INDEPENDENT CONSULTANT
PEER REVIEW REPORT FOR THE COMMUNITY BASED RISK ASSESSMENT (CBRA)

QUALITY ASSURANCE REVIEW ON THE HUMAN HEALTH RISK ASSESSMENT PORT COLBORNE, ONTARIO

WATTERS ENVIRONMENTAL GROUP INC.

CONFIDENTIAL

INDEPENDENT CONSULTANT PEER REVIEW REPORT FOR THE COMMUNITY BASED RISK ASSESSMENT (CBRA)

QUALITY ASSURANCE REVIEW ON THE HUMAN HEALTH RISK ASSESSMENT IN PORT COLBORNE, ONTARIO

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1.0 INTRODUCTION

A Human Health Risk Assessment (HHRA) concerning the impacts of emissions from a former Inco nickel refinery on the health of residents of the City of Port Colborne, Ontario was conducted by Jacques Whitford Environmental Limited (JW) [now Stantec Consulting], on behalf of its client, Vale Inco (Inco). The HHRA report (JW, 2007) is entitled, "*Port Colborne Community Based Risk Assessment – Human Health Risk Assessment – Final Report*" dated December 2007 (the HHRA Report), and is one component of a Community Based Risk Assessment (CBRA) that is attempting to address potential impacts from former Inco emissions on agricultural crops, the natural environment, and human health within the City of Port Colborne.

Watters Environmental Group Inc. is the Independent Consultant to the City of Port Colborne and the Public Liaison Committee (PLC) for the CBRA and has prepared this report to document, review and comment on the overall quality assurance and quality control (QA/QC) elements of the individual technical studies that were carried out for the HHRA.

Quality assurance (QA) is an integral part of the data gathering component of all studies in the CBRA. It applies to every aspect of the CBRA; from field sampling, to laboratory analysis, to data assessment, to final report preparation. These activities are distinctly separate but intimately interrelated. Errors and biases in any one activity can affect all other activities. Analytical accuracy in the laboratory can never compensate for errors made during sampling or indemnify against poor precision in the laboratory or incorrect statistical treatment of collection. Great care to ensure representative sample collection in the field will not indemnify against poor precision in the laboratory or incorrect treatment of the sample data. In order to produce a reliable, trustworthy environmental study, all of the components of the study must be properly planned, executed, documented, and reported.

1.1 QUALITY CONTROL AND QUALITY ASSURANCE

Quality control (QC) is a planned system of activities whose purpose is to provide a quality product. **Quality assurance** (QA) is a planned system of activities whose purpose is to provide assurance that the quality control program is effective. The purpose of this report is to assess the QC activities and the overall QA processes used in the ERA-HHRA portion of the Port Colborne CBRA that would allow an objective reviewer to form an opinion as to the accuracy, precision and quality of the data on which the conclusions in the ERA-HHRA Report are founded.

For a more detailed discussion of QA/QC and how it relates generally to environmental science, and the CBRA in particular, the reader is referred to the Quality Assurance Review on the Natural Environment in Port Colborne (Watters Environmental, November 2010).

1.2 QA/QC ACTIVITIES AND THE ERA- HHRA STUDIES

The QA/QC for the HHRA was focussed primarily on observation of study components to ensure that the requirements in the protocols were followed. There was also an evaluation of the validity of sample data through the collection of duplicate samples.

1.3 THE ROLE OF THE INDEPENDENT CONSULTANT IN QA/QC

While the Independent Consultant's role was primarily to assist the City of Port Colborne and the PLC in understanding the science within the CBRA, an important additional responsibility was to help ensure that QA was an integral part of the sampling, analytical, assessment and reporting stages of the studies carried out for the CBRA. The Independent Consultant, with input from the PLC, critiqued the study elements of these projects to sharpen the focus of the project and to ensure that proper planning and sampling was carried out, as well as to ensure that QA/QC was in place and could be documented for the various projects.

1.4 SCOPE OF THE QA/QC REPORT

Studies such as those comprising the CBRA have a number of key elements:

- Planning,
- Sampling,
- Analysis,
- Data Assessment, and
- Reporting.

In this review of QA/QC for the CBRA, elements primarily considered are associated with the planning of the studies, sampling methodology, sample-taking and laboratory analysis of samples.

The HHRA did not follow the requirements of the regulatory guidance documents despite a commitment to do so. The requirements of these are set out in the Ontario Ministry of Environment *1996 Guidance on Site Specific Risk Assessment (SSRA) for use at Contaminated Sites in Ontario, Pertaining to Requirements and Standard Practice for Conducting and Reporting Human Health Risk Assessment (HHRA) for Site Clean-Ups in Ontario. ISBN-0-7778-4058-03.* The HHRA deviated from these requirements in terms of the statistical treatment of the data, reasonable maximum exposure calculations and interpretations, and application of factors for bioavailability.

A detailed gap analysis of the HHRA against the Ontario MoE Guidance is provided in Appendix A. Also included in the Appendix is a similar gap analysis against the requirements of the U.S. EPA RAGS Guidance and Requirements for Conducting and Reporting Baseline Risk Assessment for Human Health Evaluation as Part of a Remedial Investigation and Feasibility Study.

With some minor deviations, which are addressed in the QA/QC comments of each HHRA study component, the sampling was conducted following the requirements set out on the protocols.

There are no significant concerns with the analytical work carried out for the HHRA. There is a high level of agreement between replicate samples taken and analyzed by JW with those of the Independent Consultant.

1.5 QA/QC REPORT FORMAT

The following sections of this report outline the QA/QC program and findings for each of the study components of the HHRA, including the Indoor Dust Sampling Program (Section 2.0), Private Well Water Sampling Program (Section 3.0), the Fish and Game Sampling Program (Section 4.0), the Food Basket Collection Analysis (Section 5.0), Residential Food Basket Survey Analysis (Section 6.0), Local Supermarket Food Basket Analysis (Section 7.0), Maple Sap Sampling (Section 8.0), Ambient Air Monitoring in the Community (Section 9.0), Ambient Air Monitoring in the Vicinity of Farming Activities (Section 10.0), and the sampling and analysis of soils (Sections 11.0 and 12.0).

2.0 INDOOR DUST SAMPLING PROGRAM - RENOVATION STUDY

2.1 OBJECTIVE OF THE INDOOR DUST SAMPLING PROGRAM – RENOVATION STUDY

The objective of the Indoor Dust Sampling Program - Renovation Study was to measure concentrations of Chemicals of Concern (CoCs) in indoor air and dust during periods of home renovation, for input in the HHRA.

2.2 APPROACH TAKEN FOR QA/QC

The Independent Consultant observed activities performed by JW to verify that the selection of the participants, sampling schedule, sample locations, and sampling methodology were conducted in accordance with the protocol. The Independent Consultant collected data regarding indoor air monitoring flow rates and sampling durations, as well as dust samples from the hard surface areas.

2.3 FIELD WORK

Initial sampling was conducted on November 18 and 20, 2002 prior to the start of the most disruptive phase of a renovation project in an East Side residence. Sample collection during the renovation period occurred on March 8 and 9, 2003. Teams consisted of two representatives from JW and one representative from the Independent Consultant.

2.4 PROTOCOL VERSION EMPLOYED IN CARRYING OUT THE FIELD WORK

The protocol available at the onset of the study was the "*Draft Protocol Indoor Dust Sampling – Renovation Study Protocol*, *Port Colborne Community Based Risk Assessment*" dated November 18, 2002. Subsequently, this draft was revised and reissued on December 3, 2002.

2.5 CONDUCT OF WORK

2.5.1 Selection of Study Home

The house was selected and participant permission form was completed in accordance with the Draft Protocol Indoor Dust Sampling – Renovation Study Protocol, Port Colborne Community Based Risk Assessment dated December 3, 2002. The protocol defines renovation as "*reconstruction of a building involving the removal of existing walls and/or ceilings*". The renovation observed involved increasing the size of the existing ceiling opening leading to the attic to 24 inches by 54 inches and installing a retractable staircase leading to the attic. These activities do not constitute the removal of an existing ceiling.

The Independent Consultant observed the residents sign the "Permission Form", but did not collect a copy.

2.5.2 Indoor Dust Sampling

Airborne Dust

Indoor air monitoring (TSP and PM_{10}) was conducted in accordance with the Draft Protocol Indoor Dust Sampling – Renovation Study Protocol, Port Colborne Community Based Risk Assessment dated December 3, 2002 with the following exceptions:

- Samples were not collected for a duration of 8 hours in the renovated area during renovation activities as the required in the protocol (refer to Section 4.0) as the renovation project was completed (i.e., clean-up activities completed) in approximately 6.5 hours.

- Multiple samples of up to 2 hours each were not collected in the renovated area during renovation activities as the protocol indicates (refer to Section 4.0). JW staff stated their preference to collect one sample, not consecutive samples, during the renovation phase. The Independent Consultant staff reminded JW staff of the protocol requirements on various occasions during the renovation project. The TSC specifically included the requirement of multiple samples of up to 2 hours each and made appropriate modifications to a previous draft protocol that indicated multiple samples would be taken if required (See Draft protocol dated December 2, 2002).

Hard Surface Dust

All hard surface sampling was conducted in accordance with the Draft Protocol Indoor Dust Sampling – Renovation Study Protocol, Port Colborne Community Based Risk Assessment dated December 3, 2002. Three hard surface samples (i.e., two samples collected in the immediate area of the ceiling, and a third sample near the entrance renovated area) were collected just prior to and immediately after (but before clean-up activities involving a vacuum cleaner) renovation activities. Attempts were made to collect pre and post renovation hard surface samples from the same locations.

A grab sample was also collected from the attic space prior to renovation activities.

2.6 DATA QA/QC

The Independent Consultant did not receive any analytical data from JW.

2.7 CONCLUSIONS

The Indoor Dust Sampling Program-Renovation Study, with the exceptions noted above, was performed in general accordance with the protocol.

3.0 PRIVATE WELL WATER SAMPLING PROGRAM

3.1 OBJECTIVE OF THE PRIVATE WELL WATER SAMPLING PROGRAM

The objective of the Private Well Water Sampling Protocol was to determine the level and extent of CoCs (if any) in well water.

3.2 APPROACH TAKEN FOR QA/QC

All water samples were collected in duplicate: one for JW and one for the Independent Consultant. Twenty percent of the samples collected by the Independent Consultant were analyzed at the laboratory for comparison to JW results.

The difference and percent differences between JW and the Independent Consultant results were calculated for each sample and each CoC to establish the level of agreement between sample pairs. If one or both samples constituting a sample pair had a result reported as less than the Estimated Quantitation Limit (EQL), the sample pair was not included in the statistical analysis. Rather, a qualitative analysis of the sample pair was conducted. For this qualitative analysis, acceptable agreement between the two results was considered to have been met if the difference between the two results was less than 5 times the EQL (similar approach to that described in "*Standard Methods for the Examination of Water and Wastewater*", 20th Edition, 1998). Plots of the pairs were produced to indicate if there were any obvious trends in degree of difference with concentration.

A paired t-test was conducted on the 20% duplicate samples to determine if any consistent bias is evident overall. Regression analysis was conducted to determine if the Independent Consultant and JW demonstrated a 1:1 relationship (i.e., good agreement).

3.3 FIELD WORK

The Well Water Sampling Program began on August 9, 2001 and continued to August 14, 2001. During the sampling period, the protocol for collecting the water did not include a requirement for filtering or preserving the sample. The Independent Consultant identified this as a deficiency and, on August 16, 2001, a 'revised' protocol/procedure was adopted for collecting and preserving the water samples. Residents that had previously had their wells sampled were contacted and new water samples were collected. The 'revised' sampling took place between August 16, 2001 and September 4, 2001.

Two teams were in the field for the first week and one crew on an "as needed" basis after that. Teams consisted of one representative from each consulting firm (i.e., JW and the Independent

Consultant). Coordination was carried out between Port Colborne residents and the two field crews for the first week.

3.4 PROTOCOL VERSION EMPLOYED IN CARRYING OUT THE FIELD WORK

The protocol available at the time of sampling was: "*Private Well Water Sampling Program Protocol, Port Colborne CBRA*". There was no date or version number on this protocol.

3.5 COMMENTS/DEVIATIONS FROM PROTOCOL

- Much of the well water sampling was conducted by going door-to-door and asking residents if they would like to participate. Appointments were generally not scheduled in advance.

- The protocol required third-party QA analyses to be conducted on 10% of the samples. The QA/QC process was designed by the Independent Consultant, as part of its mandate with the client. The procedure required the collection of 100% of the samples that JW collected, when possible, and random analysis of 20% of those samples.

- The protocol stated that the water samples would be collected at the water outlet closest to the well prior to passing through any water treatment system. Samples were collected, whenever possible, directly from the well using bailers.

- All water samples, under the revised procedures, were filtered and preserved with nitric acid in the field.

3.6 DATA QA/QC

The JW results sent to the Independent Consultant had many sample location labelling errors. For example, samples RS2-75 and RS2-75T were both labelled as coming from an inside tap, where, in fact, sample RS2-75 was from the well and RS2-75T from the tap. Samples RS2-64 and RS2-64T were both labelled as being taken from the well, but sample RS2-64T was actually taken from the inside tap. The JW sample codes identify where each water sample was collected, but for many of the samples, the locations written on the JW data report indicate a different location. Since the sample codes are clear, this error did not affect data QA/QC. However, the errors could cause confusion for the residents receiving the data, and could confound data interpretation if the written sample locations on the data reports were relied upon.

For the samples that the Independent Consultant had analyzed, results were tabulated for the four CoCs: arsenic, cobalt, copper and nickel. See Appendix B for the laboratory certificates of analysis. The absolute difference and percent difference between JW and the Independent

Consultant results were calculated for each sample per CoC. The absolute difference was calculated by subtracting the Independent Consultant result from the JW result, and the percent difference was calculated as follows:

(JW result - Independent Consultant result) / ((JW result + Independent Consultant result) / 2) x 100

For data reported as <EQL, the sample pair was not included in the statistical analysis. Rather, a qualitative analysis of the sample pair was conducted. For this qualitative analysis, reasonable agreement between the two results was considered to have been met if the difference between the two results was less than 5 times the EQL. The means of the differences and percent differences were calculated for each CoC per media.

The mean percent differences were -40.00, 3.65, 9.73, and 1.67% for arsenic, cobalt, copper and nickel, respectively. In a study such as this, one expects some variability in the data. The variability can be due to natural phenomena, the collection (including spatial or temporal variation) and analytical methodologies applied as well as data analysis. Varying levels of contaminant concentrations in the samples can have a significant effect on the percent difference (for example: a small difference in a low concentration can equate to a large percent difference whereas a small difference in a high concentration equates to a small percent difference).

Figures 1 through 8 give graphical representations of the degree of variability of the data.

3.6.1 Arsenic in Well Water

For arsenic in well water (see Figures 1 and 2), there was a limited dataset because arsenic was below the detection limit for all but one well water sample. The percent difference of this sample pair was -40.00%. All remaining sample results were below the EQL indicating good agreement between the sample results, also indicating that arsenic is not a problem for local groundwater. The one sample with detectable arsenic levels was well below the MOE’s water quality standard. The EQL for arsenic was 0.0001 mg/L.

3.6.2 Cobalt in Well Water

The cobalt results indicate a degree of variability in percent difference at low concentration levels, yet there is a strong linear relationship with the concentration results from JW and the Independent Consultant (see Figures 3 and 4). A statistical regression analysis confirmed this is not a significant difference from the 1:1 ratio trend line. Twenty-three sample pairs were not included in the statistical analysis as both sample results were below the EQL indicating good agreement between the sample results. One other sample pair was not included in the statistical analysis as one of the two sample results in the sample pair was below the EQL. The difference between the two sample results was less than 5 times the EQL indicating acceptable agreement between the sample results. The EQL for cobalt was 0.0001 mg/L.

3.6.3 Copper in Well Water

The copper results indicate a high degree of variability in percent difference at low concentration levels, with a general tendency of JW results being higher than the Independent Consultant results (see Figure 5). This variation drives the mean percent difference of 9.73%. Differences at low concentrations can have a much greater impact on the percent difference than differences at higher (and possibly more biologically meaningful) concentrations. Statistically, regression analysis found the slopes of the contaminant and 1:1 ratio lines as significantly different. This is not surprising due to the strong influence of the one sample at the higher concentration (see Figure 6). Five sample pairs were not included in the statistical analysis as both sample results were below the EQL indicating good agreement between the sample results. Fourteen other samples pairs were not included in the statistical analysis as one of the two sample results in the sample pair was below the EQL. The difference between the two sample results was less than 5 times the EQL indicating acceptable agreement between the sample results. One sample pair was not included in the statistical analysis as one of the two sample results in the sample pair was below the EQL. The difference between the two sample results, however, was greater than 5 times the EQL indicating poor agreement between the sample results. The EQL for copper was 0.0005 mg/L.

3.6.4 Nickel in Well Water

The nickel results indicate a degree of variability in percent difference at low concentration levels (see Figure 7), yet there is also a strong linear relationship with the concentration results from JW and the Independent Consultant. Statistical regression analysis confirmed this is not a significant difference from the 1:1 ratio trend line (see Figure 8). Thirteen sample pairs were not included in the statistical analysis as both sample results were below the EQL indicating good agreement between the sample results. Five other sample pairs were not included in the statistical analysis as one of the two sample results in the sample pair was below the EQL. The difference between the two sample results were less than 5 times the EQL indicating acceptable agreement between the sample results. The EQL For nickel was 0.001 mg/L.

3.7 CONCLUSIONS

Due to the low mean percent differences, the majority of data variation occurring at low concentrations, and the strong linear relationships between JW and the Independent Consultant results, no systematic error with the data was observed. The variability between JW and Independent Consultant results is reasonable for this study.

The well water study, with the minor exceptions noted above, has been performed in general accordance with the protocol, and the reported data, as it has been presented, is acceptable.

Arsenic in Well Water

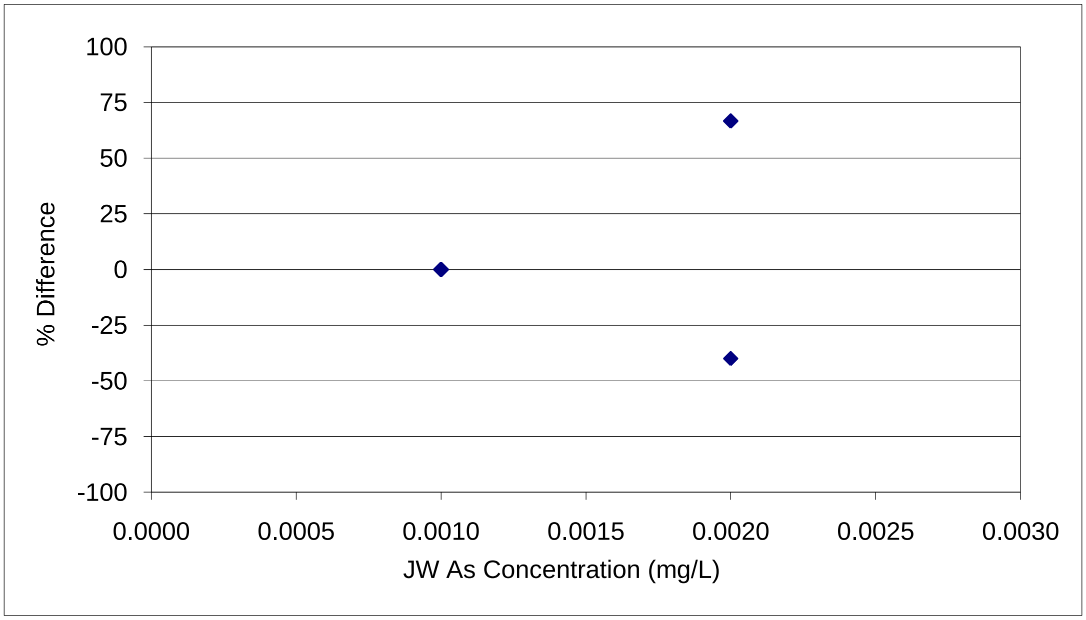

Figure 1: The percent difference between Arsenic (As) concentrations in well water from JW compared with the Independent Consultant

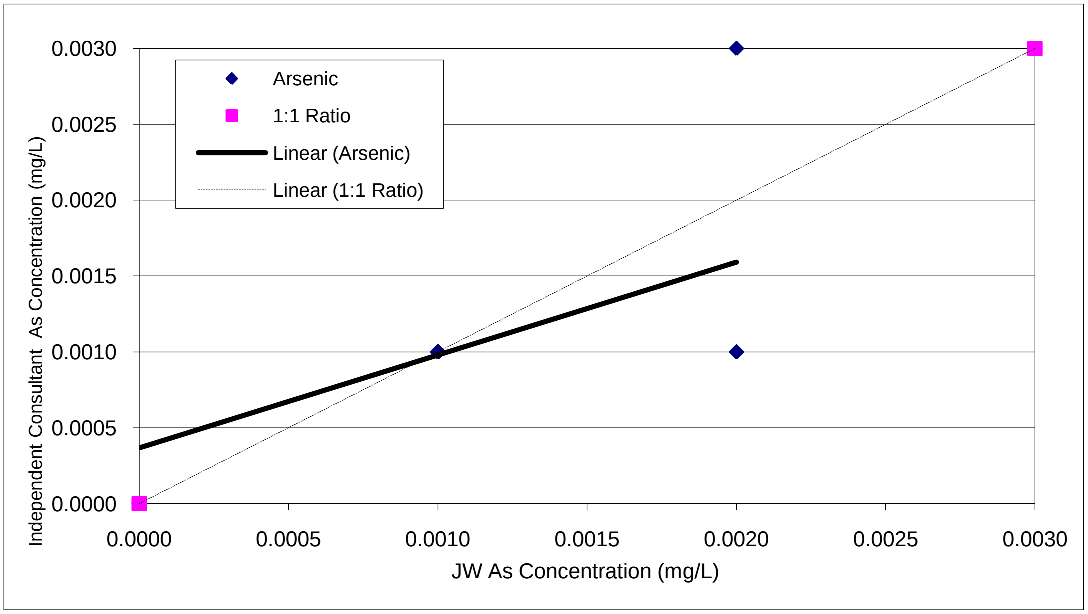

Figure 2: A comparison of Arsenic (As) concentrations in well water from samples collected by JW compared with the Independent Consultant

Cobalt in Well Water

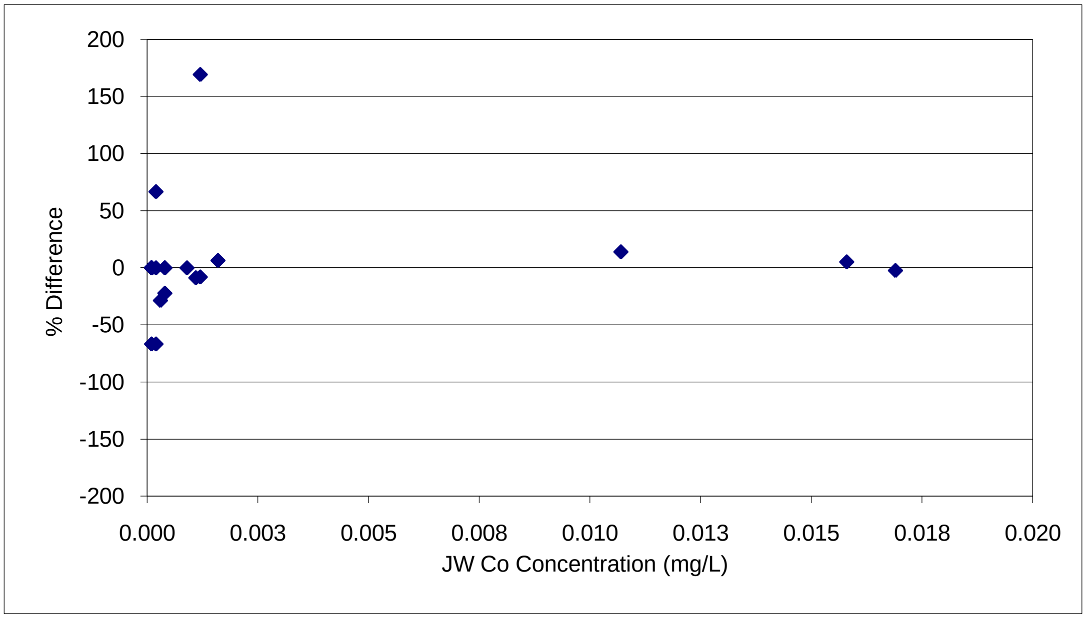

Figure 3: The percent difference between Cobalt (Co) concentrations in well water from JW compared with the Independent Consultant

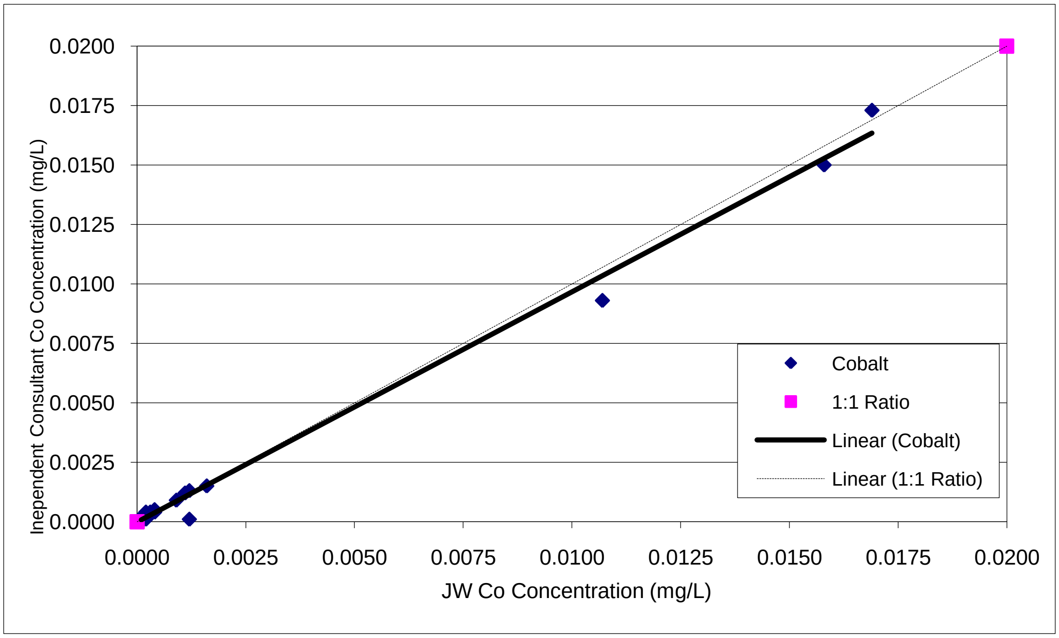

Figure 4: A comparison of Cobalt (Co) concentrations in well water from samples collected by JW compared with the Independent Consultant

Copper in Well Water

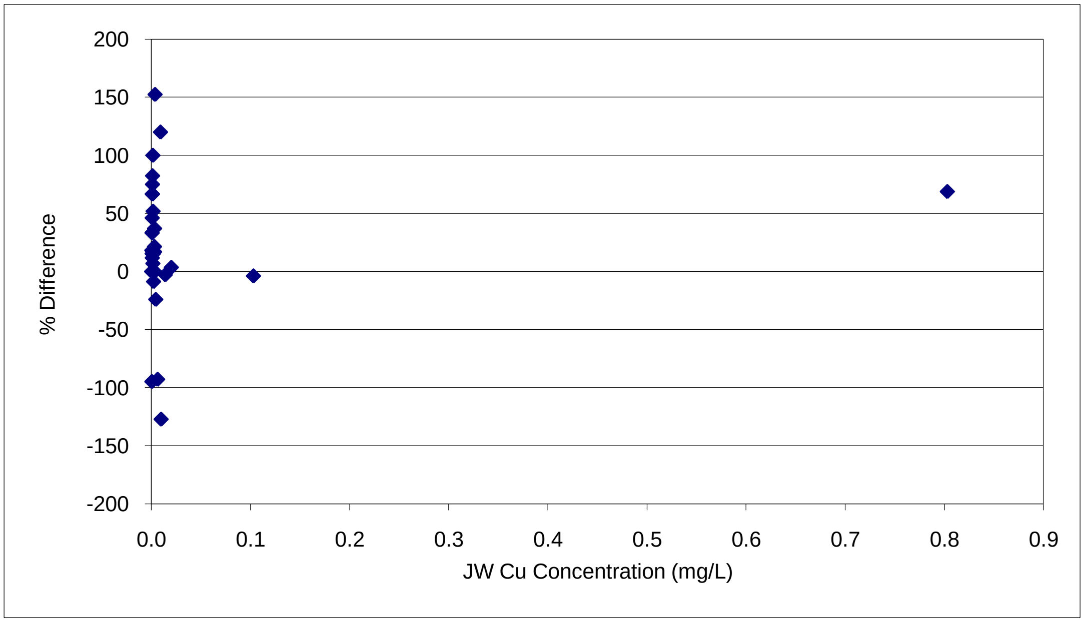

Figure 5: The percent difference between Copper (Cu) concentrations in well water from JW compared with the Independent Consultant

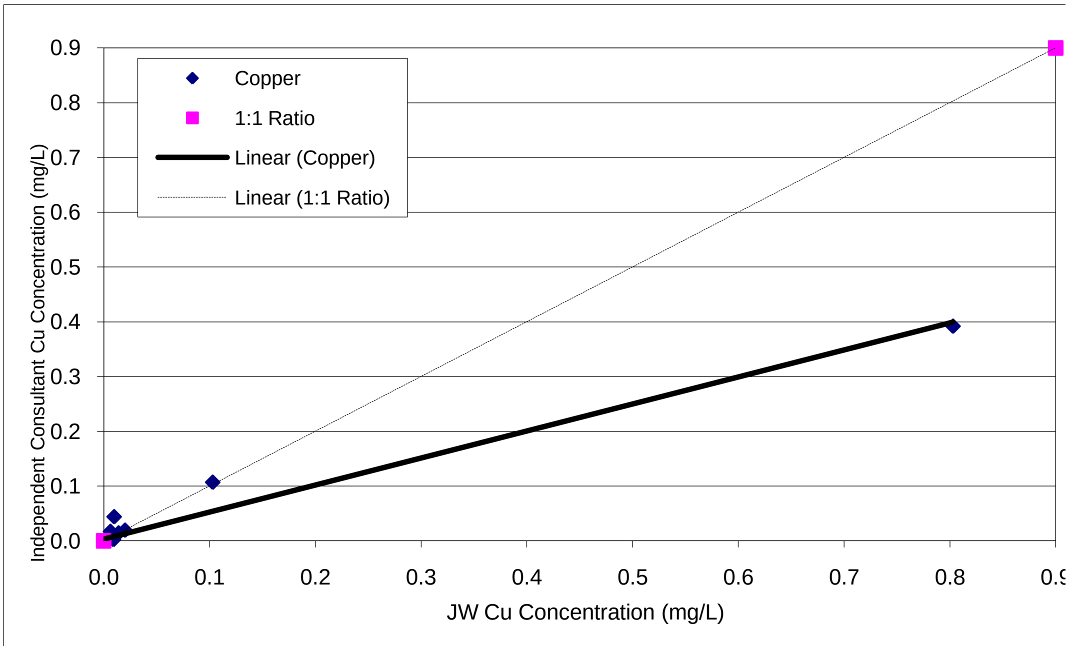

Figure 6: A comparison of Copper (Cu) concentrations in well water from samples collected by JW compared with the Independent Consultant

Nickel in Well Water

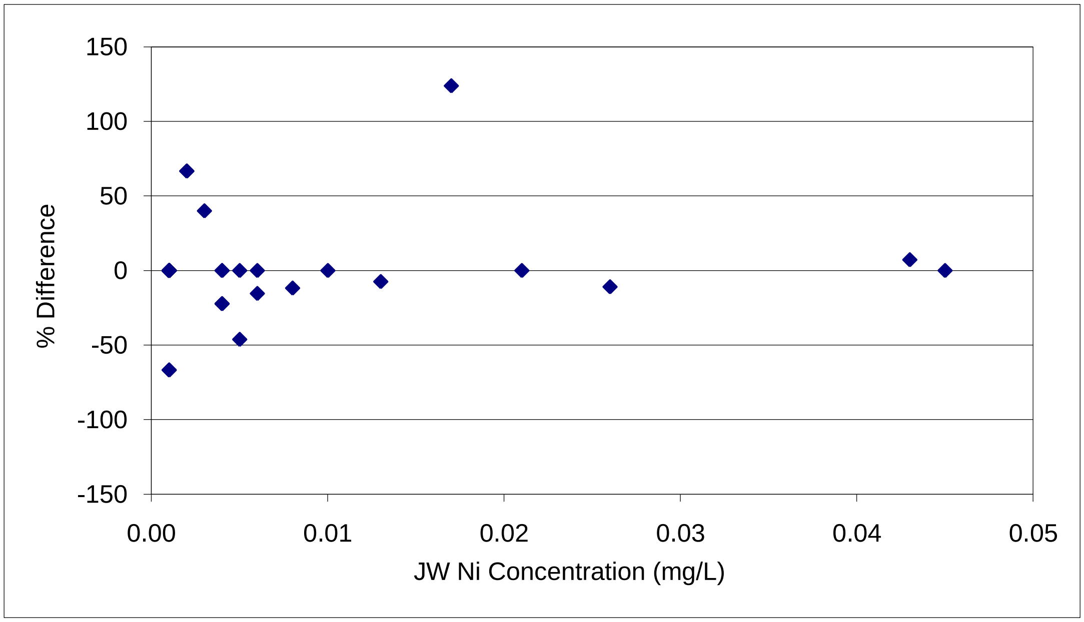

Figure 7: The percent difference between Nickel (Ni) concentrations in well water from JW compared with the Independent Consultant

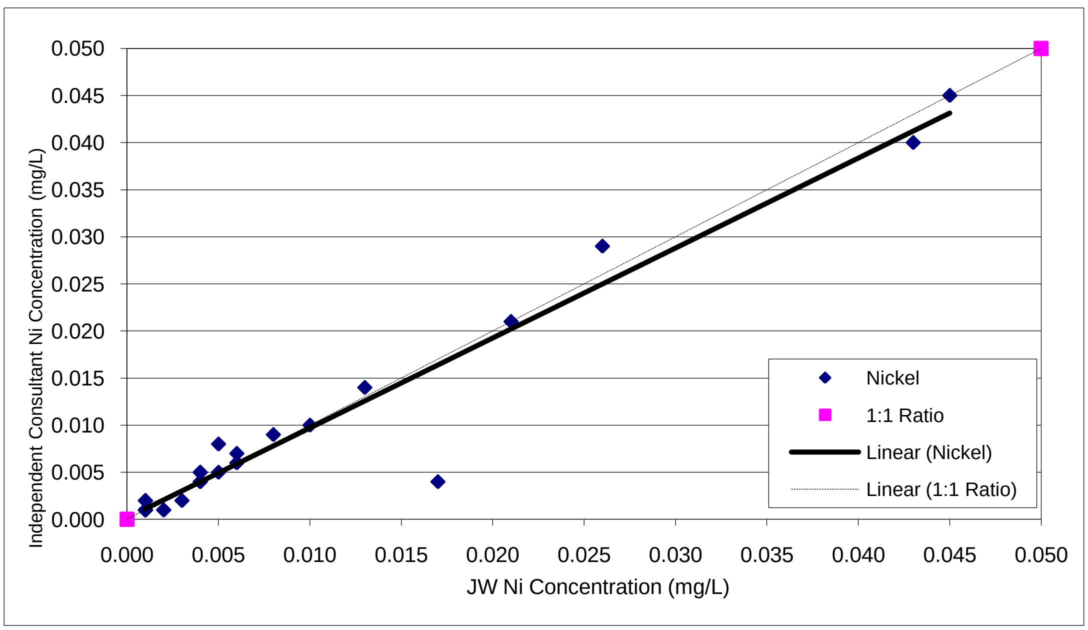

Figure 8: A comparison of Nickel (Ni) concentrations in well water from samples collected by JW compared with the Independent Consultant

4.0 FISH AND GAME SAMPLING PROGRAM

4.1 OBJECTIVE OF STUDY

The purpose of the Fish and Game Sampling Program was to determine the level and extent of CoCs (if any) in fish, poultry, eggs, milk and local game.

4.2 APPROACH TAKEN FOR QA/QC

The poultry, eggs and milk samples were sent to the laboratory for analysis, with the results sent directly to both JW and Independent Consultant (i.e. results were shared between the consulting firms). For the fish tissue and liver samples, 20% of the samples were collected in duplicate in order for the Independent Consultant to check JW's results. No QA/QC took place for the local game samples.

The difference and percent differences between JW and the Independent Consultant results were calculated for each sample and each CoC to establish the level of agreement between sample pairs. If one or both samples constituting a sample pair had a result reported as less than (<) the Estimated Quantitation Limit (EQL), the sample pair was not included in the statistical analysis. Rather, a qualitative analysis of the sample pair was conducted. For this qualitative analysis, acceptable agreement between the two results was considered to have been met if the difference between the two results was less than 5 times the EQL (similar approach to that described in "*Standard Methods for the Examination of Water and Wastewater*", 20^{th} Edition, 1998). Plots of the pairs were produced to indicate if there were any obvious trends in degree of difference with concentration.

4.3 FIELD WORK

Port Colborne chicken, eggs and milk samples were collected on December 5, 2001. Yellow perch were collected from Lake Erie on November 29, 2001 and, sometime in the fall of 2001, local rabbit and deer meat were sampled. On July 3, 2002, another free-range chicken was sampled.

One representative from the Independent Consultant and one from JW conducted the fieldwork on December 5, 2001. One representative from the Independent Consultant and two from JW carried out the fish collection on November 29, 2001. Only JW representatives were present for the rabbit and deer sampling. One representative from the Independent Consultant and two from JW conducted the fieldwork on July 3, 2002.

4.4 PROTOCOL VERSION EMPLOYED IN CARRYING OUT THE FIELD WORK

The protocol available at the time of sampling was: "*Draft: Game, Fish, Milk and Poultry Food Basket Analysis Protocol for Port Colborne 2001, November 29, 2001*".

4.5 COMMENTS/DEVIATIONS FROM PROTOCOL

- In 2001, no free-ranging chickens were located as all chickens were always fed purchased feed as well as gleaned grain. Since the chickens were not free-range, according to the protocol, the egg samples collected, and consequently the chicken coop soil samples, are not valid.

- In 2001, no chicken meat samples were collected. All meat chickens located were penned indoors and only fed purchased feed (scratch and lay). Laying hens were considered residents' pets and were therefore not for slaughter.

- In 2002, one free-ranging chicken (thigh meat) was sampled. This chicken was also not purely 'free-ranging' since it too was fed purchased feed. However, it was the closest possible sample to "free ranging" chicken that was available. Sample preparation of the chicken meat followed the supermarket study protocols.

- In 2001, no Independent Consultant personnel were present for the collection of rabbit and deer meat.

- For milk, chicken, eggs, rabbit and deer collection, the number of samples actually obtained is lower than the number required for analysis as stated in the protocol.

4.6 DATA QA/QC

The fish results are the only data available for QA/QC analysis. All other results were shared between consultants or only available to JW. For the fish tissue and liver samples that the Independent Consultant had analyzed, results were tabulated for the four CoCs: arsenic, cobalt, copper and nickel. See Appendix C for the laboratory certificates of analysis The absolute and percent difference between JW and the Independent Consultant results were calculated for each sample and CoC. The absolute difference was calculated by subtracting the Independent Consultant result from the JW result, and the percent difference was calculated as follows:

(JW result - Independent Consultant result) / ((JW result + Independent Consultant result) / 2) x 100

For data reported as <EQL, the sample pair was not included in the statistical analysis. Rather, a qualitative analysis of the sample pair was conducted. For this qualitative analysis, reasonable agreement between the two results was considered to have been met if the difference between the

two results was less than 5 times the EQL. The means of the differences and percent differences were calculated for each CoC for each media.

The mean percent difference for the fish tissue samples for copper was -54.82. The mean percent differences for the fish liver samples for copper were -159.57. In a study such as this, one assumes a certain level of variability will be associated with the data. The variability can be due to natural phenomenon and/or the collection (including spatial or temporal variation) and analytical methodologies applied. Variability is also associated with the data analysis. Varying levels of contaminant concentrations in the samples can have a significant effect on the percent difference (for example: a small difference in a low concentration can equate to a large percent difference whereas a small difference in a high concentration equates to a small percent difference).

4.6.1 Fish Tissue

For the arsenic, cobalt and nickel fish tissue samples, the sample pairs were not included in the statistical analysis as one or both results in the sample pair were below the EQL. All sample results were less than 5 times the EQL indicating good agreement between the sample pairs. In addition, only one sample per metal had a detectable level of contamination, and in those cases the difference between the JW and the Independent Consultant data was biologically insignificant.

All of the tissues samples had detectable levels of copper, with percent differences ranging from +5.28% to -152.03%. For sample P-A-1, the Independent Consultant copper value is an order of magnitude higher than the JW value. Although, there was considerable variability in the copper concentrations, a statistical regression analysis concluded that this is not a significant difference from a 1:1 ratio.

The EQLs for arsenic, cobalt, copper and nickel are 0.4, 0.02, 0.05 and 0.2 mg/kg, respectively.

4.6.2 Fish Liver

For the arsenic, cobalt and nickel fish liver samples, the sample pairs were not included in the statistical analysis as one or both results in the sample pair were below the EQL, with JW results consistently lower than the corresponding Independent Consultant sample result. For arsenic, no sample pairs were included. JW sample results were below the EQL, while the Independent Consultant's corresponding sample was above the EQL. In fact, one of the three Independent Consultant samples was more than 5 times the EQL, indicating poor agreement between sample pairs.

For Cobalt, sample results were below the EQL, while the Independent Consultant's corresponding samples were above the EQL. In fact, all sample pairs were more than 5 times the EQL, indicating poor agreement between the sample pairs.

There was considerable variability in the copper concentrations. The copper concentrations in all of the Independent Consultant's results for the liver samples are approximately an order of a magnitude higher than the JW results. A statistical regression analysis concluded that this is not significantly different from a 1:1 ration, mainly due to the small number of samples.

The EQLs for arsenic, cobalt, copper and nickel were 0.4, 0.02, 0.05 and 0.2 mg/kg, respectively.

Although the fish tissue and liver datasets are small and therefore limited statistically, the large variation between JW and the Independent results raises serious concerns for the validity of the data. Differences of an order of a magnitude suggest the possibility of inadvertent contamination or other error during analysis and/or reporting.

4.7 CONCLUSIONS

The study results are of limited scientific value due to the small sample sizes for the various components, and the large variations seen in the QA/QC samples. In addition, there are issues with the execution and analysis of this sampling program.

It does not appear that dairy farming is a common activity in the Port Colborne area, nor the sale of locally produced dairy products to area grocery stores. Therefore, the ingestion of local dairy products does not appear to be a significant exposure pathway. The results from the milk sample collected are sufficient to represent any other locally produced milk.

Free-ranging poultry, as defined in the protocol, does not appear to be common to the Port Colborne area either. The requirements of 'free-range' are strict, and exclude poultry fed locally purchased feed. However, the chicken meat and eggs that were collected are representative of small local area farms and/or hobby farmers, whose poultry did have possible exposure to contaminated soils. Therefore, the collected samples follow the intent of the sampling program.

Although the Independent Consultant was not present for the collection of deer and rabbit samples, the Independent Consultant does trust that the animals collected were from the Port Colborne area and that the concentration results from these animals are representative of mammals in the area.

The collection of fish samples, both tissue and liver, did follow the procedures outlined in the protocol. However, as stated above, the results of the QA/QC analysis indicate concern regarding the validity of the data. As such, this data cannot be accepted without a thorough review of both JW and the Independent Consultant's fish data.

The Independent Consultant concludes that there have been deviations from the Fish and Game Study Protocol but overall the objectives of the study have been met. With the exception of the fish data, the data from study components are acceptable for inclusion in the human health risk assessment.

5.0 FOOD BASKET COLLECTION ANALYSIS

5.1 OBJECTIVE OF THE FOOD BASKET COLLECTION ANALYSIS

The objective of the Food Basket Collection Analysis Protocol was to determine the level and extent of CoCs (if any) in fruits and vegetables of residential gardens.

5.2 APPROACH TAKEN FOR QA/QC

For fieldwork conducted in 2001, all food basket samples, and the corresponding soil samples, were collected in duplicate: one for JW and one for the Independent Consultant. Twenty percent (20%) of the samples collected by the Independent Consultant were analyzed at the laboratory for comparison to JW results. In 2002, the results from the food basket samples were shared between the two consulting firms (i.e., the analytical laboratory sent the results directly to both consulting firms).

The difference and percent differences between JW and the Independent Consultant results were calculated for each sample and each CoC to establish the level of agreement between sample pairs. If one or both samples constituting a sample pair had a result reported as less than the Estimated Quantitation Limit (EQL), the sample pair was not included in the statistical analysis. Rather, a qualitative analysis of the sample pair was conducted. For this qualitative analysis, acceptable agreement between the two results was considered to have been met if the difference between the two results was less than 5 times the EQL (similar approach to that described in "*Standard Methods for the Examination of Water and Wastewater*", 20th Edition, 1998). Plots of the pairs were produced to indicate if there were any obvious trends in degree of difference with concentration.

A paired t-test was conducted on the 20% duplicate samples to determine if consistent bias was evident overall. Regression analysis was conducted to determine how closely the Independent Consultant and JW demonstrated a 1:1 relationship.

The Independent Consultant established the criteria for acceptable agreement between the apired sets as +/- 45%. This value was chosen based on the author's personal observation that for most environmental work involving the analysis of metals in environmental samples such as biomaterials and soils, analysis of duplicate samples often provides results that differ by more than +/- 50% and occasionally by more than +/- 100%. For the CBRA Food Basket Assessment it was felt that +/- 45% would provide a reasonable criterion that was somewhat more rigorous than the general duplicate test agreement of +/- 50%, and it would also allow for a wide variety of sample types to be compared on the same basis.

5.3 FIELD WORK

The food basket sampling took place between July 3 and 4, 2001 (for the collection of strawberries, cherries and rhubarb were collected), July 30 and August 3, 2001 (for the collection of raspberries) and from September 4 to 12, 2001 (for the collection of garden fruits and vegetables, as well as produce from local farmers markets). On August 12, 2002, one resident’s garden produce was re-collected due to an anomaly in the analytical results the year before.

One representative from the Independent Consultant field crew and the JW field crew were present at each sampling event. A member of the Independent Consultant field crew conducted the coordination and scheduling of sampling locations and times.

5.4 PROTOCOL VERSION EMPLOYED IN CARRYING OUT THE FIELD WORK

The protocol available at the time of sampling was: “*Food Basket Analysis Protocol, Draft May 25, 2001*”.

5.5 COMMENTS/DEVIATIONS FROM PROTOCOL

- For the spring fruit sampling, locations were selected based on those homeowners that volunteered to gave the sampling completed (i.e., the owners that volunteered at a PLC meeting or participated the previous year); they were not based on metal contamination of soil zones.

- Samples were collected from only three ‘contamination’ zones; high, medium and low, not four as outlined in the protocol.

- Originally, there were supposed to be 30 root samples, 30 other vegetable samples and 30 fruit samples from each zone. Half-way through sampling, JW changed these requirements to: 30 other vegetable samples per zone, 20 root samples, and 15 fruit samples.

- Originally, there were a maximum number of samples that could be collected per group (root, other, fruit) per house. This number changed from 3 to 4 partway through sampling.

- Protocols state that 30 control samples will be collected from a local supermarket or from soils < 200 mg/kg. First, < 200 mg/kg was part of the ‘new’ low zone. Secondly, only 17 control samples were collected, from two different local farmers markets, at JW’s request.

- For the fall 2001 sampling, soils were collected at the base of the plant, as was done in the spring. However, samples were not 'split' with the Independent Consultant. Two jars were filled three quarters full with soil from the corer (soil from 0 - 15 cm), one jar at a time. Soil samples for the Independent Consultant and JW were not homogenized then split. Each jar contained approximately 3 to 4 cores of soil; more soil cores were required if the soil was dry.

