.9	1.9	3.8	1.9	3.8
Antimony	6010C	mg/kg	0.4	15	0.38	14.4	0.43	16.2
Arsenic	6010C	mg/kg	0.4	2	0.38	1.9	0.43	2.2
Barium	6010C	mg/kg	0.11	0.5	0.11	0.48	0.12	0.54
Beryllium	6010C	mg/kg	0.028	0.2	0.027	0.19	0.03	0.22
Boron	6010C	mg/kg	0.19	2	0.18	1.9	0.21	2.2
Cadmium	6010C	mg/kg	0.03	0.2	0.029	0.19	0.032	0.22
Calcium	6010C	mg/kg	3.3	49.9	3.2	48	3.6	54.1
Chromium	6010C	mg/kg	0.2	0.5	0.19	0.48	0.22	0.54
Cobalt	6010C	mg/kg	0.05	0.5	0.048	0.48	0.054	0.54
Copper	6010C	mg/kg	0.21	1	0.2	0.96	0.23	1.1
Iron	6010C	mg/kg	3.5	10	3.4	9.6	3.8	10.8
Lead	6010C	mg/kg	0.24	1	0.23	0.96	0.26	1.1
Lithium	6010C	mg/kg	0.5	5	0.48	4.8	0.54	5.4
Magnesium	6010C	mg/kg	0.93	20	0.89	19.2	1	21.6
Manganese	6010C	mg/kg	0.032	0.2	0.031	0.19	0.035	0.22
Mercury	7471B	mg/kg	0.0081	0.02	0.0081	0.02	0.0083	0.021
Molybdenum	6010C	mg/kg	0.13	1	0.12	0.96	0.14	1.1
Nickel	6010C	mg/kg	0.23	5	0.22	4.8	0.25	5.4
Nitrate/Nitrite-N	353.2	mg/kg	1.9	4.8	2.6	6.4	0.63	1.6
Potassium	6010C	mg/kg	20	30	19.2	28.8	21.6	32.4
Selenium	6010C	mg/kg	0.4	4	0.38	3.8	0.43	4.3
Sodium	6010C	mg/kg	13	140	12.5	134	14.1	151
Strontium	6010C	mg/kg	0.043	0.5	0.041	0.48	0.046	0.54
Sulfate	300.0	mg/kg	3.4	19.4	3.5	19.9	3	17.1
Sulfur	6010C	mg/kg	26.1	50.1	25.1	48.4	26.3	50.5
Thallium	6010C	mg/kg	0.3	6	0.29	5.8	0.32	6.5
Total Kjeldahl Nitrogen	351.2	mg/kg	85.4	196	83.5	192	84.3	194
Total Phosphorus	4500 P E	mg/kg	2.7	6.7	1.4	3.4	6.7	16.6
Uranium	6020	mg/kg	0.0028	0.19	0.0028	0.19	0.0028	0.19
Vanadium	6010C	mg/kg	0.11	0.5	0.11	0.48	0.12	0.54
Zinc	6010C	mg/kg	0.64	2	0.61	1.9	0.69	2.2

B.10 Sample method, MDL, and MQL Values used for 2017 wintergreen plant analysis

			2017 WINTERGREEN PLANT SAMPLES			
			Mine Site Sample		Control Site Sample	
PARAMETER	METHOD	UNITS	MDL	MQL	MDL	MQL
Aluminum	6010C	mg/kg	4.1	41	4	9.2
Ammonia-N	350.1	mg/kg	2	3.9	1.9	3.8
Antimony	6010C	mg/kg	2.8	6.1	0.37	13.8
Arsenic	6010C	mg/kg	4.4	10	0.37	1.8
Barium	6010C	mg/kg	0.2	1	0.1	0.46
Beryllium	6010C	mg/kg	0.041	0.2	0.026	0.18
Boron	6010C	mg/kg	4	10	0.17	1.8
Cadmium	6010C	mg/kg	0.13	0.31	0.028	0.18
Calcium	6010C	mg/kg	4.1	31	3	46
Chromium	6010C	mg/kg	0.1	0.31	0.18	0.46
Cobalt	6010C	mg/kg	0.22	1	0.046	0.46
Copper	6010C	mg/kg	0.3	1	0.19	0.92
Iron	6010C	mg/kg	0.9	5.1	3.2	9.2
Lead	6010C	mg/kg	1.5	10	0.22	0.92
Lithium	6010C	mg/kg	5.1	15	0.46	4.6
Magnesium	6010C	mg/kg	4.1	20	0.85	18.4
Manganese	6010C	mg/kg	0.04	0.2	0.029	0.18
Mercury	7471B	mg/kg	0.0072	0.018	0.0079	0.019
Molybdenum	6010C	mg/kg	6.8	20	0.12	0.92
Nickel	6010C	mg/kg	1.3	3.1	0.21	4.6
Nitrate/Nitrite-N	353.2	mg/kg	43	96	0.6	1.5
Potassium	6010C	mg/kg	31	120	18.4	27.6
Selenium	6010C	mg/kg	6	31	0.37	3.7
Sodium	6010C	mg/kg	73	160	12	129
Strontium	6010C	mg/kg	0.01	0.06	0.04	0.46
Sulfate	300.0	mg/kg	-	-	3.2	18.1
Sulfate	4500-SO4-E	mg/kg	1400	2900	-	-
Sulfur	6010C	mg/kg	25	48	25.5	49.1
Thallium	6010C	mg/kg	4.3	10	0.28	5.5
Total Kjeldahl Nitrogen	351.2	mg/kg	48	120	85.5	197
Total Phosphorus	4500 P E	mg/kg	39	200	1.3	3.3
Uranium	6020	mg/kg	0.0027	0.18	0.0029	0.19
Vanadium	6010C	mg/kg	0.59	2	0.1	0.46
Zinc	6010C	mg/kg	0.35	3.1	0.59	1.8

APPENDIX C

Acid Digestion Protocols used by White Water Associates, Inc. for Plant Tissue Analysis

8.1.5. Method 3050B: Total Recoverable Metals in Soil, Sludge, Tissue, and Solid Waste

8.1.5.1. This method is an acid digestion for the preparation of sediments, sludges, tissue and soil samples for ICP-OES and ICP-MS analysis.

8.1.5.2. In an aluminum pan, crucible, or beaker, pre-dry a representative sample overnight. For hot block method, transfer 0.5 grams of a dried sample into a pre-cleaned polyethylene digestion vessel. For this subsampling procedure, we will avoid a non-representative sample by not targeting a specific weight.

8.1.5.3. Add matrix spike analytes at this time to the sample(s) selected for spiking. Prepare a sufficient number of duplicate samples or duplicate spikes for digestion (see the quality control section of this procedure for required frequency of matrix spikes and duplicates).

8.1.5.4. Add 5 ml of 1:1 nitric acid, mix the slurry, and cover with a reflux cap. Heat the sample to 95oC+5oC and reflux for 25 minutes without boiling. Allow the sample to cool, add 2.5 ml of concentrated nitric acid, replace reflux cap and continue for 30 minutes. If brown fumes are generated, repeat this step until no brown fumes are given off. Allow the solution to evaporate to approximately 2.5 ml without boiling. Maintain a covering of solution over the bottom of the vessel at all times.

8.1.5.5. After the sample has cooled, add 1.0 ml of DI water and 1.5 ml of 30% H2O2 and heat until effervescence subsides. Cool and continue to add 30% H2O2 in 0.5 ml aliquots with warming until effervescence is minimal or sample appearance no longer changes. DO NOT ADD MORE THAN A TOTAL OF 5.0 ml of H2O2. Care must be taken upon additions of H2O2. Some samples are more reactive than others and may foam over causing sample loss.

8.1.5.6. Continue heating the acid-peroxide digestate until the volume has been reduced to approximately 2.5 ml. Maintain a covering of solution over the bottom of the digestion vessel at all times.

8.1.5.7. Add 5.0 ml concentrated HCl to the sample digest and cover with a reflux cap. Continue at 95oC+5oC for 15 minutes.

8.1.5.8. Bring volume back to 50 ml with DI water. Sample may be filtered if suspended material is present.

8.1.5.9. Prepare and digest an MB and LCS with Ottawa sand for each batch of samples digested.

10.2.4. Method 3050B: Total Recoverable Metals in Soil, Sludge, and Solid Materials

10.2.4.1. This method is an acid digestion for the preparation of sediment, sludge, soil and other solids samples for ICP-OES analysis.

10.2.4.2. Metals digested for ICP-OES by this method are: Al, As, Sb, Se, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Ag, Na, Tl, V, and Zn.

10.2.4.3. As In an aluminum pan or equivalent, pre-dry a representative sample overnight. For hot block method, transfer 0.50gm of a dried sample into a pre-cleaned polyethylene digestion vessel. For this subsampling procedure, we will avoid a non-representative sample by not targeting a specific weight.

10.2.4.4. Add matrix spike analytes at this time to the sample(s) selected for spiking. Prepare a sufficient number of duplicate samples or duplicate spikes for digestion (see the quality control section of this procedure for required frequency of matrix spikes and duplicates).

10.2.4.5. Add 5 mls of 1:1 nitric acid, mix the slurry, and cover with a reflux cap. Heat the sample to 95oC+5oC and reflux for 25 minutes without boiling. Record the start time in the digestion log book along with the starting hot block temperature. Allow the sample to cool, add 2.5mLs of concentrated nitric acid, replace reflux cap and continue for another 30 minutes. If brown fumes are generated, repeat this step until no brown fumes are given off. Allow the solution to evaporate to approximately 2.5mL without boiling. Maintain a covering of solution over the bottom of the vessel at all times.

10.2.4.6. After the sample has cooled, add 1.0mL of DI water and 1.5mLs of 30% H2O2 and heat until effervescence subsides. Cool and continue to add 30% H2O2 in 0.5-mL aliquots with warming until effervescence is minimal or sample appearance no longer changes. DO NOT ADD MORE THAN A TOTAL OF 5.0mLs of H2O2. Care must be taken upon additions of H2O2. Some samples are more reactive than others and may foam over causing sample loss.

10.2.4.7. Continue heating the acid-peroxide digestate until the volume has been reduced to approximately 2.5mLs. Maintain a covering of solution over the bottom of the digestion vessel at all times.

10.2.4.8. Add 5.0mLs concentrated HCL to the sample digest and cover with a watch reflux cap. Reflux at 95oC+5oC for 15 minutes. Record the stop time along with the ending hotblock temperature reading in the digestion logbook.

10.2.4.9. Bring volume back to 50ml with DI water. Sample may be filtered if suspended material is present.

10.2.4.10. Prepare a laboratory digested blank (MB) and LCS for matrix and batch of 20 samples digested. NOTE: To improve samples solubility and recoveries of antimony, barium, lead, and silver, refer to section 7.5 of Method 3050B, SW