5.6 DATA QA/QC

For the samples that the Independent Consultant had analyzed, results were tabulated for the four CoCs. See Appendix D for the laboratory certificates of analysis. Data from produce and soil were tabulated separately. The absolute and percent differences between JW and the Independent Consultant results were calculated for each sample and each CoC. The absolute difference was calculated by subtracting the Independent Consultant result from the JW result, and the percent difference was calculated as follows:

(JW result - Independent Consultant result) / ((JW result + Independent Consultant result) / 2) x 100

For data reported as <EQL, the sample pair was not included in the statistical analysis. Rather, a qualitative analysis of the sample pair was conducted. For this qualitative analysis, reasonable agreement between the two results was considered to have been met if the difference between the two results was less than 5 times the EQL. The means of the differences and percent differences were calculated for each CoC for each media.

The mean percent differences for food basket produce were 0.00, 3.96, -2.02 and –7.02% for As, Co, Cu and Ni, respectively. The mean percent differences for food basket soil were –1.44, -0.42, 1.55 and –2.18% for As, Co, Cu and Ni, respectively. In any environmental analytical study, a certain level of variability is associated with the analytical data. Variability occurs naturally with samples – one pea might contain more copper than another pea from the same plant, and one plant might contain a different level than its neighbour. Variability also occurs with both sampling and analysis. Varying levels of contaminant concentrations in the samples can have a significant effect on the percent difference (for example: a small difference in a low concentration can equate to a large percent difference whereas a small difference in a high concentration equates to a small percent difference). Figures 9 through 16 provide graphical representations of the degree of variability in the produce data, and Figures 17 through 24 of the soil data.

Samples collected on July 3, 2001, coded FBJ3S1 and FBJ3S2, are both strawberries. These samples were collected from the same garden and field notes confirm that FBJ3S2 is in fact rhubarb. Since all fruit samples have been grouped together for modelling purposes, this error is not significant.

5.7 FOOD BASKET PRODUCE

Figures 9, 11, 13 and 15 provide a comparison of the percent differences between JW and the Independent Consultant results to the corresponding JW concentrations, for As, Co, Cu and Ni respectively. Figures 10, 12, 14 and 16 provide a linear comparison of the JW and the Independent Consultant As, Co, Cu and Ni concentrations, respectively. The dotted line in these figures represents a 1:1 ratio, indicating the line that would arise if all of the concentrations in the JW and the Independent Consultant paired samples were identical.

5.7.1 Arsenic in Food Basket Produce

Most of the arsenic data was "non-detect", which left only one sample pair for the food basket produce results. The percent difference of this sample pair was zero (0) percent. All remaining sample results were below the EQL or below the adjusted EQL indicating agreement between the sample results. The EQL for As ranged from 0.2 – 0.6 mg/kg.

5.7.2 Cobalt in Food Basket Produce

A statistical regression analysis of the variation of the cobalt concentrations in the samples confirmed there is not a significant difference from the 1:1 ratio line. Two sample pairs were not included in the statistical analysis as both sample results were below the EQL indicating acceptable agreement between the sample results. Two other sample pairs were not included in the statistical analysis as one of the two sample results in the sample pair was below the EQL. The difference between the two sample results were less than 5 times the EQL indicating acceptable agreement between the sample results. The EQL ranged from 0.01 mg/kg to 0.02 mg/kg.

5.7.3 Copper in Food Basket Produce

Although the percent difference for the copper concentrations appears to be scattered across all concentration levels, the overall linear relationship between JW and the Independent Consultant data is strong. Statistical regression analysis found a significant difference between the slopes of the contaminant and 1:1 ratio trend lines, but this difference is not considered meaningful based on the end use of this data.

5.7.4 Nickel in Food Basket Produce

For nickel, the linear relationship of the concentration results from JW and the Independent Consultant data is skewed to the right (lower) of the 1:1 ratio line. A statistical regression analysis confirmed this is not a significant difference from the 1:1 ratio trend line. Two sample pairs were not included in the statistical analysis as both sample results in the sample pairs were below the EQL indicating acceptable agreement between the sample results. The EQL was 0.01 mg/kg.

5.8 FOOD BASKET SOIL

For each of the chemicals of concern, the majority of variation of percent differences occurred at the lower concentration levels and there was a strong linear relationship with the concentration results from JW and the Independent Consultant. The slopes of the contaminant and 1:1 ratio trend lines were statistically significantly different for the arsenic and nickel datasets, and not significant for the cobalt and copper datasets. The differences were not considered meaningful based on the end use of the data.

5.9 CONCLUSIONS

Due to the low mean percent differences, most of the data variation occurring at low concentrations and the strong linear relationships between JW and the Independent Consultant produce and soil data, systematic error with the data was not observed. The variability between JW and the Independent Consultant results is acceptable for this study.

The Independent Consultant concludes that the 2001 food basket study, with the exceptions noted above, has been performed according to the agreed upon protocol, and that the reported data, as it has been presented, is acceptable.

Arsenic in Food Basket Produce

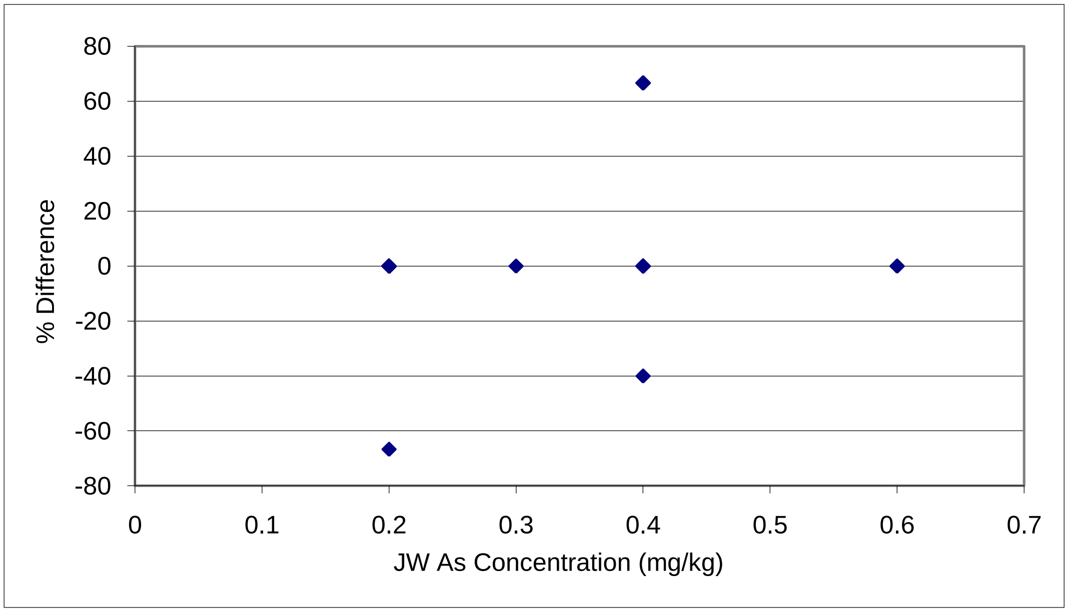

Figure 9: The percent difference between Arsenic (As) concentrations in food basket produce from JW compared with the Independent Consultant

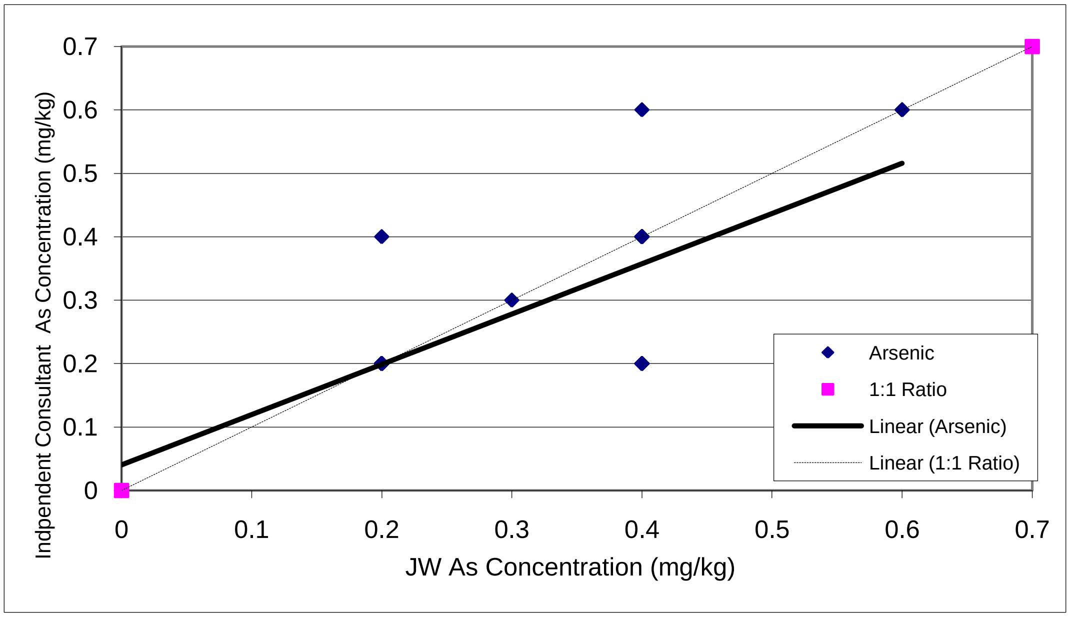

Figure 10: A comparison of Arsenic (As) concentrations in food basket produce from samples collected by JW compared with the Independent Consultant

Cobalt in Food Basket Produce

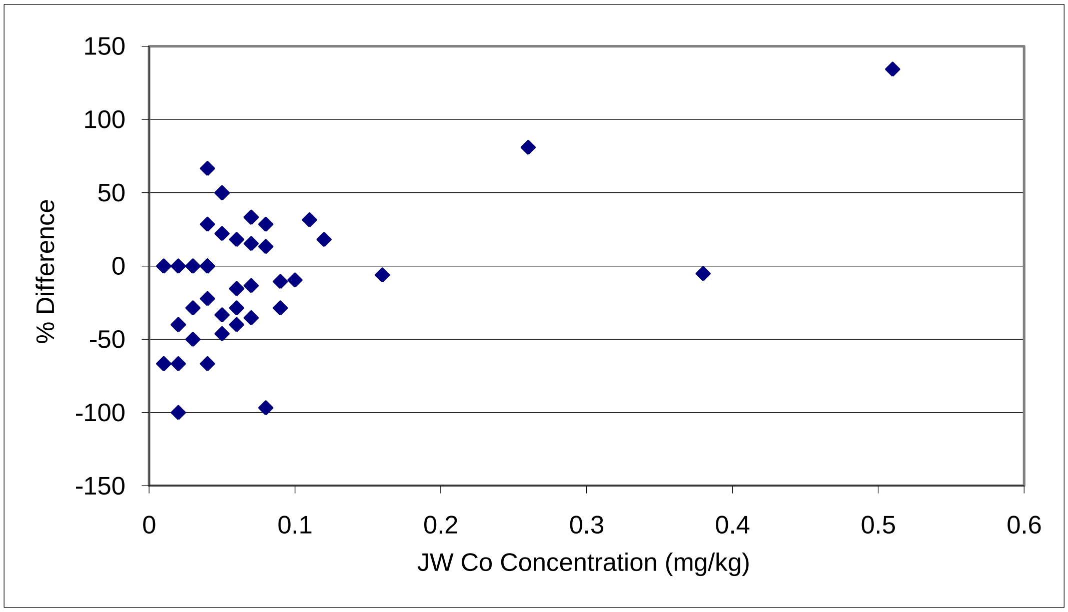

Figure 11: The percent difference between Cobalt (Co) concentrations in food basket produce from JW compared with the Independent Consultant

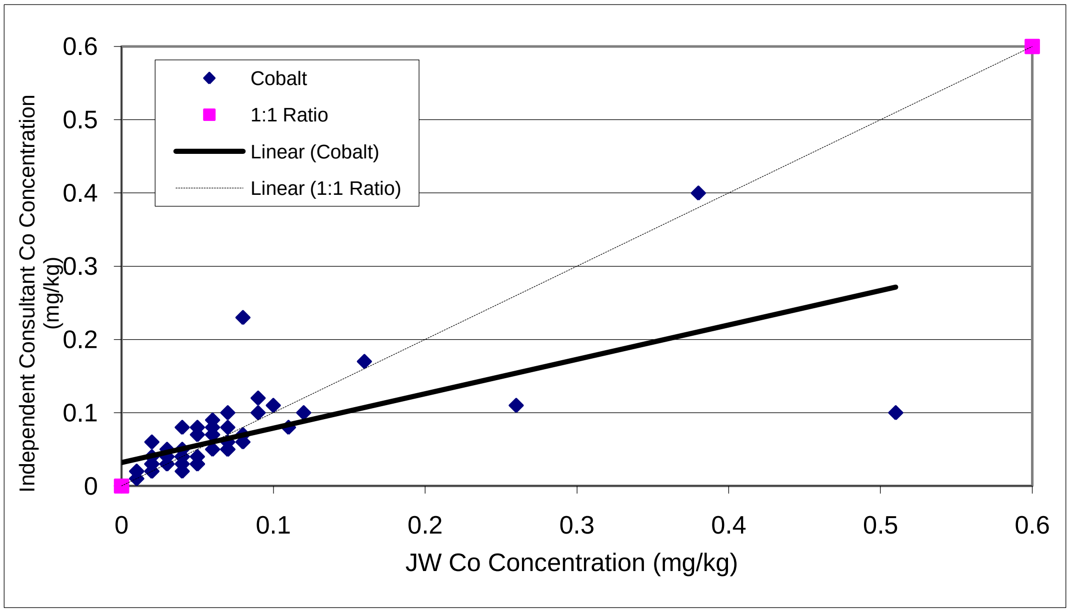

Figure 12: A comparison of Cobalt (Co) concentrations in food basket produce from samples collected by JW compared with the Independent Consultant

Copper in Food Basket Produce

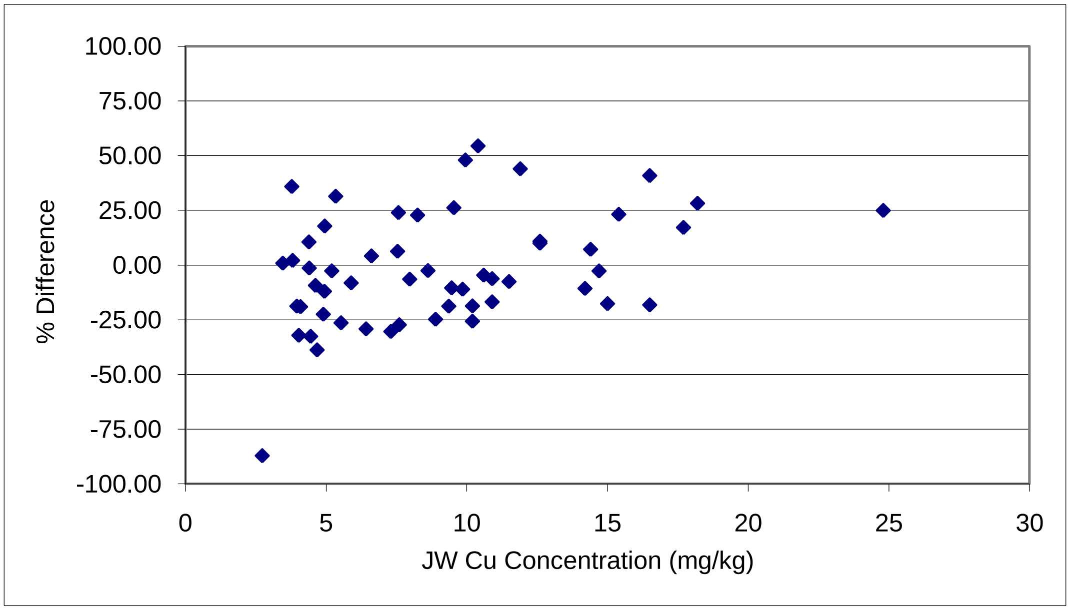

Figure 13: The percent difference between Copper (Cu) concentrations in food basket produce from JW compared with the Independent Consultant

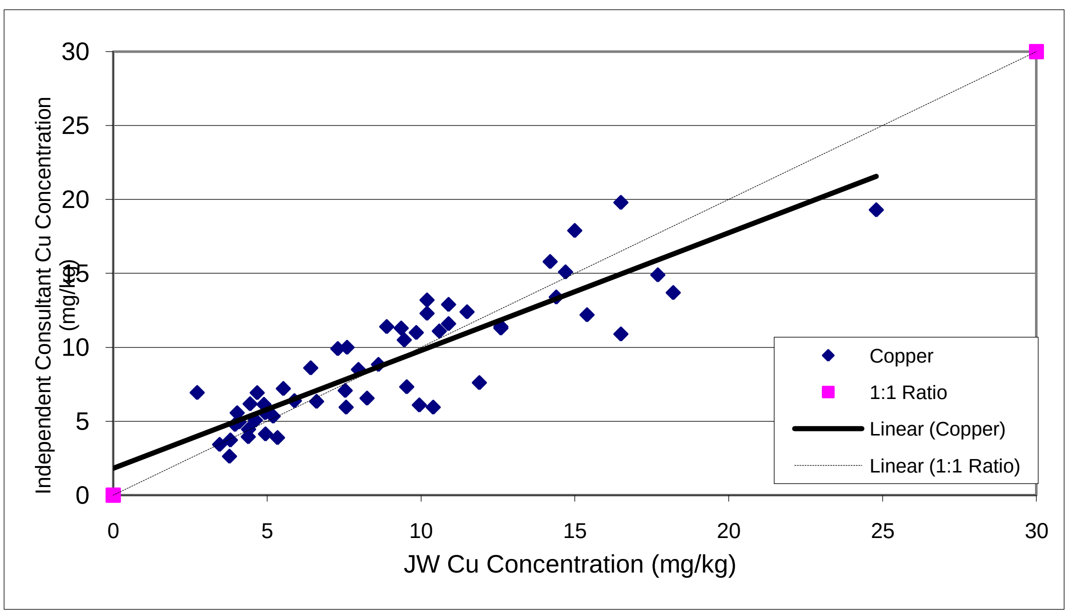

Figure 14: A comparison of Copper (Cu) concentrations in food basket produce from samples collected by JW compared with the Independent Consultant

Nickel in Food Basket Produce

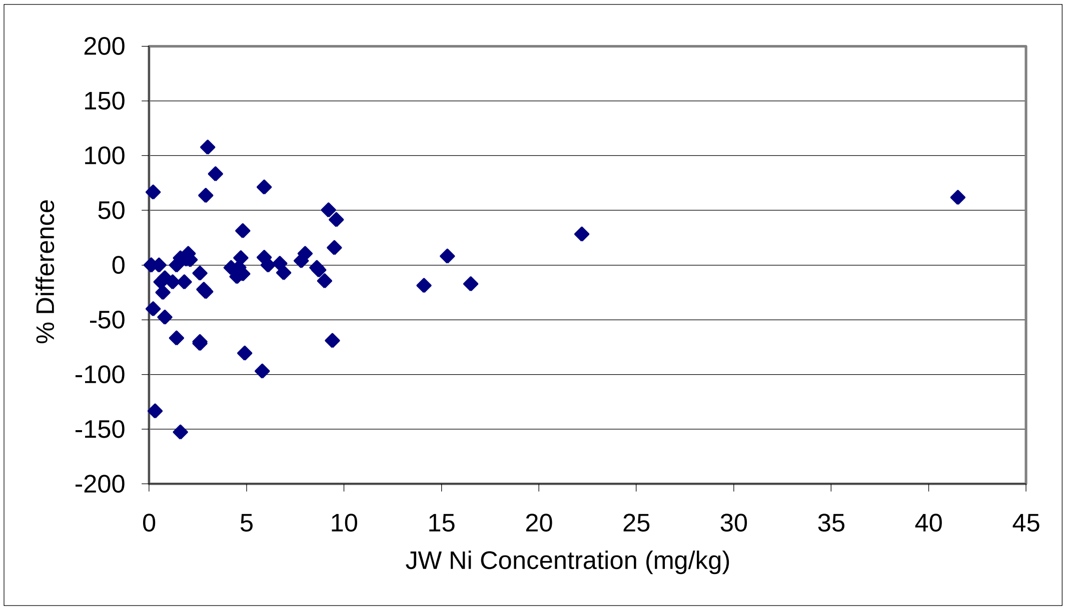

Figure 15: The percent difference between Nickel (Ni) concentrations in food basket produce from JW compared with the Independent Consultant

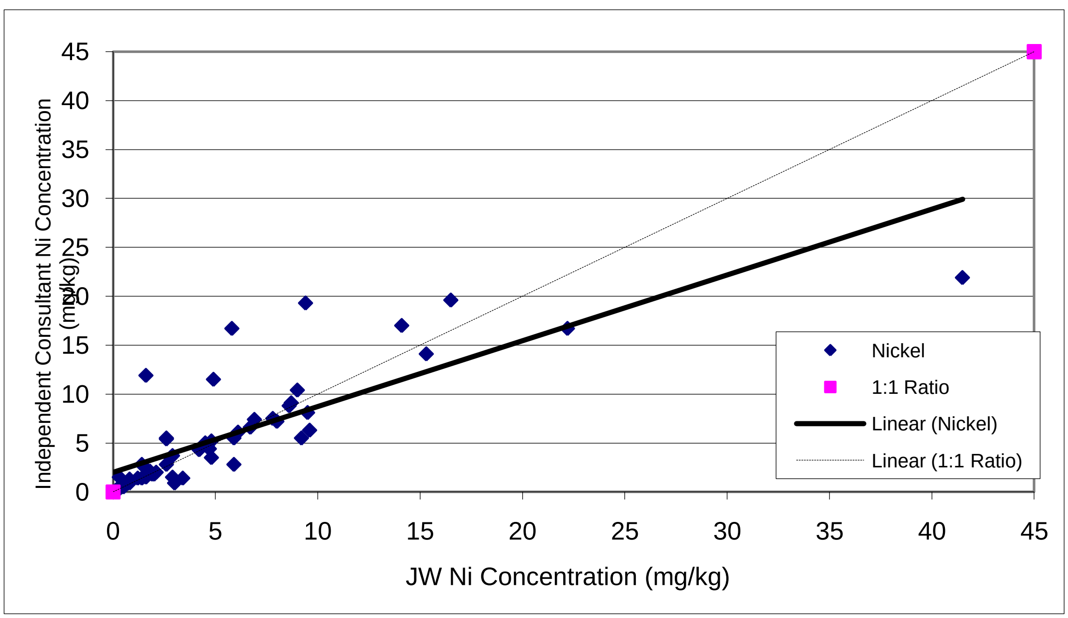

Figure 16: A comparison of Nickel (Ni) concentrations in food basket produce from samples collected by JW compared with the Independent Consultant

Arsenic in Food Basket Soil

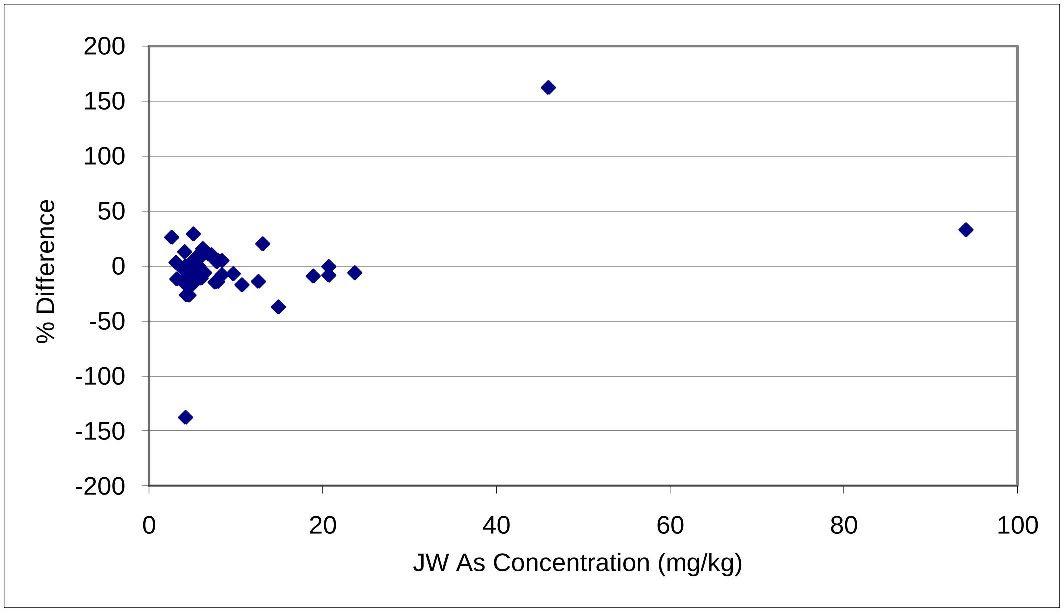

Figure 17: The percent difference between Arsenic (As) concentrations in food basket soil from JW compared with the Independent Consultant

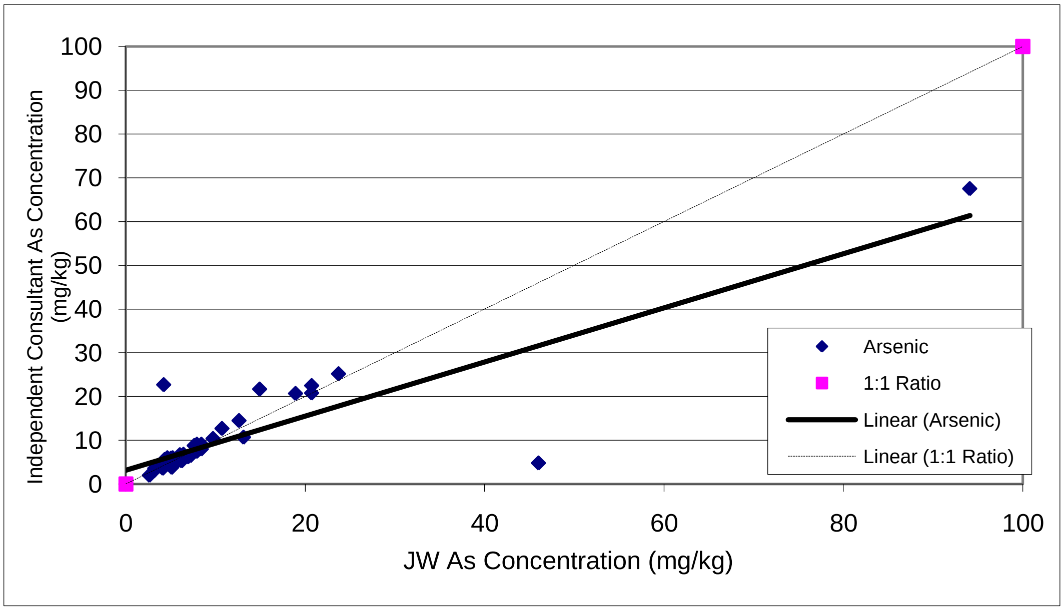

Figure 18: A comparison of Arsenic (As) concentrations in food basket soil from samples collected by JW compared with the Independent Consultant

Cobalt in Food Basket Soil

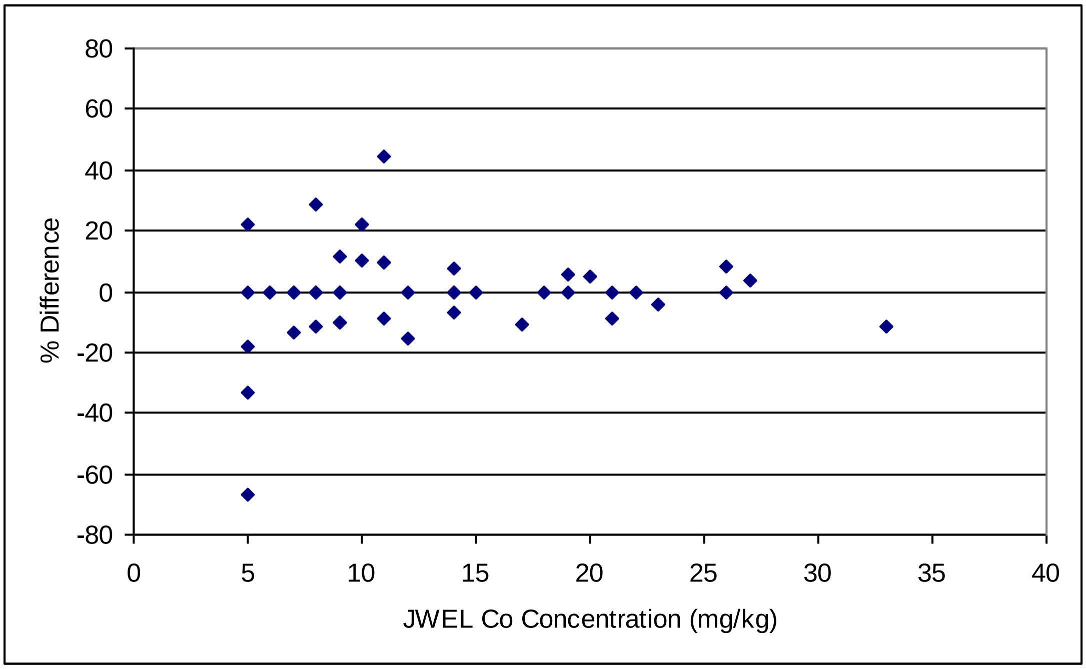

Figure 19: The percent difference between Cobalt (Co) concentrations in food basket soil from JW compared with the Independent Consultant

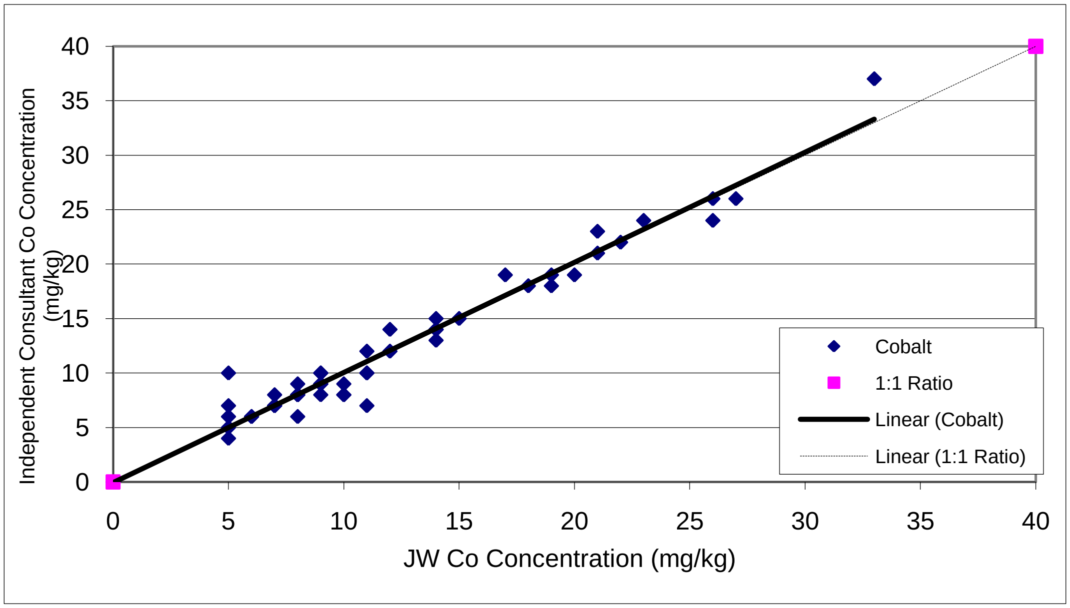

Figure 20: A comparison of Cobalt (Co) concentrations in food basket soil from samples collected by JW compared with the Independent Consultant

Copper in Food Basket Soil

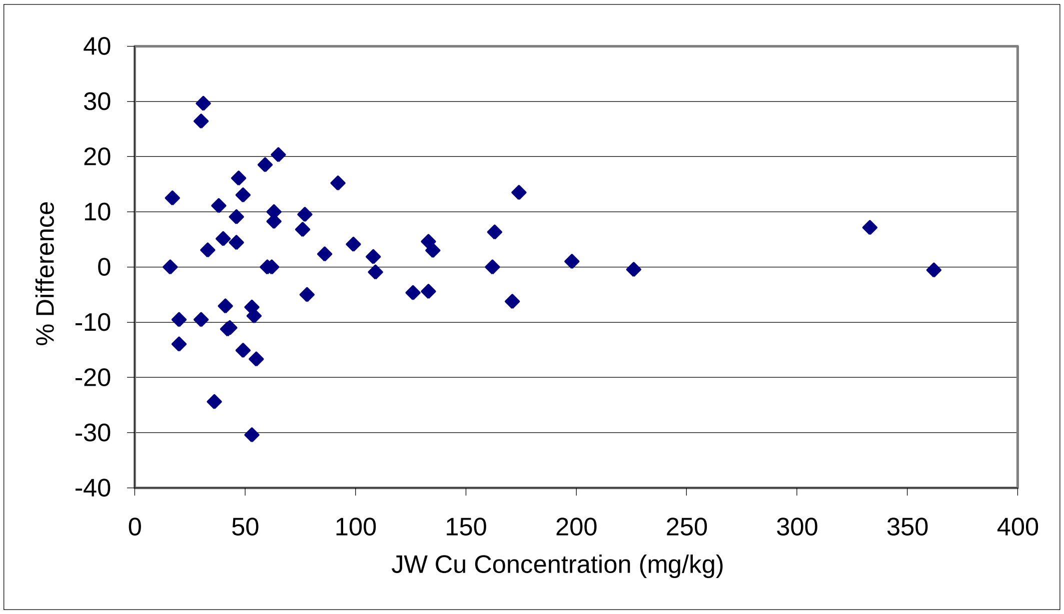

Figure 21: The percent difference between Copper (Cu) concentrations in food basket soil from JW compared with the Independent Consultant

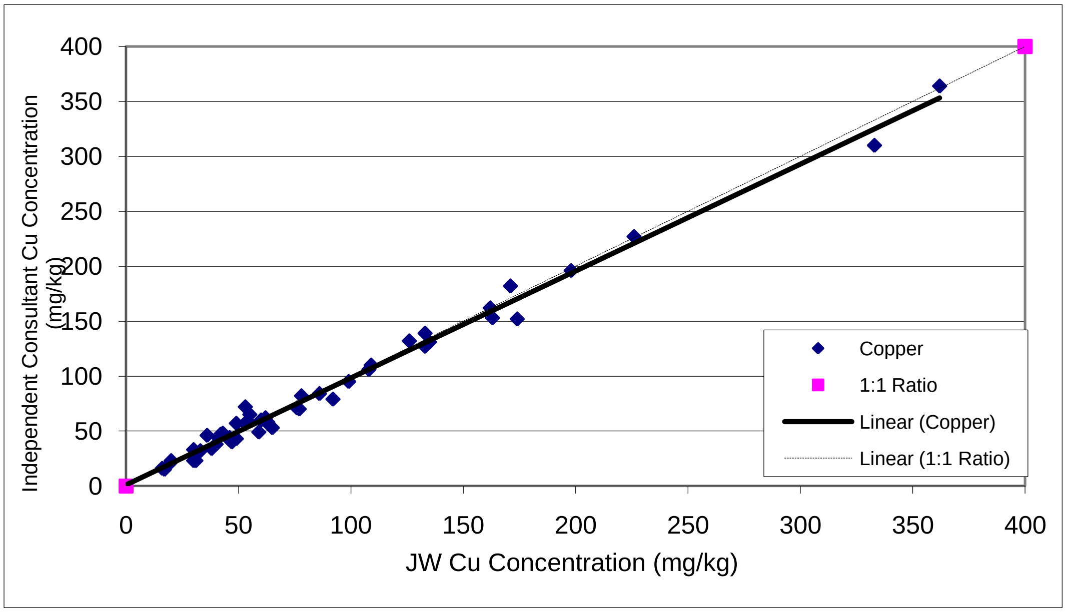

Figure 22: A comparison of Copper (Cu) concentrations in food basket soil from samples collected by JW compared with the Independent Consultant

Nickel in Food Basket Soil

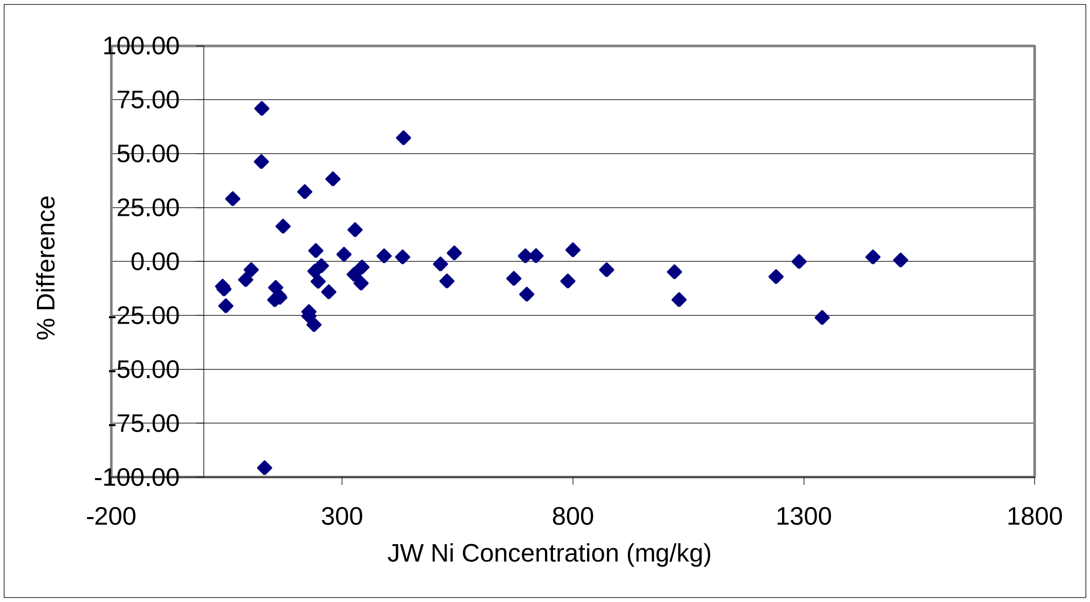

Figure 23: The percent difference between Nickel (Ni) concentrations in food basket soil from JW compared with the Independent Consultant

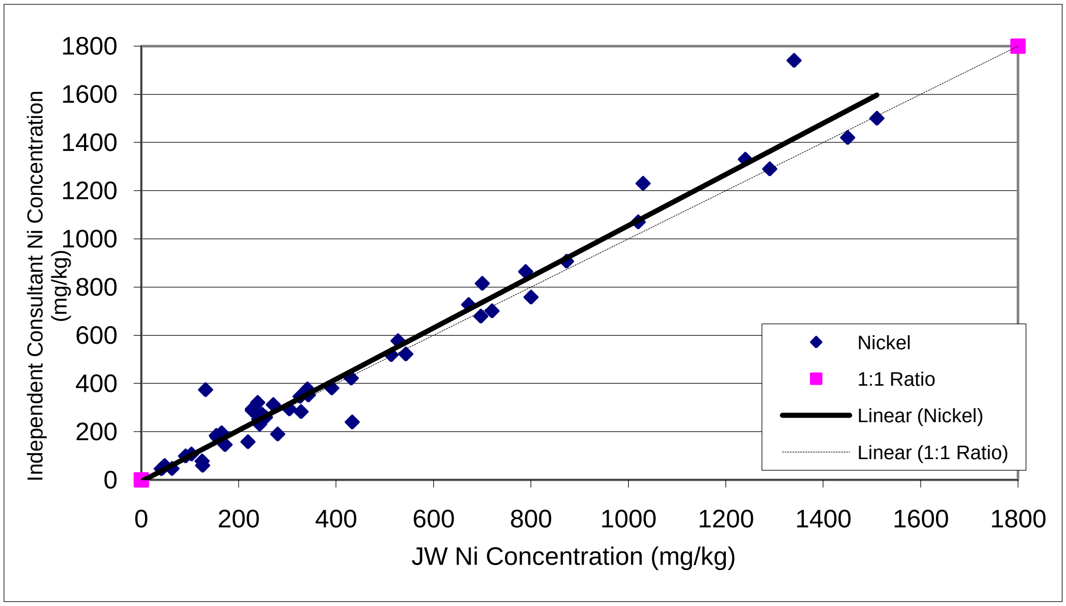

Figure 24: A comparison of Nickel (Ni) concentrations in food basket soil from samples collected by JW compared with the Independent Consultant

6.0 RESIDENTIAL FOOD BASKET SURVEY ANALYSIS PROTOCOL

6.1 OBJECTIVE OF THE RESIDENTIAL FOOD BASKET SURVEY ANALYSIS PROTOCOL

The objective of the Residential Food Basket Survey Analysis Protocol was to determine the extent of consumption of locally grown/farmed food by residents of Port Colborne and their exposure patterns to outdoor soil, through the use of a prepared survey.

6.2 APPROACH TAKEN FOR QA/QC

JW and the Independent Consultant completed the surveys separately. The Independent Consultant worked in quadrants 2 and 4, while JW worked in quadrants 1 and 3. Independent Consultant personnel were not present when JW conducted the surveys, nor were JW personnel present when the Independent Consultant did.

6.3 DATE(S) FIELD WORK CARRIED OUT

For the Independent Consultant, initial coordination for the survey began June 22, 2001. The survey was conducted for several weeks throughout July and was completed August 7, 2001.

6.4 PROTOCOL VERSION EMPLOYED IN CARRYING OUT THE FIELD WORK

The protocol available at the time of the survey was: "*Port Colborne CBRA, Draft 2001 Residential Foodbasket Survey Protocol, Draft 1*".

6.5 COMMENTS ON THE SAMPLING AREAS

- The Independent Consultant used the City census lists as guides for the boundaries to each quadrant. As a result, quadrant 4 included an extended region. This region was part of the city census list but not originally included in the boundaries outlined by JW in the protocol. The top of the questionnaires, completed by the Independent Consultant, were coded as follows:

  Q2 = residents in quadrant 2 (Welland to Davis and south of Durham)

  Q4 = residents in quadrant 4 (Elizabeth to Miller and south of Hwy 3)

  QX = residents in the extended region of quadrant 4 (Miller to Pinecrest and Hwy 3 to Second Concession).

- In the Q2 region, every name on the city census list that was also in the local telephone book was called. There was an approximate 40% refusal rate. Canvassing door to door proved unsuccessful in this area. Eventually, names of residents willing to complete the survey were received from a local resident and the lawyer involved in the class action lawsuit.

  In the Q4 and QX regions, names were randomly selected from the city census list.

6.6 COMMENTS ON THE SURVEY

- The local grocery stores sell chicken from the local poultry farm, but the proportion of local chicken versus chicken from other areas is unknown. The local fruit market usually comprises farmers from Fonthill, ON or other areas; most residents were unsure whether the products they purchased at the local market were from the Port Colborne area.

- Some of the questions were difficult for residents to answer. For example: "The percentage of local produce consumed in their annual diet?" Persons conducting the survey were forced to help residents calculate the percentage, based on the residents' knowledge of their diet.

- Generally, the answers to the questions were recorded exactly as the people responded, making notes accordingly.

6.7 DATA QA/QC

In total, the Independent Consultant completed 56 surveys from the Q4 and QX quadrants, and 94 from the Q2 quadrant. At the completion of the survey all questionnaires were forwarded to JW for data compilation and interpretation.

6.8 CONCLUSIONS

Due to the nature of this undertaking, Independent Consultant personnel were not present while JW conducted the surveys, and JW personnel were not present while the Independent Consultant conducted the surveys. It was assumed that every person who conducted the survey, whether the Independent Consultant or JW, did so in a fair and honest manner and that the records accurately reflected the residents' responses. As such, the survey achieved its objective of identifying the consumption and exposure habits of residents of Port Colborne.

7.0 LOCAL SUPERMARKET FOOD BASKET ANALYSIS

7.1 OBJECTIVE OF THE LOCAL SUPERMARKET FOOD BASKET ANALYSIS

The objective of the Local Supermarket Food Basket Survey Analysis Protocol was to determine the level and extent of CoCs in locally purchased food products.

7.2 APPROACH TAKEN FOR QA/QC

All analytical results of the collected samples were shared between JW and the Independent Consultant; the laboratory sent the results directly to each consultant.

7.3 FIELD WORK

The supermarket study took place June 6, 7, 20 and 21 and July 2, 3, and 4, 2002. The food and beverage samples were collected over a three-week time span at the request of the laboratory, as many of the sampled items were perishable and the lab did not want to be overwhelmed. On August 12, 2002 some milk items were re-sampled due to a sampling error at the laboratory.

One representative of the Independent Consultant and two representatives of JW were present for each sampling event.

7.4 PROTOCOL VERSION EMPLOYED IN CARRYING OUT THE FIELD WORK

The protocol available at the time of sampling was: "*Local Supermarket Food Basket Analysis Protocol (Final Draft) for Port Colborne, Revised June 5, 2002*".

7.5 COMMENTS/DEVIATIONS FROM PROTOCOL

No deviations from the protocol were observed. At times when specific food items were not available from a particular grocery store or farmer's market as was planned, either a comparable product was purchased or that particular item was purchased from another store. All items purchased were clearly identified in the field notes.

7.6 DATA QA/QC

This section is not applicable, since all results were shared between the consulting firms.

7.7 CONCLUSIONS

The study achieved its objectives of accurately identifying the levels of CoCs in locally purchased food products.

8.0 MAPLE SAP SAMPLING PROGRAM

8.1 OBJECTIVE OF THE MAPLE SAP SAMPLING PROGRAM

The objective of the Maple Sap Sampling Program was to determine the level and extent of CoCs (if any) in maple tree sap.

8.2 APPROACH TAKEN FOR QA/QC

The Independent Consultant collected duplicate samples of 50% of the maple sap and soil samples that JW collected. Half of these duplicate samples were analyzed at the laboratory for comparison to JW results.

8.3 FIELD WORK

The maple sap collection took place from March 14 to 29, 2001. The soil samples surrounding the maple trees were collected May 1 and 4, 2001.

One representative of the Independent Consultant and of JW was present for each sampling event.

8.4 PROTOCOL VERSION EMPLOYED IN CARRYING OUT THE FIELD WORK

The protocol available at the time of sampling was: "*Sugar Maple Sap Sampling Protocol (February 29, 2001)*".

8.5 COMMENTS/DEVIATIONS FROM PROTOCOL

Twenty (20) cores (plugs) of soil were collected from the drip line around the windward side of each maple tree, not 8 as stated in protocol. 0 – 5 cm and 5 – 15 cm depths were stored separately, not 0 – 5 and 10 – 15 depths as stated in the protocol.

8.6 DATA QA/QC

For the samples that the Independent Consultant had analyzed, results were tabulated for the four CoCs. See Appendix E and F for the laboratory certificates of analysis. Data from sap and soil were tabulated separately. The absolute and percent differences between JW and the Independent Consultant results were calculated for each sample and each CoC. The absolute difference was calculated by subtracting the Independent Consultant result from the JW result, and the percent difference was calculated as follows:

(JW result - Independent Consultant result) / ((JW result + Independent Consultant result) / 2) x 100

For data reported as <EQL, the sample pair was not included in the statistical analysis. Rather, a qualitative analysis of the sample pair was conducted. For this qualitative analysis, reasonable agreement between the two results was considered to have been met if the difference between the two results was less than 5 times the EQL. The means of the differences and percent differences were calculated for each CoC for each media

The mean percent differences for maple sap were 0, -9.19, -11.66 and –16.64% for As, Co, Cu and Ni, respectively. The mean percent differences for maple tree soil were 6.96, 33.69, 1.80 and 30.13%, respectively. In a study such as this, one assumes a certain level of variability associated with the data. The variability can be due to natural phenomenon and/or the collection (including spatial or temporal variation) and analytical methodologies applied. Variability is also associated with the data analysis. Varying levels of contaminant concentrations in the samples can have a significant effect on the percent difference (for example: a small difference in a low concentration can equate to a large percent difference whereas a small difference in a high concentration equates to a small percent difference). Figures 25 through 30 give graphical representations of the degree of variability in the maple sap data, and Figures 31 through 38 in the maple tree soil data.

8.6.1 Maple Sap

All Independent Consultant maple sap samples, and the corresponding JW sample, had arsenic concentrations below the laboratory MDL of 0.002 mg/L. Therefore, the percent difference between JW and the Independent Consultant data was 0. Consequently, no figures or statistical analyses of the data were prepared.

Figures 25, 27 and 29 provide a comparison of the percent differences between JW and the Independent Consultant results to the corresponding JW concentration, for Co, Cu and Ni, respectively. Figures 26, 28 and 30 provide a linear comparison of the JW and Independent Consultant Co, Cu and Ni concentrations, respectively. The dotted line in these figures represents a 1:1 ratio, indicating the line that would arise if all of the concentrations in the JW and Independent Consultant samples were identical. Results for the three COCs are similar; percent difference variation occurs generally at the lower concentration levels and there is a strong linear relationship with the concentration results from JW and the Independent Consultant. A statistical regression analysis concludes that there are no significant differences between the slopes of the contaminant and 1:1 ratio trend lines.

8.6.2 Maple Tree Soil

Figures 31, 33, 35 and 37 illustrate the percent difference comparisons for As, Co, Cu and Ni, respectively, while Figures 32, 34, 36 and 38 linearly compare the results from JW and the Independent Consultant. For all chemicals of concern, the majority of variation with percent differences occurs at the lower concentration levels, with the exception of two samples. These two samples have contaminant concentrations considerably higher than the other samples, and the JW results are consistently higher than the results of the Independent Consultant's samples. The influence of these two samples on the analyses can be seen in the linear comparison of the results, with the slope of the contaminant lines consistently less than the slope of the 1:1 ratio line. Although a statistical regression analysis found the slopes of the trend lines from all four CoCs to be significantly different, the two higher concentration samples place an undue amount of influence on the results for the statistical analysis to be meaningful.

8.7 CONCLUSIONS

No systematic error with the data was observed. The maple sap data was not significantly different, and the majority of the variation with the maple tree soil data occurred at low concentrations. The variability between JW and the Independent Consultant results is acceptable for this study.

Cobalt in Maple Sap

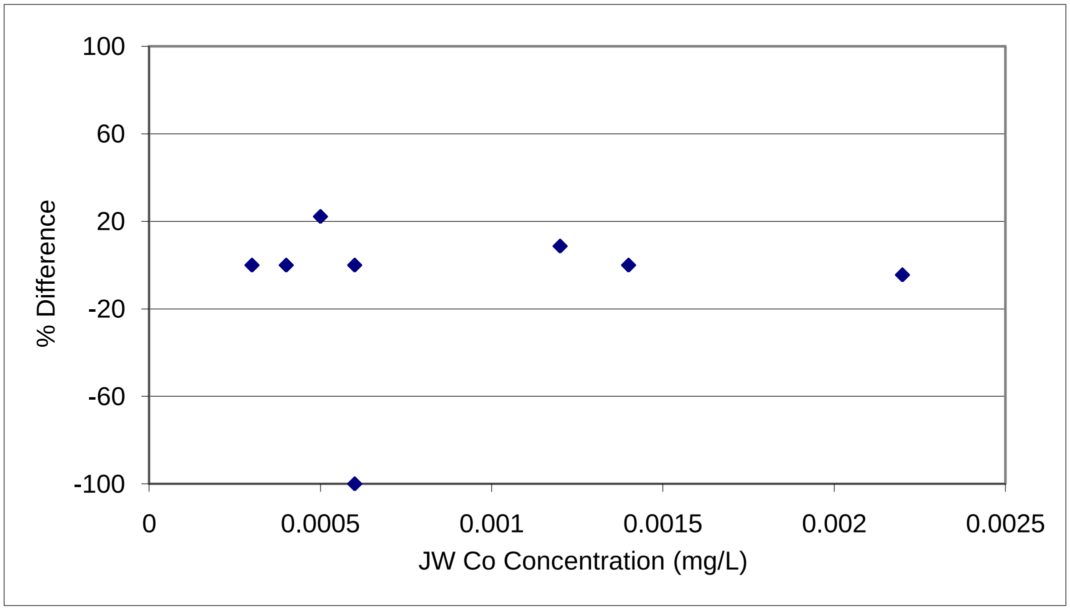

Figure 25: The percent difference between Cobalt (Co) concentrations in maple sap from JW compared with the Independent Consultant

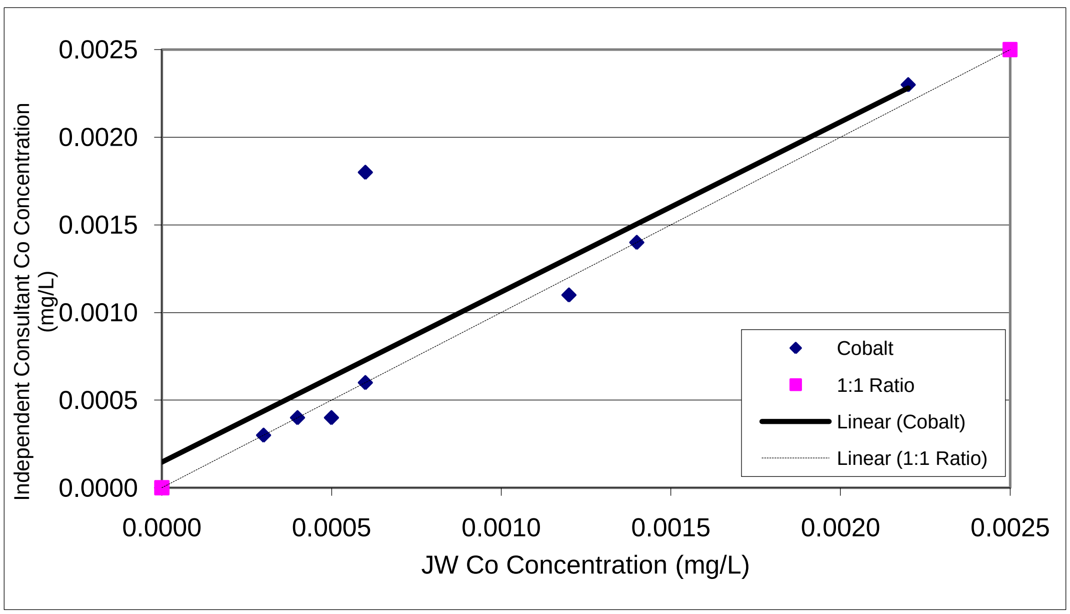

Figure 26: A comparison of Cobalt (Co) concentrations in maple sap from samples collected by JW compared with the Independent Consultant

Copper in Maple Sap

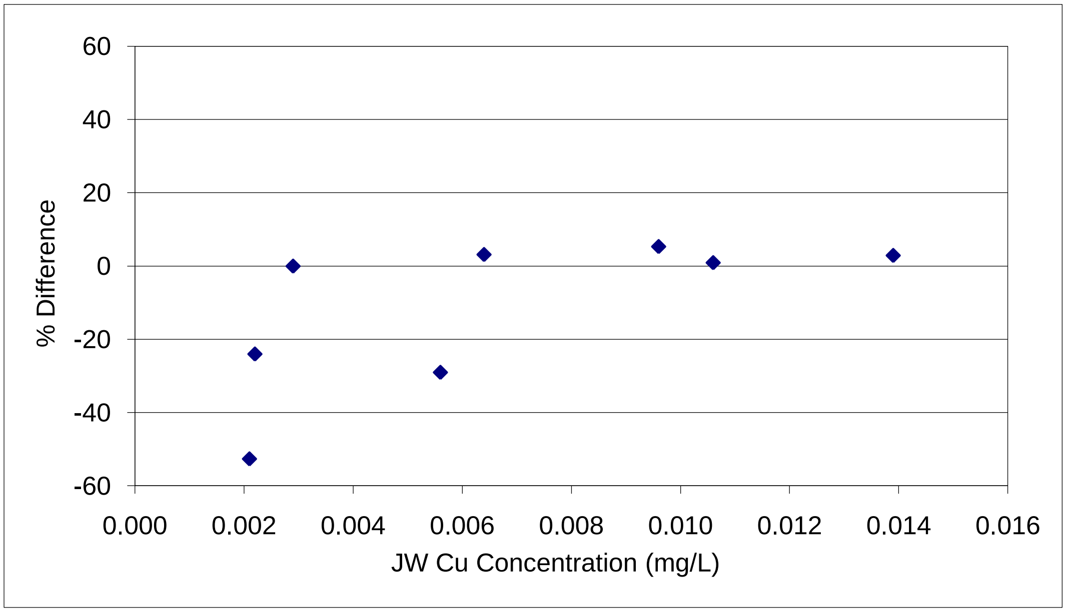

Figure 27: The percent difference between Copper (Cu) concentrations in maple sap from JW compared with the Independent Consultant

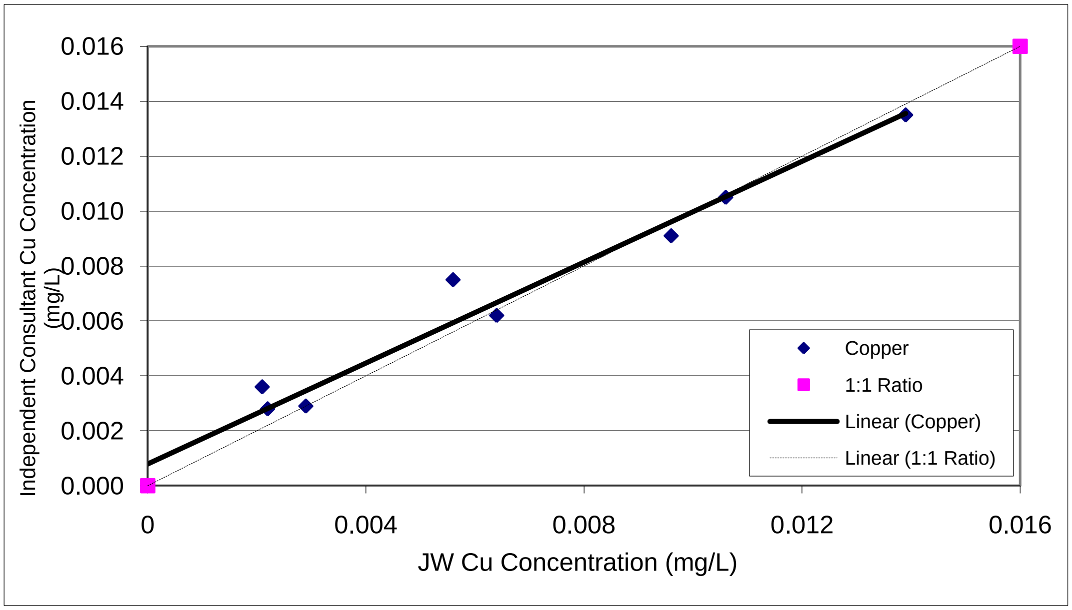

Figure 28: A comparison of Copper (Cu) concentrations in maple sap from samples collected by JW compared with the Independent Consultant

Nickel in Maple Sap

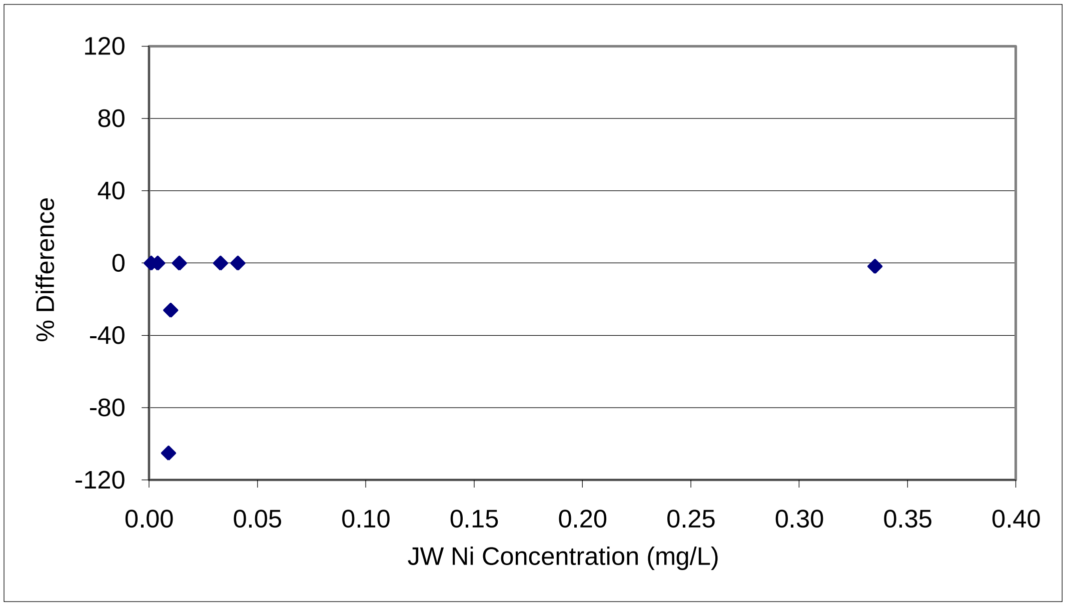

Figure 29: The percent difference between Nickel (Ni) concentrations in maple sap from JW compared with the Independent Consultant

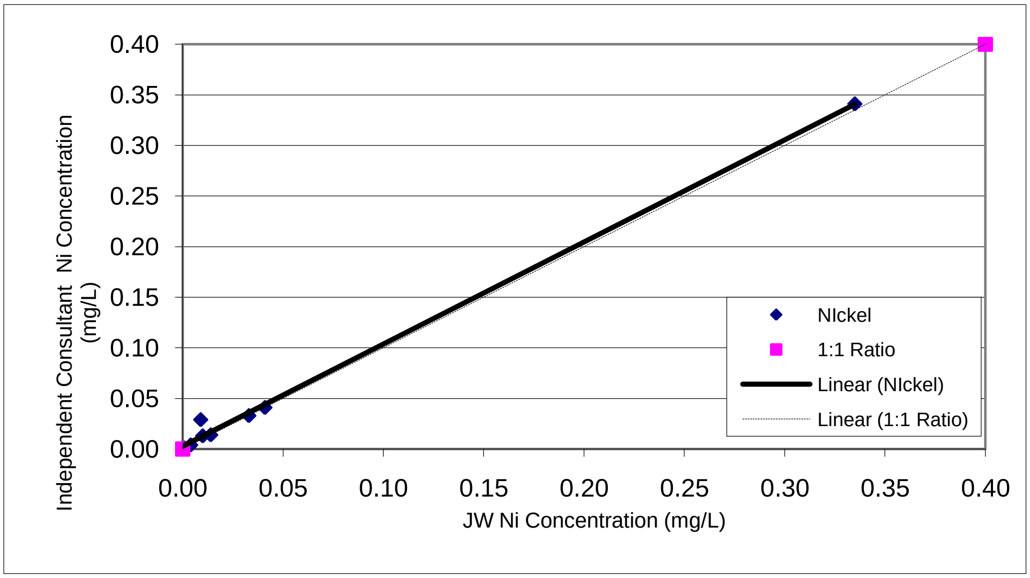

Figure 30: A comparison of Nickel (Ni) concentrations in maple sap from samples collected by JW compared with the Independent Consultant

Arsenic in Soils near Maple Trees

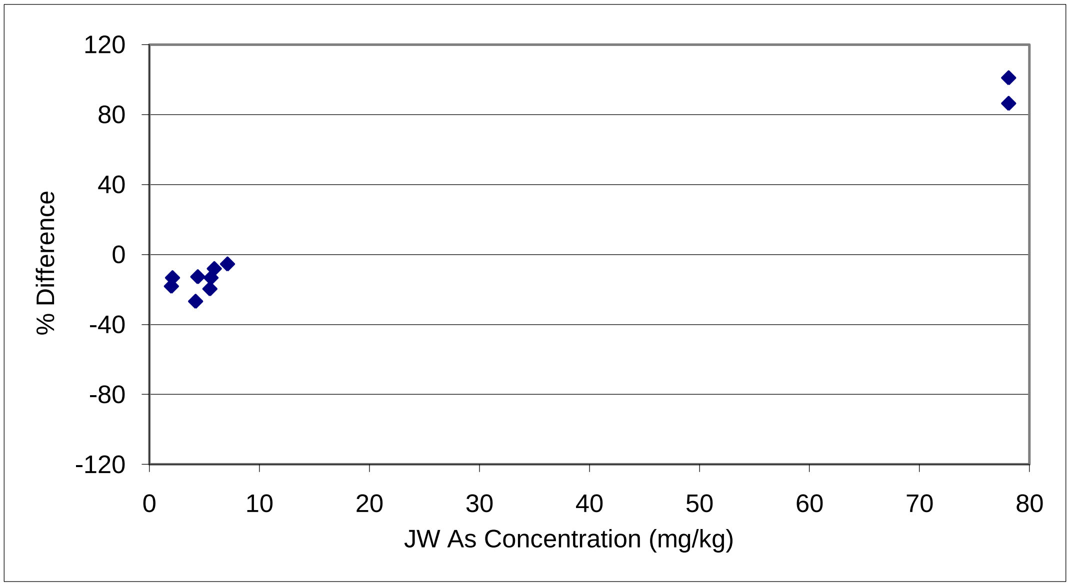

Figure 31: The percent difference between Arsenic (As) concentrations in soils near maple trees from JW compared with the Independent Consultant

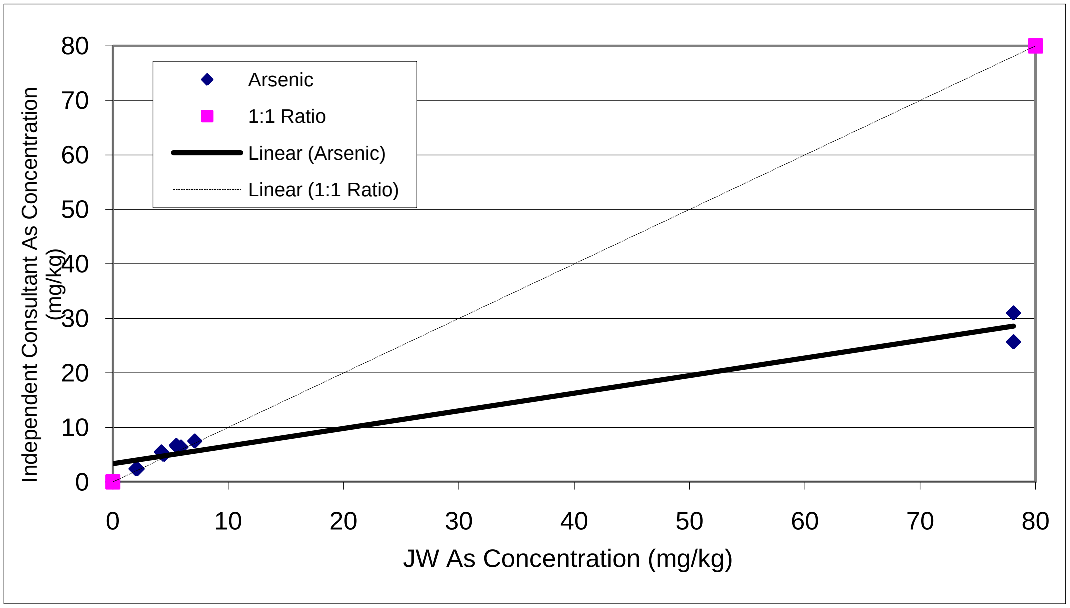

Figure 32: A comparison of Arsenic (As) concentrations in soils near maple trees from samples collected by JW compared with the Independent Consultant

Cobalt in Soils near Maple Trees

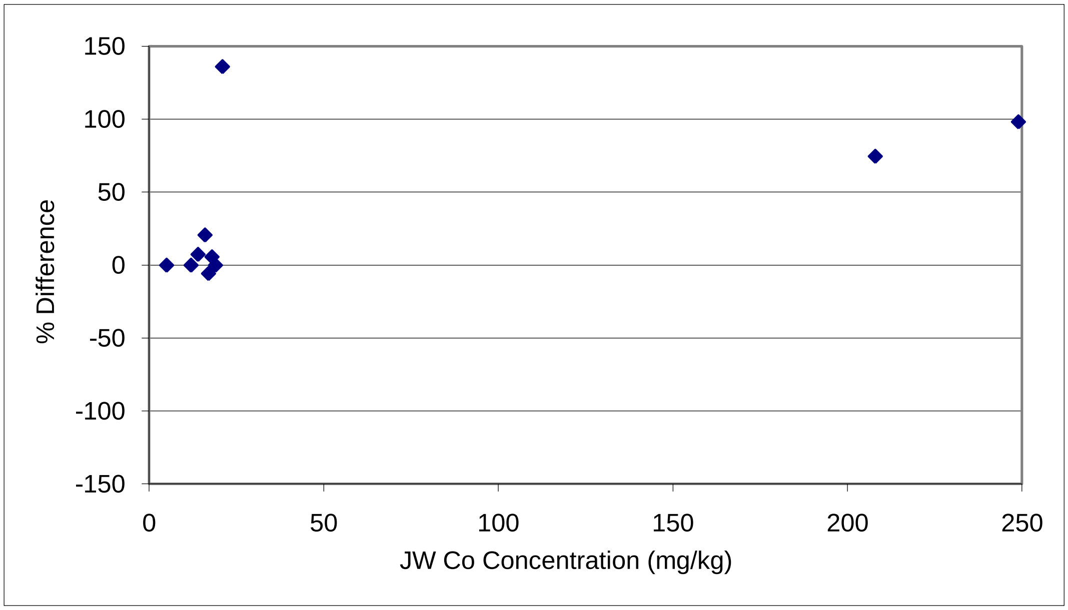

Figure 33: The percent difference between Cobalt (Co) concentrations in soils near maple trees from JW compared with the Independent Consultant

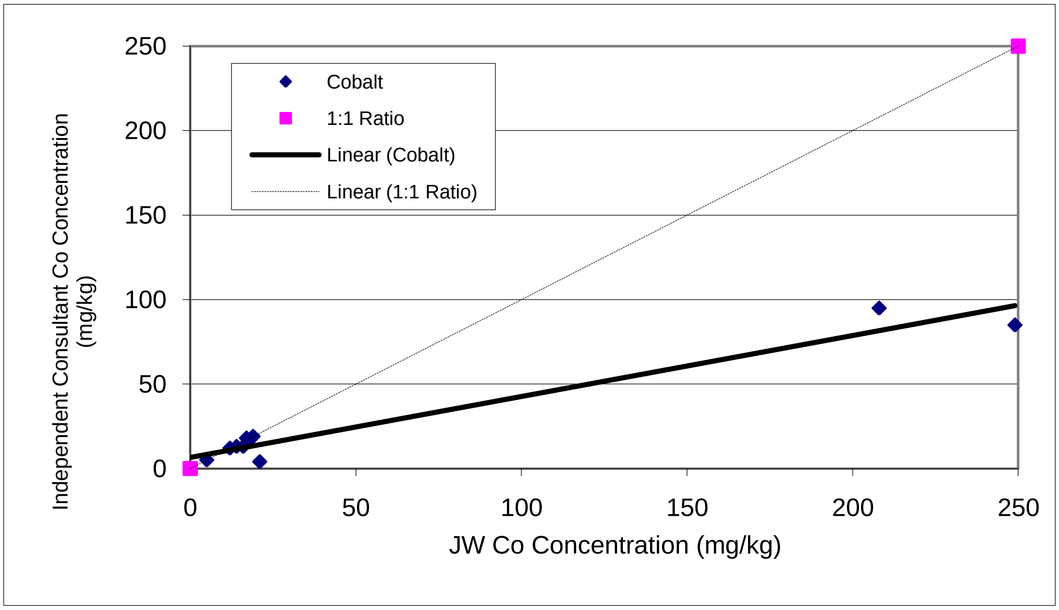

Figure 34: A comparison of Cobalt (Co) concentrations in soils near maple trees from samples collected by JW compared with the Independent Consultant

Copper in Soils near Maple Trees

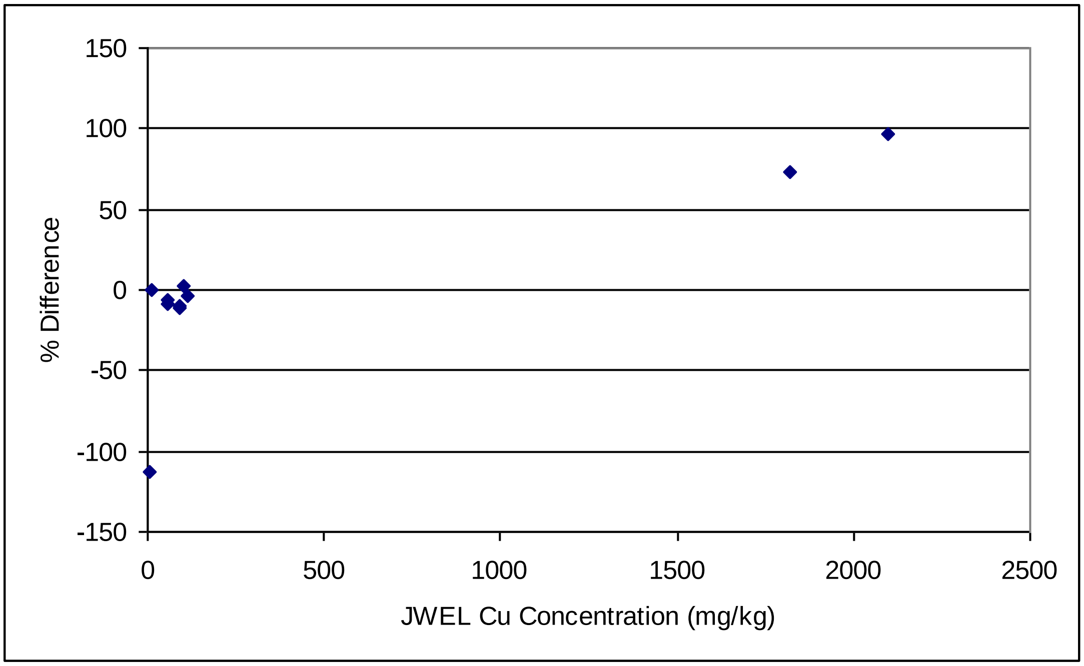

Figure 35: The percent difference between Copper (Cu) concentrations in soils near maple trees from JW compared with the Independent Consultant

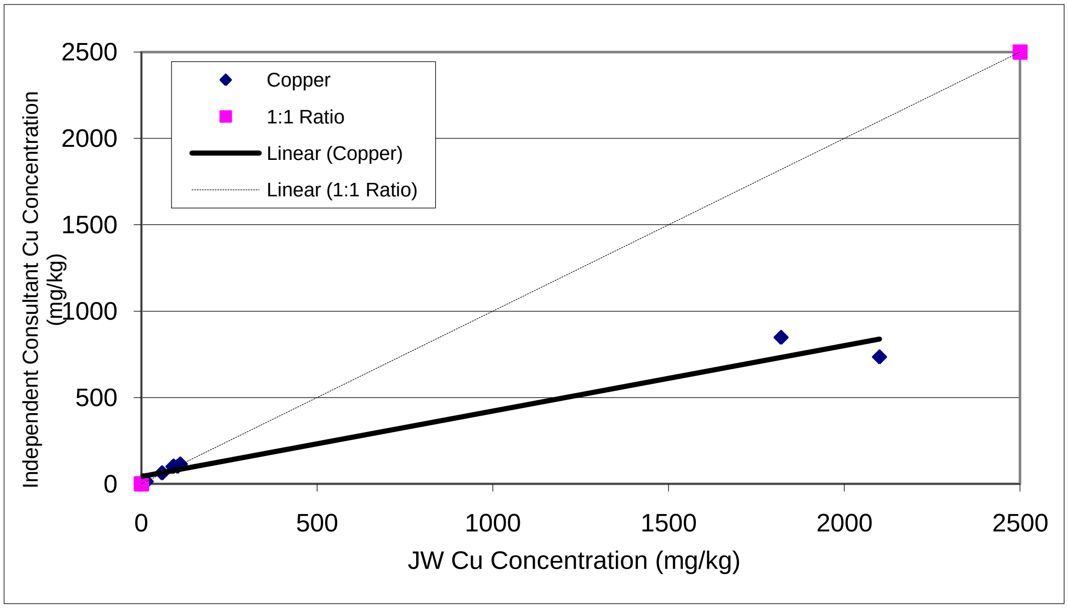

Figure 36: A comparison of Copper (Cu) concentrations in soils near maple trees from samples collected by JW compared with the Independent Consultant

Nickel in Soils near Maple Trees

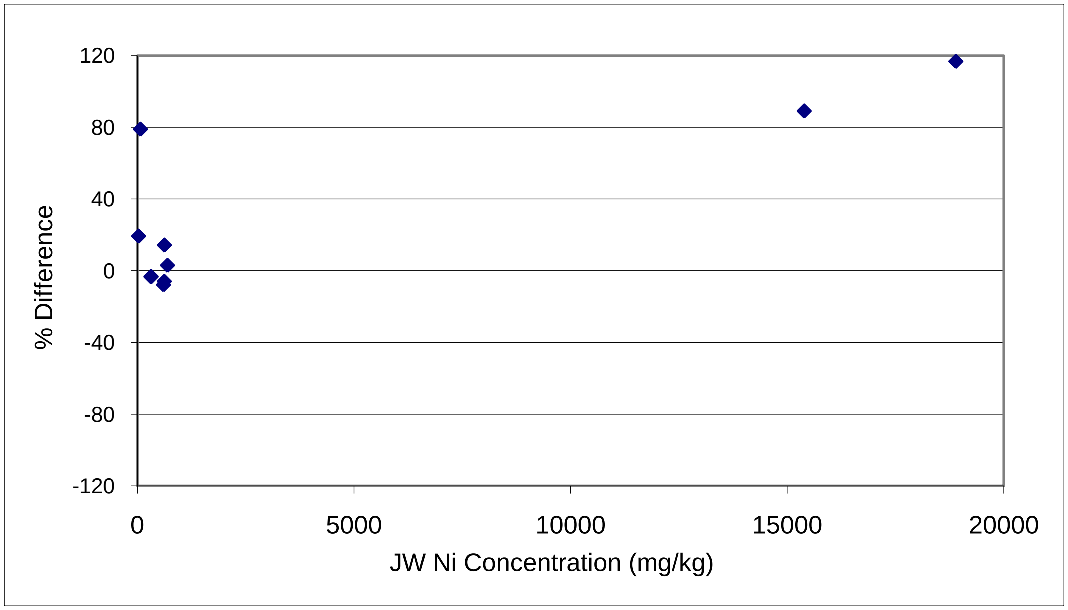

Figure 37: The percent difference between Nickel (Ni) concentrations in soils near maple trees from JW compared with the Independent Consultant

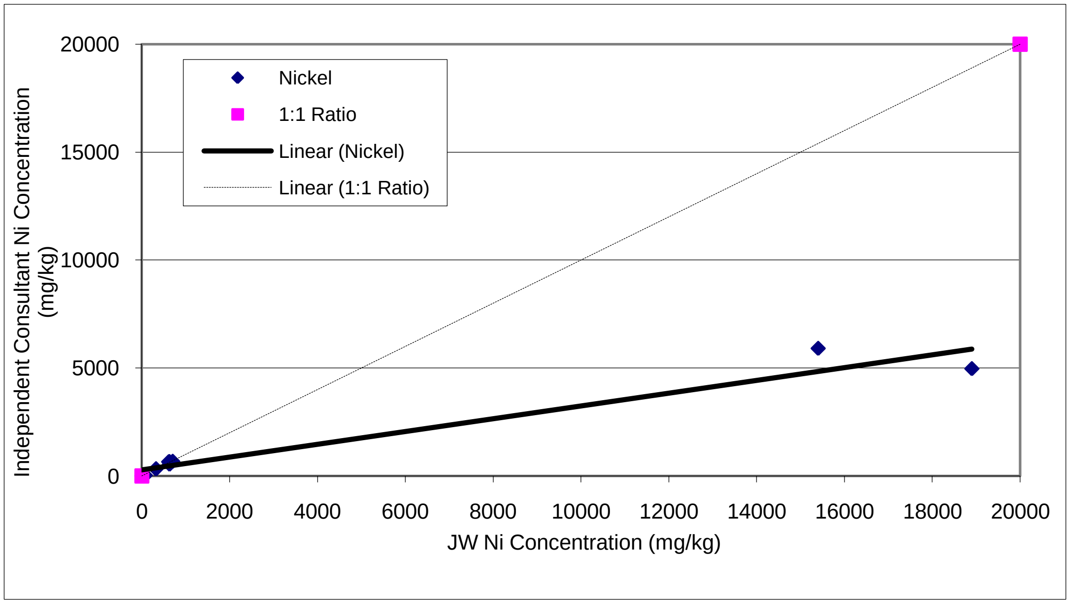

Figure 38: A comparison of Nickel (Ni) concentrations in soils near maple trees from samples collected by JW compared with the Independent Consultant

9.0 AMBIENT AIR MONITORING IN THE COMMUNITY

9.1 OBJECTIVE OF MONITORING AMBIENT AIR IN THE COMMUNITY

To obtain scientifically credible ambient air quality measurements in the populated areas of the Port Colborne Community in order to assess the impact to the community as a whole from potential exposure to CoCs that may be present in ambient air. This protocol specifically dealt with the collection of ambient air quality data.

9.2 APPROACH TAKEN TO QA/QC

A representative of the Independent Consultant was present during retrieval of all samples. The Independent Consultant staff observed the retrieval of all sample media and recorded parameters measured by the Hi-Vol samplers. For all samples, the Independent Consultant received the Certificates of Analysis from the analytical laboratory at the same time as the data was provided to JW. This means there was no independent check of the analytical data by analysis of “split” sampled.

9.3 FIELD WORK

The ambient air monitoring in the community began with control samples being collected on August 11, 2001. The final sampling event was completed on September 11, 2001. From the initiation of the protocol, a sampling period of 24 hours (midnight to midnight) was to occur every third or sixth day, depending on the sampling site. This pattern was to be performed for a 30 day duration. A list of the sampling sites and the date of each sampling events are as follows:

Date of Sampling Events	Active Sampling Locations
August 11, 2001 to August 12, 2001	Golf Course; Soccer Club; Jehovah Witness Church; Stormwater Retention Pond; P.C. Hydro Service Yard; Control Site; and Highways 140/3
August 14 2001 to August 15, 2001	Golf Course; Soccer Club; Jehovah Witness Church; Stormwater Retention Pond; P.C. Hydro Service Yard; and Control Site
August 17 2001 to August 18, 2001	Soccer Club; Stormwater Retention Pond; and Control Site

Date of Sampling Events	Active Sampling Locations
August 20 2001 to August 21, 2001	Golf Course; Soccer club; Jehovah Witness Church; Stormwater Retention Pond; P.C. Hydro Service Yard; and Control Site
August 23 2001 to August 24, 2001	Soccer Club; Stormwater Retention Pond; Control Site; and Rodney Street Baseball Diamond
August 26 2001 to August 27, 2001	Golf Course; Soccer Club; Jehovah Witness Church; Stormwater Retention Pond; P.C. Hydro Service Yard; Control Site; and Rodney Street Baseball Diamond
August 29 2001 to August 30, 2001	Soccer Club; Stormwater Retention Pond; Control Site; and Rodney Street Baseball Diamond
September 1, 2001 to September 2, 2001	Soccer club; Jeohovah Witness Church; Stormwater Retention Pond; PC. Hydro Service Yard; Control Site; and Rodney Street Baseball Diamond
September 4, 2001 to September 5, 2001	Soccer Club; Stormwater Retention Pond; Control Site; and Rodney Street Baseball Diamond
September 8, 2001 to September 9, 2001	Golf Course; Soccer Club; Jehovah Witness Church; Stormwater Retention Pond; P.C. Hydro Service Yard; Control Site; and Rodney Street Baseball Diamond
September 10, 2001 to September 11, 2001	Golf Course; Soccer Club; Jehovah Witness Church; Stormwater Retention Pond; P.C. Hydro Service Yard; Control Site; and Rodney Street Baseball Diamond

Independent Consultant representatives were present during each sampling event.

9.4 PROTOCOL VERSION EMPLOYED IN CARRYING OUT THE FIELD WORK

The protocol available at the time of sampling was: "*Protocol for Ambient Monitoring in the Community, Human Health Risk Assessment Input, Port Colborne CBRA*", dated August, 2001. The protocol utilized during the sampling event was not branded as final; however, no subsequent versions of the protocol were forwarded to the Independent Consultant.

9.5 CONDUCT OF WORK AND DEVIATIONS FROM PROTOCOL

The field activities were conducted as specified in the protocol, with some variation of the key dates, which are referred to as "Approximate Dates" further in the protocol. While the final sampling event was on September 11, 2001, the projected completion date was September 15, 2001. The sampling program was stopped one sampling event sooner than projected, as the Hi-Vol units were required for use in the Simulated Farming study.

The sampling locations that are listed in the table in the Dates of Fieldwork conducted section, coincide with those listed in the protocol after the August 23, 2001 sampling event. During the first sampling event (August 11 to 12, 2001) a Hi-Vol unit (P.M. 2.5) was located near the southwest intersection of Highways 140 and 3. This sampling location was unacceptable to the Independent Consultant as the sampling site was adjacent to an automotive collision repair facility where painting and sand-blasting occurred. JW agreed to remove this sampling location and to not include the filter analysis from the single sampling event in further calculations.

The sampling location at the Rodney Street Baseball Diamond was not included in the study until the August 23 and 24, 2001 sampling event. The Hi-Vol units (P.M. 2.5, P.M. 10, and TSP) were located approximately 8 metres from similar Hi-Vol units installed by the Ministry of Environment. At the initiation of the sampling program, JW and the Independent Consultant anticipated that the MOE would provide the analytical results from their Hi-Vol units, and JW believed that there were no additional Hi-Vol units available to them. As the sampling program advanced, the Independent Consultant emphasized the desire for results independent of the MOE, and JW was able to locate addition Hi-Vol units.

Further deviations from the protocol occurred due to technical difficulties with the Hi-Vol units and difficulties experienced by JW in procuring filter media. A list of these deviations is as follows:

Hi-Vol Station ID	Hi-Vol Unit ID	Filter ID	Date of Observation	Comments
Field Bank	Not Applicable	Not Applicable	Aug. 26, 2001	No filter available
Field Blank	Not Applicable	Not Applicable	Sept. 10, 2001	No filter available

Hi-Vol Station ID	Hi-Vol Unit ID	Filter ID	Date of Observation	Comments
Golf Course	P.M. 2.5 – 2	Not Applicable	Sept. 4, 2001	No sample, filter damaged during transport
Stormwater Retention Pond	P.M. 2.5 - 5	Not Applicable	Aug. 20, 2001	No sample, Hi-Vol unit fell over
Stormwater Retention Pond	P.M. 2.5-5	Not Applicable	Aug. 23, 2001	No sample, Hi-Vol unit being repaired
Stormwater Retention Pond	TSP - 2	Not Applicable	Aug. 23, 2001	No sample, no electricity to Hi-Vol unit
Soccer Club	P.M. 10-1	Not Applicable	Aug. 14, 2001	No sample, no electricity to Hi-vol unit
Control	P.M. 10 - 2	Not Applicable	Sept. 10, 2001	No Sample*

*Note that the tabulated data provided by JW identified that no sample was collected/retrieved from the Control Site on September 10, 2001, from the Hi-Vol unit P.M. 10 – 2. The Independent Consultant anticipates that the incorrect filter ID has been listed by JW, as the Independent Consultant records identify filter 01-14-11 as having been retrieved from the Hi-Vol unit. The lab Certificate of Analysis also identifies filter 01-14-11, and provides results for this sample. These results have not been included in the tabulated data provided by JW.

All deviations from the protocol in reference to sample collection and handling are listed below in the Data QA/QC section.

9.6 DATA QA/QC

Certificates of Analysis prepared by the laboratory were forwarded to both the Independent Consultant and JW. As per the protocol, the Independent Consultant also received documents from JW with the analytical results and the field parameters tabulated.

The Independent Consultant reviewed the table which was to be utilized by JW for use in the HHRA and observed the following:

- Replicate analysis performed by the analytical laboratory is available for the samples collected from the PM_{10} unit at the Soccer Club station, and the $PM_{2.5}$ unit at the Lorraine station, both on September 18, 2001; the TSP unit at the control station on October 2, 2001; and the $PM_{2.5}$ unit at the Lorraine station on October 3 and 4, 2001. While the replicates were provided by the lab, JW did not include the values with their tabulated data. The Independent Consultant acknowledges that the concentrations identified in the replicate analysis did not exceed the tabulated values and therefore have no impact on subsequent calculations utilizing values obtained from the tabulated data;

- The field blank retrieved on September 18, 2001 appears in the table, however there are no analytical results presented for this sample, even though the results were provided by the lab. The Independent Consultant acknowledges that the analytical results from this sample were not the minimum values for the measured parameters and thus are not to be included in calculations for the HHRA, as the protocol states that the more conservative, minimum value would be utilized; and

- The tabulated data provided by JW identifies the sample collected from the Control Site, on September 10, 2001 as filter 01-14-21. There are no recorded results for this sample and there is no further explanation as to why no results were achieved. According to the Independent Consultants records, the sample retrieved from the September 10, 2001 sampling event, from the P.M. 10 – 2 Hi-Volt unit was filter 01-14-11. The Certificate of Analysis provided by the lab for filters received by the lab on September 13, 2001 do not identify a filter with identification 01-14-21, however results for filter 01-14-11 are present. The protocol does not outline the use of the control samples, therefore the Independent Consultant is unable to identify the reason or ramifications of this data omission.

The tabulation document provided by JW also contains comments related to physical observations of the filter media, activities in the vicinity of the Hi-Vol units, or mechanical difficulties. A combined list of the Independent Consultant and JW observations follows:

Hi-Vol Station ID	Hi-Vol Unit ID	Filter ID	Date of Observation	Comments
Golf Course	P.M. 2.5 – 2	01-9-10	Aug. 11, 2001	Winged insects on filter
	P.M. 2.5 – 2	01-8-19	Aug. 17, 2001	Plant parts on filter; flow chart not working
	P.M. 2.5 – 2	01-10-3	Aug. 30, 2001	Clamp off of F-casing
	P.M. 2.5 – 2	Not Applicable	Sept. 4, 2001	No sample, filter damaged
	P.M. 2.5 – 2	01-14-15	Sept. 10, 2001	Black flecks on filter; pen not set on Dixon chart
Soccer Club	TSP - 1	01-12-30	Aug. 11, 2001	Chart wheel not working
	P.M. 2.5 – 1	01-8-24	Aug. 17, 2001	Insects, seeds on filter
	P.M. 2.5 – 1	01-14-2	Sept. 3, 2001	Filter ripped, new one installed
	P.M. 10 – 1	01-9-15	Aug. 11, 2001	Mass flow meter not working
	P.M. 10 – 1	01-8-7	Aug. 14, 2001	No sample, power failure
	P.M. 10 – 1	Not Applicable	Sept. 4, 2001	No sample, no filter available
	P.M. 10 – 1	01-10-2	Sept. 7, 2001	Moth on filter
	P.M. 10 – 1	01-14-16	Sept. 12, 2001	Small tear in filter

Hi-Vol Station ID	Hi-Vol Unit ID	Filter ID	Date of Observation	Comments
Jehovah Witness Church	P.M. 2.5 - 7	01-9-20	Aug. 11, 2001	Timer malfunction
	P.M. 2.5 - 7	01-8-15	Aug. 16, 2001	Splitter needed for timer
	P.M. 2.5 - 7	01-8-15	Aug. 17, 2001	Black flecks on filter; timer did not work
	P.M. 2.5 - 7	01-13-14	Sept. 4, 2001	No Dixon chart reading, average of other readings used
	P.M. 2.5 - 7	01-13-22	Sept. 10, 2001	Long sample, timer not assembled properly
Rodney Street Baseball Diamond	P.M. 2.5 - 5	01-10-7	Aug. 30, 2001	Long sample, 3 days; workers spraying on INCO roof
	TSP - 4	01-12-44	Aug. 29, 2001	No sample, grasshopper ate portion of filter
	TSP - 4	01-12-46	Sept. 1, 2001	No sample, grasshopper ate portion of filter
	P.M. 10 - 4	01-10-8	Sept. 1, 2001	Workers spraying on INCO roof

Hi-Vol Station ID	Hi-Vol Unit ID	Filter ID	Date of Observation	Comments
Stormwater Retention Pond	P.M. 2.5 – 5	01-8-13	Aug. 17, 2001	No sample, Hi-Vol unit fell over
	P.M. 2.5 – 5	01-11-25	Aug. 20, 2001	No sample, unit did not operate
	P.M. 2.5 – 5	01-11-02	Aug. 23, 2001	Pressure line loose
	P.M. 10 – 3	01-11-21	Aug. 20, 2001	Short sample, 5 hours short
	P.M. 10 – 3	01-11-24	Aug. 23, 2001	Short sample, only 8 hours
	TSP – 2	01-12-13	Aug. 20, 2001	Short sample, 5 hours short
	TSP – 2	01-12-37	Aug. 23, 2001	No sample, no power to unit

Hi-Vol Station ID	Hi-Vol Unit ID	Filter ID	Date of Observation	Comments
Control Station	P.M. 2.5 - 4	01-8-8	Aug. 14, 2001	Pressure measured at wrong orifice, use average of Aug. 11 and 23
	P.M. 2.5 - 4	01-8-20	Aug. 17, 2001	Pressure measured at wrong orifice, use average of Aug. 11 and 23. Insects on filter, construction nearby
	P.M. 2.5 - 4	01-11-22	Aug. 20, 2001	Pressure measured at wrong orfice, use average of Aug. 11 and 23. Insects on filter, construction nearby
	P.M. 10 - 2	01-09-21	Aug. 11, 2001	Black flecks on filter
	P.M. 10 - 2	01-11-23	Aug. 20, 2001	Insects on filter
	P.M. 10 - 2	01-11-08	Aug. 28, 2001	Filter changed at Site, no spare casings
	P.M. 10 - 2	01-11-09	Aug. 29, 2001	
	P.M. 10 - 2	01-14-21	Sept. 10, 2001	No sample
	TSP - 3	01-12-28	Aug. 11, 2001	Dixon chart malfunction, average utilized
	TSP - 3	01-12-24	Aug. 14, 2001	Dixon chart malfunction, average utilized
	TSP - 3	01-12-39	Aug. 30, 2001	Filter changed at Site, no spare casings

9.7 CONCLUSIONS

As the data was shared directly from the analytical lab by both the Independent Consultant and JW, there is no variation in the analytical results. However, the QA/QC duties of the Independent Consultant also included observations to ensure validity of the information collected. The Independent Consultant is unaware of how JW has accounted for the deviations from the optimal sample recovery.

The ambient air monitoring in the Port Colborne Community, with the exceptions noted above, has been performed in accordance with the protocol. However, there are questions regarding the use of data collected when an optimal sample recovery was not achieved.

10.0 AMBIENT AIR MONITORING IN THE VICINITY OF FARMING ACTIVITIES

10.1 OBJECTIVE OF MONITORING AMBIENT AIR IN THE VICINITY OF FARMING ACTIVITIES

To determine the amount and concentrations of CoCs (if any) released into ambient air from farming operations.

10.2 APPROACH TAKEN FOR QA/QC

The Independent Consultant staff observed the retrieval of all sample media and recorded parameters measured by the Hi-Vol samplers. The Independent Consultants also received the analytical data from the analytical laboratory at the same time as the data was provided to JW.

10.3 DATE(S) FIELD WORK WAS CONDUCTED

The ambient air monitoring in the vicinity of farming activities began with control samples being collected on September 18, 2001. Sampling collected during farming activities occurred on October 1, 2001 through to October 4, 2001.

10.4 FIELD WORK

A representative of the Independent Consultant was present during all field work for this program.

10.5 PROTOCOL VERSION EMPLOYED IN CARRYING OUT THE FIELD WORK

The protocol available at the time of sampling was: "*Protocol for Ambient Monitoring in the Vicinity of Farming Activities, Human Health Risk Assessment Input, Port Colborne CBRA*", dated September 19, 2001.

10.6 CONDUCT OF WORK AND DEVIATIONS FROM PROTOCOL

- The protocol indicated two $PM_{2.5}$ samplers with one sampler located 100-metres west and the other 100-metres south of the field. The samplers were moved to the eastern edge and the edge of the northwest corner, respectively. The sampler on the eastern edge was in a direct downwind position from the farming activity.

- According to the protocol, farming activities were not to occur if greater than 0.1 millimetre of precipitation occurs. The Independent Consultant was present at the field Site prior to initiation of the farming activity each day to determine whether the moisture content of the soil was sufficient to prevent the creation of dust during the farming activities.

10.7 DATA QA/QC

Certificates of Analysis prepared by the laboratory were forwarded simultaneously to both the Independent Consultant and JW. As per the protocol, the Independent Consultant also received documents from JW with the analytical results and the field parameters tabulated.

The Independent Consultant reviewed the table that was to be utilized by JW for use in the HHRA and observed the following:

- Replicate analyses performed by the lab were available for the samples collected from the PM10 unit at the Soccer Club station, and for the the PM2.5 unit at the Lorraine Station, both on September 18, 2001; the TSP unit at the Control station on October 2, 2001; and the PM2.5 unit at the Lorraine station on October 3 and 4, 2001. While the replicates were included as line items by JW in their tabulated data, the minimum value between the sample value and the replicate value was tabulated.

- The field blank retrieved on September 18, 2001 appears in the table. However no analytical results are presented for this sample, even though the results were provided by the analytical lab. The Independent Consultant acknowledges that the analytical results from this sample were not the minimum values for the measured parameters and thus are not to be included in calculations for the HHRA.

10.8 CONCLUSIONS

As both the Independent Consultant and JW shared the data directly from the analytical laboratory, there is no variation in the analytical results.

The ambient air monitoring in the vicinity of farming activities, with the minor exceptions noted above, has been performed in accordance with the protocol, and the reported data, as it has been presented, is acceptable.

11.0 DESCRIPTION, SAMPLING AND ANALYSIS OF SOILS

11.1 OBJECTIVE OF DESCRIBING, SAMPLING, AND CHEMICALLY TESTING SOILS

To describe and differentiate the properties of previously unidentified soil types in urban areas of Port Colborne and to determine the concentration of chemicals of concern (CoCs) in soil profiles with increasing distance from Inco.

11.2 APPROACH TAKEN TO QA/QC

An Independent Consultant representative was present during the advancement of all sampling test pits and the collection of soil samples. At the time of sample collection, the Independent Consultant staff received approximately 70% of the samples collected by JW staff, and later submitted approximately 24% of the total number of samples collected for corroborative testing. The samples collected by the Independent Consultant and JW were submitted to the analytical laboratory for chemical analysis. The samples collected by the Independent Consultant were labelled with different sample identifications than the JW samples, in order to maintain independent data sets and thus provide a greater degree of quality assurance.

11.3 DATE(S) FIELD WORK CONDUCTED

The soil mapping initiative began with test pits being advanced and soil samples collected on October 8, 2001. Subsequent sampling occurred on October 10, 2001; October 12, 2001; October 15, 2001; October 19, 2001; and June 13, 2002.

11.4 FIELD WORK

The Independent Consultant was represented during all field work for this program.

11.5 PROTOCOL VERSION EMPLOYED IN CARRYING OUT THE FIELD WORK

The protocol available at the time of sampling was: "*Protocol for Description, Sampling, and Chemical Analyses of Soil Materials, Port Colborne CBRA*", dated August 31, 2001.

11.6 CONDUCT OF WORK AND DEVIATIONS FROM THE PROTOCOL

Although the JW field representative logged the sampling site using a GPS unit, there are errors in the figure provided by JW displaying the soil pit locations, with many sampling locations in incorrect locations. As the figure does not have street detail, the Independent Consultant is unable to confirm all sampling locations; however, the Independent Consultant identified the following inaccuracies:

- TP M was advanced in agricultural field on the north side of Highway 3;
- TP N was located northwest of the displayed location, and was at the southwest corner of Reuter Road and Lorraine Road;
- TP T was located west of King Street, at the southeast corner of Adelaide and Catharine Street; and
- TP J2 is displayed approximately 300 metres north of the true sampling location, as the soil pit was advanced in a field south of Killaly Street.

11.7 DATA QA/QC

The Independent Consultant submitted soil samples to the lab for chemical analysis of the 17 ICP metals, plus As, Se and Sb. The analytical results of soil samples submitted for chemical analysis by JW have not been forwarded to the Independent Consultant. Thus, the Independent Consultant cannot provide comment on the validity of the reported soil chemical characteristics.

11.8 CONCLUSIONS

While the physical advancement of test pits and collection of soil samples followed the prescribed practices of the protocol, the reported locations were often incorrect. The analytical results for the samples were not provided to the Independent Consultant and, therefore, further comment on the study is not possible.

12.0 SOIL SAMPLING, ANALYSES, AND ADDITIONAL COC INVESTIGATION OF SOILS

12.1 OBJECTIVE OF CONDUCTING SOIL SAMPLING, ANALYSES AND ADDITIONAL COC INVESTIGATION

The purpose of this study was to supplement the CoCs data obtained by JW by performing additional soil sampling and chemical analyses and soil test pits.

12.2 APPROACH TAKEN TO QA/QC

A representative of the Independent Consultant was present during the advancement of all sampling test pits, with the exception of one test pit. The Independent Consultant was not present and was not informed prior to the advancement of TP4.

At the time of sample collection, the Independent Consultant staff retained a "duplicate" portion of approximately 65% of the samples collected by JW staff and later submitted 41 samples, or approximately 20% of the total number of samples taken during this protocol.

While these samples were submitted and analyzed, and were also collected by JW, with the exception of the moss sample, the analytical results of these additional samples, excluding E1 Bedrock, are not included in this report as JW results for these materials were not provided. These samples were collected during the sampling event as the Independent Consultant and JW recognized their potential importance in the CoC determination. The bedrock, coal and iron pellets (i.e. E1 Bedrock, Pellets, and E14 Coal) were of importance as the bedrock is potential parent material for native soils in the area, and the coal and iron pellets were believed to be feed-stock of the former Algoma Steel Mill. The moss (i.e. E16 Moss) was collected because such vegetation has the potential to live for a long time, and it has very dense growth. Thus, it was felt that the moss could have been similar to the surface soil layer in its accumulation of metals from atmospheric deposition.

All samples collected by the Independent Consultant and JW, for analysis, were submitted to the analytical laboratory for chemical analysis. The samples collected by the Independent Consultant were labelled with different sample identifications than the JW samples, in order to provide a greater degree of quality assurance.

The test pits were excavated by a backhoe, then using a hand shovel and knife, both made of steel, one face of the pit was cleared of loose debris and smearing. The soil horizons were then logged.

An Independent Consultant representative was present during excavations and the collection of all soil samples from the test pits. As each sample horizon was removed from the cleaned face of the test pit, a portion of the sample was provided to JW staff and a portion provided to the Independent Consultant. Both the Independent Consultant and JW representatives were adjacent to, or within the test pit during sample retrieval.

The difference and percent differences between JW and the Independent Consultant results were calculated for each sample and each CoC to establish the level of agreement between sample pairs. For data point reported as less than the Estimated Quantitation Limit (EQL), the sample pair was not included in the statistical analysis. Rather, a qualitative analysis of the sample pair was conducted. For this qualitative analysis, good agreement between the two results was indicated if the difference between the two results was less than 5 times the EQL. Plots of the pairs were produced to indicate if there were any obvious trends in degree of difference with concentration.

A paired t-test was conducted on the duplicate samples to determine if any consistent bias is evident overall. Regression analysis was conducted to determine if the Independent Consultant and JW demonstrated a 1:1 relationship (i.e., good agreement).

The Independent Consultant established the criteria for acceptable agreement between the paired sets as +/- 45%.

12.3 DATE(S) FIELD WORK CONDUCTED

The advancement of test pits and soil sampling occurred on August 14 to 17, 2001, inclusively, and on August 21, 2001.

12.4 FIELD WORK

The Independent Consultant was represented during all field work for this program.

The protocol available at the time of sampling was: "*Soil Sampling and Chemical Analyses Protocol, Additional CoC Investigation, Inco Boundary and Rodney Street Area, Port Colborne CBRA*", dated June 27, 2001. At the time of the field activities, the protocol was in draft format. No subsequent versions of the protocol were received by the Independent Consultant following the sampling event.

12.5 CONDUCT OF WORK AND DEVIATIONS FROM THE PROTOCOL

According to the protocol, soil sampling was to be performed at 10 locations, with 7 locations being within the Inco property boundary and the remaining 3 from areas outside the Inco property. During the sampling event additional test pits were added and the total number of sampling locations was increased to 17, with 11 locations within the Inco property boundary and 6 locations on residential, City of Port Colborne property, or federal lands formerly belonging to the St. Lawrence Seaway.

While test pits which were advanced on the residential properties, and on City of Port Colborne land had not been included in the protocol, they were advanced once the opportunity of cooperation with the land owners arose. There were two test pits, TP9 and TP17, which were advanced on residential properties, TP8, TP11 and likely TP15 were advanced on City of Port Colborne land and TP12, TP13 and TP14 were advanced on federal lands. All additional test pits were advanced on lands owned by Inco, although not all test pits are located on the primary INCO compound. The additional test pits allowed for a greater collection of the soil profiles in the Rodney Street area, and of the chemical constituents of the soils.

The protocol states that all soil samples collected by JW will be split to form replicates of the sample. One set of replicates was to be sent to the lab for chemical analysis and the second set archived. The Independent Consultant requested that all data related to the chemical analyses performed on samples collected during this sampling event be provided to the Independent Consultant. The Independent Consultant subsequently received laboratory Certificates of Analysis which should have represented all the analyses performed for this protocol. However, the results are not representative of all the samples collected. The Independent Consultant anticipates that JW submitted approximately 60% of the retrieved soil samples for analysis, compared to 100% as described in the protocol.

12.6 DATA QA/QC

During each sampling event general observations were made of the soil horizons and soil types for comparison with the observations made by JW, however the soil descriptions and characteristics were not provided to the Independent Consultant. Consequently, the Independent Consultant cannot provide further comment on the reported soil characteristics.

The methodology practiced at TP9 and TP17 should have resulted in the retrieval of 18 soil samples. According to the Certificates of Analysis provided by the lab, JW did not submit any samples from TP9, and submitted 15 samples from TP17. As these two test pits were located on residential properties located on Rodney Street, it is not clear why samples from TP9 were not submitted. It is also unclear why only a portion of the samples were submitted for analysis, which is not in line with the protocol.

An analytical result from E12, depth of 10 – 15 cm, was included on the Certificate of Analysis for the samples submitted by the Independent Consultant. This sample identification is incorrect; the Independent Consultant has disregarded this analytical result.

The tabulated data and figure provided by JW indicate soil samples were recovered on a 2.5 cm interval from TP16. As the Independent Consultant observed TP16 to be located in an area of operational fill material, analytical results from this test pit do not coincide with this protocol, and as such analytical results from this test pit should not be included in the tabulated data, or in calculations derived from this data.

The Independent Consultant was not present during the advancement of TP4 and was thus unable to perform QA/QC for this test pit. Accordingly, analytical results from this test pit should not e included in the tabulated data, or in calculations derived from this data.

The Independent Consultant was present during the advancement of TP3 and TP5. As discussed in the Data QA/QC section, the Independent Consultant believes that the sampling methodology would provide soil samples on a 5 cm interval. The analytical report for the JW samples identifies 18 and 17 samples collected from TP3 and TP5, respectively. It appears that that the sampling methodology at these test pits, as described above, would have resulted in a maximum retrieval of 13 samples. The source of the additional samples is not known.

For the samples that the Independent Consultant had analyzed, results were tabulated for the four chemicals of concern (CoCs): arsenic, cobalt, copper and nickel. See Appendix G for the laboratory certificates of analysis. The difference and percent differences between JW and the Independent Consultant results were calculated for each sample and each CoC. The difference was calculated by simply subtracting the Independent Consultant result from the JW result, and the percent difference was calculated as follows:

(JW result – Independent Consultant result) / ((JW result + Independent Consultant result) / 2 x 100.

For data reported as less than the EPL, the sample pair was not included in the statistical analysis. Rather, a qualitative analysis of the sample pair was conducted. For this qualitative analysis, acceptable agreement between the tow results was indicated if the difference between the two results was less than 5 times the EQL. The means of the differences and percent differences were calculated for each chemical of concern per media. Figures 39 - 46 provide the soil results from JW and the Independent Consultant as well as the calculated differences.

12.7 CONCLUSIONS

While the physical advancement of test pits and collection of soil samples followed the prescribed practices of the protocol, only a portion of the results of these actions have been forwarded to the Independent Consultant, and therefore, the Independent Consultant is not able to comment on the whole study.

Arsenic – CoC Investigation Soil

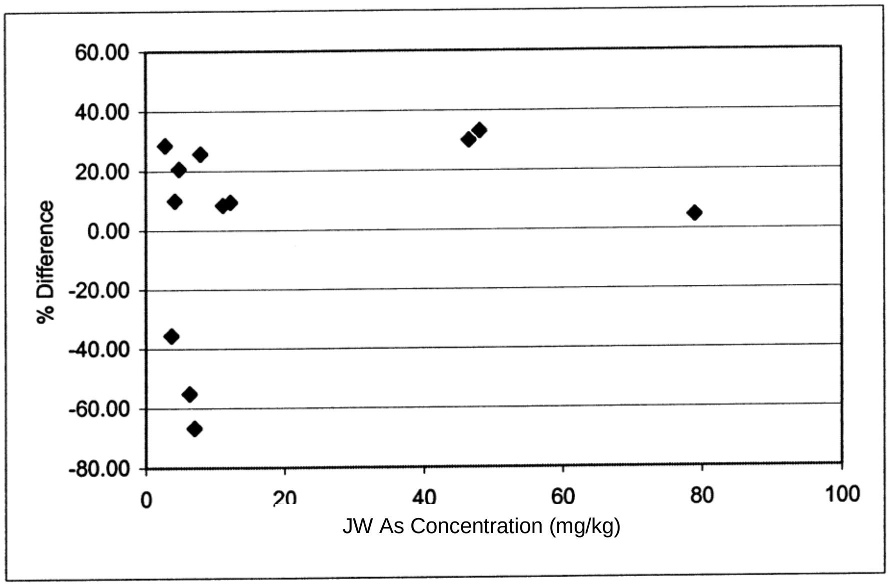

Figure 39: The percent difference between Arsenic (As) concentrations in soils from JW compared with the Independent Consultant (as part of an additional CoC investigation)

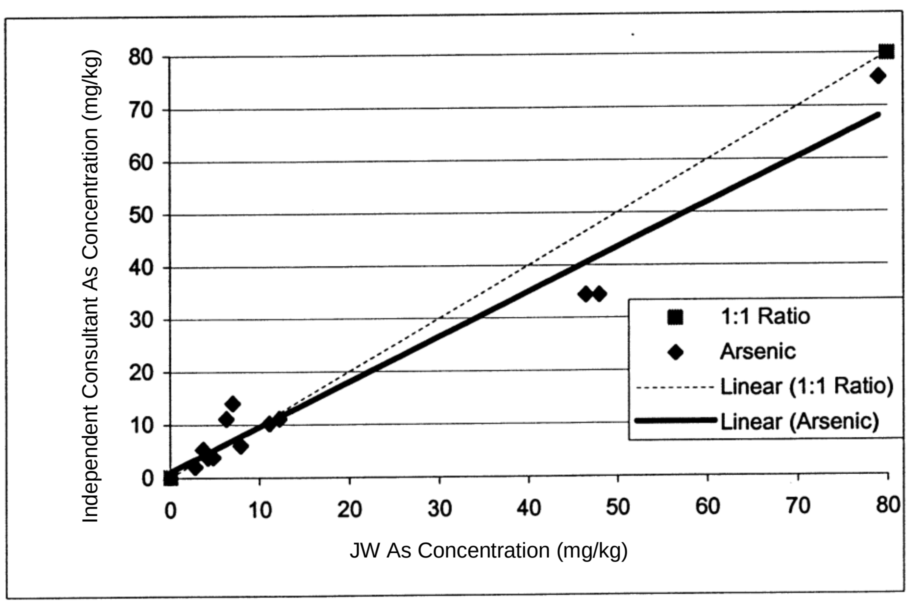

Figure 40: A comparison of Arsenic (As) concentrations in soils from samples collected by JW compared with the Independent Consultant (as part of an additional CoC investigation)

Cobalt – CoC Investigation Soil

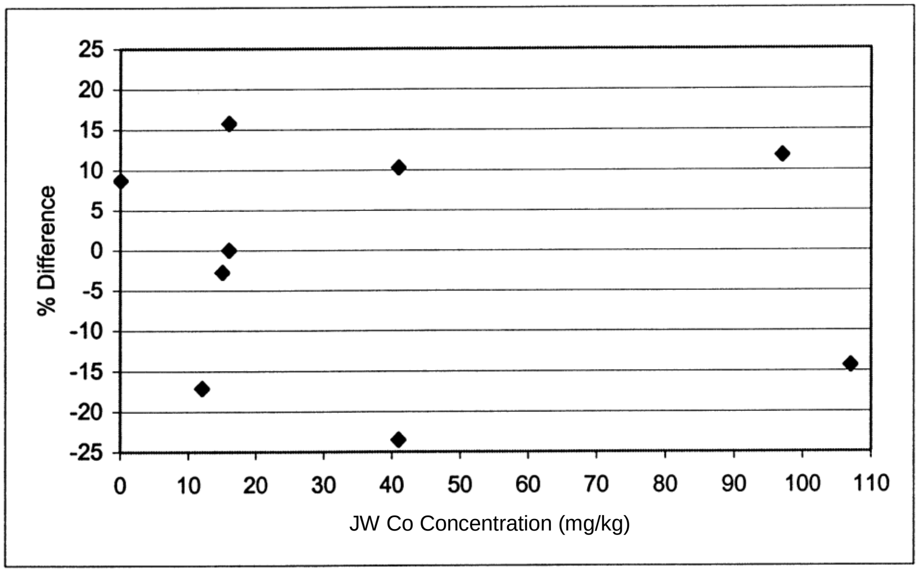

Figure 41: The percent difference between Cobalt (Co) concentrations in soils from JW compared with the Independent Consultant (as part of an additional CoC investigation)

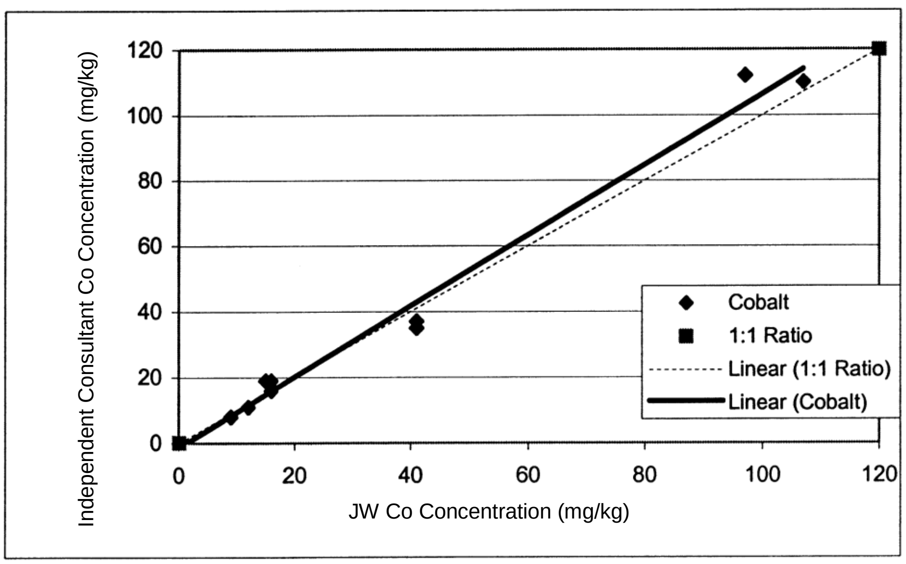

Figure 42: A comparison of Cobalt (Co) concentrations in soils from samples collected by JW compared with the Independent Consultant (as part of an additional CoC investigation)

Copper - CoC Investigation Soil

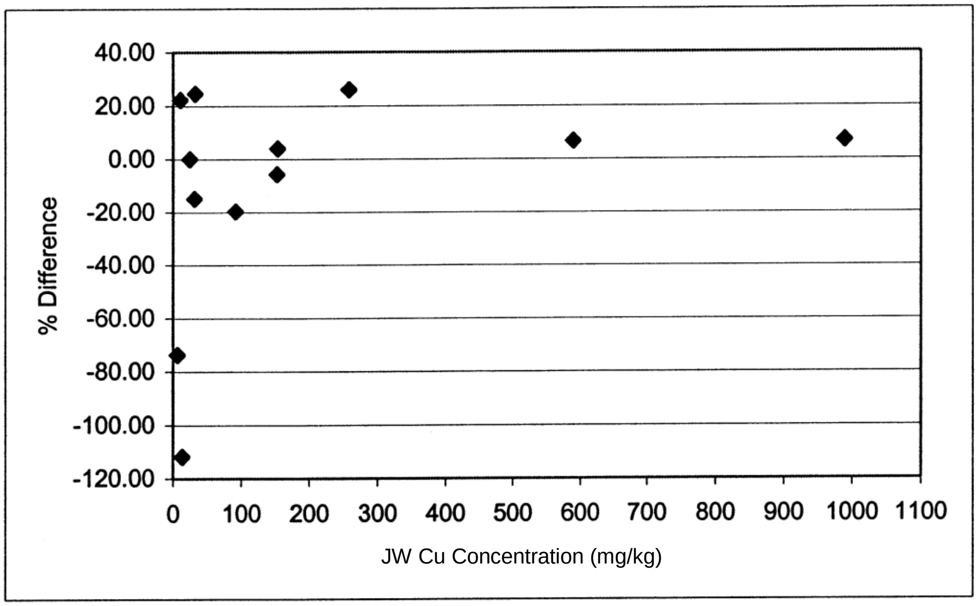

Figure 43: The percent difference between Copper (Cu) concentrations in soils from JW compared with the Independent Consultant (as part of an additional CoC investigation)

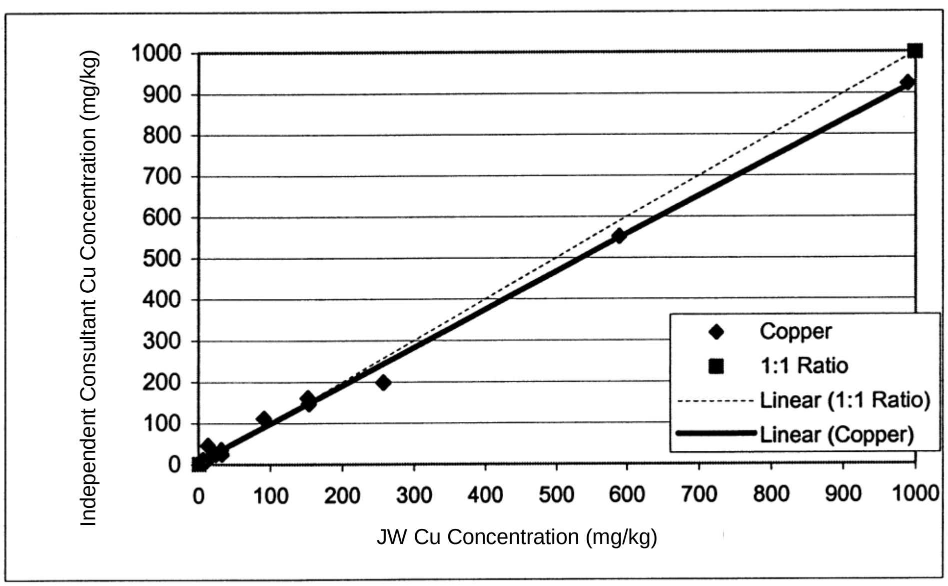

Figure 44: A comparison of Copper (Cu) concentrations in soils from samples collected by JW compared with the Independent Consultant (as part of an additional CoC investigation)

Nickel – CoC Investigation Soil

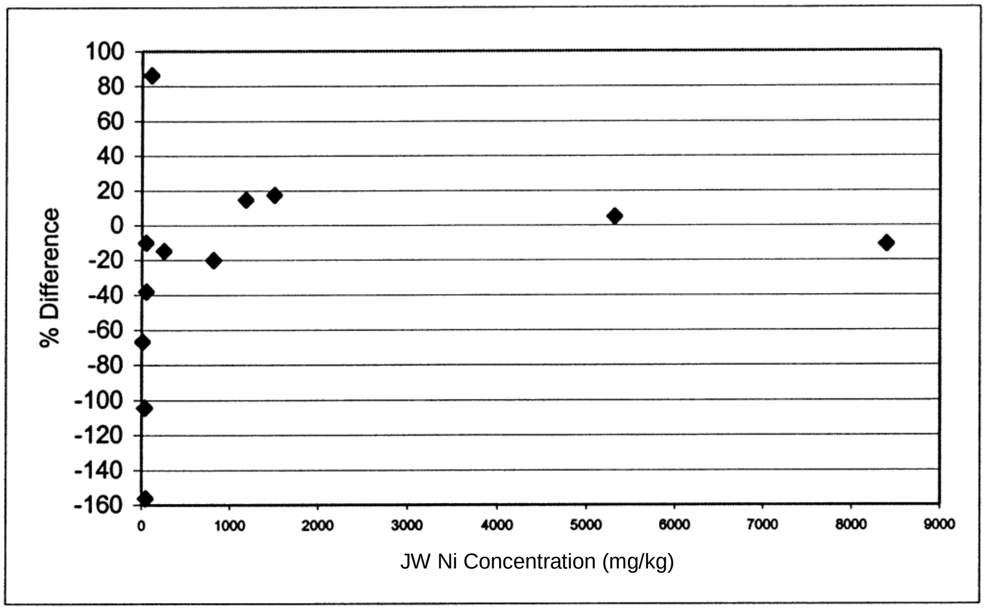

Figure 45: The percent difference between Nickel (Ni) concentrations in soils from JW compared with the Independent Consultant (as part of an additional CoC investigation)

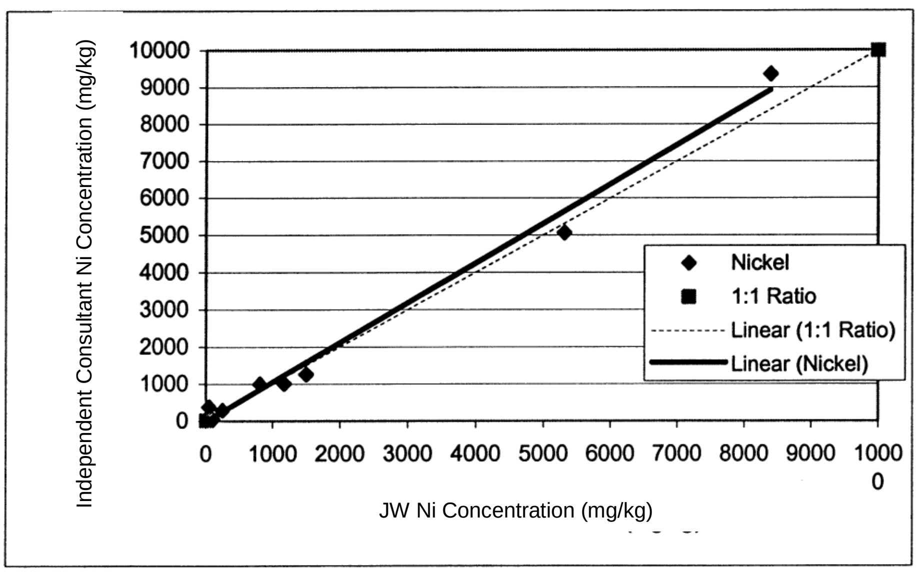

Figure 46: A comparison of Nickel (Ni) concentrations in soils from samples collected by JW compared with the Independent Consultant (as part of an additional CoC investigation)

APPENDIX A

Comparison of JW HHRA to the MOE and U.S. EPA Requirement

Appendix A - Regulatory Requirements for the Conduct of Health Risk Assessments

Table 1: Summary Evaluation that CBRA HHRA 2007 meets the Ontario Ministry of Environment 1996 Guidance on Site Specific Risk Assessment (SSRA) for Use at Contaminated Sites in Ontario, pertaining to requirements and standard practice for conducting and reporting Human Health Risk Assessment (HHRA) for site clean-ups in Ontario. ISBN-0-7778-4058-03. Questions are sourced from Appendix F Checklist for Reviewers.

MOE 1996 Guidance and Requirement	**Evaluation**	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Comment**
MOE guidance document describes the role of risk assessors in the site remediation decision-making process often followed in Ontario. It provides some general guidance for conducting human health risk assessment for the remediation of contaminated sites in Ontario. It is not intended to be an exhaustive guideline or protocol, but a statement of basic principles and general requirements for Human Health Risk Assessment (HHRA). It also formulates the Ministry of the Environment (and Energy's) (MOEE's) requirements regarding third party review. A basic framework for conducting site specific ecological risk assessments in Ontario using concepts and terminology that are consistent with the framework for conducting ecological risk assessments that has been developed by the Canadian Council of Ministers of the Environment (CCME) (CCME, 1996). Information derived from risk assessment can be of assistance in determining remediation criteria. The process can also help risk managers evaluate and compare the effectiveness of site specific remedial alternatives and technologies to reduce risk and to design a remediation plan.	Partially met	See comments below and detailed comments.

MOE 1996 Guidance and Requirement	**Evaluation**	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Comment**
What is an acceptable risk? An additional lifetime cancer risk of one-in-a-million (10^{-6}) for carcinogens must be utilized.		Ni inhalation exposure of soil and dust - lifetime additional cancer risk appears not to have been considered in derivation of proposed soil clean-up values.
What apportionment of a reference dose to different media should be used in developing the criteria? In the case of threshold chemicals, any deviation from the 20% apportionment used in the development of the generic criteria must be fully justified via a multimedia exposure assessment. As was the case for generic criteria, the incorporation of the 50% of solubility limits must be adhered to for parameters in water.		Apportionment of the daily Ni reference dose did not consider all possible pathways. Inadequate data for scientific justification of the apportionment of total tolerable upper daily intake limit (UL) per age group per environmental media used in the HHRA and for the derivation of the recommended soil risk-based clean-up value. Consumer products not considered. Directed (not random) sampling of local supermarket and local garden produce undertaken.
How should normal background concentrations be accounted for? In the development of the generic criteria, the numerical values were always limited at the low end by both known background concentrations and analytical capabilities. The same concepts apply to the development of site specific criteria. That is the values cannot be expected to fall below the background concentrations for uncontaminated parkland sites (defined within the guideline), nor would they be driven below the method detection limits (MDLs) listed in the document “Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario.” (MOEE, 1996a).	Not met	Did not consider comparison of arsenic data to natural background levels in soils for the Port Colborne area. Proposed soil clean up value for Ni exceeds the upper concentration limit threshold value of 10,000 µg/g (10,000 ppm as per Level 2 risk management guideline). Statistical analyses of database taking into account the distribution of contamination in environmental media, null hypothesis testing, and power analysis of the likelihood of a Type I and Type II error was not documented in the HHRA.

MOE 1996 Guidance and Requirement	**Evaluation**	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Comment**
When numbers are lacking in the guidelines or supporting documentation, they may be developed using the methods and principles outlined in the guidelines and in the above document. In addition to minimum values described above, the Ministry has developed a set of maximum numeric values for soils and non-potable groundwater which will serve as ceiling or upper concentration limits for site specific criteria developed via SSRA and Level 1 risk management. These values were developed to minimize degradation of soil and groundwater supplies in Ontario, recognizing that once contaminated, it may not be possible or feasible to return these media to pre-contamination levels. *"It is stressed that these values are absolute maxim that may not be exceeded by criteria derived from an SSRA approach without some form of Level 2 risk management. They are not to be viewed under any circumstances as acceptable or allowable levels…. In the cases of soils, the Upper Concentration Limit has been set at a level equal to 10 times the highest exposure-related human contact component (S1, S2, S3), with an absolute ceiling of 10,000 ppm (µg/g)."Upper Concentration Limits are presented in Appendix E.*		

MOE 1996 Guidance and Requirement	Evaluation	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Comment**
How should the SSRA consider analytical capabilities? Risk assessor should follow principles and methods in “Guidance on Sampling and Analytical Methods for Use a Contaminated Sites in Ontario.” (MOEE, 1996a), and Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part A); Interim Final. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, D.C. 1989. EPA/540/1-89/002 General expectations of the Ministry of the Environment (and Energy) for the planning and conduct of an SSRA are provided in the 1996 Guidance document. *“Sound scientific judgement must be exercised (utilized) throughout the assessment.”*	Partially met	Not fully documented. Rationale provided by the consultant is not consistent with MOE SSRA guidance and US EPA RAGS; questionable scientific judgement in all aspects of environmental data analyses; evidence of incorrect key assumptions and incorrect application of statistical methods affecting calculations of important input data to the model and validity of the results. See detailed comments.

MOE 1996 Guidance and Requirement	**Evaluation**	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Comment**
Appendix F		
1 GENERAL		
Were the site-specific objectives of the risk assessment stated?	Met	
Was the scope of the assessment described (e.g., in terms of complexity of the assessment and rationale, data needs, and overview of the study design)?	Partially met	
2 Problem Formulation/ Hazard Identification/		
2.1 Site Characteristics		
History of site activities provided, including chronology of land use (e.g. specifying agriculture, industry, waste deposition, and residential development at the sites)?	Met	
Was a general map of the site (or study area of the CBRA) depicting boundaries and surface topography included, which illustrates site features, geographical relationships between specific potential receptors and the site?	Met	
Were current and future land use identified and adequately described?	Partially met	Current land uses were described. Future land uses were not.

MOE 1996 Guidance and Requirement	Evaluation	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Comment**
Was a qualitative overview of the nature of the contamination included (e.g., specifying in a general manner the potential or suspected sources of contaminants, types and concentration of contaminants detected at the site, media potentially contaminated as well as potential exposure pathways and receptors)?	Partially met	Does not include rationale for exclusion of consumer products. Rationale for exclusion of infant contact with soil is an assumption and not based on evidence. Model does not explicitly address people suffering from chronic illnesses such as asthma, heart disease and hypertension, etc.. Model addresses exposure pathways for people to Ni and COCs in surface soil but not for those that may be exposed to soils at greater depths, such as during soil excavation, gardening, farming and utility maintenance. Zones within the study area included those of low socioeconomic status. Contamination sources included current and historical INCO refinery emissions. Environmental fate and transport estimations using mass balance calculations were not done to evaluate historical and future movement of contaminants within the community. Model included sampling, analysis and estimation of exposures from contaminants in soils and air, drinking water, ground water, indoor dust and local grown and raised food.

MOE 1996 Guidance and Requirement	Evaluation	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Comment**
Were key site characteristics documented? The following should be included: • Soil/sediment parameters (e.g. particle size, pH, redox potential, soil type, organic carbon and clay content, bulk density, porosity). • Hydrogeological parameters (e.g., hydraulic gradient, pH/Eh, hydraulic conductivity, location, saturated thickness, direction, and rate of flow of aquifers, relative location of bedrock). • Hydrological parameters (e.g., hardness, pH , dissolved oxygen, temperature, total suspended solids, flow rates, and depths of rivers or streams; estuary as well as lake parameters such as area, volume, depth). • Meteorological parameters (e.g., direction of prevailing wind, average wind speed, temperature, humidity, annual average and 24 hour maximum rainfall).	Met	Soil parameters were met.

MOE 1996 Guidance and Requirement	Evaluation	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Comment**
2.2 Data Collection:		
Was there a statement specifying both the qualitative and quantitative nature of the sampling data, in terms of relative quality and adequacy for use for the intended objective of the study?	Partially met	Not provided for all media and contaminants and exposure point concentrations used in the exposure assessment.
Were all appropriate media sampled? Was there adequate justification for omissions?	Met	Soil, dust, air, drinking water, surface water and ground water , and locally grown and raised foods were sampled.
Were all key areas sampled, based on available information? Did sampling include media along potential routes of migration (e.g., between the contaminant source and potential future exposure points)? Were sampling locations consistent with nature of contamination (e.g., at the appropriate depth)?	Partially met	The Independent Reviewer has reason to believe that not all sampling locations and analytical results have been documented and were used in the HHRA. Surface soils were sampled and used in the HHRA to assess residential exposures to metal contaminants in surface soils and dust. Soil metal concentration data at depth was not fully documented in the HHRA and potential risks form exposure to contaminants at depth during intermittent and short-term periods through activities such as soil excavation, gardening, agriculture and utilities maintenance were not presented in the HHRA.
Were sample maps provided, indicating the location, type, and numerical code of each sample?	Partially met	Appears that not all soil sampling has been fully documented.
Were sampling efforts consistent with field screening and visual observations in locating “hot spots”?	Partially met	??

MOE 1996 Guidance and Requirement	Evaluation	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Comment**
Did sampling include appropriate QA/QC measures (e.g., replicates, travelling blanks, traveling spiked blanks)? If background samples were collected, were they collected from appropriate areas (e.g, areas proximate to the site, free of potential contamination by site chemicals or other anthropogenic sources, and similar to the site in topography, geology, meteorology, and other physical characteristics) using methodologies consistent with the development of Ontario OTRs?	Partially met	Standard practices were stated to be followed and Ministry soil and air sampling protocols were used to generate data for the 2007 HHRA. It appears that the consultant has not provided full documentation of the QA/QC measures for all media and sampling efforts in the 2007 HHRA report and appendices.
2.3 Data Evaluation		
Were appropriate analytical methods, i.e., in accordance with the MOEE document "Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario" (MOEE, 1996a), employed for collection of data upon which risk estimates are based?	Partially met	See detailed comments
Where monitoring data for specific chemicals indicated "<detection limit", were the method detection limits for these chemicals acceptable to the Ministry as defined in the document "Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario" (MOEE, 1996a),	?	

MOE 1996 Guidance and Requirement	Evaluation	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Comment**
Were any site-related chemicals eliminated without appropriate justification? Were inappropriate "proxy concentrations" assigned to site-related chemicals? Was a value of zero or half the method detection limit (MDL) assigned? Was an erroneous sample specific quantification employed?	Yes	Details of soil database appear to be missing in the 2007 report. Lead, a CEPA Priority pollutant, should have been carried through the detailed HHRA. Justification for exclusion of the other contaminants is not documented in the 2007 HHRA. In some cases a value of half the method detection limit (MDL) was used to estimate concentrations when samples were found to have non-detectable concentrations of the COCs.
Were uncertainties, limitations, and gaps in the quality of collection or analysis adequately addressed?	No	See detailed comments. Details of the soils analyses and selection of EPC are not provided in 2007 HHRA precluding verification of the values by the Independent Reviewer.
2.4 Selection of Contaminants for Detailed Analysis		
Were criteria for chemical selection provided?	Yes	

MOE 1996 Guidance and Requirement	**Evaluation**	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Comment**
Were criteria consistent with the general guidance in Appendix A, appropriate for the site and for the specific problem at hand? Were the chemical selection criteria appropriately applied to the list of contaminants found on site and was the application well documented? Was the exclusion of any chemical from detailed analysis unjustified? Should any contaminants excluded as a result of the chemical selection process be considered for evaluation? Was an analysis of the potential adverse effects on the human receptors for chemicals provided? Was the analysis appropriate? Note Appendix A states: *“No particular selection criterion has been given greater weight than any other. All must be applied to a given contaminant.”*	Not met.	Screening analysis was conducted but does not appear to be fully documented in the 2007 HHRA and supporting appendices. Details of statistical analysis of the data, including distribution of the data for soil and other media using summary statistics, non-parametric analysis of soil data and null hypothesis testing and power analysis not provided in report and appendices. Details of screening and rationale for excluding certain chemicals from further investigation are not fully documented. This critical supporting information should be provided in a separate appendix. Not all selection criteria in Appendix A were applied. Details of the application of the selection criteria and the analysis of potential adverse effects on human receptors were not provided in the HHRA. For example, not considered was – 3. All known or probable human carcinogens and chemicals for which no human health threshold has been established for their adverse effect must be evaluated. 4. Compounds which have the potential to bioaccumulate and are also persistent and toxic must be evaluated. 5. the toxic breakdown products must be assessed. The exclusion of Lead from detailed analysis was unjustified.

MOE 1996 Guidance and Requirement	**Evaluation**	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Comment**
3 Toxicity Assessment		
Were appropriate toxicity values employed based on the nature of exposure?	Partially met	Toxicity Risk Values (TRVs) were revised in the 2007 HHRA in response to reviewer comments.
Were subchronic vs. chronic RfDs applied correctly based on the duration of exposure?	Partially met	Subchronic exposures were not assessed. Only chronic exposures assessed.
Did the toxicity values utilized correspond with the route of exposure of interest? Were appropriate route to route extrapolations performed in cases where a toxicity values was applied across differing routes of exposure?	Partially met	Dermal TRV extrapolation from oral RfD was questionable, and was revised in 2007 HHRA. Different values for assessing dermal absorption of Ni were selected for use by JW than those used in the Ministry's Rodney Street HHRA, and those recommended in published literature by world leading experts.
Were the toxicity values used appropriate for the receptor of interest?	Yes	
Were sensitive subpopulations, such as pregnant women or nursing women potentially requiring developmental RfDs, considered in the selection of the toxicity values used?	Yes	

MOE 1996 Guidance and Requirement	**Evaluation**	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Comment**
If a toxicity value has been adopted from other reputable regulatory agencies, was the basis for the toxicity value provided? Was an explanation provided for the selection of the chosen toxicity value as compared to other existing values, in terms of the quality of the toxicity assessment from which these values were derived, data selection, methodologies, assumptions and how current the values contained within the documentation of the agency from which the toxicity value was adopted?	Yes	
In the case of insufficient toxicity assessment, was the conclusion appropriately based on appropriate guidance?	No	Arsenic and Lead. No detailed assessment of lead and arsenic in 2007 HHRA.
Were sources and the impact of uncertainty adequately characterized?	Partially met	See detailed comments

MOE 1996 Guidance and Requirement	Evaluation	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Comment**
4 Exposure Assessment		
If a deterministic approach is used in the conduct of the exposure assessment, were average as well as "reasonable maximum exposures" (i.e., the highest exposures that are reasonably expected to occur) considered? Were the point estimates of contaminant concentration supported by the monitoring data?	Partially met	A deterministic model was used. There are inconsistencies in how the CTE and RME were calculated. See detailed comments. The average 95^{th} percentile (UCL) of the environmental monitoring data was not used to estimate the RME. This is inconsistent with SSDRA and O Reg 154/04 guidance. The arithmetic UCLM was not used to provide an estimate of the Central Tendency Exposure (CTE). The approached used by the consultant did not follow SSRA guidance and US EPA RAGS for estimating the average daily long term continuous exposure. Details of soil database appear to be missing in the 2007 report.
If a probabilistic approach is used in the conduct of the exposure assessment, were any significant distributions supported by appropriate monitoring/survey data? Were the data qualitatively and quantitatively adequate for describing a distribution?	N/A	Not used.
Were current and future land uses considered?	No	Only current land uses were considered.
Was residential land use considered as potential future land use when no decision has been made regarding the use of the site? If not, was a valid rationale provided?	No	
Were both on-site and off-site receptors (i.e., including occasional receptors) considered?	Yes	

MOE 1996 Guidance and Requirement	**Evaluation**	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Comment**
Were all potential sensitive subpopulations considered (i.e., elderly people, pregnant or nursing women, infants and children, and people with chronic illness)?	Partially met	Elderly and people with chronic illness were not explicitly considered. People with sensitization to Ni were considered in the revised 2007 HHRA.
Were all significant contaminant sources considered?		Contamination sources that were considered included current and historical INCO refinery emissions. Environmental fate and transport estimations using mass balance calculations were not done to evaluate historical contribution to current levels of COCs in soils. No fate and transport modeling was done to estimate future movement of contaminants within the community.
Were all potential contaminant release mechanisms considered, such as volatilization, fugitive dust emission, surface runoff, leaching to ground water, tracking by humans, animals, and soil gas generation?		These were not considered quantitatively.
Were all potential contaminant transport pathways considered, such as direct air transport downwind, diffusion in surface water, surface water flow, ground-water flow, and soil gas migration?		Exposure to contaminants in soil and dust via wind, agricultural activities were assessed. Future exposures and distribution of contaminants from dispersion of surface soils and dusts were not assessed. Potential for leaching of metals to groundwater was considered for current situation only. Contamination sources included current and historical INCO refinery emissions. Environmental fate and transport estimations using mass balance calculations were not done to evaluate historical and future movement of contaminants within the community.

MOE 1996 Guidance and Requirement	**Evaluation**	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Comment**
Were all relevant cross-media transport pathways considered, such as direct air transport downwind diffusion in surface water, surface water flow, groundwater flow, and soil gas migration?		Exposure to contaminants in soil and dust via wind, agricultural activities were assessed. Future exposures and distribution of contaminants from dispersion of surface soils and dusts were not assessed. Potential for leaching of metals to groundwater was considered for current situation only.
Were all media potentially associated with exposure considered?	Yes	
Were all relevant site-specific characteristics considered, including topographical, hydrogeological, hydrological, and meteorological parameters?		For the most part, they appear to have been considered in general. Detailed discussion not provided.
Were all possible exposure pathways, direct and indirect, considered? Was a valid rationale offered for exclusion of any potential pathways from quantitative evaluation?	Partially met	A valid rationale was not provided to explain the exclusion of consumer products, and infant contact with soil from the exposure assessment and risk assessment model. The rationale provided was not based on scientific evidence. The model addresses exposure pathways to Ni and other COCs in surface soil only. Exposure pathways to COCs in soils at greater depths, such as could occur during soil excavation, gardening, farming and utility maintenance, were not assessed. The model included sampling, analysis and estimation of exposures from contaminants in soils and air, drinking water, ground water, indoor dust and local grown and raised food.

MOE 1996 Guidance and Requirement	**Evaluation**	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Comment**
Were all "spatial relationships" adequately considered as factors that could affect the level of exposure (e.g., hot spots in an area that is frequented by children, exposure to ground water from two aquifers that are not hydraulically connected and that differ in the type and extent of contamination)?	No	Location and spatial extent of all hot spots were not explicitly delineated in the HHRA.
Were appropriate values used in exposure calculations (e.g., age-specific body weight, appropriate exposure frequency and duration values)?	Partially met	Soil ingestion value for young children was not supported by the current scientific evidence in the U.S. EPA 2008 children's exposure handbook. Adjustment factor based on bioaccessibility/bioavailability data is inconsistent with regulatory guidance that states soil matrix and food matrix do not require adjustment unless strong scientific evidence of significant difference. There is inadequate evidence to conclude that the uptake of Ni in food is significantly different from uptake of Ni in soil. The few bioaccessibility/bioavailability testing results are equivocal when compared. Lung particle deposition was not adequately considered in the exposure model. Exposure frequencies and duration used in the model may not be representative of the population since these were obtain from community survey that was of small sample size and may have introduced bias.

MOE 1996 Guidance and Requirement	**Evaluation**	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Comment**
If exposure models are used in exposure calculation, were all major model characteristics and assumptions provided? Were they appropriate? Was the model appropriate for use?	No	Summary tables were provided of data inputs. The actual model was not provided to the Independent reviewers to verify calculations. Results of local directed market basket survey were inappropriate for input to the model because of the small sample size and high censoring of data (90%). A comparative statistical analysis to ascertain whether Port Colborne market basket is significantly different from published comprehensive market basket surveys for the US, Canada and UK that have been published in recent years was not reported. The scientific evidence does not support using the results of the Port Colborne directed sampling to estimate average daily dietary Ni intakes. Apportioning of the RfD for Ni was not consistent with recommendations by the IOM for tolerable daily Ni intake and what is known about Ni in consumer products, especially smoking tobacco products.
Were general equations and sample calculations provided? Were the calculations conducted without error?	Yes/No	Could not verify model computations. The revised 2007 HHRA report included a maximum sample calculation. The adjustment factor was incorrectly derived and applied.

MOE 1996 Guidance and Requirement	**Evaluation**	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Comment**
Has background exposure (i.e., other than that originating from the contaminated site) been incorporated in the total exposure or put in context with site-specific exposure?	Partially met	Consumer products were not included in the estimate of background exposures. No power analysis was documented to determine the likelihood of a Type I or Type II error. No null hypothesis testing was documented that shows significant differences between background and site exposures.
In the conduct of a screening risk assessment, was the plausible maximal on-site exposure calculated for the most sensitive receptor using a simple maximal exposure scenario? Was the maximum detected concentration of a contaminant or sum of maximum concentration of a related class of chemicals used in the calculation?	Yes	The maximum concentration of Ni in zone B was used to calculate exposure for the toddler receptor was provided in the revised 2007 HHRA. There was no report of a statistical analysis of the variance in the soil database to evaluate the probability that the maximum concentration measured in soil in zone B might be exceeded in other locations in zone B or elsewhere.
Was uncertainty adequately addressed?	No	See other comments and detailed comments. Independent Reviewer concerns include: the small sample size for some environmental media, lack of statistical study design for indoor air survey, very few samples tested for bioaccessibility and bioavailability studies, insensitivity of the model to changes in input values for key parameters, especially soil bioavailability and soil concentration which indicate that the model is overwhelmed by the influence of other exposure media, most likely food. This is contrary to the intent of the TSOW and SSRA and USEPA RAGS HHRA guidance.

MOE 1996 Guidance and Requirement	**Evaluation**	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Comment**
5 Risk Characterization		
Were exposure estimates and toxicity values consistently expressed as either intakes or uptakes for each chemical carried through risk characterization? Appendix D provides examples for: 1. Conversion of an estimated intake to an absorbed dose, 2. Conversion of an administered dose RfD to an absorbed dose RfD. An example for conversions based on different media of exposure is also provided in Appendix D. Often a conversion is required to adjust for differences in the medium of exposure in the site specific assessment from the medium of exposure used in the experiments upon which the toxicity value is based. An adjustment factor would have to be made to the RfD for a chemical whose absorption may be greatly reduced if present in soil as compared to being present in the medium of exposure used in the studies to derive the RfD (i.e., comparison of absorption in food versus absorption in soil). In the absence of reliable scientific information for making these adjustments based on relative absorption efficiencies, it should be assumed that the relative absorption efficiency between food or soil and drinking water is 1.0 (i.e. the absorption efficiencies are considered to be the same for all media types, and the Relative Adjustment Factor (RAF) = 1.0).		SSRA HHRA guidance was not followed. The TRVs and exposure estimates were not consistently expressed as intakes or uptakes. All RfDs and RfCs and cancer risk values are based on administered dose (i.e. intakes). The value input to the model to estimate exposure to Ni from soil in the 2007 HHRA was for the absorbed dose (i.e. uptake). An RAF of 1.0 should be used so as not to underestimate possible exposures and risks. There is inadequate evidence to conclude that the absorption efficiencies of Ni in soil and of Ni in food would be significantly different. The sample size is too small for determination of bioaccessibility/bioavailability to extrapolate on a community-wide basis. No definitive conclusion can be made whether soils of three types are significantly different form one another in terms of their ability to release Ni and other COCs readily into solution when exposed to water and acidic bodily secretions in saliva and mouth, gastric acids in GI tract, and sweat on skin surface.

MOE 1996 Guidance and Requirement	Evaluation	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Comment**
Basic Principles (copied from Appendix D) (continued): • For risk characterization purposes, exposure and toxicity values should both be expressed either as absorbed doses (uptakes) or as administered doses (intakes). • Adjustments for bioavailability in various media should only be made where the difference due to variation in media matrices are meaningfully greater than other receptor influences on the uptake (e.g., individual variation in nutritional status). • do not convert exposure estimates to absorbed dose if toxicity values are based on administered dose. • Conversions for bioavailability should only be undertaken on the basis of strong observational data from human and/or animal studies, and not on model prediction or assumption.		
Were risks appropriately summed only across exposure pathways that affect the same individual or population subgroup, and that result in the same adverse effects and mediated by the same mechanism of action?	Partially met	Assessment of mixtures using the assumption of additivity was considered.
When remediation action plans were evaluated for their effectiveness in reducing human health risk, were risk calculations presented for each modification to the exposure scenario?	Not applicable	No assessment of remediation action plans was reported.

MOE 1996 Guidance and Requirement	**Evaluation**	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Comment**
Was the description and interpretation of the risk, unambiguous, appropriate, objective and well supported?	No	Some issues remain outstanding. For example, discrepancies with the apportionment of RfD, issues with subchronic exposure risks not assessed, adjustment factor derived and applied incorrectly to external administered dose (i.e., intake vs uptake); data quality issues with in vivo rat study to estimate bioavailability of Ni in soil. Lack of transparency of the analysis of statistical uncertainties in the variance of the data, and the ability to detect Type I and Type II error.
Were sources of uncertainty adequately characterized?	No	Inadequate documentation of statistical analyses conducted to assess the uncertainty and power of the statistical analyses. Independent Reviewer has expressed concerns that not all soil sampling data have been fully documented or were provided for verification of results. Null hypothesis testing, and power analysis were not included in 2007 HHRA report. Inconsistencies in how the CTE and RME were calculated. Appendices contain some detailed analyses. The impact of data quality issues on data usability is not fully documented in HHRA for all media and analyses. The approach used for the selection of CTE and RME does not follow standard practice, guidance and requirements for baseline human health risk assessments. Inconsistent statistical methods were applied to derive EPC. Did not use 95th percentile for RME.

MOE 1996 Guidance and Requirement	Evaluation	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Comment**
Were sources of uncertainty adequately characterized? (Continued)	No	Summary tables of input data are provided. General intake equations provided. Example of maximum exposure scenario provided in revised 2007 HHRA The actual model was not provided to the Independent reviewer precluding verification of results. It is not clear what data combinations were used for all unique combinations, as these were numerous.
6 Overall Document:		
Was the documentation of the risk assessment report adequate in addressing the human health risk arising from the contaminated site?	No	Documentation of statistical methods and rationale for selection of the statistics for each COC is considered to be inadequately supported by the science and is not consistent with standard practices for statistical analyses of environmental data for use in risk assessments. Soil data appears to be missing. The rationales are not adequate. for the exclusion of other contaminants. In particular, the rationale for not providing detailed assessments for arsenic and lead are considered to be inadequate and not scientifically supported.
Were all assumptions made explicit? Were assumptions appropriate and supported with suitable data?	Yes	Majority are explicitly provided. Not all were supported; for example, infant was assumed to have no contact with soil.

MOE 1996 Guidance and Requirement	**Evaluation**	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Comment**
Did the conduct of the risk assessment follow sound scientific principles?	No	Some examples where sound scientific principles were not followed. Adjustment factor for Ni in soil versus food was not scientifically supported, and did not followed regulatory guidance provided in the US EPA RAGS and MOE Guidance for SSRAs. No null hypothesis testing was provided in the HHRA. No statistical power analysis to determine the likelihood of Type I and Type II error was provided in the report. 95^{th} percentile soil concentrations were not used to provide and estimation of upper realistic maximum exposures (RME). No consistent statistical methods were used to derive estimates of CTE and RME.
Was the assessment scientifically defensible and of sufficient quality?	No	See previous comments.
If the maximum exposure exceeded the exposure limit in a screening risk assessment, was it followed up with a comprehensive risk assessment.	Not for all contaminants	No detailed assessment for As, and Pb. The rationale for not addressing lead is not scientifically supported. Details of and rationale for exclusion of other chemicals from further assessment was not provided in the HHRA2007 report.

US EPA RAGS Guidance and Requirement	**Evaluation**	
Table 2: Summary Evaluation that CBRA HHRA 2007 meets the U.S. EPA RAGS guidance and requirements for conducting and reporting baseline risk assessment for human health evaluation as part of a remedial investigation and feasibility study.		
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Comment**
EPA guidance should be consulted in preparing the Draft Baseline Risk Assessment Report. The draft baseline RA would consist of: • Completed EPA Planning Tables 0 through 10, worksheets on Data Useability, Dermal, and Lead, as applicable; • Supporting Information; • The Assessment of Confidence and Uncertainty; • Probabilistic Analysis information (if applicable). Additional narrative should be necessary for a clear and comprehensible Baseline Risk Assessment Report. For example, information such as definition of hazard indices and cancer slope factors, toxicological profiles for COPCs, and other information indicated by risk assessment guidance should be incorporated. Every risk assessment should contain a Risk Characterization appropriate to the assessment. Risk assessments submitted to the Agency or performed by the Agency should incorporate any current Agency guidance.	Partially met	See comments below and detailed comments.

US EPA RAGS Guidance and Requirement	**Evaluation**	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Comment**
The site conceptual model identifies all potential sources of contamination, all potential Exposure Pathways, the Medium associated with each, and the potentially exposed populations (Receptors). Realistic Exposure Pathways are selected for detailed analyses, including the rationale for exclusion of potential Exposure Pathways.	Partially met	Does not include rationale for exclusion of consumer products; especially tobacco smoke, work related exposures and automotive exhaust. Rationale for exclusion of infant contact with soil is an assumption and not based on evidence.
Sensitive populations, including but not limited to the elderly, pregnant or nursing women, infants and children, and people suffering from chronic illnesses.	Partially met	Model does not explicitly address people suffering from chronic illnesses such as asthma, heart disease and hypertension, etc.
People exposed to particularly high levels of contaminants	Partially met	Model addresses exposure pathways for people to Ni and COCs in surface soil but not for those that may be exposed to soils at greater depths, such as during soil excavation, gardening, farming and utility maintenance.
Circumstances where a disadvantaged population is exposed to hazardous materials (i.e., Environmental Justice situations)	Met	Zones within the study area included those of low socioeconomic status.
Significant contamination sources.	Met	Contamination sources included current and historical INCO refinery emissions.
Potential contaminant release mechanisms (e.g., volatilization, fugitive dust emission, surface runoff/overland flow, leaching to groundwater, tracking by humans/animals, soil gas generation, biodegradation).	Partially met	Qualitatively addressed. Environmental fate and transport estimations using mass balance calculations were not done to evaluate historical and future movement of contaminants within the community.

US EPA RAGS Guidance and Requirement	**Evaluation**	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Comment**
Contaminant transport pathways such as direct air transport downwind, diffusion in surface water, surface water flow, groundwater flow, soil gas migration, and biomagnification in the food chain.	Met	Model included sampling, analysis and estimation of exposures from contaminants in soils and air, drinking water, ground water, indoor dust and local grown and raised food.
Cross media transfer effects, such as volatilization to air, wet deposition, dry deposition, groundwater discharge to surface water, groundwater recharge from surface water, and bioaccumulation by aquatic species.	Met	Considered in conceptual model.
HHRA Provided as a Stand Alone Report is required to include:		
A general map of the site depicting boundaries and surface topography, which illustrates site features, such as fences, ponds, structures, as well as geographical relationships between potential receptors and the site.	Met	
Discussion of historical site activity, and chronology of land use (specify agriculture, industry, recreation, waste deposition, and residential development at the site).	Met	
Present an overview of the nature and extent of contamination, including when samples were collected and the kinds of contaminants and media potentially contaminated.	Partially met	Independent Reviewer has expressed concerns that all soil sampling data have not been fully documented or were provided for verification of results.
Describe the analytical and data validation methods used.	Partially met	Null hypothesis testing, and power analysis were not included in 2007 HHRA report.

US EPA RAGS Guidance and Requirement	**Evaluation**	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Comment**
If modeling was used to estimate exposure point concentrations, document the parameters related to soil/sediment, hydrogeology, hydrology, and meteorology	Met	Model was not used to estimate exposure point concentrations; site monitoring data was used.
Provide tables for different contaminant, exposure pathways, different media or exposures showing reasonable maximum exposure [RME] versus central tendency [CT].	Not Met	Inconsistencies in how the CTE and RME were calculated. Not in agreement with RAGS recommendations for several applications.
Data quality is an important component of the risk assessment and the evaluation of data quality should be documented. Record and identify the impact of data quality issues as they relate to data usability. Deviations from approved site workplans which occurred during sample collection, laboratory analysis, or data review should be assessed. Data validation land usability evaluated and recorded prior to screening for COPCs.	Partially met	Appendices contain some detailed analyses. The impact of data quality issues on data usability is not fully documented in HHRA for all media, all exposure pathways and analyses.
Key Data Elements that should be provided: Scenario Timeframe, Medium, Exposure Medium, Exposure Point, Receptor Population, Receptor Age, Exposure Route, Type of Analysis, Rationale for Selection or Exclusion of Exposure Pathway.	Met	???

US EPA RAGS Guidance and Requirement	**Evaluation**	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Comment**
Provide adequate information on the occurrence, distribution, and selection of COPCs. So the user/reviewer gets a sense of the chemicals detected at the site and the potential magnitude of the potential problems at the site. Provide chemical screening data and rationale for selection of COPCs. The information includes: statistical information about chemicals detected in each Medium; the detection limits of chemicals; the toxicity screening values for COPC selection; the chemicals and selected and deleted as COPCs. Discuss selection criteria for COPCs; including toxicity screening values, frequency of detection, and background comparison, as appropriate. Perform screening; select COPCs that will be carried into the risk assessment (include comparison to regulatory standards and criteria where appropriate).	Partially met	Screening analysis was conducted but does not appear to be fully documented in the 2007 HHRA and supporting appendices. Details of statistical analysis of the data, including distribution of the data for soil and other media using summary statistics, non-parametric analysis of soil data and null hypothesis testing and power analysis not provided in report and appendices. Details of screening and rationale for excluding certain chemicals from further investigation are not fully documented. This critical supporting information could be provided in a separate appendix.
Key Data Elements to be provided: For each unique combination of Scenario Timeframe, Medium, and Exposure Medium, Regions should provide the following information: Exposure Point, CAS Number, Chemical, Minimum Concentration (Qualifier), Maximum Concentration (Qualifier), Units, Location of Maximum Concentration, Detection Frequency, Range of Detection Limits, Concentration Used for Screening, Background Value, Screening Toxicity Value (N/C), Potential ARAR/TBC Value, Potential ARAR/TBC Source, COPC Flag (Y/N), and Rationale for Selection or Deletion.	Partiallymet	Details of soil database appear to be missing in the 2007 report.

US EPA RAGS Guidance and Requirement	**Evaluation**	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Standard Practice for Human Health Baseline Risk Assessment**
Supporting Information to substantiate the available Background Value shown for each chemical to enable verification of those values by EPA. Relevant information for each chemical used to determine the background concentration, including (but not limited to) average, maximum, hypothesis testing of equality of the mean, and other information that may be required to fully describe the background selection process.	Partially met	
Exposure Point Concentrations:		
Key Data Elements for each Exposure Point Concentration: For each unique combination of Scenario Timeframe, Medium, and Exposure Medium, Regions should provide the following information: Exposure Point, Chemical of Potential Concern, Units, Arithmetic Mean, 95% upper confidence level (UCL), Maximum Concentration (Qualifier), EPC Value, EPC Units, EPC Statistic, and EPC Rationale. The purpose is to provide the EPCs for measured and modeled values; and to provide statistical information on the derivation of the EPCs. The information documented should include: statistical information which was used to calculate the EPCs for chemicals detected in each Medium; EPCs (RME and/or CT). The statistics which were used to make the determinations as well as the rationale for the selection of the statistics for each chemical (i.e., discuss statistical derivation of measured data or approach for modeled data).	Partially met	Inconsistent statistical methods applied to derive EPC. Did not use 95^{th} UCL of the arithmetic mean for CTE. Documentation of statistical methods and rationale for selection of the statistics for each COC is considered to be inadequately supported by the science and is not consistent with standard practices for statistical analyses of environmental data for use in risk assessments.

US EPA RAGS Guidance and Requirement	Evaluation	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Standard Practice for Human Health Baseline Risk Assessment**
The EPC documentation should also provide information on: how samples are grouped (e.g., how hot spots in soil are considered; how groundwater data will be combined; how temporal and chemical phases are addressed; how upgradient, downgradient, and cross gradient samples are addressed); the approach used to determine how data are distributed (e.g., normal, log-normal); the evaluation of priority pollutants e.g. lead, and any other special chemicals. Adequate supporting information should be provided to enable verification of those values outside experts and regulators. The supporting information should discuss EPCs statistically derived from measured data, including identification of the samples used in each calculation, results of distribution testing (Wilk-Shapiro, D'Agostino), mean (transformed if appropriate), maximum (transformed if appropriate), Planning deviation (transformed if appropriate), t- or H-statistic, 95% UCL (including non-parametric methods, where applicable), and other protocols as required. The supporting information should also present information for EPCs, including derivation of modeled values, assumptions and values used, statistical derivation of measured values and associated calculations, and other protocols as required.	Not met	Details of the soils analyses and selection of EPC are not provided in 2007 HHRA precluding verification of the values by the Independent Reviewer.

US EPA RAGS Guidance and Requirement	Evaluation	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Standard Practice for Human Health Baseline Risk Assessment**
Values Used for Daily Intake Calculations:		
These Key Data Elements should be provided for values used for each intake equation for each Exposure Pathway and the reference/rationale for each. Intake equation or model used to calculate the intake for each Exposure Pathway. Submit supporting information to summarize the Modeled Intake Methodology and Parameters used to calculate modeled intake values and to enable verification of those values by independent reviewer and regulators. Submit supporting information on Chemical-Specific Parameters, to enable verification of those values. The summary should identify and display chemical parameters and constants that are used to calculate risks and hazards. The values and constants that are used to calculate risk and hazards, including molecular weight, vapor pressure, K_{oc}, K_{ow}, dermal permeability constant, Henry's Law constant, and other information that would be useful for understanding the risk assessment discussion should be included.	Partiallymet	Summary tables of input data are provided. General intake equations provided. Example of maximum exposure scenario provided.
Provide references for all exposure parameters.	?	
Provide the intake equations or models used for each Exposure Route/Pathway.	Partially Met	Model not provided.

US EPA RAGS Guidance and Requirement	Evaluation	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Standard Practice for Human Health Baseline Risk Assessment**
For each unique combination of Scenario Timeframe, Medium, and Exposure Medium provide the following information: Exposure Route, Receptor Population, Receptor Age, Exposure Point, Parameter Code, Parameter (Definition, Value, and Units), Rationale/Reference, and Intake Equation/Model Name.	?	Not clear what data combinations were used for all unique combinations, as these were numerous.
Dermal assessment for calculating absorbed dose per event DA (event). For each medium for which the dermal exposure route will be quantitatively assessed provide summary of data for each COPC under evaluation.	Some concerns	Values for assessing dermal absorption of Ni that were selected for use by JW did not agree with those used in the Ministry's Rodney Street HHRA, and those recommended in published literature by world leading experts.
Toxicity Assessment		
The purpose of the toxicity assessment is to provide information on: reference doses (RfDs), reference concentrations (RfCs), target organs, and adjustment factors for chemicals; oral to dermal adjustment factors; provide RfC to RfD adjustment factors; references. To allow for verification of references for non-cancer toxicity data used in HHRA the following information should be included for each Chemical of Potential Concern: (Continued)	Met with some concerns	Values used in the 2007 HHRA were revised from those used in previous versions of the HHRA. The TRV for estimating oral exposure to Ni in soil was based on the Springborn rat NOAEL for nickel sulphate in water administered by gavage. This is not an appropriate TRV for the risk assessment of exposure to Ni in a soil and food matrix. The oral TRV selected by the consultant was not developed by an authoritative health protection organization.

US EPA RAGS Guidance and Requirement	Evaluation	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Standard Practice for Human Health Baseline Risk Assessment**
Oral and Dermal Routes - Chronic/Subchronic, Oral RfD Value and Units, Oral Absorption Efficiency for Dermal, Absorbed RfD for Dermal Value and Units, Primary Target Organ(s), Combined Uncertainty/Modifying Factors, Source(s) of RfD and corresponding Target Organ(s), and Dates of RfD. *Inhalation Route* - Chronic/Subchronic, Inhalation RfC Value and Units, Extrapolated RfD Value and Units, Primary Target Organ(s), Combined Uncertainty/Modifying Factors, Source(s) of RfC and corresponding Target Organ(s), and Date(s) of RfC.		Inadequate scientific evidence was provided to justify the deviation from the conservative assumption that total metal in soil, food, water, dust and air are readily available for uptake into the body upon release from their environmental matrix.. The oral bioavailabilities (i.e.,RAF) values used were not developed by an authoritative health protection organization.
Carcinogenicity Assessment:		
The purpose of carcinogenicity assessment is to provide the oral, dermal, and inhalation cancer toxicity information (values and sources of information) for chemicals of potential concern; the methodology and adjustment factors used to convert oral cancer toxicity values to dermal toxicity values and to convert inhalation unit risks to inhalation cancer slope factors; weight of evidence/cancer guideline descriptions for each chemical and radionuclide of potential concern; cancer toxicity information for “special case” chemicals. The following information should be provided for each Chemical of Potential Concern. (continued)	Met	Values used in the 2007 HHRA were revised in response to concerns raised in the reviewer comments on previous versions of the HHRA.

US EPA RAGS Guidance and Requirement	Evaluation	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Standard Practice for Human Health Baseline Risk Assessment**
Oral and Dermal Routes - Oral Cancer Slope Factor Value and Units, Oral Absorption Efficiency for Dermal, Absorbed Cancer Slope Factor for Dermal Value and Units, Weight of Evidence/Cancer Guideline Description, Source(s) and Date(s) of Oral CSF. *Inhalation Route* - Unit Risk Value and Units, Inhalation Cancer Slope Factor Value and Units, Weight of Evidence/Cancer Guideline Description, Source(s) and Date(s) of Unit Risk: Inhalation CSF. Chemical of Potential Concern, Parameter (Name, Value, and Units), Source(s), and Dates(s). Chemical of Potential Concern, Cancer Slope Factor Value and Units, Source(s), and Dates(s).		
Risk Characterization:		
Chronic and subchronic toxicity values are applied correctly based on the duration of exposure.	Partially met	Only chronic exposures assessed. Concerns with risk characterization step for a number of reasons, including inappropriate TRV and bioavailabilities for assessing risk in an environmentally solid matrix and

US EPA RAGS Guidance and Requirement	**Evaluation**	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Standard Practice for Human Health Baseline Risk Assessment**
Include tabulated summary of the variables used to calculate chemical cancer risks and non cancer hazards with the purpose to show the EPC and intake used in the non-cancer hazard and cancer risk calculations; to present the result of the calculation for each Exposure Route/Pathway for each COPC; to provide the total hazard index and cancer risks for all Exposure Routes/Pathways for all scenario timeframe and receptors assessed (one table pre scenario and receptor is recommended). The information should include: The non-cancer hazard quotient (HQ) and cancer risk value for each COPC for each Exposure Route/Pathway; the values used for EPC, non-cancer intake, cancer intake, reference doses and concentrations, and cancer slope factors for each COPC for each Exposure Route. Key data elements for each unique combination of Scenario Timeframe, Receptor Population, and Receptor Age required are: Medium, Exposure Medium, Exposure Point, Exposure Route, Chemical of Potential Concern, EPC Value and Units, Cancer Risk Calculations (Intake/Exposure Concentration Value and Units, CSF/Unit Risk Value and Units, and Cancer Risk), and Non-Cancer Hazard Calculations (Intake/Exposure Concentration Value and Units, RfD/RfC Value and Units, and Hazard Quotient) (continued).	Partially met	Summary tables provided not fully consistent with RAGS requirements

US EPA RAGS Guidance and Requirement	**Evaluation**	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Standard Practice for Human Health Baseline Risk Assessment**
For each unique combination of Scenario Timeframe, Receptor Population, and Receptor Age required are: Medium, Exposure Medium, Exposure Point, Chemical of Potential Concern, Carcinogenic Risk (Ingestion, Inhalation, Dermal, and Exposure Routes Total), and Non-Carcinogenic Hazard Quotient (Primary Target Organ(s), Ingestion, Inhalation, Dermal, and Exposure Routes Total).		
Provide a summary of cancer risks and non-cancer hazards for each Receptor, by Medium, Exposure Medium, Exposure Route, and Exposure Point. The information documented should include: • The cancer risk and non-cancer hazard to each Receptor for each COPC by Exposure Route and Exposure Point; • The total cancer risk and non-cancer hazard for each Exposure Point, Exposure Medium and Medium across all Exposure Routes; • The total cancer risk and non-cancer hazard for a Receptor across all media; • The primary target organs for non-carcinogenic hazard effects (continued)	Not met	Approach used for the selection of CTE and RME does not follow RAGS standard practice, guidance, and requirements for baseline human health risk assessments.

US EPA RAGS Guidance and Requirement	**Evaluation**	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Standard Practice for Human Health Baseline Risk Assessment**
Required to address non-cancer hazards and cancer risks including the calculations and supporting information by Exposure Route. Include RME and CT results in separate tables. Ensure that risks and hazards from multiple chemicals are combined appropriately across Pathways that affect the same individual or population subgroup, for all site-related chemicals.		
Submit Supporting Information that summarizes the approach used to perform Special Chemical Risk and Hazard Calculations and to enable verification of those values by EPA. This summary should address the calculation of non-cancer hazards and cancer risks for chemicals that do not use RfD or cancer slope factor (CSF) values, respectively.	Not met	No detailed assessment of lead in 2007 HHRA.
Risk Summary Report includes:		
The purpose of the risk summary report is to provide a summary of cancer risks and non-cancer hazards for each Receptor, by Medium, Exposure Medium, Exposure Route, and Exposure Point, that may trigger the need for remedial action. The information documented should include: • The cancer risk and non-cancer hazard to each Receptor for each chemical by Exposure Route and Exposure Point for risk drivers; (continued)	Partially met	Primary target organs identified for each chemical, each receptor and each exposure medium? Total cancer risk and non-cancer risk summarized in tables for most highly exposed receptor (toddler) identified in the 2007 HHRA.

US EPA RAGS Guidance and Requirement	**Evaluation**	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Standard Practice for Human Health Baseline Risk Assessment**
• The total cancer risk and non-cancer hazard for each Exposure Point, Exposure Medium, and Medium across all Exposure Routes for risk drivers; • The total cancer risk and non-cancer hazard for a Receptor across all media for risk drivers; The primary target organs for non-carcinogenic hazard effects for risk drivers.		
Special attention to lead.		
Proved Lead data for Child and Adult. Also attach the appropriate graphs and results from the Integrated Exposure Uptake Biokinetic Model (IEUBK) model (if used) to assess exposure and risks to the Child. Attach adult lead spreadsheet.	Not met	No assessment of lead.
Assessment of Confidence and Uncertainty		
Uncertainty assessment is important in risk assessment. Although the risk assessment should indicate sources of variability and uncertainty throughout the process, it will generally be appropriate to include a separate section of the Baseline Risk Assessment Report that also focuses on the uncertainties associated with data evaluation, toxicity assessment, exposure assessment, and risk characterization, as well as overall uncertainty of the final risk numbers. Summarize the Assessment of Confidence and Uncertainty and incorporate in baseline risk assessment report.	Partially met	2007 HHRA has a Chapter on Uncertainties but there is inadequate documentation of the statistical analyses conducted to assess the uncertainty and power of the statistical analyses. The model was not provided. The assessment of statistical confidence and uncertainty does not appear to have been done (not documented in the HHRA report).

US EPA RAGS Guidance and Requirement	**Evaluation**	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Standard Practice for Human Health Baseline Risk Assessment**
Based upon the results from a deterministic risk characterization calculation a decision is made if a Probabilistic Analysis will be performed to calculate cancer risks and non-cancer hazards in accordance with Agency policy.	met	Deterministic approach was considered appropriate for baseline HHRA.
Summary HHRA Report of the Baseline Risk Assessment:		
A summary of the Baseline Risk Assessment Report is required which supports the basis for the remedial action. The primary focus should be on those exposure pathways and chemicals of concern found to pose actual or potential threats to human health or the environment.	Partially met	No assessment for As and Pb
Chemicals included in the risk assessment but determined not to contribute significantly to an unacceptable risk (i.e. chemicals with risk levels less than $1x10^{-6}$ or HQ less than 0.1) need not be included in the Risk Characterization Summary unless they are needed to justify a no action.	Partially met	Rationale for not addressing lead is not scientifically supported. Details of and rationale for exclusion of other chemicals from further assessment was not provided in the HHRA2007 report.
Information related to values used for intake calculations and non-cancer and cancer toxicity data and exposure point concentrations are summarized	Partially met	Some discrepancies.

US EPA RAGS Guidance and Requirement	**Evaluation**	
Standard Practice for Human Health Baseline Risk Assessment	**Requirement Met**	**Standard Practice for Human Health Baseline Risk Assessment**
Preliminary Remediation Goals are initial cleanup goals that (1) are protective of human health and the environment and (2) comply with ARARs. Pursuant to the NCP, they are developed early in the remedy selection process based on readily available information and should be modified to reflect results of the baseline risk assessment. They also should be used during analysis of remedial alternatives in the remedial investigation/feasibility study (RI/FS). Remedial goals, selected as part of the risk management decision, normally replace PRGs in the Record of Decision.	Partially met	In Ontario, the equivalent to applicable or relevant and appropriate requirements (ARARs) would be provincial and federal legislation for environmental protection (e.g., Canadian Environmental Protection Act, Fisheries and Oceans Act, Ontario Environmental Protection Act, Ontario Regulation 153/04). Ontario soil standards are identified for the 4 COCs in the HHRA 2007. Why isn't soil standard for lead listed in CBRA HHRA? Lead is a CEPA Priority Pollutant.

APPENDIX B

QA/QC Analytical Data for Private Well Water

ANALYTICAL SERVICES

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

10-Sep-2001

Attn: Rachel Gould
Project: PORT COLBOURNE
PO #:
Received: 17-Aug-2001 09:48

Job: 2157875
Status: Final

Water Samples

Sample Id	Ag ICP/MS mg/L	Al ICP/MS mg/L	As ICP/MS mg/L	B ICP/MS mg/L	Ba ICP/MS mg/L
QUESNELLE-1007 KILLALY WELL	<0.0001	0.022	<0.002	0.100	0.058
F. BLANK	<0.0001	0.007	<0.002	<0.005	<0.005
T. SPIKE	<0.0001	0.107	0.099	0.098	<0.005
T. BLANK	0.0001	0.006	<0.002	<0.005	<0.005
BROWN-1682 MILLLER-CISTERN TAP	<0.0001	0.254	<0.002	0.045	0.067
BROWN-1682 MILLLER CISTERN TAP-TM	<0.0001	0.061	<0.002	0.046	0.066
BUREER-713 WEAVER-OUTSIDE TAP	<0.0001	0.572	<0.002	0.063	0.105
WEST 527 LAKESHORE WELL	<0.0001	0.025	<0.002	0.057	0.040
GABRIELE 635 WELL	<0.0001	0.013	<0.002	0.043	0.022
GABRIELE 635 TAP	<0.0001	0.011	<0.002	0.041	0.007
Sample+Spike (found)	---	0.527	0.538	---	0.520
Sample+Spike (expected)	---	0.511	0.500	---	0.507
Blank	<0.0001	<0.005	<0.002	<0.005	<0.005
QC Standard (found)	0.0020	1.01	0.104	0.051	0.104
QC Standard (expected)	0.0030	1.00	0.100	0.050	0.100
Repeat QUESNELLE-1007 KILLALY WELL	<0.0001	0.025	<0.002	0.102	0.060

ANALYTICAL SERVICES

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

Attn: Rachel Gould
Project: PORT COLBOURNE
PO #:
Received: 17-Aug-2001 09:48

Job: 2157875 Status: Final

Water Samples

Sample Id	Be ICP/MS mg/L	Bi ICP/MS mg/L	Ca ICP/MS mg/L	Cd ICP/MS mg/L	Co ICP/MS mg/L
QUESNELLE-1007 KILLALY WELL	<0.001	<0.001	120.	<0.0001	<0.0001
F. BLANK	<0.001	<0.001	<0.5	<0.0001	<0.0001
T. SPIKE	0.095	0.108	<0.5	0.0975	0.0932
T. BLANK	<0.001	<0.001	<0.5	<0.0001	<0.0001
BROWN-1682 MILLLER-CISTERN TAP	<0.001	<0.001	116.	<0.0001	<0.0001
BROWN-1682 MILLLER CISTERN TAP-TM	<0.001	<0.001	117.	0.0005	<0.0001
BUREER-713 WEAVER-OUTSIDE TAP	<0.001	<0.001	121.	<0.0001	<0.0001
WEST 527 LAKESHORE WELL	<0.001	<0.001	132.	<0.0001	0.0001
GABRIELE 635 WELL	<0.001	<0.001	103.	<0.0001	<0.0001
GABRIELE 635 TAP	<0.001	<0.001	75.9	<0.0001	0.0002
Sample+Spike (found)	0.513	---	---	0.503	0.517
Sample+Spike (expected)	0.500	---	---	0.500	0.500
Blank	<0.001	<0.001	<0.5	<0.0001	<0.0001
QC Standard (found)	0.005	0.112	5.7	0.0481	0.0492
QC Standard (expected)	0.005	0.100	5.0	0.0500	0.0500
Repeat QUESNELLE-1007 KILLALY WELL	<0.001	<0.001	123.	<0.0001	<0.0001

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ANALYTICAL SERVICES

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

10-Sep-2001

Attn: Rachel Gould
Project: PORT COLBOURNE
PO #:
Received: 17-Aug-2001 09:48

Job: 2157875
Status: Final

Water Samples

Sample Id	Cr ICP/MS mg/L	Cu ICP/MS mg/L	Fe ICP/MS mg/L	K ICP/MS mg/L	Mg ICP/MS mg/L
QUESNELLE-1007 KILLALY WELL	<0.005	0.0010	<0.03	3.2	37.2
F. BLANK	<0.005	<0.0005	<0.03	<0.1	<0.05
T. SPIKE	0.094	0.101	1.00	<0.1	<0.05
T. BLANK	<0.005	0.0009	<0.03	<0.1	<0.05
BROWN-1682 MILLLER-CISTERN TAP	<0.005	0.0010	0.10	1.0	51.7
BROWN-1682 MILLER CISTERN TAP-TM	<0.005	0.0127	0.28	1.0	51.5
BUREER-713 WEAVER-OUTSIDE TAP	<0.005	0.0014	0.09	1.2	80.5
WEST 527 LAKESHORE WELL	<0.005	0.0006	3.39	2.6	22.7
GABRIELE 635 WELL	<0.005	0.0056	0.33	2.9	19.1
GABRIELE 635 TAP	<0.005	0.0144	0.04	3.4	29.4
Sample+Spike (found)	0.507	0.533	0.62	---	---
Sample+Spike (expected)	0.500	0.514	0.54	---	---
Blank	<0.005	<0.0005	<0.03	<0.1	<0.05
QC Standard (found)	0.050	0.0529	1.07	0.8	1.23
QC Standard (expected)	0.050	0.0500	1.00	1.0	1.00
Repeat QUESNELLE-1007 KILLALY WELL	<0.005	0.0005	<0.03	3.3	37.8

ANALYTICAL SERVICES

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Job: 2157875   Status: Final

Water Samples

Sample Id	Mn ICP/MS mg/L	Mo ICP/MS mg/L	Na ICP/MS mg/L	Ni ICP/MS mg/L	P ICP/MS mg/L
QUESNELLE-1007 KILLALY WELL	0.042	<0.001	78.6	0.002	<0.05
F. BLANK	<0.005	<0.001	<0.1	0.002	<0.05
T. SPIKE	0.093	<0.001	<0.1	0.095	<0.05
T. BLANK	<0.005	<0.001	<0.1	<0.001	<0.05
BROWN-1682 MILLLER-CISTERN TAP	0.016	<0.001	16.5	<0.001	<0.05
BROWN-1682 MILLER CISTERN TAP-TM	0.017	<0.001	16.3	<0.001	<0.05
BUREER-713 WEAVER-OUTSIDE TAP	0.108	<0.001	33.3	<0.001	0.06
WEST 527 LAKESHORE WELL	0.218	<0.001	14.5	<0.001	0.62
GABRIELE 635 WELL	0.107	<0.001	30.1	0.002	<0.05
GABRIELE 635 TAP	0.178	<0.001	38.6	0.001	<0.05
Sample+Spike (found)	0.692	0.520	---	0.505	---
Sample+Spike (expected)	0.678	0.500	---	0.501	---
Blank	<0.005	<0.001	<0.1	<0.001	<0.05
QC Standard (found)	0.050	0.053	6.1	0.050	1.04
QC Standard (expected)	0.050	0.050	5.0	0.050	1.00
Repeat QUESNELLE-1007 KILLALY WELL	0.044	<0.001	81.8	0.002	<0.05

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Job: 2157875
Status: Final

Water Samples

Sample Id	Pb ICP/MS mg/L	Sb ICP/MS mg/L	Se ICP/MS mg/L	Sn ICP/MS mg/L	Sr ICP/MS mg/L
QUESNELLE-1007 KILLALY WELL	<0.0005	<0.0005	<0.002	0.002	1.70
F. BLANK	<0.0005	<0.0005	<0.002	<0.001	<0.001
T. SPIKE	0.104	<0.0005	0.095	<0.001	0.100
T. BLANK	<0.0005	<0.0005	<0.002	0.001	<0.001
BROWN-1682 MILLLER-CISTERN TAP	<0.0005	<0.0005	<0.002	0.004	36.4
BROWN-1682 MILLER CISTERN TAP-TM	0.0011	<0.0005	<0.002	0.004	37.1
BUREER-713 WEAVER-OUTSIDE TAP	<0.0005	<0.0005	<0.002	0.004	1.07
WEST 527 LAKESHORE WELL	<0.0005	<0.0005	<0.002	<0.001	0.836
GABRIELE 635 WELL	<0.0005	<0.0005	<0.002	<0.001	0.546
GABRIELE 635 TAP	0.0006	<0.0005	<0.002	<0.001	0.305
Sample+Spike (found)	0.541	0.522	0.502	---	---
Sample+Spike (expected)	0.500	0.500	0.500	---	---
Blank	<0.0005	<0.0005	<0.002	<0.001	<0.001
QC Standard (found)	0.0549	0.105	0.101	0.103	0.051
QC Standard (expected)	0.0500	0.100	0.100	0.100	0.050
Repeat QUESNELLE-1007 KILLALY WELL	<0.0005	<0.0005	<0.002	0.001	1.70

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ANALYTICAL SERVICES

10-Sep-2001

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14 Abacus Road
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Attn: Rachel Gould
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Received: 17-Aug-2001 09:48

PO #:

Job: 2157875

Status: Final

Water Samples

Sample Id	Ti ICP/MS mg/L	Tl ICP/MS mg/L	U ICP/MS mg/L	V ICP/MS mg/L	Zn ICP/MS mg/L
QUESNELLE-1007 KILLALY WELL	<0.005	0.00014	0.0002	<0.0005	<0.005
F. BLANK	<0.005	<0.00005	<0.0001	<0.0005	<0.005
T. SPIKE	0.097	0.109	0.108	0.0926	0.098
T. BLANK	<0.005	<0.00005	<0.0001	<0.0005	<0.005
BROWN-1682 MILLLER-CISTERN TAP	<0.005	<0.00005	0.0001	<0.0005	0.065
BROWN-1682 MILLLER CISTERN TAP-TM	<0.005	<0.00005	0.0001	<0.0005	0.316
BUREER-713 WEAVER-OUTSIDE TAP	<0.005	<0.00005	0.0029	<0.0005	<0.005
WEST 527 LAKESHORE WELL	<0.005	<0.00005	<0.0001	0.0010	0.007
GABRIELE 635 WELL	<0.005	<0.00005	0.0003	<0.0005	0.183
GABRIELE 635 TAP	<0.005	<0.00005	0.0003	<0.0005	0.305
Sample+Spike (found)	0.507	0.577	0.518	0.512	0.809
Sample+Spike (expected)	0.500	0.500	0.500	0.500	0.805
Blank	<0.005	<0.00005	<0.0001	<0.0005	<0.005
QC Standard (found)	0.053	0.114	0.0047	0.0503	0.051
QC Standard (expected)	0.050	0.100	0.0050	0.0500	0.050
Repeat QUESNELLE-1007 KILLALY WELL	<0.005	0.00011	0.0002	0.0005	<0.005

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Attn: Rachel Gould
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Received: 17-Aug-2001 09:48

Job: 2157875 Status: Final

Water Samples

Sample Id	As SW 7061 mg/L	Se SW 7741 mg/L
QUESNELLE-1007 KILLALY WELL	<0.010	<0.001
F. BLANK	<0.001	<0.001
T. SPIKE	0.097	0.091
T. BLANK	<0.001	<0.001
BROWN-1682 MILLLER-CISTERN TAP	<0.001	<0.001
BROWN-1682 MILLLER CISTERN TAP-TM	<0.001	<0.001
BUREER-713 WEAVER-OUTSIDE TAP	<0.001	<0.001
WEST 527 LAKESHORE WELL	<0.001	<0.001
GABRIELE 635 WELL	<0.001	<0.001
GABRIELE 635 TAP	<0.001	<0.001
Sample+Spike (found)	0.016	0.015
Sample+Spike (expected)	0.015	0.015
Blank	<0.001	<0.001
QC Standard (found)	0.014	0.016
QC Standard (expected)	0.015	0.015
Repeat QUESNELLE-1007 KILLALY WELL	<0.001	<0.001

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Note: T. SPIKE contains 0.1mg/L of all elements except Fe (1.0 mg/L). Na, Mg, P. K, Ca, Mo, Ag, Sn, Sb and Ba are not included in T. SPIKE.

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Job approved by:

Signed: ....
Ralph Siebert, B.Sc.
Section Supervisor, Metals

5735 McAdam Road, Mississauga, Ontario, Canada L4Z 1N9 Tel: (905) 890-8566 Fax: (905) 890-8575

PSC

ANALYTICAL SERVICES

10-Sep-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

Attn: Eric Azzopardi
Project: 22270.501

Received: 22-Aug-2001 10:53
PO #: INCO CBRA

Job: 2158052 Status: Final

Water Samples

Sample Id	As SW 7061 mg/L	Se SW 7741 mg/L	Ag ICP/MS mg/L	Al ICP/MS mg/L	As ICP/MS mg/L	B ICP/MS mg/L
VAN RUYVEN HWY3 WELL	<0.001	<0.001	<0.0001	0.010	<0.002	0.254
AZZOPARD PINECREST WELL	<0.001	<0.001	<0.0001	0.020	<0.002	0.076
Sample+Spike (found)	0.015	0.015	---	0.586	0.558	---
Sample+Spike (expected)	0.015	0.015	---	0.520	0.500	---
Blank	<0.001	<0.001	<0.0001	<0.005	<0.002	0.005
QC Standard (found)	0.014	0.014	0.0028	1.06	0.103	0.064
QC Standard (expected)	0.015	0.015	0.0030	1.00	0.100	0.050
Repeat VAN RUYVEN HWY3 WELL	<0.001	<0.001	<0.0001	0.007	<0.002	0.267

Sample Id	Ba ICP/MS mg/L	Be ICP/MS mg/L	Bi ICP/MS mg/L	Ca ICP/MS mg/L	Cd ICP/MS mg/L
VAN RUYVEN HWY3 WELL	0.070	<0.001	<0.001	165.	<0.0001
AZZOPARD PINECREST WELL	0.043	<0.001	<0.001	145.	<0.0001
Sample+Spike (found)	0.570	0.545	---	---	0.532
Sample+Spike (expected)	0.543	0.500	---	---	0.500
Blank	<0.005	<0.001	<0.001	<0.5	<0.0001
QC Standard (found)	0.104	0.005	0.105	5.5	0.0508
QC Standard (expected)	0.100	0.005	0.100	5.0	0.0500
Repeat VAN RUYVEN HWY3 WELL	0.076	<0.001	<0.001	173.	<0.0001

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Brampton, ON
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Attn: Eric Azzopardi
Project: 22270.501

Received: 22-Aug-2001 10:53
PO #: INCO CBRA

Job: 2158052 Status: Final

Water Samples

Sample Id	Co ICP/MS mg/L	Cr ICP/MS mg/L	Cu ICP/MS mg/L	Fe ICP/MS mg/L	K ICP/MS mg/L
VAN RUYVEN HWY3 WELL	0.0009	<0.005	0.0033	0.09	4.4
AZZOPARD PINECREST WELL	<0.0001	<0.005	0.0024	0.03	3.4
Sample+Spike (found)	0.539	0.539	0.533	0.60	---
Sample+Spike (expected)	0.500	0.500	0.502	0.53	---
Blank	<0.0001	<0.005	<0.0005	0.03	<0.1
QC Standard (found)	0.0523	0.052	0.0532	1.12	1.1
QC Standard (expected)	0.0500	0.050	0.0500	1.00	1.0
Repeat VAN RUYVEN HWY3 WELL	0.0009	<0.005	0.0030	0.06	4.6

Sample Id	Mg ICP/MS mg/L	Mn ICP/MS mg/L	Mo ICP/MS mg/L	Na ICP/MS mg/L	Ni ICP/MS mg/L
VAN RUYVEN HWY3 WELL	115.	0.059	0.002	147.	0.021
AZZOPARD PINECREST WELL	32.7	<0.005	<0.001	64.0	0.004
Sample+Spike (found)	---	0.540	0.572	---	0.539
Sample+Spike (expected)	---	0.500	0.500	---	0.504
Blank	<0.05	<0.005	<0.001	<0.1	<0.001
QC Standard (found)	1.10	0.051	0.054	5.3	0.052
QC Standard (expected)	1.00	0.050	0.050	5.0	0.050
Repeat VAN RUYVEN HWY3 WELL	117.	0.062	0.002	152.	0.022

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ANALYTICAL SERVICES

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Attn: Eric Azzopardi
Project: 22270.501

Received: 22-Aug-2001 10:53
PO #: INCO CBRA

Job: 2158052 Status: Final

Water Samples

Sample Id	P ICP/MS mg/L	Pb ICP/MS mg/L	Sb ICP/MS mg/L	Se ICP/MS mg/L	Sn ICP/MS mg/L
VAN RUYVEN HWY3 WELL	<0.05	<0.0005	0.0008	<0.002	0.003
AZZOPARD PINECREST WELL	<0.05	<0.0005	0.0005	<0.002	0.001
Sample+Spike (found)	---	0.542	0.574	0.512	---
Sample+Spike (expected)	---	0.500	0.500	0.500	---
Blank	<0.05	<0.0005	0.0007	<0.002	<0.001
QC Standard (found)	1.10	0.0527	0.100	0.099	0.107
QC Standard (expected)	1.00	0.0500	0.100	0.100	0.100
Repeat VAN RUYVEN HWY3 WELL	<0.05	<0.0005	<0.0005	<0.002	0.003

Sample Id	Sr ICP/MS mg/L	Ti ICP/MS mg/L	Tl ICP/MS mg/L	U ICP/MS mg/L	V ICP/MS mg/L
VAN RUYVEN HWY3 WELL	1.37	<0.005	0.00014	0.0095	<0.0005
AZZOPARD PINECREST WELL	0.359	<0.005	0.00008	0.0008	<0.0005
Sample+Spike (found)	---	0.528	0.543	0.549	0.542
Sample+Spike (expected)	---	0.500	0.500	0.500	0.500
Blank	<0.001	<0.005	<0.00005	<0.0001	<0.0005
QC Standard (found)	0.052	0.052	0.103	0.0044	0.0516
QC Standard (expected)	0.050	0.050	0.100	0.0050	0.0500
Repeat VAN RUYVEN HWY3 WELL	1.48	<0.005	0.00013	0.0104	<0.0005

ANALYTICAL SERVICES

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Sample Id	Zn ICP/MS mg/L
VAN RUYVEN HWY3 WELL	0.007
AZZOPARD PINECREST WELL	0.041
Sample+Spike (found)	0.551
Sample+Spike (expected)	0.541
Blank	<0.005
QC Standard (found)	0.051
QC Standard (expected)	0.050
Repeat VAN RUYVEN HWY3 WELL	0.007

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Job approved by:

Signed: ....
Ralph Siebert, B.Sc.
Section Supervisor, Metals

ANALYTICAL SERVICES

10-Sep-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

Attn: Rob Watters
Project: INCO JOB

Received: 22-Aug-2001 10:52
PO #:

Job: 2158051 Status: Final

Water Samples

Sample Id	As SW 7061 mg/L	Se SW 7741 mg/L	Ag ICP/MS mg/L	Al ICP/MS mg/L	As ICP/MS mg/L
MAZUTTO-1866 WHITE-WELL	<0.001	<0.001	<0.0001	0.006	<0.002
MAZUTTO-1866 WHITE-TAP	<0.001	<0.001	<0.0001	0.010	<0.002
BURROW-1252 #3-WELL	<0.001	<0.001	<0.0001	0.007	<0.002
BURROW-1252 #3-TAP	<0.001	<0.001	<0.0001	0.012	<0.002
YALOWICA-2145 KILLALY-WELL	<0.001	<0.001	<0.0001	0.008	<0.002
YALOWICA-2145 KILLALY-TAP	<0.001	<0.001	<0.0001	0.008	<0.002
SODER-981 #3-WELL	<0.001	<0.001	<0.0001	0.123	<0.002
HOCKLEY-915 LORRAINE-WELL	<0.001	<0.001	<0.0001	0.010	<0.002
HOCKLEY-915 LORRAINE-TAP	<0.001	<0.001	<0.0001	0.009	<0.002
LINDSAY-2468 #3-WELL	<0.001	<0.001	<0.0001	0.005	<0.002
LINDSAY-2468 #3-CISTERN	<0.001	<0.001	<0.0001	0.061	<0.002
MILLER-1359 MILLER-WELL	<0.001	<0.001	<0.0001	<0.005	<0.002
MILLER-1359 MILLER-UNWELL	<0.001	<0.001	0.0001	0.038	<0.002
WAYNE-991 #3-WELL	<0.001	<0.001	<0.0001	<0.005	<0.002
Sample+Spike (found)	0.015	0.016	---	0.544	0.553
Sample+Spike (expected)	0.015	0.015	---	0.506	0.500
Blank	<0.001	<0.001	0.0001	<0.005	<0.002
QC Standard (found)	0.016	0.015	0.0027	1.06	0.107
QC Standard (expected)	0.015	0.015	0.0030	1.00	0.100
Repeat MAZUTTO-1866 WHITE-WELL	<0.001	<0.001	<0.0001	0.006	<0.002

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14 Abacus Road
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Attn: Rob Watters
Project: INCO JOB

PO #:

Received: 22-Aug-2001 10:52

Job: 2158051

Status: Final

Water Samples

Sample Id	As SW 7061 mg/L	Se SW 7741 mg/L	Ag ICP/MS mg/L	Al ICP/MS mg/L	As ICP/MS mg/L
WAYNE-991 #3-UNWELL	0.001	<0.001	<0.0001	0.009	<0.002
MIDDLESTEAD-1903-WELL	<0.001	<0.001	<0.0001	0.005	<0.002
MIDDLESTEAD-1903-TAP	<0.001	<0.001	<0.0001	<0.005	<0.002
CUDMORE-771 LAKESHORE-INSIDE TAP	<0.001	<0.001	<0.0001	0.006	<0.002
CUDMORE-771 LAKESHORE-INSD TAP DUP	<0.001	<0.001	<0.0001	0.007	<0.002
CZINEGE-671 WEAVER-BLD WELL-FILT	<0.001	<0.001	<0.0001	0.026	<0.002
CZINEGE-671 WEAVER-BLD WELL-UNFILT	<0.001	<0.001	<0.0001	0.056	<0.002
T SPIKE	0.084	0.071	0.0003	0.100	0.093
TRIP BLANK	<0.001	<0.001	0.0001	0.007	<0.002
FIELD BLANK	<0.001	<0.001	<0.0001	0.007	<0.002
STEELE-960LORRAINE-INSIDE TAP	0.001	<0.001	<0.0001	0.006	<0.002
STEELE-960LORRAINE-KITCHEN TAP	<0.001	<0.001	<0.0001	0.014	<0.002
LAGACE-933KILLALY-WELL	0.001	<0.001	<0.0001	0.020	<0.002
LAGACE-933KILLALY-KITCHEN TAP	0.001	<0.001	<0.0001	0.015	<0.002
Blank	<0.001	<0.001	0.0001	<0.005	<0.002
QC Standard (found)	0.016	0.015	0.0027	1.06	0.107
QC Standard (expected)	0.015	0.015	0.0030	1.00	0.100
Repeat WAYNE-991 #3-UNWELL	0.001	<0.001	<0.0001	0.009	<0.002

ANALYTICAL SERVICES

10-Sep-2001

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14 Abacus Road
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L6T 5B7

Attn: Rob Watters
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Received: 22-Aug-2001 10:52

PO #:

Job: 2158051

Status: Final

Water Samples

Sample Id	B ICP/MS mg/L	Ba ICP/MS mg/L	Be ICP/MS mg/L	Bi ICP/MS mg/L	Ca ICP/MS mg/L
MAZUTTO-1866 WHITE-WELL	0.022	0.055	<0.001	<0.001	78.0
MAZUTTO-1866 WHITE-TAP	0.022	<0.005	<0.001	<0.001	1.3
BURROW-1252 #3-WELL	0.085	0.044	<0.001	<0.001	101.
BURROW-1252 #3-TAP	0.073	0.034	<0.001	<0.001	91.9
YALOWICA-2145 KILLALY-WELL	0.804	0.015	<0.001	<0.001	166.
YALOWICA-2145 KILLALY-TAP	0.788	<0.005	<0.001	<0.001	3.1
SODER-981 #3-WELL	0.166	0.012	<0.001	<0.001	158.
HOCKLEY-915 LORRAINE-WELL	0.092	0.058	<0.001	<0.001	93.0
HOCKLEY-915 LORRAINE-TAP	0.096	0.060	<0.001	<0.001	95.8
LINDSAY-2468 #3-WELL	0.246	0.013	<0.001	<0.001	25.2
LINDSAY-2468 #3-CISTERN	0.029	0.023	<0.001	<0.001	36.2
MILLER-1359 MILLER-WELL	0.020	0.054	<0.001	<0.001	103.
MILLER-1359 MILLER-UNWELL	0.018	0.054	<0.001	<0.001	94.9
WAYNE-991 #3-WELL	0.177	0.029	<0.001	<0.001	152.
Sample+Spike (found)	---	0.598	0.538	---	---
Sample+Spike (expected)	---	0.555	0.500	---	---
Blank	<0.005	<0.005	<0.001	<0.001	<0.5
QC Standard (found)	0.055	0.109	0.005	0.111	5.5
QC Standard (expected)	0.050	0.100	0.005	0.100	5.0
Repeat MAZUTTO-1866 WHITE-WELL	0.023	0.054	<0.001	<0.001	76.0

PSC

ANALYTICAL SERVICES

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

10-Sep-2001

Attn: Rob Watters
Project: INCO JOB

Received: 22-Aug-2001 10:52

PO #:

Job: 2158051

Status: Final

Water Samples

Sample Id	B ICP/MS mg/L	Ba ICP/MS mg/L	Be ICP/MS mg/L	Bi ICP/MS mg/L	Ca ICP/MS mg/L
WAYNE-991 #3-UNWELL	0.191	0.031	<0.001	<0.001	160.
MIDDLESTEAD-1903-WELL	0.132	0.022	<0.001	<0.001	122.
MIDDLESTEAD-1903-TAP	0.123	0.021	<0.001	<0.001	119.
CUDMORE-771 LAKESHORE-INSIDE TAP	0.225	0.229	<0.001	<0.001	99.3
CUDMORE-771 LAKESHORE-INSD TAP DUP	0.221	0.222	<0.001	<0.001	95.0
CZINEGE-671 WEAVER-BLD WELL-FILT	0.200	0.066	<0.001	<0.001	133.
CZINEGE-671 WEAVER-BLD WELL-UNFILT	0.206	0.069	<0.001	<0.001	132.
T SPIKE	0.097	<0.005	0.092	0.096	<0.5
TRIP BLANK	<0.005	<0.005	<0.001	0.002	<0.5
FIELD BLANK	<0.005	<0.005	<0.001	<0.001	<0.5
STEELE-960LORRAINE-INSIDE TAP	0.131	0.073	<0.001	<0.001	98.1
STEELE-960LORRAINE-KITCHEN TAP	0.127	<0.005	<0.001	<0.001	1.3
LAGACE-933KILLALY-WELL	0.108	0.080	<0.001	<0.001	102.
LAGACE-933KILLALY-KITCHEN TAP	0.108	<0.005	<0.001	<0.001	3.1
Blank	<0.005	<0.005	<0.001	<0.001	<0.5
QC Standard (found)	0.055	0.109	0.005	0.111	5.5
QC Standard (expected)	0.050	0.100	0.005	0.100	5.0
Repeat WAYNE-991 #3-UNWELL	0.195	0.032	<0.001	<0.001	161.

PSC

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Water Samples

Sample Id	Cd ICP/MS mg/L	Co ICP/MS mg/L	Cr ICP/MS mg/L	Cu ICP/MS mg/L	Fe ICP/MS mg/L
MAZUTTO-1866 WHITE-WELL	<0.0001	<0.0001	<0.005	<0.0005	0.08
MAZUTTO-1866 WHITE-TAP	<0.0001	<0.0001	<0.005	<0.0005	<0.03
BURROW-1252 #3-WELL	<0.0001	0.0150	<0.005	0.0018	<0.03
BURROW-1252 #3-TAP	<0.0001	0.0173	<0.005	0.0194	<0.03
YALOWICA-2145 KILLALY-WELL	<0.0001	<0.0001	<0.005	0.0005	<0.03
YALOWICA-2145 KILLALY-TAP	<0.0001	<0.0001	<0.005	0.107	<0.03
SODER-981 #3-WELL	<0.0001	0.0015	<0.005	<0.0005	0.27
HOCKLEY-915 LORRAINE-WELL	<0.0001	0.0004	<0.005	0.0027	0.06
HOCKLEY-915 LORRAINE-TAP	<0.0001	0.0004	<0.005	0.0008	0.06
LINDSAY-2468 #3-WELL	<0.0001	<0.0001	<0.005	<0.0005	0.91
LINDSAY-2468 #3-CISTERN	<0.0001	<0.0001	<0.005	<0.0005	<0.03
MILLER-1359 MILLER-WELL	<0.0001	<0.0001	<0.005	<0.0005	<0.03
MILLER-1359 MILLER-UNWELL	<0.0001	0.0003	<0.005	0.0016	0.93
WAYNE-991 #3-WELL	<0.0001	0.0013	<0.005	<0.0005	<0.03
Sample+Spike (found)	0.538	0.536	0.539	0.530	0.66
Sample+Spike (expected)	0.500	0.500	0.500	0.500	0.58
Blank	<0.0001	<0.0001	<0.005	<0.0005	<0.03
QC Standard (found)	0.0547	0.0549	0.054	0.0555	1.11
QC Standard (expected)	0.0500	0.0500	0.050	0.0500	1.00
Repeat MAZUTTO-1866 WHITE-WELL	<0.0001	<0.0001	<0.005	<0.0005	0.10

ANALYTICAL SERVICES

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Water Samples

Sample Id	Cd ICP/MS mg/L	Co ICP/MS mg/L	Cr ICP/MS mg/L	Cu ICP/MS mg/L	Fe ICP/MS mg/L
WAYNE-991 #3-UNWELL	<0.0001	0.0048	<0.005	0.0008	1.41
MIDDLESTEAD-1903-WELL	<0.0001	<0.0001	<0.005	<0.0005	0.04
MIDDLESTEAD-1903-TAP	<0.0001	<0.0001	<0.005	<0.0005	<0.03
CUDMORE-771 LAKESHORE-INSIDE TAP	<0.0001	<0.0001	<0.005	<0.0005	<0.03
CUDMORE-771 LAKESHORE-INSD TAP DUP	<0.0001	<0.0001	<0.005	<0.0005	<0.03
CZINEGE-671 WEAVER-BLD WELL-FILT	<0.0001	<0.0001	<0.005	<0.0005	1.47
CZINEGE-671 WEAVER-BLD WELL-UNFILT	<0.0001	<0.0001	<0.005	0.0013	4.85
T SPIKE	0.0953	0.0940	0.093	0.0976	0.92
TRIP BLANK	<0.0001	<0.0001	<0.005	<0.0005	<0.03
FIELD BLANK	<0.0001	<0.0001	<0.005	<0.0005	<0.03
STEELE-960LORRAINE-INSIDE TAP	<0.0001	<0.0001	<0.005	<0.0005	0.07
STEELE-960LORRAINE-KITCHEN TAP	<0.0001	<0.0001	<0.005	<0.0005	0.04
LAGACE-933KILLALY-WELL	<0.0001	0.0001	<0.005	0.0014	0.05
LAGACE-933KILLALY-KITCHEN TAP	<0.0001	0.0002	<0.005	<0.0005	0.11
Blank	<0.0001	<0.0001	<0.005	<0.0005	<0.03
QC Standard (found)	0.0547	0.0549	0.054	0.0555	1.11
QC Standard (expected)	0.0500	0.0500	0.050	0.0500	1.00
Repeat WAYNE-991 #3-UNWELL	<0.0001	0.0048	<0.005	0.0008	1.39

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14 Abacus Road
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L6T 5B7

Attn: Rob Watters
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Received: 22-Aug-2001 10:52

PO #:

Job: 2158051 Status: Final

Water Samples

Sample Id	K ICP/MS mg/L	Mg ICP/MS mg/L	Mn ICP/MS mg/L	Mo ICP/MS mg/L	Na ICP/MS mg/L
MAZUTTO-1866 WHITE-WELL	3.2	39.8	<0.005	0.003	4.7
MAZUTTO-1866 WHITE-TAP	0.7	0.15	<0.005	0.003	182.
BURROW-1252 #3-WELL	4.2	21.3	0.035	0.006	151.
BURROW-1252 #3-TAP	3.8	18.1	0.034	0.006	147.
YALOWICA-2145 KILLALY-WELL	6.6	63.4	0.008	<0.001	21.0
YALOWICA-2145 KILLALY-TAP	0.6	0.87	<0.005	<0.001	374.
SODER-981 #3-WELL	4.7	72.4	0.020	<0.001	85.4
HOCKLEY-915 LORRAINE-WELL	5.9	40.3	0.048	0.004	19.1
HOCKLEY-915 LORRAINE-TAP	5.5	42.0	0.049	0.004	21.9
LINDSAY-2468 #3-WELL	9.1	36.0	0.024	0.001	29.4
LINDSAY-2468 #3-CISTERN	2.0	8.69	<0.005	0.001	10.9
MILLER-1359 MILLER-WELL	1.6	64.0	<0.005	0.004	20.2
MILLER-1359 MILLER-UNWELL	1.4	58.5	0.011	0.003	18.1
WAYNE-991 #3-WELL	7.1	58.1	0.020	0.002	192.
Sample+Spike (found)	---	---	0.547	0.557	---
Sample+Spike (expected)	---	---	0.500	0.503	---
Blank	<0.1	<0.05	<0.005	<0.001	<0.1
QC Standard (found)	1.1	1.11	0.054	0.057	5.4
QC Standard (expected)	1.0	1.00	0.050	0.050	5.0
Repeat MAZUTTO-1866 WHITE-WELL	3.1	39.8	<0.005	0.003	4.6

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Job: 2158051

Status: Final

Water Samples

Sample Id	K ICP/MS mg/L	Mg ICP/MS mg/L	Mn ICP/MS mg/L	Mo ICP/MS mg/L	Na ICP/MS mg/L
WAYNE-991 #3-UNWELL	7.3	60.7	0.053	0.002	200.
MIDDLESTEAD-1903-WELL	3.4	57.3	<0.005	<0.001	12.4
MIDDLESTEAD-1903-TAP	3.3	53.9	<0.005	<0.001	11.7
CUDMORE-771 LAKESHORE-INSIDE TAP	2.8	35.1	0.044	<0.001	28.6
CUDMORE-771 LAKESHORE-INSD TAP DUP	2.6	33.5	0.043	<0.001	28.2
CZINEGE-671 WEAVER-BLD WELL-FILT	2.4	54.7	0.134	<0.001	22.1
CZINEGE-671 WEAVER-BLD WELL-UNFILT	2.4	55.1	0.136	<0.001	22.7
T SPIKE	<0.1	<0.05	0.093	<0.001	<0.1
TRIP BLANK	<0.1	<0.05	<0.005	<0.001	<0.1
FIELD BLANK	<0.1	<0.05	<0.005	<0.001	<0.1
STEELE-960LORRAINE-INSIDE TAP	4.6	35.0	0.020	<0.001	41.5
STEELE-960LORRAINE-KITCHEN TAP	0.1	0.32	0.016	0.003	217.
LAGACE-933KILLALY-WELL	5.1	40.4	0.040	0.006	104.
LAGACE-933KILLALY-KITCHEN TAP	1.6	0.33	0.007	0.006	292.
Blank	<0.1	<0.05	<0.005	<0.001	<0.1
QC Standard (found)	1.1	1.11	0.054	0.057	5.4
QC Standard (expected)	1.0	1.00	0.050	0.050	5.0
Repeat WAYNE-991 #3-UNWELL	7.3	59.8	0.051	0.002	199.

ANALYTICAL SERVICES

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10-Sep-2001

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Project: INCO JOB
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Received: 22-Aug-2001 10:52

Job: 2158051
Status: Final

Water Samples

Sample Id	Ni ICP/MS mg/L	P ICP/MS mg/L	Pb ICP/MS mg/L	Sb ICP/MS mg/L	Se ICP/MS mg/L
MAZUTTO-1866 WHITE-WELL	<0.001	<0.05	0.0007	<0.0005	<0.002
MAZUTTO-1866 WHITE-TAP	<0.001	<0.05	<0.0005	<0.0005	<0.002
BURROW-1252 #3-WELL	0.040	<0.05	<0.0005	0.0014	<0.002
BURROW-1252 #3-TAP	0.045	<0.05	0.0005	0.0011	<0.002
YALOWICA-2145 KILLALY-WELL	<0.001	<0.05	<0.0005	<0.0005	<0.002
YALOWICA-2145 KILLALY-TAP	0.002	<0.05	0.0005	<0.0005	<0.002
SODER-981 #3-WELL	0.005	<0.05	<0.0005	<0.0005	<0.002
HOCKLEY-915 LORRAINE-WELL	0.007	<0.05	<0.0005	<0.0005	<0.002
HOCKLEY-915 LORRAINE-TAP	0.006	<0.05	0.0011	<0.0005	<0.002
LINDSAY-2468 #3-WELL	<0.001	<0.05	<0.0005	<0.0005	<0.002
LINDSAY-2468 #3-CISTERN	<0.001	<0.05	<0.0005	<0.0005	<0.002
MILLER-1359 MILLER-WELL	0.005	<0.05	<0.0005	<0.0005	<0.002
MILLER-1359 MILLER-UNWELL	0.004	<0.05	0.0053	0.0010	<0.002
WAYNE-991 #3-WELL	0.010	<0.05	<0.0005	0.0008	<0.002
Sample+Spike (found)	0.534	---	0.562	0.554	0.526
Sample+Spike (expected)	0.500	---	0.500	0.500	0.500
Blank	<0.001	<0.05	<0.0005	0.0008	<0.002
QC Standard (found)	0.054	1.10	0.0562	0.112	0.106
QC Standard (expected)	0.050	1.00	0.0500	0.100	0.100
Repeat MAZUTTO-1866 WHITE-WELL	<0.001	<0.05	0.0009	<0.0005	<0.002

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Attn: Rob Watters
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Job: 2158051
Status: Final

Water Samples

Sample Id	Ni ICP/MS mg/L	P ICP/MS mg/L	Pb ICP/MS mg/L	Sb ICP/MS mg/L	Se ICP/MS mg/L
WAYNE-991 #3-UNWELL	0.011	<0.05	<0.0005	<0.0005	<0.002
MIDDLESTEAD-1903-WELL	<0.001	<0.05	<0.0005	<0.0005	<0.002
MIDDLESTEAD-1903-TAP	<0.001	<0.05	<0.0005	<0.0005	<0.002
CUDMORE-771 LAKESHORE-INSIDE TAP	<0.001	0.06	<0.0005	<0.0005	<0.002
CUDMORE-771 LAKESHORE-INSD TAP DUP	<0.001	<0.05	<0.0005	<0.0005	<0.002
CZINEGE-671 WEAVER-BLD WELL-FILT	<0.001	<0.05	<0.0005	<0.0005	<0.002
CZINEGE-671 WEAVER-BLD WELL-UNFILT	0.002	<0.05	0.0020	<0.0005	<0.002
T SPIKE	0.094	<0.05	0.0990	0.0010	0.090
TRIP BLANK	<0.001	<0.05	<0.0005	<0.0005	<0.002
FIELD BLANK	<0.001	<0.05	<0.0005	<0.0005	<0.002
STEELE-960LORRAINE-INSIDE TAP	0.001	<0.05	<0.0005	<0.0005	<0.002
STEELE-960LORRAINE-KITCHEN TAP	<0.001	<0.05	0.0006	<0.0005	<0.002
LAGACE-933KILLALY-WELL	0.005	<0.05	<0.0005	<0.0005	<0.002
LAGACE-933KILLALY-KITCHEN TAP	0.004	<0.05	0.0007	<0.0005	<0.002
Blank	<0.001	<0.05	<0.0005	0.0008	<0.002
QC Standard (found)	0.054	1.10	0.0562	0.112	0.106
QC Standard (expected)	0.050	1.00	0.0500	0.100	0.100
Repeat WAYNE-991 #3-UNWELL	0.011	<0.05	<0.0005	<0.0005	<0.002

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Water Samples

Sample Id	Sn ICP/MS mg/L	Sr ICP/MS mg/L	Ti ICP/MS mg/L	Tl ICP/MS mg/L	U ICP/MS mg/L
MAZUTTO-1866 WHITE-WELL	<0.001	14.5	<0.005	<0.00005	0.0012
MAZUTTO-1866 WHITE-TAP	<0.001	0.029	<0.005	<0.00005	0.0012
BURROW-1252 #3-WELL	0.003	1.45	<0.005	0.00024	0.0063
BURROW-1252 #3-TAP	<0.001	1.45	<0.005	0.00018	0.0071
YALOWICA-2145 KILLALY-WELL	<0.001	12.1	<0.005	0.00005	<0.0001
YALOWICA-2145 KILLALY-TAP	<0.001	0.176	<0.005	0.00013	<0.0001
SODER-981 #3-WELL	0.003	3.20	<0.005	0.00036	0.0005
HOCKLEY-915 LORRAINE-WELL	<0.001	0.928	<0.005	0.00007	0.0037
HOCKLEY-915 LORRAINE-TAP	<0.001	1.00	<0.005	0.00007	0.0037
LINDSAY-2468 #3-WELL	0.002	4.17	<0.005	0.00011	<0.0001
LINDSAY-2468 #3-CISTERN	0.003	0.168	<0.005	<0.00005	<0.0001
MILLER-1359 MILLER-WELL	<0.001	0.892	<0.005	0.00007	0.0140
MILLER-1359 MILLER-UNWELL	0.004	0.829	<0.005	0.00010	0.0125
WAYNE-991 #3-WELL	0.003	3.02	<0.005	0.00045	0.0010
Sample+Spike (found)	---	---	0.539	0.559	0.588
Sample+Spike (expected)	---	---	0.500	0.500	0.501
Blank	<0.001	<0.001	<0.005	<0.00005	<0.0001
QC Standard (found)	0.112	0.055	0.055	0.110	0.0048
QC Standard (expected)	0.100	0.050	0.050	0.100	0.0050
Repeat MAZUTTO-1866 WHITE-WELL	<0.001	14.2	<0.005	<0.00005	0.0011

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Water Samples

Sample Id	Sn ICP/MS mg/L	Sr ICP/MS mg/L	Ti ICP/MS mg/L	Tl ICP/MS mg/L	U ICP/MS mg/L
WAYNE-991 #3-UNWELL	0.001	3.16	<0.005	0.00045	0.0010
MIDDLESTEAD-1903-WELL	<0.001	18.2	<0.005	0.00005	<0.0001
MIDDLESTEAD-1903-TAP	<0.001	20.4	<0.005	<0.00005	<0.0001
CUDMORE-771 LAKESHORE-INSIDE TAP	0.004	2.92	<0.005	0.00008	<0.0001
CUDMORE-771 LAKESHORE-INSD TAP DUP	0.002	2.82	<0.005	0.00008	<0.0001
CZINEGE-671 WEAVER-BLD WELL-FILT	<0.001	2.53	<0.005	<0.00005	0.0005
CZINEGE-671 WEAVER-BLD WELL-UNFILT	0.001	2.56	<0.005	<0.00005	0.0006
T SPIKE	0.001	0.094	0.095	0.0998	0.100
TRIP BLANK	<0.001	<0.001	<0.005	<0.00005	<0.0001
FIELD BLANK	<0.001	<0.001	<0.005	<0.00005	<0.0001
STEELE-960LORRAINE-INSIDE TAP	0.003	1.56	<0.005	<0.00005	0.0011
STEELE-960LORRAINE-KITCHEN TAP	<0.001	0.007	<0.005	<0.00005	0.0012
LAGACE-933KILLALY-WELL	0.004	1.19	<0.005	0.00015	0.0023
LAGACE-933KILLALY-KITCHEN TAP	<0.001	0.010	<0.005	0.00016	0.0021
Blank	<0.001	<0.001	<0.005	<0.00005	<0.0001
QC Standard (found)	0.112	0.055	0.055	0.110	0.0048
QC Standard (expected)	0.100	0.050	0.050	0.100	0.0050
Repeat WAYNE-991 #3-UNWELL	0.001	3.24	<0.005	0.00045	0.0010

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Water Samples

Sample Id	V ICP/MS mg/L	Zn ICP/MS mg/L
MAZUTTO-1866 WHITE-WELL	<0.0005	0.006
MAZUTTO-1866 WHITE-TAP	<0.0005	0.011
BURROW-1252 #3-WELL	<0.0005	0.022
BURROW-1252 #3-TAP	<0.0005	0.023
YALOWICA-2145 KILLALY-WELL	<0.0005	<0.005
YALOWICA-2145 KILLALY-TAP	<0.0005	0.016
SODER-981 #3-WELL	<0.0005	<0.005
HOCKLEY-915 LORRAINE-WELL	<0.0005	0.030
HOCKLEY-915 LORRAINE-TAP	<0.0005	0.052
LINDSAY-2468 #3-WELL	<0.0005	<0.005
LINDSAY-2468 #3-CISTERN	0.0007	0.066
MILLER-1359 MILLER-WELL	<0.0005	0.013
MILLER-1359 MILLER-UNWELL	<0.0005	0.069
WAYNE-991 #3-WELL	<0.0005	0.005
Sample+Spike (found)	0.544	0.511
Sample+Spike (expected)	0.500	0.506
Blank	<0.0005	<0.005
QC Standard (found)	0.0534	0.052
QC Standard (expected)	0.0500	0.050
Repeat MAZUTTO-1866 WHITE-WELL	<0.0005	0.008

PSC

ANALYTICAL SERVICES

10-Sep-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

Attn: Rob Watters
Project: INCO JOB
PO #:
Received: 22-Aug-2001 10:52

Job: 2158051
Status: Final

Water Samples

Sample Id	V ICP/MS mg/L	Zn ICP/MS mg/L
WAYNE-991 #3-UNWELL	<0.0005	0.013
MIDDLESTEAD-1903-WELL	<0.0005	0.054
MIDDLESTEAD-1903-TAP	<0.0005	0.021
CUDMORE-771 LAKESHORE-INSIDE TAP	0.0006	<0.005
CUDMORE-771 LAKESHORE-INSD TAP DUP	0.0006	<0.005
CZINEGE-671 WEAVER-BLD WELL-FILT	<0.0005	0.064
CZINEGE-671 WEAVER-BLD WELL-UNFILT	<0.0005	0.082
T SPIKE	0.0919	0.092
TRIP BLANK	<0.0005	<0.005
FIELD BLANK	<0.0005	<0.005
STEELE-960LORRAINE-INSIDE TAP	<0.0005	<0.005
STEELE-960LORRAINE-KITCHEN TAP	<0.0005	0.010
LAGACE-933KILLALY-WELL	0.0009	0.067
LAGACE-933KILLALY-KITCHEN TAP	0.0011	0.061
Blank	<0.0005	<0.005
QC Standard (found)	0.0534	0.052
QC Standard (expected)	0.0500	0.050
Repeat WAYNE-991 #3-UNWELL	<0.0005	0.013

ANALYTICAL SERVICES

10-Sep-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

Attn: Rob Watters
Project: INCO JOB

Received: 22-Aug-2001 10:52

PO #:

Job: 2158051 Status: Final

Note: T SPIKE contains 0.1mg/L of all elements except Fe (1.0mg/L). Na, Mg, P, K, Ca, Mo, Ag, Sn, Sb and Ba are not included in T SPIKE.

All work recorded herein has been done in accordance with normal professional standards using accepted testing methodologies and QA/QC procedures. Philip Analytical is limited in liability to the actual cost of the pertinent analyses done unless otherwise agreed upon by contractual arrangement. Your samples will be retained by PASC for a period of 30 days following reporting or as per specific contractual arrangements.

Job approved by:

Signed: ....
Ralph Siebert, B.Sc.
Section Supervisor, Metals

PSC
ANALYTICAL SERVICES

10-Sep-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

Attn: Rob Watters
Project: INCO
PO #:
Received: 24-Aug-2001 17:40

Job: 2158219
Status: Final

Water Samples

Sample Id	As SW 7061 mg/L	Se SW 7741 mg/L	Ag ICP/MS mg/L	Al ICP/MS mg/L	As ICP/MS mg/L
VERDONK/791KLLCY/WELL BAILED	<0.001	<0.001	<0.0001	0.006	<0.002
VERDONK/791KLLCY/WELL BAILED DUP.	<0.001	<0.001	<0.0001	0.009	<0.002
TRIP BLANK	<0.001	<0.001	<0.0001	0.008	<0.002
FIELD BLANK	<0.001	<0.001	<0.0001	0.008	<0.002
SPIKE (TRIP)	0.080	0.079	<0.0001	0.115	0.096
PHILLIPS/1413LORRAINE/BAILED WELL	<0.001	<0.001	<0.0001	0.014	<0.002
SISSONS/749LAKESHORE/WELL	<0.001	<0.001	<0.0001	0.017	<0.002
SISSONS/749LAKESHORE/TAP	0.003	0.002	<0.0001	0.012	0.003
SISSONS/749KLAESHORE/BEACHWELL	0.003	<0.001	<0.0001	0.019	0.003
SISSONS/749LAKESHORE/UNWELL	<0.001	<0.001	<0.0001	0.178	<0.002
Sample+Spike (found)	0.016	0.016	---	0.572	0.564
Sample+Spike (expected)	0.015	0.015	---	0.506	0.500
Blank	<0.001	<0.001	<0.0001	<0.005	<0.002
QC Standard (found)	0.016	0.014	0.0021	1.05	0.105
QC Standard (expected)	0.015	0.015	0.0030	1.00	0.100
Repeat VERDONK/791KLLCY/WELL BAIL	<0.001	<0.001	<0.0001	0.005	<0.002

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ANALYTICAL SERVICES

10-Sep-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

Attn: Rob Watters
Project: INCO

Received: 24-Aug-2001 17:40

PO #:

Job: 2158219

Status: Final

Water Samples

Sample Id	B ICP/MS mg/L	Ba ICP/MS mg/L	Be ICP/MS mg/L	Bi ICP/MS mg/L	Ca ICP/MS mg/L
VERDONK/791KLLCY/WELL BAILED	0.165	0.024	<0.001	<0.001	134.
VERDONK/791KLLCY/WELL BAILED DUP.	0.155	0.023	<0.001	<0.001	129.
TRIP BLANK	<0.005	<0.005	<0.001	<0.001	<0.5
FIELD BLANK	<0.005	<0.005	<0.001	<0.001	<0.5
SPIKE (TRIP)	0.099	<0.005	0.096	0.102	<0.5
PHILLIPS/1413LORRAINE/BAILED WELL	0.154	0.023	<0.001	0.002	160.
SISSONS/749LAKESHORE/WELL	0.030	0.020	<0.001	<0.001	118.
SISSONS/749LAKESHORE/TAP	0.048	<0.005	<0.001	<0.001	3.3
SISSONS/749KLAESHORE/BEACHWELL	0.048	0.046	<0.001	<0.001	136.
SISSONS/749LAKESHORE/UNWELL	0.028	0.020	<0.001	<0.001	115.
Sample+Spike (found)	---	0.560	0.549	---	---
Sample+Spike (expected)	---	0.524	0.500	---	---
Blank	<0.005	<0.005	<0.001	<0.001	<0.5
QC Standard (found)	0.053	0.105	0.006	0.110	5.5
QC Standard (expected)	0.050	0.100	0.005	0.100	5.0
Repeat VERDONK/791KLLCY/WELL BAIL	0.169	0.025	<0.001	<0.001	137.

ANALYTICAL SERVICES

10-Sep-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

Page: 3
Copy: 1 of 2

Attn: Rob Watters
Project: INCO

Received: 24-Aug-2001 17:40
PO #:

Job: 2158219 Status: Final

Water Samples

Sample Id	Cd ICP/MS mg/L	Co ICP/MS mg/L	Cr ICP/MS mg/L	Cu ICP/MS mg/L	Fe ICP/MS mg/L
VERDONK/791KLLCY/WELL BAILED	<0.0001	0.0005	<0.005	0.0005	0.04
VERDONK/791KLLCY/WELL BAILED DUP.	<0.0001	0.0004	<0.005	0.0010	<0.03
TRIP BLANK	<0.0001	<0.0001	<0.005	<0.0005	<0.03
FIELD BLANK	<0.0001	<0.0001	<0.005	<0.0005	<0.03
SPIKE (TRIP)	0.0957	0.0976	0.097	0.0972	1.04
PHILLIPS/1413LORRAINE/BAILED WELL	<0.0001	0.0093	<0.005	0.0440	<0.03
SISSONS/749LAKESHORE/WELL	<0.0001	0.0001	<0.005	0.0023	0.06
SISSONS/749LAKESHORE/TAP	<0.0001	0.0012	<0.005	0.392	<0.03
SISSONS/749KLAESHORE/BEACHWELL	<0.0001	0.0012	<0.005	0.0092	0.18
SISSONS/749LAKESHORE/UNWELL	<0.0001	0.0002	0.009	0.0042	0.31
Sample+Spike (found)	0.534	0.529	0.531	0.514	0.59
Sample+Spike (expected)	0.500	0.500	0.500	0.500	0.54
Blank	<0.0001	<0.0001	<0.005	<0.0005	<0.03
QC Standard (found)	0.0526	0.0505	0.051	0.0518	1.09
QC Standard (expected)	0.0500	0.0500	0.050	0.0500	1.00
Repeat VERDONK/791KLLCY/WELL BAIL	<0.0001	0.0005	<0.005	0.0007	<0.03

ANALYTICAL SERVICES

10-Sep-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

Attn: Rob Watters
Project: INCO
PO #:
Received: 24-Aug-2001 17:40

Job: 2158219 Status: Final

Water Samples

Sample Id	K ICP/MS mg/L	Mg ICP/MS mg/L	Mn ICP/MS mg/L	Mo ICP/MS mg/L	Na ICP/MS mg/L
VERDONK/791KLLCY/WELL BAILED	3.1	102.	0.034	0.001	47.3
VERDONK/791KLLCY/WELL BAILED DUP.	3.0	92.6	0.028	0.001	43.1
TRIP BLANK	<0.1	<0.05	<0.005	<0.001	<0.1
FIELD BLANK	<0.1	<0.05	<0.005	<0.001	<0.1
SPIKE (TRIP)	<0.1	<0.05	0.096	<0.001	<0.1
PHILLIPS/1413LORRAINE/BAILED WELL	4.8	62.2	0.035	0.003	149.
SISSONS/749LAKESHORE/WELL	2.1	18.1	0.067	0.002	22.6
SISSONS/749LAKESHORE/TAP	2.2	0.46	<0.005	0.002	803.
SISSONS/749KLAESHORE/BEACHWELL	11.3	18.8	0.082	0.002	644.
SISSONS/749LAKESHORE/UNWELL	2.1	17.9	0.069	0.002	22.2
Sample+Spike (found)	---	---	0.565	0.557	---
Sample+Spike (expected)	---	---	0.534	0.501	---
Blank	<0.1	<0.05	<0.005	<0.001	<0.1
QC Standard (found)	0.8	1.24	0.050	0.054	5.8
QC Standard (expected)	1.0	1.00	0.050	0.050	5.0
Repeat VERDONK/791KLLCY/WELL BAIL	3.3	108.	0.035	0.001	48.6

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ANALYTICAL SERVICES

10-Sep-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

Attn: Rob Watters
Project: INCO

Received: 24-Aug-2001 17:40
PO #:

Job: 2158219

Status: Final

Water Samples

Sample Id	Ni ICP/MS mg/L	P ICP/MS mg/L	Pb ICP/MS mg/L	Sb ICP/MS mg/L	Se ICP/MS mg/L
VERDONK/791KLLCY/WELL BAILED	0.008	<0.05	<0.0005	<0.0005	<0.002
VERDONK/791KLLCY/WELL BAILED DUP.	0.005	<0.05	<0.0005	<0.0005	<0.002
TRIP BLANK	<0.001	<0.05	<0.0005	0.0006	<0.002
FIELD BLANK	<0.001	<0.05	<0.0005	<0.0005	<0.002
SPIKE (TRIP)	0.096	<0.05	0.0965	<0.0005	0.096
PHILLIPS/1413LORRAINE/BAILED WELL	0.029	<0.05	0.0009	<0.0005	<0.002
SISSONS/749LAKESHORE/WELL	0.004	<0.05	<0.0005	<0.0005	<0.002
SISSONS/749LAKESHORE/TAP	0.014	0.43	0.0009	<0.0005	<0.002
SISSONS/749KLAESHORE/BEACHWELL	0.016	0.45	<0.0005	<0.0005	<0.002
SISSONS/749LAKESHORE/UNWELL	0.005	<0.05	0.0017	<0.0005	<0.002
Sample+Spike (found)	0.526	---	0.528	0.570	0.528
Sample+Spike (expected)	0.508	---	0.500	0.500	0.500
Blank	<0.001	<0.05	<0.0005	0.0006	<0.002
QC Standard (found)	0.050	1.07	0.0521	0.103	0.104
QC Standard (expected)	0.050	1.00	0.0500	0.100	0.100
Repeat VERDONK/791KLLCY/WELL BAIL	0.007	<0.05	<0.0005	<0.0005	<0.002

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ANALYTICAL SERVICES

10-Sep-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

Attn: Rob Watters
Project: INCO
PO #:
Received: 24-Aug-2001 17:40

Job: 2158219
Status: Final

Water Samples

Sample Id	Sn ICP/MS mg/L	Sr ICP/MS mg/L	Ti ICP/MS mg/L	Tl ICP/MS mg/L	U ICP/MS mg/L
VERDONK/791KLLCY/WELL BAILED	<0.001	3.86	<0.005	<0.00005	0.0037
VERDONK/791KLLCY/WELL BAILED DUP.	0.002	3.29	<0.005	<0.00005	0.0027
TRIP BLANK	<0.001	<0.001	<0.005	<0.00005	<0.0001
FIELD BLANK	<0.001	<0.001	<0.005	<0.00005	<0.0001
SPIKE (TRIP)	<0.001	0.100	0.100	0.104	0.103
PHILLIPS/1413LORRAINE/BAILED WELL	0.002	2.42	<0.005	0.00022	0.0049
SISSONS/749LAKESHORE/WELL	<0.001	0.377	<0.005	<0.00005	0.0005
SISSONS/749LAKESHORE/TAP	<0.001	0.007	<0.005	0.00021	0.0012
SISSONS/749KLAESHORE/BEACHWELL	0.002	0.335	<0.005	0.00023	0.0013
SISSONS/749LAKESHORE/UNWELL	0.001	0.369	<0.005	0.00008	0.0005
Sample+Spike (found)	---	---	0.539	0.573	0.527
Sample+Spike (expected)	---	---	0.500	0.500	0.503
Blank	<0.001	<0.001	<0.005	<0.00005	<0.0001
QC Standard (found)	0.107	0.054	0.052	0.110	0.0046
QC Standard (expected)	0.100	0.050	0.050	0.100	0.0050
Repeat VERDONK/791KLLCY/WELL BAIL	<0.001	3.91	<0.005	0.00006	0.0038

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ANALYTICAL SERVICES

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14 Abacus Road
Brampton, ON
L6T 5B7

Attn: Rob Watters
Project: INCO
PO #:
Received: 24-Aug-2001 17:40

Job: 2158219
Status: Final

Water Samples

Sample Id	V ICP/MS mg/L	Zn ICP/MS mg/L
VERDONK/791KLLCY/WELL BAILED	0.0007	0.009
VERDONK/791KLLCY/WELL BAILED DUP.	0.0006	0.014
TRIP BLANK	<0.0005	<0.005
FIELD BLANK	<0.0005	<0.005
SPIKE (TRIP)	0.0959	0.094
PHILLIPS/1413LORRAINE/BAILED WELL	0.0006	0.254
SISSONS/749LAKESHORE/WELL	0.0008	0.030
SISSONS/749LAKESHORE/TAP	<0.0050	0.028
SISSONS/749KLAESHORE/BEACHWELL	<0.0050	0.052
SISSONS/749LAKESHORE/UNWELL	0.0013	0.025
Sample+Spike (found)	0.533	0.509
Sample+Spike (expected)	0.500	0.509
Blank	<0.0005	<0.005
QC Standard (found)	0.0506	0.051
QC Standard (expected)	0.0500	0.050
Repeat VERDONK/791KLLCY/WELL BAIL	0.0010	0.010

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ANALYTICAL SERVICES

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14 Abacus Road
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Attn: Rob Watters
Project: INCO
PO #:
Received: 24-Aug-2001 17:40

Job: 2158219 Status: Final

Note: SPIKE TRIP contains 0.1mg/L of all elements except Fe (1.0mg/L). Na, Mg, P, K, Ca, Mo, Sn, Sb and Ba are not present in the SPIKE TRIP.

All work recorded herein has been done in accordance with normal professional standards using accepted testing methodologies and QA/QC procedures. Philip Analytical is limited in liability to the actual cost of the pertinent analyses done unless otherwise agreed upon by contractual arrangement. Your samples will be retained by PASC for a period of 30 days following reporting or as per specific contractual arrangements.

Job approved by:

Signed: ....
Ralph Siebert, B.Sc.
Section Supervisor, Metals

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PSC
ANALYTICAL SERVICES

24-Sep-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

Attn: Rachel Gould
Project: 21843.1 PO #:
Received: 28-Aug-2001 18:31

Job: 2158322 Status: Final

Water Samples

Sample Id	As SW 7061 mg/L	Se SW 7741 mg/L	Ag ICP/MS mg/L	Al ICP/MS mg/L	As ICP/MS mg/L
1127 WHITE/HURST/INSIDE TAP	<0.001	<0.001	<0.0001	0.018	<0.002
851 PINECREST/KALINUK/BAILED	<0.001	<0.001	<0.0001	0.017	<0.002
1408 KALLALY/KING/INSIDE TAP	<0.001	<0.001	<0.0001	0.008	<0.002
FIELD BLANK AUG.28/01	<0.001	<0.001	<0.0001	0.008	<0.002
TRAVEL SPIKE AUG.27/01	0.095	0.099	<0.0001	0.110	0.093
926 PINECREST/ABELE/BAILED	<0.001	<0.001	<0.0001	0.009	<0.002
926 PINECREST/ABELE/KITCHEN TAP	<0.001	<0.001	<0.0001	0.027	<0.002
644 LAKESHORE/RUSSELL/BAILED	<0.001	0.005	<0.0001	0.032	<0.002
644 LAKESHORE/RUSSELL/KITCHEN	<0.001	<0.001	<0.0001	0.010	<0.002
Sample+Spike (found)	0.015	0.015	---	0.539	0.531
Sample+Spike (expected)	0.015	0.015	---	0.518	0.500
Blank	<0.001	<0.001	<0.0001	0.005	<0.002
QC Standard (found)	0.015	0.015	0.0018	0.972	0.098
QC Standard (expected)	0.015	0.015	0.0030	1.00	0.100
Repeat 1127 WHITE/HURST/INSIDE TAP	<0.001	<0.001	<0.0001	0.018	<0.002

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ANALYTICAL SERVICES

24-Sep-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

Attn: Rachel Gould
Project: 21843.1
PO #:
Received: 28-Aug-2001 18:31

Job: 2158322
Status: Final

Water Samples

Sample Id	B ICP/MS mg/L	Ba ICP/MS mg/L	Be ICP/MS mg/L	Bi ICP/MS mg/L	Ca ICP/MS mg/L
1127 WHITE/HURST/INSIDE TAP	0.387	0.039	<0.001	<0.001	129.
851 PINECREST/KALINUK/BAILED	0.054	0.023	<0.001	<0.001	21.9
1408 KALLALY/KING/INSIDE TAP	0.100	0.190	<0.001	<0.001	168.
FIELD BLANK AUG.28/01	<0.005	<0.005	<0.001	<0.001	<0.5
TRAVEL SPIKE AUG.27/01	0.100	<0.005	0.096	0.100	<0.5
926 PINECREST/ABELE/BAILED	0.657	0.028	<0.001	<0.001	119.
926 PINECREST/ABELE/KITCHEN TAP	0.622	0.026	<0.001	<0.001	128.
644 LAKESHORE/RUSSELL/BAILED	0.051	0.023	<0.001	<0.001	110.
644 LAKESHORE/RUSSELL/KITCHEN	0.048	<0.005	<0.001	<0.001	1.6
Sample+Spike (found)	---	0.542	0.535	---	---
Sample+Spike (expected)	---	0.539	0.500	---	---
Blank	<0.005	<0.005	<0.001	<0.001	<0.5
QC Standard (found)	0.053	0.106	0.005	0.106	5.4
QC Standard (expected)	0.050	0.100	0.005	0.100	5.0
Repeat 1127 WHITE/HURST/INSIDE TAP	0.394	0.039	<0.001	<0.001	131.

ANALYTICAL SERVICES

24-Sep-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

Attn: Rachel Gould
Project: 21843.1 PO #: Received: 28-Aug-2001 18:31

Job: 2158322 Status: Final

Water Samples

Sample Id	Cd ICP/MS mg/L	Co ICP/MS mg/L	Cr ICP/MS mg/L	Cu ICP/MS mg/L	Fe ICP/MS mg/L
1127 WHITE/HURST/INSIDE TAP	<0.0001	<0.0001	<0.005	<0.0005	0.19
851 PINECREST/KALINUK/BAILED	<0.0001	<0.0001	<0.005	<0.0005	<0.03
1408 KALLALY/KING/INSIDE TAP	<0.0001	<0.0001	<0.005	<0.0005	3.94
FIELD BLANK AUG.28/01	<0.0001	<0.0001	<0.005	<0.0005	<0.03
TRAVEL SPIKE AUG.27/01	0.0947	0.0997	0.095	0.0942	1.10
926 PINECREST/ABELE/BAILED	<0.0001	<0.0001	<0.005	<0.0005	<0.03
926 PINECREST/ABELE/KITCHEN TAP	<0.0001	<0.0001	<0.005	0.0005	0.03
644 LAKESHORE/RUSSELL/BAILED	<0.0001	0.0004	<0.005	0.0022	0.54
644 LAKESHORE/RUSSELL/KITCHEN	<0.0001	<0.0001	<0.005	0.0172	<0.03
Sample+Spike (found)	0.537	0.556	0.544	0.501	---
Sample+Spike (expected)	0.500	0.500	0.500	0.500	---
Blank	<0.0001	<0.0001	<0.005	<0.0005	<0.03
QC Standard (found)	0.0498	0.0519	0.051	0.0487	1.17
QC Standard (expected)	0.0500	0.0500	0.050	0.0500	1.00
Repeat 1127 WHITE/HURST/INSIDE TAP	<0.0001	<0.0001	<0.005	0.0007	0.18

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ANALYTICAL SERVICES

24-Sep-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

Attn: Rachel Gould
Project: 21843.1
PO #:
Received: 28-Aug-2001 18:31

Job: 2158322
Status: Final

Water Samples

Sample Id	K ICP/MS mg/L	Mg ICP/MS mg/L	Mn ICP/MS mg/L	Mo ICP/MS mg/L	Na ICP/MS mg/L
1127 WHITE/HURST/INSIDE TAP	4.1	49.2	0.036	<0.001	14.9
851 PINECREST/KALINUK/BAILED	2.8	12.9	0.037	<0.001	14.7
1408 KALLALY/KING/INSIDE TAP	3.4	58.6	0.233	<0.001	78.3
FIELD BLANK AUG.28/01	<0.1	<0.05	<0.005	<0.001	<0.1
TRAVEL SPIKE AUG.27/01	<0.1	<0.05	0.097	<0.001	<0.1
926 PINECREST/ABELE/BAILED	4.3	46.7	0.028	<0.001	16.6
926 PINECREST/ABELE/KITCHEN TAP	4.3	49.7	0.080	<0.001	15.8
644 LAKESHORE/RUSSELL/BAILED	4.6	23.0	0.111	0.002	55.3
644 LAKESHORE/RUSSELL/KITCHEN	<0.1	<0.05	<0.005	<0.001	28.2
Sample+Spike (found)	---	48.8	0.579	0.554	---
Sample+Spike (expected)	---	49.7	0.536	0.500	---
Blank	<0.1	<0.05	<0.005	<0.001	<0.1
QC Standard (found)	0.8	1.06	0.051	0.052	5.1
QC Standard (expected)	1.0	1.00	0.050	0.050	5.0
Repeat 1127 WHITE/HURST/INSIDE TAP	4.1	50.9	0.035	<0.001	15.3

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ANALYTICAL SERVICES

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

24-Sep-2001

Attn: Rachel Gould
Project: 21843.1 PO #:

Received: 28-Aug-2001 18:31

Job: 2158322 Status: Final

Water Samples

Sample Id	Ni ICP/MS mg/L	P ICP/MS mg/L	Pb ICP/MS mg/L	Sb ICP/MS mg/L	Se ICP/MS mg/L
1127 WHITE/HURST/INSIDE TAP	<0.001	<0.05	0.0016	<0.0005	<0.002
851 PINECREST/KALINUK/BAILED	<0.001	<0.05	<0.0005	<0.0005	<0.002
1408 KALLALY/KING/INSIDE TAP	0.001	<0.05	<0.0005	<0.0005	<0.002
FIELD BLANK AUG.28/01	<0.001	<0.05	<0.0005	<0.0005	<0.002
TRAVEL SPIKE AUG.27/01	0.096	<0.05	0.0971	<0.0005	0.090
926 PINECREST/ABELE/BAILED	<0.001	<0.05	<0.0005	<0.0005	<0.002
926 PINECREST/ABELE/KITCHEN TAP	<0.001	<0.05	<0.0005	<0.0005	<0.002
644 LAKESHORE/RUSSELL/BAILED	0.002	<0.05	0.0006	0.0006	0.005
644 LAKESHORE/RUSSELL/KITCHEN	<0.001	<0.05	0.0016	<0.0005	<0.002
Sample+Spike (found)	0.539	---	0.532	0.585	0.243
Sample+Spike (expected)	0.500	---	0.501	0.500	0.500
Blank	<0.001	<0.05	<0.0005	<0.0005	<0.002
QC Standard (found)	0.050	0.98	0.0514	0.102	0.096
QC Standard (expected)	0.050	1.00	0.0500	0.100	0.100
Repeat 1127 WHITE/HURST/INSIDE TAP	<0.001	<0.05	<0.0005	<0.0005	<0.002

ANALYTICAL SERVICES

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

Attn: Rachel Gould
Project: 21843.1 PO #: Received: 28-Aug-2001 18:31

Job: 2158322 Status: Final

Water Samples

Sample Id	Sn ICP/MS mg/L	Sr ICP/MS mg/L	Ti ICP/MS mg/L	Tl ICP/MS mg/L	U ICP/MS mg/L
1127 WHITE/HURST/INSIDE TAP	<0.001	5.97	<0.005	<0.00005	0.0002
851 PINECREST/KALINUK/BAILED	0.002	0.431	<0.005	<0.00005	0.0002
1408 KALLALY/KING/INSIDE TAP	0.001	2.67	<0.005	0.00010	0.0013
FIELD BLANK AUG.28/01	<0.001	<0.001	<0.005	<0.00005	<0.0001
TRAVEL SPIKE AUG.27/01	<0.001	0.096	0.097	0.100	0.102
926 PINECREST/ABELE/BAILED	0.003	8.60	<0.005	<0.00005	<0.0001
926 PINECREST/ABELE/KITCHEN TAP	<0.001	8.96	<0.005	<0.00005	<0.0001
644 LAKESHORE/RUSSELL/BAILED	0.002	0.505	<0.005	0.00009	0.0005
644 LAKESHORE/RUSSELL/KITCHEN	<0.001	0.001	<0.005	<0.00005	<0.0001
Sample+Spike (found)	---	---	0.538	0.546	0.526
Sample+Spike (expected)	---	---	0.500	0.500	0.500
Blank	<0.001	<0.001	<0.005	<0.00005	<0.0001
QC Standard (found)	0.103	0.050	0.052	0.101	0.0046
QC Standard (expected)	0.100	0.050	0.050	0.100	0.0050
Repeat 1127 WHITE/HURST/INSIDE TAP	0.001	6.23	<0.005	<0.00005	0.0002

ANALYTICAL SERVICES

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

Attn: Rachel Gould
Project: 21843.1

PO #:

Received: 28-Aug-2001 18:31

Job: 2158322

Status: Final

Water Samples

Sample Id	V ICP/MS mg/L	Zn ICP/MS mg/L
1127 WHITE/HURST/INSIDE TAP	<0.0005	0.027
851 PINECREST/KALINUK/BAILED	<0.0005	0.038
1408 KALLALY/KING/INSIDE TAP	<0.0005	0.008
FIELD BLANK AUG.28/01	<0.0005	<0.005
TRAVEL SPIKE AUG.27/01	0.0948	0.091
926 PINECREST/ABELE/BAILED	<0.0005	0.015
926 PINECREST/ABELE/KITCHEN TAP	<0.0005	0.006
644 LAKESHORE/RUSSELL/BAILED	0.0023	0.016
644 LAKESHORE/RUSSELL/KITCHEN	<0.0005	0.149
Sample+Spike (found)	0.549	0.549
Sample+Spike (expected)	0.500	0.527
Blank	<0.0005	<0.005
QC Standard (found)	0.0505	0.051
QC Standard (expected)	0.0500	0.050
Repeat 1127 WHITE/HURST/INSIDE TAP	<0.0005	0.027

ANALYTICAL SERVICES

24-Sep-2001

BEAK INTERNATIONAL INC.
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Attn: Rachel Gould
Project: 21843.1
PO #:
Received: 28-Aug-2001 18:31

Job: 2158322 Status: Final

Note: TRAVEL SPIKE contains 0.1 mg/L of all elements except Fe (1.0mg/L)
Na, Mg, P, K, Ca, Mo, Ag, Sn, Sb and Ba are not included in the TRAVEL SPIKE.

All work recorded herein has been done in accordance with normal professional standards using accepted testing methodologies and QA/QC procedures. Philip Analytical is limited in liability to the actual cost of the pertinent analyses done unless otherwise agreed upon by contractual arrangement. Your samples will be retained by PASC for a period of 30 days following reporting or as per specific contractual arrangements.

Job approved by:

Signed: ....
Ralph Siebert, B.Sc.
Section Supervisor, Metals

ANALYTICAL SERVICES

13-Sep-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

Attn: Rob Watters
Project: 21843.1
PO #:
Received: 31-Aug-2001 09:52

Job: 2158438
Status: Final

Water Samples

Sample Id	As SW 7061 mg/L	Se SW 7741 mg/L	Ag ICP/MS mg/L	Al ICP/MS mg/L	As ICP/MS mg/L
SCHNEIDER/660 LAKESHORE/OUTSIDE/TP	<0.001	<0.001	<0.0001	0.009	<0.002
FIELD BLANK	<0.001	<0.001	<0.0001	0.009	<0.002
Sample+Spike (found)	0.011	0.015	---	0.506	0.526
Sample+Spike (expected)	0.015	0.015	---	0.509	0.500
Blank	<0.001	<0.001	<0.0001	<0.005	<0.002
QC Standard (found)	0.016	0.016	0.0022	0.970	0.100
QC Standard (expected)	0.015	0.015	0.0030	1.00	0.100
Repeat SCHNEIDER/660 LAKESHORE/OUT	<0.001	<0.001	<0.0001	0.011	<0.002

Sample Id	B ICP/MS mg/L	Ba ICP/MS mg/L	Be ICP/MS mg/L	Bi ICP/MS mg/L	Ca ICP/MS mg/L
SCHNEIDER/660 LAKESHORE/OUTSIDE/TP	0.046	0.017	<0.001	<0.001	115.
FIELD BLANK	<0.005	<0.005	<0.001	<0.001	<0.5
Sample+Spike (found)	---	0.518	0.531	---	---
Sample+Spike (expected)	---	0.517	0.500	---	---
Blank	<0.005	<0.005	<0.001	<0.001	<0.5
QC Standard (found)	0.049	0.100	0.005	0.100	5.2
QC Standard (expected)	0.050	0.100	0.005	0.100	5.0
Repeat SCHNEIDER/660 LAKESHORE/OUT	0.045	0.018	<0.001	<0.001	116.

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ANALYTICAL SERVICES

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

13-Sep-2001

Attn: Rob Watters
Project: 21843.1
PO #:
Received: 31-Aug-2001 09:52

Job: 2158438
Status: Final

Water Samples

Sample Id	Cd ICP/MS mg/L	Co ICP/MS mg/L	Cr ICP/MS mg/L	Cu ICP/MS mg/L	Fe ICP/MS mg/L
SCHNEIDER/660 LAKESHORE/OUTSIDE/TP	<0.0001	0.0004	<0.005	0.0025	0.07
FIELD BLANK	<0.0001	<0.0001	<0.005	<0.0005	<0.03
Sample+Spike (found)	0.524	0.524	0.523	0.498	0.64
Sample+Spike (expected)	0.500	0.500	0.500	0.502	0.57
Blank	<0.0001	<0.0001	<0.005	<0.0005	<0.03
QC Standard (found)	0.0491	0.0498	0.050	0.0484	1.07
QC Standard (expected)	0.0500	0.0500	0.050	0.0500	1.00
Repeat SCHNEIDER/660 LAKESHORE/OUT	<0.0001	0.0003	<0.005	0.0026	0.14

Sample Id	K ICP/MS mg/L	Mg ICP/MS mg/L	Mn ICP/MS mg/L	Mo ICP/MS mg/L	Na ICP/MS mg/L
SCHNEIDER/660 LAKESHORE/OUTSIDE/TP	4.1	15.0	0.064	<0.001	22.6
FIELD BLANK	<0.1	<0.05	<0.005	<0.001	<0.1
Sample+Spike (found)	---	15.2	0.596	0.538	---
Sample+Spike (expected)	---	15.5	0.564	0.500	---
Blank	<0.1	<0.05	<0.005	<0.001	<0.1
QC Standard (found)	1.0	1.04	0.050	0.051	5.2
QC Standard (expected)	1.0	1.00	0.050	0.050	5.0
Repeat SCHNEIDER/660 LAKESHORE/OUT	4.2	15.5	0.065	0.001	23.1

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Attn: Rob Watters
Project: 21843.1

PO #:

Received: 31-Aug-2001 09:52

Job: 2158438

Status: Final

Water Samples

Sample Id	Ni ICP/MS mg/L	P ICP/MS mg/L	Pb ICP/MS mg/L	Sb ICP/MS mg/L	Se ICP/MS mg/L
SCHNEIDER/660 LAKESHORE/OUTSIDE/TP	0.009	<0.05	<0.0005	<0.0005	<0.002
FIELD BLANK	<0.001	<0.05	<0.0005	<0.0005	<0.002
Sample+Spike (found)	0.533	---	0.514	0.529	0.504
Sample+Spike (expected)	0.509	---	0.500	0.500	0.500
Blank	<0.001	<0.05	<0.0005	<0.0005	<0.002
QC Standard (found)	0.049	1.09	0.0502	0.0946	0.098
QC Standard (expected)	0.050	1.00	0.0500	0.100	0.100
Repeat SCHNEIDER/660 LAKESHORE/OUT	0.009	<0.05	<0.0005	<0.0005	0.002

Sample Id	Si ICP/MS mg/L	Sn ICP/MS mg/L	Sr ICP/MS mg/L	Ti ICP/MS mg/L	Tl ICP/MS mg/L
SCHNEIDER/660 LAKESHORE/OUTSIDE/TP	3.87	0.002	0.365	<0.005	<0.00005
FIELD BLANK	<0.05	<0.001	<0.001	<0.005	<0.00005
Sample+Spike (found)	---	---	---	0.516	0.516
Sample+Spike (expected)	---	---	---	0.500	0.500
Blank	<0.05	<0.001	<0.001	<0.005	<0.00005
QC Standard (found)	1.03	0.100	0.048	0.049	0.0990
QC Standard (expected)	1.00	0.100	0.050	0.050	0.100
Repeat SCHNEIDER/660 LAKESHORE/OUT	4.01	0.002	0.361	<0.005	<0.00005

ANALYTICAL SERVICES

13-Sep-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
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Attn: Rob Watters
Project: 21843.1
PO #:
Received: 31-Aug-2001 09:52

Job: 2158438 Status: Final

Water Samples

Sample Id	U ICP/MS mg/L	V ICP/MS mg/L	Zn ICP/MS mg/L
SCHNEIDER/660 LAKESHORE/OUTSIDE/TP	0.0005	<0.0005	0.495
FIELD BLANK	<0.0001	<0.0005	<0.005
Sample+Spike (found)	0.502	0.527	1.01
Sample+Spike (expected)	0.500	0.500	0.950
Blank	<0.0001	<0.0005	<0.005
QC Standard (found)	0.0042	0.0495	0.055
QC Standard (expected)	0.0050	0.0500	0.050
Repeat SCHNEIDER/660 LAKESHORE/OUT	0.0005	<0.0005	0.501

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13-Sep-2001

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14 Abacus Road
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Attn: Rob Watters
Project: 21843.1 PO #:
Received: 31-Aug-2001 09:52

Job: 2158438 Status: Final

All work recorded herein has been done in accordance with normal professional standards using accepted testing methodologies and QA/QC procedures. Philip Analytical is limited in liability to the actual cost of the pertinent analyses done unless otherwise agreed upon by contractual arrangement. Your samples will be retained by PASC for a period of 30 days following reporting or as per specific contractual arrangements.

Job approved by:

Signed: ....
for Ralph Siebert, B.Sc.
Project Manager

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APPENDIX C

QA/QC Analytical Data for Fish Liver and Tissue

PSC
ANALYTICAL SERVICES

29-Jan-2002

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

Page: 1
Copy: 1 of 2

Attn: Mark Taylor
Project: 22271.1

Received: 11-Jan-2002 17:35
PO #: INCO

Job: 2250275 Status: Final

Tissue Samples

Loss on Drying

Sample Id	LOD Grav. %	Ag ICP/MS ppm	Al ICP/MS ppm	As ICP/MS ppm	Ba ICP/MS ppm	Be ICP/MS ppm	Bi ICP/MS ppm	Cd ICP/MS ppm
1	77.2	<0.02	1.8	<0.4	<1.0	<0.2	<0.2	0.02
2	75.8	<0.02	2.9	<0.4	<1.0	<0.2	<0.2	0.06
3	76.4	<0.02	3.0	<0.4	<1.0	<0.2	<0.2	<0.02
4	75.9	<0.02	1.9	0.6	<1.0	<0.2	<0.2	0.02
328	---	<0.02	9.1	1.4	<1.0	<0.2	<0.2	1.64
333	65.2	<0.01	2.0	8.8	<0.5	<0.1	<0.1	0.50
337	75.1	<0.02	4.3	1.0	<1.0	<0.2	<0.2	1.36
Sample+Spike (found)	---	---	112.	122.	116.	114.	---	113.
Sample+Spike (expected)	---	---	111.	109.	109.	109.	---	109.
Blank	<0.01	<0.01	<1.0	<0.2	<0.5	<0.1	<0.1	<0.01
QC Standard (found)	---	0.58	194.	20.5	20.7	1.0	20.5	9.99
QC Standard (expected)	---	0.60	200.	20.0	20.0	0.1	20.0	10.0
Repeat 1	77.2	<0.02	1.9	<0.4	<1.0	<0.2	<0.2	0.04

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ANALYTICAL SERVICES

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
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29-Jan-2002

Attn: Mark Taylor
Project: 22271.1

Received: 11-Jan-2002 17:35
PO #: INCO

Job: 2250275

Status: Final

Tissue Samples

Sample Id	Co ICP/MS ppm	Cr ICP/MS ppm	Cu ICP/MS ppm	Fe ICP/MS ppm	Mn ICP/MS ppm	Mo ICP/MS ppm	Ni ICP/MS ppm	P ICP/MS ppm
1	<0.02	<1.0	10.2	<12	<1.0	<0.2	<0.2	10100
2	<0.02	<1.0	1.89	<12	1.2	<0.2	<0.2	13500
3	<0.02	<1.0	3.33	<12	<1.0	<0.2	<0.2	10700
4	0.03	<1.0	1.29	<12	1.1	<0.2	<0.2	11900
328	0.15	<1.0	13.1	146	9.0	0.4	0.2	13500
333	0.39	<0.5	20.3	64	3.2	0.4	0.2	7560
337	0.27	<1.0	23.4	98	6.7	0.5	<0.2	14700
Sample+Spike (found)	117.	117.	128.	125	119.	115.	118.	---
Sample+Spike (expected)	109.	109.	119.	110	109.	109.	109.	---
Blank	<0.01	<0.5	<0.05	<6	<0.5	<0.1	<0.1	<5
QC Standard (found)	10.1	10.3	10.1	206	10.3	10.3	10.1	201
QC Standard (expected)	10.0	10.0	10.0	200	10.0	10.0	10.0	200
Repeat 1	<0.02	<1.0	13.2	<12	<1.0	<0.2	<0.2	10200

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ANALYTICAL SERVICES

29-Jan-2002

BEAK INTERNATIONAL INC.
14 Abacus Road
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Attn: Mark Taylor
Project: 22271.1

Received: 11-Jan-2002 17:35
PO #: INCO

Job: 2250275

Status: Final

Tissue Samples

Sample Id	Pb ICP/MS ppm	Sb ICP/MS ppm	Se ICP/MS ppm	Sr ICP/MS ppm	Ti ICP/MS ppm	Tl ICP/MS ppm	U ICP/MS ppm	V ICP/MS ppm
1	0.11	<0.10	2.4	0.9	<2	0.027	<0.02	<0.10
2	<0.10	<0.10	2.5	8.9	<2	0.035	<0.02	<0.10
3	<0.10	<0.10	2.1	5.3	<2	0.021	<0.02	<0.10
4	0.17	<0.10	4.1	4.9	<2	0.046	<0.02	<0.10
328	0.20	<0.10	6.3	0.4	<2	0.131	<0.02	0.17
333	0.05	<0.05	8.7	<0.1	<1	0.081	<0.01	0.11
337	0.22	<0.10	6.6	0.3	<2	0.077	<0.02	0.28
Sample+Spike (found)	117.	84.3	120.	---	84	114.	116.	119.
Sample+Spike (expected)	109.	109.	111.	---	110	109.	109.	109.
Blank	<0.05	<0.05	<0.2	<0.1	<1	<0.005	<0.01	<0.05
QC Standard (found)	10.2	11.5	20.6	10.2	10	20.7	0.88	10.1
QC Standard (expected)	10.0	20.0	20.0	10.0	10	20.0	0.80	10.0
Repeat 1	0.33	<0.10	2.4	1.6	<2	0.028	<0.02	<0.10

ANALYTICAL SERVICES

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
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29-Jan-2002

Attn: Mark Taylor
Project: 22271.1

Received: 11-Jan-2002 17:35
PO #: INCO

Job: 2250275

Status: Final

Tissue Samples

Sample Id	Zn ICP/MS ppm
1	31.3
2	37.7
3	26.6
4	30.4
328	108.
333	83.9
337	131.
Sample+Spike (found)	152.
Sample+Spike (expected)	140.
Blank	<0.5
QC Standard (found)	10.8
QC Standard (expected)	10.0
Repeat 1	32.0

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ANALYTICAL SERVICES

BEAK INTERNATIONAL INC.
14 Abacus Road
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Attn: Mark Taylor
Project: 22271.1

Received: 11-Jan-2002 17:35
PO #: INCO

Job: 2250275 Status: Final

Note: EQLs were adjusted based on moisture content (LOD). Insufficient sample 328 was available for moisture content determination. A moisture content of 70% was used for moisture content correction for this sample. The value is an average of the LODs for 333 and 337.

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Job approved by:

Signed: ....
Ralph Siebert, B.Sc.
Section Supervisor, Metals

APPENDIX D

QA/QC Analytical Data for Food Basket Produce and Soil

ANALYTICAL SERVICES

1-Aug-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

Attn: Rachel Gould
Project: 21843.1

Received: 4-Jul-2001 19:03
PO #: 21843.1

Job: 2156287

Status: Final

Vegetation Samples

Sample Id	As SW 7061 ppm	Se SW 7741 ppm	Ag ICP/MS ppm	Al ICP/MS ppm	As ICP/MS ppm	Ba ICP/MS ppm	Be ICP/MS ppm
BWSTFR	<0.1	<0.1	<0.01	9.3	<0.2	6.2	<0.1
W3RHFR	<0.1	<0.1	<0.02	4.3	<0.4	3.2	<0.2
BWSTFR+Spike (found)	---	---	---	18.9	1.0	7.0	---
Sample+Spike (expected)	---	---	---	18.2	0.9	7.0	---
Blank	<0.1	<0.1	<0.01	<0.5	<0.2	<0.5	<0.1
QC Standard (found)	0.9	0.9	0.00	119.	0.1	56.0	<0.0
QC Standard (expected)	1.0	1.0	0.01	105.	0.1	51.3	<0.0
Repeat BWSTFR	<0.1	<0.1	<0.01	9.3	<0.2	5.9	<0.1

Sample Id	Bi ICP/MS ppm	Cd ICP/MS ppm	Co ICP/MS ppm	Cr ICP/MS ppm	Cu ICP/MS ppm	Fe ICP/MS ppm	Mn ICP/MS ppm	Mo ICP/MS ppm
BWSTFR	<0.1	0.02	0.03	<0.5	4.46	32	10.1	0.5
W3RHFR	<0.2	0.06	<0.02	<1.0	5.07	26	6.3	<0.2
BWSTFR+Spike (found)	0.9	0.48	0.49	0.6	4.46	41	10.4	0.9
Sample+Spike (expected)	0.9	0.47	0.46	<0.5	4.90	41	10.5	0.9
Blank	<0.1	<0.01	<0.01	<0.5	<0.05	<5	<0.5	<0.1
QC Standard (found)	<0.0	1.39	0.51	0.8	4.39	286	231.	0.4
QC Standard (expected)	<0.0	1.25	0.44	0.7	4.16	259	199.	0.4
Repeat BWSTFR	<0.1	<0.01	0.03	<0.5	4.03	32	10.0	0.5

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ANALYTICAL SERVICES

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

Attn: Rachel Gould
Project: 21843.1

Received: 4-Jul-2001 19:03
PO #: 21843.1

Job: 2156287 Status: Final

Vegetation Samples

Sample Id	Ni ICP/MS ppm	P ICP/MS ppm	Pb ICP/MS ppm	Sb ICP/MS ppm	Se ICP/MS ppm	Sr ICP/MS ppm	Ti ICP/MS ppm	Tl ICP/MS ppm
BWSTFR	1.4	2520	0.40	<0.05	<0.2	9.9	<0.5	<0.005
W3RHFR	3.7	3070	0.97	<0.10	<0.4	19.4	<1.0	<0.010
BWSTFR+Spike (found)	1.8	---	1.31	0.94	0.9	---	---	0.937
Sample+Spike (expected)	1.8	---	0.85	0.89	0.9	---	---	0.894
Blank	<0.1	<5	<0.05	<0.05	<0.2	<0.1	<0.5	<0.005
QC Standard (found)	1.1	1830	1.04	0.07	0.2	83.6	2.6	0.037
QC Standard (expected)	0.8	1700	0.59	0.39	0.2	73.1	2.5	0.045
Repeat BWSTFR	1.4	2420	0.13	<0.05	<0.2	9.6	<0.5	<0.005

Sample Id	U ICP/MS ppm	V ICP/MS ppm	Zn ICP/MS ppm	LOD Grav. %
BWSTFR	<0.01	<0.05	10.2	88.8
W3RHFR	<0.02	<0.10	21.7	93.5
BWSTFR+Spike (found)	0.04	0.48	---	---
Sample+Spike (expected)	0.04	0.45	---	---
Blank	<0.01	<0.05	<0.5	---
QC Standard (found)	0.01	0.27	27.9	---
QC Standard (expected)	0.01	0.22	24.4	---
Repeat BWSTFR	<0.01	<0.05	9.7	---

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L6T 5B7

Attn: Rachel Gould
Project: 21843.1

Received: 4-Jul-2001 19:03
PO #: 21843.1

Job: 2156287 Status: Final

Note: EQLs for ICP/MS analysis of sample W3RHFR were adjusted due to high moisture content.

Note: Sample were frozen upon receipt. LOD was performed after thawing samples. For comparison, store bought fruit and vegetables had LOD performed before and after freezing for 36 hours. Results are within 2% of each other.

All work recorded herein has been done in accordance with normal professional standards using accepted testing methodologies and QA/QC procedures. Philip Analytical is limited in liability to the actual cost of the pertinent analyses done unless otherwise agreed upon by contractual arrangement. Your samples will be retained by PASC for a period of 30 days following reporting or as per specific contractual arrangements.

Job approved by:

Signed: ....
Ralph Siebert, B.Sc.
Section Supervisor, Metals

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ANALYTICAL SERVICES

21-Aug-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

Page: 1
Copy: 1 of 2

Attn: Rachel Gould
Project: 21843.1
PO #:
Received: 31-Jul-2001 11:05

Job: 2157233
Status: Final

Soil Samples

Sample Id	As SW 7061 ppm	Se SW 7741 ppm	Ag ICAP ppm	Al ICAP ppm	Ba ICAP ppm	Be ICAP ppm	Cd ICAP ppm	Co ICAP ppm
W3 RASP SOIL	3.8	0.6	<1.0	9580	58	0.4	<0.5	8
Sample+Spike (found)	8.2	5.4	<1.0	---	166	10.0	95.5	102
Sample+Spike (expected)	8.8	5.6	<1.0	---	163	10.4	100.	108
Blank	<0.2	<0.2	<1.0	<20	<5	<0.2	<0.5	<2
QC Standard (found)	20.9	0.4	1.9	16700	158	0.5	0.6	26
QC Standard (expected)	20.4	0.5	2.4	16300	157	0.6	<0.5	25
Repeat W3 RASP SOIL	8.2	0.6	<1.0	9900	63	0.4	<0.5	8

Sample Id	Cr ICAP ppm	Cu ICAP ppm	Fe ICAP ppm	Mn ICAP ppm	Mo ICAP ppm	Ni ICAP ppm	P ICAP ppm	Pb ICAP ppm
W3 RASP SOIL	14	40	16600	208	<3	294	897	32
Sample+Spike (found)	110	141	---	314	191	409	---	126
Sample+Spike (expected)	114	142	---	308	200	400	---	132
Blank	<1	2	<50	<1	<3	<2	<20	<5
QC Standard (found)	47	30	31200	1140	<3	43	910	19
QC Standard (expected)	45	32	31100	1140	<3	43	810	21
Repeat W3 RASP SOIL	14	42	16400	208	<3	300	934	32

ANALYTICAL SERVICES

BEAK INTERNATIONAL INC.
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21-Aug-2001

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Attn: Rachel Gould
Project: 21843.1 PO #:
Received: 31-Jul-2001 11:05

Job: 2157233 Status: Final

Soil Samples

Sample Id	Ti ICAP ppm	V ICAP ppm	Zn ICAP ppm
W3 RASP SOIL	129	24	80
Sample+Spike (found)	306	122	185
Sample+Spike (expected)	220	124	182
Blank	<5	<1	<5
QC Standard (found)	1090	48	128
QC Standard (expected)	882	48	126
Repeat W3 RASP SOIL	120	24	82

ANALYTICAL SERVICES

BEAK INTERNATIONAL INC.
14 Abacus Road
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Attn: Rachel Gould
Project: 21843.1 PO #:
Received: 31-Jul-2001 11:05

Job: 2157233 Status: Final

Vegetation Samples

Sample Id	As SW 7061 ppm	Se SW 7741 ppm	Ag ICP/MS ppm	Al ICP/MS ppm	As ICP/MS ppm	Ba ICP/MS ppm
W3 RASP	<0.1	<0.1	<0.01	6.6	<0.2	2.3
Blank	<0.1	<0.1	<0.01	<0.5	<0.2	<0.5
QC Standard (found)	0.9	1.0	0.04	10.3	1.0	1.0
QC Standard (expected)	1.0	1.0	0.03	10.0	1.0	1.0
Repeat W3 RASP	<0.1	<0.1	<0.01	6.1	<0.2	2.4

Sample Id	Be ICP/MS ppm	Bi ICP/MS ppm	Cd ICP/MS ppm	Co ICP/MS ppm	Cr ICP/MS ppm	Cu ICP/MS ppm
W3 RASP	<0.1	<0.1	0.05	0.08	<0.5	6.14
Blank	<0.1	<0.1	<0.01	<0.01	<0.5	<0.05
QC Standard (found)	0.5	9.8	0.48	0.48	4.8	0.55
QC Standard (expected)	0.5	10.0	0.50	0.50	5.0	0.50
Repeat W3 RASP	<0.1	<0.1	0.05	0.07	<0.5	6.25

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14 Abacus Road
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Attn: Rachel Gould
Project: 21843.1
PO #:
Received: 31-Jul-2001 11:05

Job: 2157233
Status: Final

Vegetation Samples

Sample Id	Fe ICP/MS ppm	Mn ICP/MS ppm	Mo ICP/MS ppm	Ni ICP/MS ppm	P ICP/MS ppm	Pb ICP/MS ppm
W3 RASP	53	8.1	0.7	11.5	2540	0.13
Blank	<3	<0.5	<0.1	<0.1	<5	<0.05
QC Standard (found)	11	0.5	0.5	0.0	11	0.53
QC Standard (expected)	10	0.5	0.5	0.5	10	0.50
Repeat W3 RASP	52	7.7	0.8	10.6	3160	0.12

Sample Id	Sb ICP/MS ppm	Se ICP/MS ppm	Sr ICP/MS ppm	Ti ICP/MS ppm	Tl ICP/MS ppm	U ICP/MS ppm
W3 RASP	<0.05	<0.2	7.3	<0.5	<0.005	<0.01
Blank	<0.05	<0.2	<0.1	<0.5	<0.005	<0.01
QC Standard (found)	1.01	0.9	5.2	5.3	0.982	0.39
QC Standard (expected)	1.00	1.0	5.0	5.0	1.00	0.40
Repeat W3 RASP	<0.05	<0.2	7.5	<0.5	<0.005	<0.01

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Attn: Rachel Gould
Project: 21843.1

PO #:

Received: 31-Jul-2001 11:05

Job: 2157233

Status: Final

Vegetation Samples

Sample Id	V ICP/MS ppm	Zn ICP/MS ppm
W3 RASP	0.16	27.2
Blank	<0.05	<0.5
QC Standard (found)	4.79	5.0
QC Standard (expected)	5.00	5.0
Repeat W3 RASP	0.26	27.2

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21-Aug-2001

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14 Abacus Road
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Attn: Rachel Gould
Project: 21843.1 PO #: Received: 31-Jul-2001 11:05

Job: 2157233 Status: Final

Note: The sample W3 RASP was re-digested due to QC failure of the original digest. Insufficient sample was available for a matrix spike. No spike data reported for this sample.

All work recorded herein has been done in accordance with normal professional standards using accepted testing methodologies and QA/QC procedures. Philip Analytical is limited in liability to the actual cost of the pertinent analyses done unless otherwise agreed upon by contractual arrangement. Your samples will be retained by PASC for a period of 30 days following reporting or as per specific contractual arrangements.

Job approved by:

Signed: ....
Ralph Siebert, B.Sc.
Section Supervisor, Metals

PSC

ANALYTICAL SERVICES

28-Sep-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
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Page: 1
Copy: 1 of 2

Attn: Rachel Gould
Project: 21843.1

Received: 5-Sep-2001 10:31

PO #:

Job: 2158539

Status: Final

Vegetation Samples

Sample Id	LOD Grav. %	Ag ICP/MS ppm	Al ICP/MS ppm	As ICP/MS ppm	Ba ICP/MS ppm	Be ICP/MS ppm	Bi ICP/MS ppm	Ca ICP/MS ppm
FB1133KIL PCH	89.8	<0.01	2.9	<0.2	<0.5	<0.1	<0.1	641
FB271FAR TOM	96.0	<0.03	3.8	<0.6	<1.5	<0.3	<0.3	1170
FB271FAR ONN	92.6	<0.02	11.2	<0.4	4.6	<0.2	<0.2	8200
FB244MIT BEET	88.9	<0.01	20.5	<0.2	35.7	<0.1	<0.1	3280
FB244MIT CRT	91.0	<0.01	27.4	<0.2	21.3	<0.1	<0.1	4300
FB114FAR TOM	90.4	<0.01	2.0	<0.2	<0.5	<0.1	<0.1	463
Sample+Spike (found)	---	---	9.1	5.5	5.7	5.1	---	---
Sample+Spike (expected)	---	---	7.8	4.9	4.9	4.9	---	---
Blank	<0.1	<0.01	<0.5	<0.2	<0.5	<0.1	<0.1	<50
QC Standard (found)	---	0.26	106.	10.2	10.0	0.5	9.8	517
QC Standard (expected)	---	0.30	100.	10.0	10.0	0.5	10.0	500
Repeat FB1133KIL PCH	89.6	<0.01	3.8	<0.2	<0.5	<0.1	<0.1	700

ANALYTICAL SERVICES

28-Sep-2001

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Attn: Rachel Gould
Project: 21843.1
PO #:
Received: 5-Sep-2001 10:31

Job: 2158539 Status: Final

Vegetation Samples

Sample Id	Cd ICP/MS ppm	Co ICP/MS ppm	Cr ICP/MS ppm	Cu ICP/MS ppm	Fe ICP/MS ppm	K ICP/MS ppm	Mg ICP/MS ppm	Mn ICP/MS ppm
FB1133KIL PCH	0.01	0.07	<0.5	6.56	28	16200	704	3.5
FB271FAR TOM	0.36	0.10	<1.5	11.6	65	54100	2270	8.2
FB271FAR ONN	0.06	0.05	<1.0	5.95	50	15800	1220	5.7
FB244MIT BEET	0.45	0.06	<0.5	13.7	63	40300	3190	10.5
FB244MIT CRT	0.22	0.04	<0.5	9.91	55	43500	1400	5.7
FB114FAR TOM	0.10	0.04	<0.5	11.3	43	42000	1730	8.8
Sample+Spike (found)	4.91	5.14	4.3	11.8	---	---	---	8.4
Sample+Spike (expected)	4.91	4.97	4.9	11.4	---	---	---	8.4
Blank	<0.01	<0.01	<0.5	<0.05	11	<10	<5	<0.5
QC Standard (found)	4.85	5.05	5.4	5.25	120	107	97	5.0
QC Standard (expected)	5.00	5.00	5.0	5.00	100	100	100	5.0
Repeat FB1133KIL PCH	0.01	0.06	<0.5	6.65	35	17500	752	3.6

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ANALYTICAL SERVICES

28-Sep-2001

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Attn: Rachel Gould
Project: 21843.1
PO #:
Received: 5-Sep-2001 10:31

Job: 2158539 Status: Final

Vegetation Samples

Sample Id	Mo ICP/MS ppm	Ni ICP/MS ppm	P ICP/MS ppm	Pb ICP/MS ppm	Sb ICP/MS ppm	Se ICP/MS ppm	Sr ICP/MS ppm	Ti ICP/MS ppm
FB1133KIL PCH	0.3	4.3	2110	<0.05	<0.05	<0.2	1.2	<1
FB271FAR TOM	0.8	2.0	6220	<0.15	<0.15	<0.6	29.2	<3
FB271FAR ONN	0.8	7.2	2350	0.41	<0.10	4.6	47.8	<2
FB244MIT BEET	0.3	4.4	4690	0.32	<0.05	<0.2	27.2	<1
FB244MIT CRT	0.4	3.5	4430	0.24	<0.05	<0.2	22.0	<1
FB114FAR TOM	1.5	1.8	3380	<0.05	<0.05	<0.2	2.1	<1
Sample+Spike (found)	5.0	9.4	---	4.87	5.04	5.2	---	5
Sample+Spike (expected)	5.2	9.2	---	4.90	4.90	4.9	---	5
Blank	<0.1	<0.1	<5	<0.05	<0.05	<0.2	<0.1	<1
QC Standard (found)	4.8	5.1	111	4.94	7.19	9.9	5.0	5
QC Standard (expected)	5.0	5.0	100	5.00	10.0	10.0	5.0	5
Repeat FB1133KIL PCH	0.2	4.4	2200	<0.05	<0.05	<0.2	1.2	<1

ANALYTICAL SERVICES

28-Sep-2001

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Received: 5-Sep-2001 10:31

PO #:

Job: 2158539

Status: Final

Vegetation Samples

Sample Id	Tl ICP/MS ppm	U ICP/MS ppm	V ICP/MS ppm	Zn ICP/MS ppm
FB1133KIL PCH	<0.005	<0.01	<0.05	8.8
FB271FAR TOM	<0.015	<0.03	<0.15	28.2
FB271FAR ONN	0.010	<0.02	<0.10	19.2
FB244MIT BEET	0.008	<0.01	<0.05	54.3
FB244MIT CRT	<0.005	<0.01	0.07	23.1
FB114FAR TOM	<0.005	<0.01	<0.05	20.5
Sample+Spike (found)	4.82	4.92	4.95	13.5
Sample+Spike (expected)	4.90	4.90	4.90	13.8
Blank	<0.005	<0.01	<0.05	<0.5
QC Standard (found)	9.36	0.39	4.96	30.5
QC Standard (expected)	10.0	0.40	5.00	30.9
Repeat FB1133KIL PCH	<0.005	<0.01	<0.05	8.6

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BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

28-Sep-2001

Attn: Rachel Gould
Project: 21843.1

Received: 5-Sep-2001 10:31

PO #:

Job: 2158539 Status: Final

Soil Samples

Sample Id	As SW 7061 ppm	Se SW 7741 ppm	pH SM 4500B pH Units	LOD Grav. %	Ag ICAP ppm	Al ICAP ppm	Ba ICAP ppm	Be ICAP ppm
FB1133KIL PCHSL	7.5	1.4	6.17	23.2	<1	19600.	130	1.0
FB271FAR TOMSL	10.7	2.2	7.03	24.1	<1	11000.	167	0.6
FB271FAR ONNSL	21.7	3.2	7.04	14.9	<1	12000.	188	0.7
FB244MIT BEETSL	7.5	1.1	6.95	20.5	<1	9610.	78	0.4
FB244MIT CRTSL	5.7	0.9	7.06	28.6	<1	8410.	58	0.3
FB114FAR TOMSL	22.7	1.2	7.02	20.0	<1	7190.	78	0.4
Sample +Spike (found)	15.2	7.1	---	---	---	---	227	9.9
Sample+Spike (expected)	12.5	6.4	---	---	---	---	229	10.9
Blank	<0.2	<0.2	---	<0.0	<1	<20.0	<5	<0.2
QC Standard (found)	22.9	0.5	9.17	---	2	14000.	152	0.5
QC Standard (expected)	20.4	0.5	9.38	---	2	16300.	157	0.6
Repeat FB1133KIL PCH	7.5	1.4	6.18	23.2	<1	19300.	129	1.0

ANALYTICAL SERVICES

28-Sep-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
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Attn: Rachel Gould
Project: 21843.1
Received: 5-Sep-2001 10:31
PO #:

Job: 2158539
Status: Final

Soil Samples

Sample Id	Ca ICAP ppm	Co ICAP ppm	Cr ICAP ppm	Cu ICAP ppm	Fe ICAP ppm	K ICAP ppm	Mo ICAP ppm	Na ICAP ppm
FB1133KIL PCHSL	5800	14	26	79	28200	2900	<3	78
FB271FAR TOMSL	25900	18	22	131	18200	1480	<3	129
FB271FAR ONNSL	23400	21	22	153	19900	1820	<3	146
FB244MIT BEETSL	12300	10	14	57	12000	1180	<3	89
FB244MIT CRTSL	9910	8	11	43	10400	747	<3	75
FB114FAR TOMSL	39500	10	14	65	13900	1550	<3	194
Sample +Spike (found)	---	103	118	170	---	---	181	---
Sample+Spike (expected)	---	114	125	179	---	---	200	---
Blank	<50	<2	<1	<1	<50	<100	<3	<50
QC Standard (found)	5490	24	45	30	29100	2430	<3	246
QC Standard (expected)	6210	25	45	32	31100	2630	<3	337
Repeat FB1133KIL PCH	5740	14	26	79	27900	2840	<3	78

ANALYTICAL SERVICES

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

28-Sep-2001

Attn: Rachel Gould
Project: 21843.1 PO #: Received: 5-Sep-2001 10:31

Job: 2158539 Status: Final

Soil Samples

Sample Id	P ICAP ppm	Pb ICAP ppm	Sr ICAP ppm	V ICAP ppm	Zn ICAP ppm	Sb SW 7041 ppm
FB1133KIL PCHSL	1130	25	21.2	39	109	<0.2
FB271FAR TOMSL	2200	303	100.	28	282	1.2
FB271FAR ONNSL	2290	294	85.7	29	304	1.0
FB244MIT BEETSL	1670	65	39.8	21	136	0.3
FB244MIT CRTSL	1370	45	30.7	18	106	0.2
FB114FAR TOMSL	3290	56	80.9	18	233	0.3
Sample +Spike (found)	---	114	112.	130	196	4.6
Sample+Spike (expected)	---	124	121.	138	209	5.0
Blank	<20	<5	<0.3	<1	<5	<0.2
QC Standard (found)	873	21	21.1	44	114	0.9
QC Standard (expected)	810	21	26.0	48	126	0.7
Repeat FB1133KIL PCH	1120	23	20.9	39	108	<0.2

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ANALYTICAL SERVICES

28-Sep-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

Attn: Rachel Gould
Project: 21843.1

PO #:

Received: 5-Sep-2001 10:31

Job: 2158539

Status: Final

Note: EQLs for vegetation samples adjusted based on moisture content.

All work recorded herein has been done in accordance with normal professional standards using accepted testing methodologies and QA/QC procedures. Philip Analytical is limited in liability to the actual cost of the pertinent analyses done unless otherwise agreed upon by contractual arrangement. Your samples will be retained by PASC for a period of 30 days following reporting or as per specific contractual arrangements.

Job approved by:

Signed: ....
Ralph Siebert, B.Sc.
Section Supervisor, Metals

ANALYTICAL SERVICES

14-May-2002

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

Attn: Rachel Gould
Project: 21843.1

Received: 5-Sep-2001 10:31
PO #: INCO

Job: 2158539 Status: Final

Revised Final Report

Soil Samples

Sample Id	As SW 7061 ppm	Se SW 7741 ppm	pH SM 4500B pH Units	LOD Grav. %	Ag ICAP ppm	Al ICAP ppm	Ba ICAP ppm	Be ICAP ppm
FB1133KIL PCHSL	7.5	1.4	6.17	23.2	<1	19600.	130	1.0
FB271FAR TOMSL	10.7	2.2	7.03	24.1	<1	11000.	167	0.6
FB271FAR ONNSL	21.7	3.2	7.04	14.9	<1	12000.	188	0.7
FB244MIT BEETSL	7.5	1.1	6.95	20.5	<1	9610.	78	0.4
FB244MIT CRTSL	5.7	0.9	7.06	28.6	<1	8410.	58	0.3
FB114FAR TOMSL	22.7	1.2	7.02	20.0	<1	7190.	78	0.4
Sample +Spike (found)	15.2	7.1	---	---	---	---	227	9.9
Sample+Spike (expected)	12.5	6.4	---	---	---	---	229	10.9
Blank	<0.2	<0.2	---	<0.0	<1	<20.0	<5	<0.2
QC Standard (found)	22.9	0.5	9.17	---	2	14000.	152	0.5
QC Standard (expected)	20.4	0.5	9.38	---	2	16300.	157	0.6
Repeat FB1133KIL PCH	7.5	1.4	6.18	23.2	<1	19300.	129	1.0

ANALYTICAL SERVICES

14-May-2002

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
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Attn: Rachel Gould
Received: 5-Sep-2001 10:31
Project: 21843.1
PO #: INCO

Job: 2158539 Status: Final

Revised Final Report

Soil Samples

Sample Id	Cd ICAP ppm	Co ICAP ppm	Cr ICAP ppm	Cu ICAP ppm	Fe ICAP ppm	Mn ICAP ppm	Mo ICAP ppm	Ni ICAP ppm
FB1133KIL PCHSL	<0.5	14	26	79	28200	599	<3	381
FB271FAR TOMSL	0.7	18	22	131	18200	317	<3	758
FB271FAR ONNSL	1.0	21	22	153	19900	301	<3	1070
FB244MIT BEETSL	0.7	10	14	57	12000	199	<3	377
FB244MIT CRTSL	<0.5	8	11	43	10400	158	<3	272
FB114FAR TOMSL	<0.5	10	14	65	13900	344	<3	374
Sample +Spike (found)	91.7	103	118	170	---	713	181	476
Sample+Spike (expected)	100.	114	125	179	---	698	200	480
Blank	<0.5	<2	<1	<1	<50	<1	<3	<2
QC Standard (found)	<0.5	24	45	30	29100	1080	<3	41
QC Standard (expected)	0.5	25	45	32	31100	1140	<3	43
Repeat FB1133KIL PCH	0.5	14	26	79	27900	595	<3	382

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Brampton, ON
L6T 5B7

Attn: Rachel Gould
Project: 21843.1
Received: 5-Sep-2001 10:31
PO #: INCO

Job: 2158539 Status: Final

Revised Final Report

Soil Samples

Sample Id	P ICAP ppm	Pb ICAP ppm	Ti ICAP ppm	V ICAP ppm	Zn ICAP ppm	Sb SW 7041 ppm
FB1133KIL PCHSL	1130	25	128	39	109	<0.2
FB271FAR TOMSL	2200	303	146	28	282	1.2
FB271FAR ONNSL	2290	294	144	29	304	1.0
FB244MIT BEETSL	1670	65	133	21	136	0.3
FB244MIT CRTSL	1370	45	142	18	106	0.2
FB114FAR TOMSL	3290	56	126	18	233	0.3
Sample +Spike (found)	---	114	203	130	196	4.6
Sample+Spike (expected)	---	124	228	138	209	5.0
Blank	<20	<5	<5	<1	<5	<0.2
QC Standard (found)	873	21	821	44	114	0.9
QC Standard (expected)	810	21	882	48	126	0.7
Repeat FB1133KIL PCH	1120	23	129	39	108	<0.2

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14-May-2002

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Job: 2158539 Status: Final

Revised: Parameter list for ICAP analysis of soils corrected.

Note: EQLs for vegetation samples adjusted based on moisture content.

All work recorded herein has been done in accordance with normal professional standards using accepted testing methodologies and QA/QC procedures. Philip Analytical is limited in liability to the actual cost of the pertinent analyses done unless otherwise agreed upon by contractual arrangement. Your samples will be retained by PASC for a period of 30 days following reporting or as per specific contractual arrangements.

Job approved by:

Signed: ....
Ralph Siebert, B.Sc.
Section Supervisor, Metals

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ANALYTICAL SERVICES

4-Oct-2001

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Attn: Rachel Gould
Project: 21843.1
PO #:
Received: 5-Sep-2001 10:35

Job: 2158540 **Status: Final**

Vegetation Samples

Sample Id	LOD Grav. %	Ag ICP/MS ppm	Al ICP/MS ppm	As ICP/MS ppm	Ba ICP/MS ppm	Be ICP/MS ppm	Bi ICP/MS ppm	Ca ICP/MS ppm
FB924LORR TOM	94.8	<0.02	7.1	<0.4	1.1	<0.2	<0.2	1500
FB1051LORR CAR	89.3	<0.01	37.9	<0.2	15.2	<0.1	<0.1	3090
FB836LORR PER	83.1	<0.01	2.8	<0.2	9.9	<0.1	<0.1	2190
Sample+Spike (found)	---	---	17.3	10.4	10.7	9.8	---	---
Sample+Spike (expected)	---	---	16.6	9.5	10.5	9.5	---	---
Blank	---	<0.01	<0.5	<0.2	<0.5	<0.1	<0.1	<50
QC Standard (found)	---	0.26	106.	10.2	10.0	0.5	9.8	517
QC Standard (expected)	---	0.30	100.	10.0	10.0	0.5	10.0	500
Repeat FB924LORR TOM	94.8	<0.02	7.2	<0.4	<1.0	<0.2	<0.2	1300

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Job: 2158540

Status: Final

Vegetation Samples

Sample Id	Cd ICP/MS ppm	Co ICP/MS ppm	Cr ICP/MS ppm	Cu ICP/MS ppm	Fe ICP/MS ppm	K ICP/MS ppm	Mg ICP/MS ppm	Mn ICP/MS ppm
FB924LORR TOM	1.69	0.40	<1.0	19.8	77	49600	2130	10.3
FB1051LORR CAR	0.10	0.04	<0.5	6.18	77	25000	1490	5.0
FB836LORR PER	0.03	0.17	<0.5	4.95	20	11500	925	6.3
Sample+Spike (found)	11.1	10.1	8.6	28.3	81	---	---	19.6
Sample+Spike (expected)	11.2	9.90	9.5	29.3	87	---	---	19.8
Blank	<0.01	<0.01	<0.5	<0.05	11	<10	<5	<0.5
QC Standard (found)	4.85	5.05	5.4	5.25	120	107	97	5.0
QC Standard (expected)	5.00	5.00	5.0	5.00	100	100	100	5.0
Repeat FB924LORR TOM	1.53	0.37	<1.0	17.8	73	47400	2060	9.6

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Job: 2158540

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Vegetation Samples

Sample Id	Mo ICP/MS ppm	Ni ICP/MS ppm	P ICP/MS ppm	Pb ICP/MS ppm	Sb ICP/MS ppm	Se ICP/MS ppm	Sr ICP/MS ppm	Ti ICP/MS ppm
FB924LORR TOM	0.7	6.6	4930	0.14	<0.10	<0.4	8.8	<2
FB1051LORR CAR	0.2	2.8	2500	0.08	<0.05	<0.2	20.4	<1
FB836LORR PER	<0.1	9.1	1910	0.13	<0.05	<0.2	15.9	<1
Sample+Spike (found)	9.8	16.3	---	9.37	10.0	9.9	---	9
Sample+Spike (expected)	10.1	16.1	---	9.64	9.50	9.5	---	10
Blank	<0.1	<0.1	<5	<0.05	<0.05	<0.2	<0.1	<1
QC Standard (found)	4.8	5.1	111	4.94	7.19	9.8	5.0	5
QC Standard (expected)	5.0	5.0	100	5.00	10.0	10.0	5.0	5
Repeat FB924LORR TOM	0.6	6.3	4890	0.10	<0.10	<0.4	8.1	<2

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4-Oct-2001

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Project: 21843.1

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Received: 5-Sep-2001 10:35

Job: 2158540

Status: Final

Vegetation Samples

Sample Id	Tl ICP/MS ppm	U ICP/MS ppm	V ICP/MS ppm	Zn ICP/MS ppm
FB924LORR TOM	<0.010	<0.02	<0.10	33.5
FB1051LORR CAR	0.009	<0.01	<0.05	18.3
FB836LORR PER	<0.005	<0.01	<0.05	7.0
Sample+Spike (found)	9.10	9.27	9.71	42.7
Sample+Spike (expected)	10.0	10.0	10.0	43.4
Blank	<0.005	<0.01	<0.05	<0.5
QC Standard (found)	9.36	0.39	4.96	30.5
QC Standard (expected)	10.0	0.40	5.00	30.9
Repeat FB924LORR TOM	<0.010	<0.02	<0.10	31.5

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Attn: Rachel Gould
Project: 21843.1 PO #:
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Job: 2158540 Status: Final

Soil Samples

Sample Id	LOD Grav. %	As SW 7061 ppm	Se SW 7741 ppm	pH SM 4500B pH Units	Ag ICAP ppm	Al ICAP ppm	Ba ICAP ppm	Be ICAP ppm
FB924LORR TOMSL	26.5	8.0	2.9	5.75	<1	33300	197	1.6
FB1051LORR CARS	13.3	3.0	0.2	6.99	<1	10000	49	0.4
FB836LORR PERSL	17.1	6.2	1.6	5.42	<1	16200	106	0.6
Sample +Spike (found)	---	16.5	7.6	---	---	---	288	10.2
Sample+Spike (expected)	---	13.2	7.9	---	---	---	296	11.6
Blank	<0.01	<0.2	<0.2	---	<1	<20	<5	<0.2
QC Standard (found)	---	21.7	0.5	9.17	2	14800	158	0.5
QC Standard (expected)	---	20.4	0.5	9.38	2	16300	157	0.6
Repeat FB924LORR TOM	26.9	8.3	2.9	5.76	<1	33700	200	1.6

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Soil Samples

Sample Id	Ca ICAP ppm	Cd ICAP ppm	Co ICAP ppm	Cr ICAP ppm	Cu ICAP ppm	Fe ICAP ppm	K ICAP ppm	Mg ICAP ppm
FB924LORR TOMSL	7980	1.6	19	36	127	23100	3340	6160
FB1051LORR CARS	4950	<0.5	6	14	15	15700	1120	3450
FB836LORR PERSL	4180	<0.5	14	20	71	20200	2110	3520
Sample +Spike (found)	---	88.9	104	125	211	---	---	---
Sample+Spike (expected)	---	101.	118	136	226	---	---	---
Blank	<50	<0.5	<2	<1	<1	<50	<100	<20
QC Standard (found)	5750	0.5	25	46	31	30500	2220	7800
QC Standard (expected)	6210	0.5	25	45	32	31100	2630	8060
Repeat FB924LORR TOM	7960	1.6	19	37	128	23500	3500	6190

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Project: 21843.1
PO #:
Received: 5-Sep-2001 10:35

Job: 2158540
Status: Final

Soil Samples

Sample Id	Mn ICAP ppm	Mo ICAP ppm	Na ICAP ppm	Ni ICAP ppm	P ICAP ppm	Pb ICAP ppm	Sr ICAP ppm	Ti ICAP ppm
FB924LORR TOMSL	223	<3	97	701	2000	32	80.8	90
FB1051LORR CARS	330	<3	70	47	691	12	20.3	121
FB836LORR PERSL	197	<3	69	522	921	26	29.9	60
Sample +Spike (found)	305	168	---	785	---	117	167.	133
Sample+Spike (expected)	323	200	---	801	---	131	180.	189
Blank	<1	<3	<50	<2	<20	<5	<0.3	<5
QC Standard (found)	1130	<3	252	43	927	23	22.0	875
QC Standard (expected)	1140	<3	337	43	810	21	26.0	882
Repeat FB924LORR TOM	224	<3	97	702	2030	35	81.7	87

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Job: 2158540
Status: Final

Soil Samples

Sample Id	V ICAP ppm	Zn ICAP ppm	Sb SW 7041 ppm
FB924LORR TOMSL	44	168	0.2
FB1051LORR CARS	23	56	<0.2
FB836LORR PERSL	29	82	0.2
Sample +Spike (found)	131	256	2.2
Sample+Spike (expected)	144	267	5.0
Blank	<1	<5	<0.2
QC Standard (found)	46	123	0.8
QC Standard (expected)	48	126	0.7
Repeat FB924LORR TOM	44	167	0.2

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Note: EQLs for vegetation adjusted for moisture content.

Note: Antimony soil spike is below control limits. These values may be biased low. Post digest spike recovery was 72%. Acceptance criteria for spike recovery is 70% - 130%.

All work recorded herein has been done in accordance with normal professional standards using accepted testing methodologies and QA/QC procedures. Philip Analytical is limited in liability to the actual cost of the pertinent analyses done unless otherwise agreed upon by contractual arrangement. Your samples will be retained by PASC for a period of 30 days following reporting or as per specific contractual arrangements.

Job approved by:

Signed: ....
Ralph Siebert, B.Sc.
Section Supervisor, Metals

PSC ANALYTICAL SERVICES

9-Oct-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
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Page: 1
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Attn: Rob Watters
Project: 21843.1
PO #:
Received: 6-Sep-2001 17:53

Job: 2158655
Status: Final

Vegetation Samples

Sample Id	LOD Grav. %	Ag ICP/MS ppm	Al ICP/MS ppm	As ICP/MS ppm	Ba ICP/MS ppm	Be ICP/MS ppm	Bi ICP/MS ppm	Ca ICP/MS ppm
FB198ELI PEAC	88.3	<0.01	4.8	<0.2	<0.5	<0.1	<0.1	591
FB198ELI PEAR	85.4	<0.01	2.1	<0.2	2.5	<0.1	<0.1	1170
FB181BEL TOM	96.2	<0.03	6.7	<0.6	<1.5	<0.3	<0.3	1580
FB298STA ONI	86.2	<0.01	4.0	<0.2	3.2	<0.1	<0.1	4240
FB92STAR ONI	83.4	<0.01	5.1	0.3	1.1	<0.1	<0.1	1200
Spike+FB198ELI PEAC	---	---	9.2	4.5	4.6	4.2	---	---
Sample+Spike (expected)	---	---	9.0	4.3	4.3	4.3	---	---
Blank	<0.01	<0.01	<0.5	<0.2	<0.5	<0.1	<0.1	<50
QC Standard (found)	---	0.35	90.5	9.2	9.6	0.4	10.1	473
QC Standard (expected)	---	0.30	100.	10.0	10.0	0.5	10.0	500
Repeat FB198ELI PEAC	88.2	<0.01	5.2	<0.2	<0.5	<0.1	<0.1	583

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9-Oct-2001

Attn: Rob Watters
Project: 21843.1
PO #:
Received: 6-Sep-2001 17:53

Job: 2158655
Status: Final

Vegetation Samples

Sample Id	Cd ICP/MS ppm	Co ICP/MS ppm	Cr ICP/MS ppm	Cu ICP/MS ppm	Fe ICP/MS ppm	K ICP/MS ppm	Mg ICP/MS ppm	Mn ICP/MS ppm
FB198ELI PEAC	0.03	0.03	<0.5	5.57	31	18500	693	3.8
FB198ELI PEAR	0.05	0.04	<0.5	4.78	24	13900	590	1.9
FB181BEL TOM	0.18	0.10	<1.5	13.4	64	49900	1700	9.6
FB298STA ONI	0.06	0.02	<0.5	7.21	22	14300	1320	7.5
FB92STAR ONI	0.11	0.02	<0.5	6.39	42	20700	1160	9.5
Spike+FB198ELI PEAC	4.15	4.25	4.6	9.87	34	---	---	8.2
Sample+Spike (expected)	4.32	4.33	4.8	9.86	35	---	---	9.1
Blank	<0.01	<0.01	<0.5	<0.05	<3	<10	<5	<0.5
QC Standard (found)	4.61	4.62	4.9	4.72	95	82	91	4.6
QC Standard (expected)	5.00	5.00	5.0	5.00	100	100	100	5.0
Repeat FB198ELI PEAC	0.04	0.03	<0.5	5.68	31	19300	734	3.9

ANALYTICAL SERVICES

9-Oct-2001

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Attn: Rob Watters
Project: 21843.1
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Received: 6-Sep-2001 17:53

Job: 2158655 Status: Final

Vegetation Samples

Sample Id	Mo ICP/MS ppm	Ni ICP/MS ppm	P ICP/MS ppm	Pb ICP/MS ppm	Sb ICP/MS ppm	Se ICP/MS ppm	Sr ICP/MS ppm	Ti ICP/MS ppm
FB198ELI PEAC	0.6	5.2	1960	0.06	<0.05	<0.2	1.7	<1
FB198ELI PEAR	0.2	2.8	1520	<0.05	<0.05	<0.2	5.1	<1
FB181BEL TOM	0.8	5.5	5320	0.41	<0.15	1.6	3.9	3
FB298STA ONI	1.1	0.7	3390	0.07	<0.05	<0.2	18.1	<1
FB92STAR ONI	1.1	5.0	3980	0.29	<0.05	<0.2	10.2	<1
Spike+FB198ELI PEAC	4.8	9.6	---	4.20	4.33	4.4	---	4
Sample+Spike (expected)	4.9	9.5	---	4.06	4.34	4.5	---	5
Blank	<0.1	<0.1	<5	<0.05	<0.05	<0.2	<0.1	<1
QC Standard (found)	4.6	4.7	100	4.90	6.96	8.9	4.7	5
QC Standard (expected)	5.0	5.0	100	5.00	10.0	10.0	5.0	5
Repeat FB198ELI PEAC	0.6	5.4	1950	0.06	<0.05	<0.2	1.7	<1

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Attn: Rob Watters
Project: 21843.1 PO #:
Received: 6-Sep-2001 17:53

Job: 2158655 Status: Final

Vegetation Samples

Sample Id	Tl ICP/MS ppm	U ICP/MS ppm	V ICP/MS ppm	Zn ICP/MS ppm
FB198ELI PEAC	<0.005	<0.01	<0.05	7.6
FB198ELI PEAR	0.012	<0.01	<0.05	5.9
FB181BEL TOM	<0.015	<0.03	<0.15	26.2
FB298STA ONI	0.010	<0.01	<0.05	22.2
FB92STAR ONI	<0.005	<0.01	<0.05	68.0
Spike+FB198ELI PEAC	4.09	4.18	4.29	10.7
Sample+Spike (expected)	4.30	4.30	4.34	11.9
Blank	<0.005	<0.01	<0.05	<0.5
QC Standard (found)	9.57	0.42	4.79	6.0
QC Standard (expected)	10.0	0.40	5.00	5.0
Repeat FB198ELI PEAC	<0.005	<0.01	<0.05	7.0

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Attn: Rob Watters
Project: 21843.1

PO #:

Received: 6-Sep-2001 17:53

Job: 2158655

Status: Final

Soil Samples

Sample Id	LOD Grav. %	As SW 7061 ppm	Se SW 7741 ppm	Sb SW 7041 ppm	pH SM 4500B pH Units	Ag ICAP ppm	Al ICAP ppm	Ba ICAP ppm
FB198ELI PEACSL	13.2	6.5	0.7	1.0	7.35	<1.0	11800	97
FB198ELI PEARSL	11.2	5.0	0.5	0.3	7.66	<1.0	11300	110
FB181BEL TOMSL	24.5	10.4	1.6	0.9	7.03	<1.0	7780	128
FB298STA ONISL	22.8	4.2	0.6	0.2	7.03	<1.0	10000	81
FB92STAR ONISL	30.9	67.5	1.1	2.5	6.86	<1.0	7780	442
Spike+FB918ELI PEACSL	---	13.0	6.7	6.0	---	---	---	199
Sample+Spike (expected)	---	11.3	5.7	6.0	---	---	---	196
Blank	<0.01	<0.2	<0.2	<0.2	---	<1.0	<20	<5
QC Standard (found)	---	22.0	0.5	0.7	9.31	2.8	15400	164
QC Standard (expected)	---	20.4	0.5	0.7	9.38	2.4	16300	157
Repeat FB918ELI PEAC	13.3	7.0	0.7	1.0	7.34	<1.0	12400	101

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Attn: Rob Watters
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Received: 6-Sep-2001 17:53

PO #:

Job: 2158655

Status: Final

Soil Samples

Sample Id	Be ICAP ppm	Cd ICAP ppm	Co ICAP ppm	Cr ICAP ppm	Cu ICAP ppm	Fe ICAP ppm	Mn ICAP ppm	Mo ICAP ppm
FB198ELI PEACSL	0.5	0.7	10	18	53	19800	426	<3
FB198ELI PEARSL	0.5	0.9	9	16	59	21100	504	<3
FB181BEL TOMSL	0.4	1.1	22	39	139	18000	307	<3
FB298STA ONISL	0.5	0.7	7	16	33	16900	365	<3
FB92STAR ONISL	0.4	2.6	12	39	152	16400	655	<3
Spike+FB918ELI PEACSL	9.4	96.2	100	116	146	---	518	183
Sample+Spike (expected)	10.5	100.	109	118	153	---	525	200
Blank	<0.2	<0.5	<2	<1	<1	<50	<1	<3
QC Standard (found)	0.5	1.2	25	47	33	34000	1130	<3
QC Standard (expected)	0.6	<0.5	25	45	32	31100	1140	<3
Repeat FB918ELI PEAC	0.6	1.2	10	19	56	20700	451	<3

ANALYTICAL SERVICES

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

9-Oct-2001

Attn: Rob Watters
Project: 21843.1 PO #:
Received: 6-Sep-2001 17:53

Job: 2158655 Status: Final

Soil Samples

Sample Id	Ni ICAP ppm	P ICAP ppm	Pb ICAP ppm	Ti ICAP ppm	V ICAP ppm	Zn ICAP ppm
FB198ELI PEACSL	294	973	71	100	22	120
FB198ELI PEARSL	312	1280	83	130	22	132
FB181BEL TOMSL	864	1410	177	104	19	288
FB298STA ONISL	99	1430	38	120	21	112
FB92STAR ONISL	519	3560	695	177	18	792
Spike+FB918ELI PEACSL	395	---	161	---	117	216
Sample+Spike (expected)	393	---	170	---	121	219
Blank	<2	<20	<5	<5	<1	<5
QC Standard (found)	45	981	24	888	45	126
QC Standard (expected)	43	810	21	882	48	126
Repeat FB918ELI PEAC	306	999	77	109	23	122

ANALYTICAL SERVICES

9-Oct-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

Attn: Rob Watters   Received: 6-Sep-2001 17:53
Project: 21843.1   PO #:

Job: 2158655   Status: Final

Note: EQLs for vegetation adjusted for moisture content.

All work recorded herein has been done in accordance with normal professional standards using accepted testing methodologies and QA/QC procedures. Philip Analytical is limited in liability to the actual cost of the pertinent analyses done unless otherwise agreed upon by contractual arrangement. Your samples will be retained by PASC for a period of 30 days following reporting or as per specific contractual arrangements.

Job approved by:

Signed: ....

Ralph Siebert, B.Sc.
Section Supervisor, Metals

ANALYTICAL SERVICES

11-Oct-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

Page: 1
Copy: 1 of 2

Attn: Rachel Gould
Project: 21843.1

Received: 6-Sep-2001 17:52
PO #:

Job: 2158654

Status: Final

Soil Samples

Sample Id	As SW 7061 ppm	Se SW 7741 ppm	LOD Grav. %	pH SM 4500B pH Units	Sb SW 7041 ppm	Ag ICAP ppm	Al ICAP ppm	Ba ICAP ppm
FB24TEN TOMSL	4.6	0.3	17.2	7.43	0.2	<1	8580	69
FB665CHI CUCSL	4.0	0.4	16.4	7.10	<0.2	<1	11900	83
FB977SIL APPSL	3.6	0.3	14.5	6.98	0.2	<1	8700	59
FB958SIL CHASL	5.9	0.3	17.0	7.30	0.5	<1	7930	76
FB755MAI ONISL	4.8	0.4	10.9	7.53	0.2	<1	9840	84
FB184KIL CELSL	9.1	2.0	17.6	6.38	0.4	1	12300	106
FB115GRA RPEPSL	6.7	1.1	16.0	7.33	0.3	<1	10600	76
Sample +Spike (found)	10.1	6.0	---	---	3.5	---	---	165
Sample+Spike (expected)	9.6	5.3	---	---	5.0	---	---	169
Blank	<0.2	<0.2	<0.01	---	<0.2	<1	30	<5
QC Standard (found)	22.0	0.6	---	9.10	0.7	3	15200	153
QC Standard (expected)	20.4	0.5	---	9.38	0.7	2	16300	157
Repeat FB24TEN TOMSL	4.6	0.3	17.2	7.42	0.2	<1	8420	69

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ANALYTICAL SERVICES

11-Oct-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

Attn: Rachel Gould
Project: 21843.1

PO #:

Received: 6-Sep-2001 17:52

Job: 2158654

Status: Final

Soil Samples

Sample Id	Be ICAP ppm	Cd ICAP ppm	Co ICAP ppm	Cr ICAP ppm	Cu ICAP ppm	Fe ICAP ppm	Mn ICAP ppm	Mo ICAP ppm
FB24TEN TOMSL	0.4	<0.5	6	18	22	13200	261	<3
FB665CHI CUCSL	0.5	<0.5	9	19	36	21200	313	<3
FB977SIL APPSL	0.4	<0.5	6	14	16	16300	318	<3
FB958SIL CHASL	0.4	0.8	7	13	23	13400	360	<3
FB755MAI ONISL	0.6	<0.5	10	15	47	19500	463	<3
FB184KIL CELSL	0.7	0.8	19	25	110	19200	500	<3
FB115GRA RPEPSL	0.5	0.8	14	16	82	18000	542	<3
Sample +Spike (found)	9.5	92.6	96	106	111	---	357	178
Sample+Spike (expected)	10.4	100.	106	117	121	---	361	200
Blank	<0.2	<0.5	<2	<1	<1	<50	<1	<3
QC Standard (found)	0.5	0.5	26	47	32	30900	1130	<3
QC Standard (expected)	0.6	<0.5	25	45	32	31100	1140	<3
Repeat FB24TEN TOMSL	0.4	<0.5	6	14	21	13300	265	<3

PSC

ANALYTICAL SERVICES

BEAK INTERNATIONAL INC.
14 Abacus Road
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11-Oct-2001

Attn: Rachel Gould
Project: 21843.1

PO #:

Received: 6-Sep-2001 17:52

Job: 2158654

Status: Final

Soil Samples

Sample Id	Ni ICAP ppm	P ICAP ppm	Pb ICAP ppm	Ti ICAP ppm	V ICAP ppm	Zn ICAP ppm
FB24TEN TOMSL	46	1030	27	104	20	103
FB665CHI CUCSL	137	1100	25	81	26	91
FB977SIL APPSL	59	900	19	77	21	60
FB958SIL CHASL	50	1150	54	99	19	101
FB755MAI ONISL	191	854	29	105	22	92
FB184KIL CELSL	815	2430	50	84	27	144
FB115GRA RPEPSL	577	1300	29	107	22	106
Sample +Spike (found)	140	---	121	---	113	194
Sample+Spike (expected)	145	---	127	---	120	202
Blank	<2	<20	<5	<5	<1	<5
QC Standard (found)	43	964	26	937	47	119
QC Standard (expected)	43	810	21	882	48	126
Repeat FB24TEN TOMSL	47	1020	29	100	21	100

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ANALYTICAL SERVICES

BEAK INTERNATIONAL INC.
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Brampton, ON
L6T 5B7

Attn: Rachel Gould
Project: 21843.1 PO #:
Received: 6-Sep-2001 17:52

Job: 2158654 Status: Final

Vegetation Samples

Sample Id	LOD Grav. %	Ag ICP/MS ppm	Al ICP/MS ppm	As ICP/MS ppm	Ba ICP/MS ppm	Be ICP/MS ppm	Bi ICP/MS ppm	Ca ICP/MS ppm
FB24TEN TOM	95.4	<0.02	18.8	<0.4	1.8	<0.2	<0.2	2320
FB665CHI CUC	95.6	<0.02	6.1	<0.4	1.7	<0.2	<0.2	4220
FB977SIL APP	83.8	<0.01	1.6	<0.2	1.2	<0.2	<0.1	411
FB958SIL CHA	94.1	<0.02	111.	<0.4	16.0	<0.2	<0.2	10900
FB755MAI ONI	93.4	<0.02	53.9	<0.4	6.5	<0.2	<0.2	7780
FB184KIL CEL	95.1	<0.02	27.2	<0.4	5.2	<0.2	<0.2	9580
FB115GRA RPEP	91.8	<0.01	14.3	<0.2	1.2	<0.1	<0.1	1300
Sample+Spike (found)	---	---	26.1	11.0	12.6	10.4	---	---
Sample+Spike (expected)	---	---	29.6	10.8	12.6	10.8	---	---
Blank	---	<0.01	<0.5	<0.2	<0.5	<0.1	<0.1	<50
QC Standard (found)	---	0.35	90.5	9.2	9.6	0.4	10.1	473
QC Standard (expected)	---	0.30	100.	10.0	10.0	0.5	10.0	500
Repeat FB24TEN TOM	95.8	<0.02	17.3	<0.4	2.0	<0.2	<0.2	2360

ANALYTICAL SERVICES

BEAK INTERNATIONAL INC.
14 Abacus Road
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Attn: Rachel Gould
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PO #:
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Job: 2158654
Status: Final

Vegetation Samples

Sample Id	Cd ICP/MS ppm	Co ICP/MS ppm	Cr ICP/MS ppm	Cu ICP/MS ppm	Fe ICP/MS ppm	K ICP/MS ppm	Mg ICP/MS ppm	Mn ICP/MS ppm
FB24TEN TOM	0.42	0.11	<1.0	15.1	62	52700	2200	11.9
FB665CHI CUC	0.12	0.04	<1.0	12.3	58	43000	4120	7.3
FB977SIL APP	<0.01	0.04	<0.5	3.43	10	7600	400	2.8
FB958SIL CHA	0.45	0.09	<1.0	15.8	174	88100	11100	41.3
FB755MAI ONI	0.08	0.05	<1.0	12.2	97	27000	1690	11.6
FB184KIL CEL	0.40	0.05	<1.0	3.73	58	67500	2550	11.6
FB115GRA RPEP	0.18	0.07	<0.5	11.4	75	31100	1290	9.6
Sample+Spike (found)	10.6	10.7	11.4	25.4	---	---	---	23.2
Sample+Spike (expected)	11.2	10.9	10.8	25.9	---	---	---	22.7
Blank	<0.01	<0.01	<0.5	<0.05	<3	<10	<5	<0.5
QC Standard (found)	4.61	4.62	4.9	4.72	95	82	91	4.6
QC Standard (expected)	5.00	5.00	5.0	5.00	100	100	100	5.0
Repeat FB24TEN TOM	0.48	0.14	<1.0	16.7	73	56500	2460	13.8

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11-Oct-2001

Attn: Rachel Gould
Project: 21843.1

PO #:

Received: 6-Sep-2001 17:52

Job: 2158654

Status: Final

Vegetation Samples

Sample Id	Mo ICP/MS ppm	Ni ICP/MS ppm	P ICP/MS ppm	Pb ICP/MS ppm	Sb ICP/MS ppm	Se ICP/MS ppm	Sr ICP/MS ppm	Ti ICP/MS ppm
FB24TEN TOM	0.8	0.9	5820	0.20	<0.10	<0.4	6.6	<2
FB665CHI CUC	3.1	2.8	5480	0.19	0.13	<0.4	18.5	<2
FB977SIL APP	<0.1	<0.1	1020	<0.05	<0.05	<0.2	3.9	<1
FB958SIL CHA	0.9	1.3	5810	0.40	<0.10	<0.4	60.2	3
FB755MAI ONI	0.5	3.5	4640	0.13	<0.10	<0.4	43.7	<2
FB184KIL CEL	<0.2	8.8	6650	0.13	<0.10	<0.4	32.7	<2
FB115GRA RPEP	0.2	14.1	3170	0.08	<0.05	<0.2	14.0	<1
Sample+Spike (found)	10.9	11.4	---	10.3	10.6	10.4	---	9
Sample+Spike (expected)	11.6	11.7	---	11.0	10.8	10.8	---	11
Blank	<0.1	<0.1	<5	<0.05	<0.05	<0.2	<0.1	<1
QC Standard (found)	4.6	4.7	100	4.90	0.05	8.9	4.7	5
QC Standard (expected)	5.0	5.0	100	5.00	0.05	10.0	5.0	5
Repeat FB24TEN TOM	0.9	1.0	6330	0.10	<0.10	<0.4	6.9	<2

ANALYTICAL SERVICES

11-Oct-2001

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Attn: Rachel Gould
Project: 21843.1
PO #:
Received: 6-Sep-2001 17:52

Job: 2158654
Status: Final

Vegetation Samples

Sample Id	Tl ICP/MS ppm	U ICP/MS ppm	V ICP/MS ppm	Zn ICP/MS ppm
FB24TEN TOM	<0.010	<0.02	0.12	33.5
FB665CHI CUC	<0.010	<0.02	<0.10	41.0
FB977SIL APP	<0.005	<0.01	<0.05	2.0
FB958SIL CHA	<0.010	0.02	0.28	54.0
FB755MAI ONI	<0.010	<0.02	0.16	33.2
FB184KIL CEL	<0.010	<0.02	0.14	25.8
FB115GRA RPEP	0.006	<0.01	0.08	19.6
Sample+Spike (found)	10.3	10.2	11.0	43.2
Sample+Spike (expected)	10.8	10.8	10.9	44.3
Blank	<0.005	<0.01	<0.05	<0.5
QC Standard (found)	9.57	0.42	4.79	28.5
QC Standard (expected)	10.0	0.40	5.00	29.0
Repeat FB24TEN TOM	0.032	0.03	0.17	36.1

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ANALYTICAL SERVICES

11-Oct-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
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Attn: Rachel Gould
Project: 21843.1 PO #: Received: 6-Sep-2001 17:52

Job: 2158654 Status: Final

Note: Vegetation EQLs adjusted for moisture.

All work recorded herein has been done in accordance with normal professional standards using accepted testing methodologies and QA/QC procedures. Philip Analytical is limited in liability to the actual cost of the pertinent analyses done unless otherwise agreed upon by contractual arrangement. Your samples will be retained by PASC for a period of 30 days following reporting or as per specific contractual arrangements.

Job approved by:

Signed: ....

Ralph Siebert, B.Sc.
Section Supervisor, Metals

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ANALYTICAL SERVICES

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
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4-Oct-2001

Attn: Rachel Gould
Project: 21843.1

PO #:

Received: 6-Sep-2001 17:51

Job: 2158653

Status: Final

Vegetation Samples

Sample Id	LOD Grav. %	Ag ICP/MS ppm	Al ICP/MS ppm	As ICP/MS ppm	Ba ICP/MS ppm	Be ICP/MS ppm	Bi ICP/MS ppm
FB771WEA CAR	91.9	0.03	80.8	<0.4	4.4	<0.2	<0.2
FB541KIL CAB	94.4	<0.02	3.2	<0.4	18.5	<0.2	<0.2
FB134FER PEP	90.0	<0.01	4.7	<0.2	1.9	<0.1	<0.1
FB134FER CAR	92.1	0.01	13.6	<0.2	15.9	<0.1	<0.1
FB261CLA POT	81.9	<0.01	4.1	<0.2	0.6	<0.1	<0.1
FB159CHR TOM	96.4	<0.03	8.1	<0.6	<2.0	<0.3	<0.3
FB159CHR TOM+Spike (found)	---	---	22.7	15.0	16.5	14.3	---
Sample+Spike (expected)	---	---	21.8	13.7	13.7	13.7	---
Blank	---	<0.01	<0.5	<0.2	<0.5	<0.1	<0.1
QC Standard (found)	---	0.21	103.	9.8	10.7	0.5	10.7
QC Standard (expected)	---	0.30	100.	10.0	10.0	0.5	10.0
Repeat FB159CHR TOM	---	<0.03	6.9	<0.6	<2.0	<0.3	<0.3

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ANALYTICAL SERVICES

4-Oct-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
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Attn: Rachel Gould
Project: 21843.1
PO #:
Received: 6-Sep-2001 17:51

Job: 2158653 Status: Final

Vegetation Samples

Sample Id	Ca ICP/MS ppm	Cd ICP/MS ppm	Co ICP/MS ppm	Cr ICP/MS ppm	Cu ICP/MS ppm	Fe ICP/MS ppm	K ICP/MS ppm
FB771WEA CAR	3430	0.36	0.05	<1.0	10.5	130	47500
FB541KIL CAB	20400	0.14	0.07	<1.0	7.08	76	45400
FB134FER PEP	2340	0.22	0.10	<0.5	11.0	95	32800
FB134FER CAR	3850	0.48	0.04	<0.5	12.3	69	39500
FB261CLA POT	493	0.07	0.02	<0.5	6.93	27	21600
FB159CHR TOM	1190	0.43	0.08	<2.0	19.3	78	73500
FB159CHR TOM+Spike (found)	---	14.2	14.1	13.3	33.2	88	---
Sample+Spike (expected)	---	14.1	13.8	13.7	33.0	92	---
Blank	<50	<0.01	<0.01	<0.5	<0.05	6	<10
QC Standard (found)	491	4.86	4.92	5.0	5.28	116	105
QC Standard (expected)	500	5.00	5.00	5.0	5.00	100	100
Repeat FB159CHR TOM	1130	0.42	0.08	<2.0	18.2	79	71300

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ANALYTICAL SERVICES

4-Oct-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
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Attn: Rachel Gould
Project: 21843.1 PO #:

Received: 6-Sep-2001 17:51

Job: 2158653 Status: Final

Vegetation Samples

Sample Id	Mg ICP/MS ppm	Mn ICP/MS ppm	Mo ICP/MS ppm	Ni ICP/MS ppm	P ICP/MS ppm	Pb ICP/MS ppm	Sb ICP/MS ppm
FB771WEA CAR	2410	7.9	0.4	1.4	6810	0.23	<0.20
FB541KIL CAB	3090	15.3	7.4	6.3	6710	<0.10	<0.10
FB134FER PEP	2100	14.4	0.5	19.6	3700	0.15	<0.05
FB134FER CAR	1930	4.5	0.5	5.5	5550	2.06	<0.05
FB261CLA POT	1190	2.4	0.6	0.9	2830	0.04	<0.05
FB159CHR TOM	3240	16.7	1.3	7.4	6980	<0.20	<0.20
FB159CHR TOM+Spike (found)	---	30.0	14.4	21.3	---	13.9	14.1
Sample+Spike (expected)	---	30.4	14.9	21.1	---	13.7	13.7
Blank	<5	<0.5	<0.1	<0.1	6	<0.05	<0.05
QC Standard (found)	99	4.9	4.7	5.0	110	5.09	6.30
QC Standard (expected)	100	5.0	5.0	5.0	100	5.00	5.00
Repeat FB159CHR TOM	3120	15.5	1.2	7.1	6660	<0.20	<0.20

ANALYTICAL SERVICES

BEAK INTERNATIONAL INC.
14 Abacus Road
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4-Oct-2001

Attn: Rachel Gould
Project: 21843.1
PO #:
Received: 6-Sep-2001 17:51

Job: 2158653
Status: Final

Vegetation Samples

Sample Id	Se ICP/MS ppm	Sr ICP/MS ppm	Ti ICP/MS ppm	Tl ICP/MS ppm	U ICP/MS ppm	V ICP/MS ppm	Zn ICP/MS ppm
FB771WEA CAR	<0.4	20.3	<2	<0.010	<0.02	0.22	29.3
FB541KIL CAB	<0.4	345.	<1	0.022	<0.02	<0.10	37.9
FB134FER PEP	0.5	9.6	<1	0.024	<0.01	<0.05	43.8
FB134FER CAR	0.4	41.4	<1	0.068	<0.01	<0.05	63.7
FB261CLA POT	<0.2	2.5	<1	<0.005	<0.01	<0.05	19.6
FB159CHR TOM	<0.6	3.3	<2	<0.020	<0.03	<0.20	32.7
FB159CHR TOM+Spike (found)	14.5	---	14	14.4	14.7	13.5	47.0
Sample+Spike (expected)	13.7	---	14	13.7	13.7	1.37	46.4
Blank	<0.2	<0.1	<1	<0.005	<0.01	<0.05	<0.5
QC Standard (found)	9.7	5.0	5	10.6	0.45	4.78	6.0
QC Standard (expected)	10.0	5.0	5	10.0	0.40	5.00	10.0
Repeat FB159CHR TOM	<0.6	3.1	<2	<0.015	<0.03	<0.20	31.9

ANALYTICAL SERVICES

4-Oct-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

Attn: Rachel Gould
Project: 21843.1
PO #:
Received: 6-Sep-2001 17:51

Job: 2158653
Status: Final

Soil Samples

Sample Id	LOD Grav. %	As SW 7061 ppm	Se SW 7741 ppm	Sb SW 7041 ppm	pH SM 4500B pH Units	Ag ICAP ppm	Al ICAP ppm
FB771WEA CARSL	21.6	4.8	0.5	<0.2	7.00	<1.0	10800
FB541KIL CABSL	24.1	4.8	0.6	0.3	6.96	<1.0	10800
FB134FER PEPSL	15.7	25.2	2.3	2.8	6.54	<1.0	7980
FB134FER CARSL	27.0	20.7	2.2	1.7	6.84	1.3	8490
FB261CLA POTSL	33.0	5.0	0.5	<0.2	7.19	<1.0	9520
FB159CHR TOMSL	31.4	4.0	0.3	<0.2	7.57	<1.0	7540
FB771WEA CARSL+Spike (found)	---	11.3	6.4	5.2	---	---	---
Sample+Spike (expected)	---	9.8	5.5	5.0	---	---	---
Blank	<0.0	<0.2	<0.2	<0.2	---	<1.0	<20
QC Standard (found)	---	22.0	0.5	0.7	9.31	2.8	15400
QC Standard (expected)	---	20.4	0.5	0.7	9.38	2.4	16300
Repeat FB771WEA CARS	21.3	4.9	0.5	<0.2	6.99	<1.0	11100

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ANALYTICAL SERVICES

4-Oct-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

Attn: Rachel Gould
Project: 21843.1
PO #:
Received: 6-Sep-2001 17:51

Job: 2158653 Status: Final

Soil Samples

Sample Id	Ba ICAP ppm	Be ICAP ppm	Cd ICAP ppm	Co ICAP ppm	Cr ICAP ppm	Cu ICAP ppm	Fe ICAP ppm
FB771WEA CARSL	89	0.6	0.9	8	18	32	21900
FB541KIL CABSL	94	0.5	0.6	9	22	57	19400
FB134FER PEPSL	235	0.5	2.3	24	27	196	27900
FB134FER CARSL	266	0.4	2.6	23	25	182	25000
FB261CLA POTSL	84	0.4	0.6	8	15	44	18000
FB159CHR TOMSL	74	0.3	0.5	7	11	48	16200
FB771WEA CARSL+Spike (found)	197	9.7	98.7	101	116	132	---
Sample+Spike (expected)	189	10.5	100.	108	117	131	---
Blank	<5	<0.2	<0.5	<2	<1	<1	<50
QC Standard (found)	164	0.5	1.2	25	47	33	34000
QC Standard (expected)	157	0.6	<0.5	25	45	32	31100
Repeat FB771WEA CARS	92	0.5	0.9	9	18	33	22300

ANALYTICAL SERVICES

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

4-Oct-2001

Attn: Rachel Gould
Project: 21843.1 PO #:
Received: 6-Sep-2001 17:51

Job: 2158653 Status: Final

Soil Samples

Sample Id	Mn ICAP ppm	Mo ICAP ppm	Ni ICAP ppm	P ICAP ppm	Pb ICAP ppm	Ti ICAP ppm	V ICAP ppm
FB771WEA CARSL	481	<3	107	2030	34	128	24
FB541KIL CABSL	329	<3	195	1720	28	144	22
FB134FER PEPSL	492	<3	1330	2620	480	121	20
FB134FER CARSL	478	<3	1230	2440	411	114	20
FB261CLA POTSL	381	<3	176	1630	28	117	21
FB159CHR TOMSL	447	<3	184	923	19	104	17
FB771WEA CARSL+Spike (found)	584	188	209	---	124	---	122
Sample+Spike (expected)	580	200	207	---	134	---	124
Blank	<1	<3	<2	<20	<5	<5	<1
QC Standard (found)	1130	<3	45	981	24	888	45
QC Standard (expected)	1140	<3	43	810	21	882	48
Repeat FB771WEA CARS	495	<3	111	2120	47	131	25

ANALYTICAL SERVICES

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

4-Oct-2001

Attn: Rachel Gould
Project: 21843.1   PO #:

Received: 6-Sep-2001 17:51

Job: 2158653   Status: Final

Soil Samples

Sample Id	Zn ICAP ppm
FB771WEA CARSL	96
FB541KIL CABSL	98
FB134FER PEPSL	560
FB134FER CARSL	558
FB261CLA POTSL	118
FB159CHR TOMSL	114
FB771WEA CARSL+Spike (found)	198
Sample+Spike (expected)	195
Blank	<5
QC Standard (found)	126
QC Standard (expected)	126
Repeat FB771WEA CARS	99

ANALYTICAL SERVICES

4-Oct-2001

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Attn: Rachel Gould
Project: 21843.1 PO #: Received: 6-Sep-2001 17:51

Job: 2158653 Status: Final

Note: Vegetation EQLs adjusted for moisture content.

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Job approved by:

Signed: ....

Ralph Siebert, B.Sc.
Section Supervisor, Metals

ANALYTICAL SERVICES

18-Oct-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
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Page: 1
Copy: 1 of 2

Attn: Rob Walters
Project: 21843

Received: 10-Sep-2001 18:05

PO #:

Job: 2158793

Status: Final

Vegetation Samples

Sample Id	LOD Grav. %	Ag ICP/MS ppm	Al ICP/MS ppm	As ICP/MS ppm	Ba ICP/MS ppm	Be ICP/MS ppm	Bi ICP/MS ppm	Ca ICP/MS ppm
FB43COL ONI	91.2	<0.01	7.8	<0.2	4.0	<0.1	<0.1	3210
FB491BEL PEAR	87.1	0.01	1.2	<0.2	1.5	<0.1	<0.1	543
FB166JOH CAR	90.0	<0.01	11.2	<0.2	7.9	<0.1	<0.1	3450
FB491BEL PEAR+Spike	---	---	5.1	4.1	5.4	3.7	---	---
Sample+Spike (expected)	---	---	5.1	4.0	5.3	3.9	---	---
Blank	<0.01	<0.01	<0.5	<0.2	<0.5	<0.1	<0.1	<50
QC Standard (found)	---	0.32	86.1	8.6	8.7	0.5	9.1	453
QC Standard (expected)	---	0.30	100.	10.0	10.0	5.0	10.0	500
Repeat FB491BEL PEAR	87.1	<0.01	1.8	<0.2	1.4	<0.1	<0.1	569

ANALYTICAL SERVICES

BEAK INTERNATIONAL INC.
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18-Oct-2001

Attn: Rob Walters
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PO #:

Received: 10-Sep-2001 18:05

Job: 2158793

Status: Final

Vegetation Samples

Sample Id	Cd ICP/MS ppm	Co ICP/MS ppm	Cr ICP/MS ppm	Cu ICP/MS ppm	Fe ICP/MS ppm	K ICP/MS ppm	Mg ICP/MS ppm	Mn ICP/MS ppm
FB43COL ONI	0.09	0.03	<0.5	8.61	37	24000	1270	7.5
FB491BEL PEAR	0.04	0.06	<0.5	4.14	16	7440	489	2.2
FB166JOH CAR	0.14	0.05	<0.5	6.94	39	33400	1200	5.1
FB491BEL PEAR+Spike	3.73	3.89	4.0	8.11	20	---	---	6.3
Sample+Spike (expected)	3.90	3.90	3.9	8.00	20	---	---	6.0
Blank	<0.01	<0.01	<0.5	<0.05	<5	<10	<5	<0.5
QC Standard (found)	4.18	4.31	4.6	4.43	97	84	86	4.5
QC Standard (expected)	5.00	5.00	5.0	5.00	100	100	100	5.0
Repeat FB491BEL PEAR	0.05	0.06	<0.5	4.52	17	7580	492	2.4

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BEAK INTERNATIONAL INC.
14 Abacus Road
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18-Oct-2001

Attn: Rob Walters
Project: 21843

PO #:

Received: 10-Sep-2001 18:05

Job: 2158793

Status: Final

Vegetation Samples

Sample Id	Mo ICP/MS ppm	Ni ICP/MS ppm	P ICP/MS ppm	Pb ICP/MS ppm	Sb ICP/MS ppm	Se ICP/MS ppm	Sr ICP/MS ppm	Ti ICP/MS ppm
FB43COL ONI	0.6	11.9	5820	0.08	<0.05	0.5	19.4	<1
FB491BEL PEAR	<0.1	1.5	919	<0.05	<0.05	<0.2	2.2	<1
FB166JOH CAR	0.2	5.4	4620	0.10	<0.05	<0.2	17.6	<1
FB491BEL PEAR+Spike	3.9	5.4	---	3.92	3.95	4.0	---	4
Sample+Spike (expected)	3.9	5.4	---	3.90	3.90	3.9	---	4
Blank	<0.1	<0.1	<5	<0.05	<0.05	<0.2	<0.1	<1
QC Standard (found)	4.3	4.4	93	4.53	5.47	8.6	4.4	4
QC Standard (expected)	5.0	5.0	100	5.00	10.0	10.0	5.0	5
Repeat FB491BEL PEAR	<0.1	1.6	906	<0.05	<0.05	<0.2	2.2	<1

ANALYTICAL SERVICES

18-Oct-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
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Attn: Rob Walters
Project: 21843

PO #:

Received: 10-Sep-2001 18:05

Job: 2158793

Status: Final

Vegetation Samples

Sample Id	Tl ICP/MS ppm	U ICP/MS ppm	V ICP/MS ppm	Zn ICP/MS ppm
FB43COL ONI	0.006	<0.01	<0.05	50.9
FB491BEL PEAR	0.041	<0.01	<0.05	5.3
FB166JOH CAR	<0.005	<0.01	0.08	25.0
FB491BEL PEAR+Spike	3.81	3.83	3.96	9.2
Sample+Spike (expected)	3.90	3.90	3.90	9.2
Blank	<0.005	<0.01	<0.05	<0.5
QC Standard (found)	8.78	0.38	4.57	5.8
QC Standard (expected)	10.0	0.40	5.00	5.0
Repeat FB491BEL PEAR	0.041	<0.01	<0.05	5.3

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14 Abacus Road
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18-Oct-2001

Attn: Rob Walters
Project: 21843 PO #:

Received: 10-Sep-2001 18:05

Job: 2158793 Status: Final

Soil Samples

Sample Id	LOD Grav. %	As SW 7061 ppm	Se SW 7741 ppm	Sb SW 7041 ppm	pH SM 4500B pH Units	Ag ICAP ppm	Al ICAP ppm	Ba ICAP ppm
FB43COL ONISL	20.0	6.8	1.0	0.6	7.00	<1.0	10400	96
FB491BEL PEARLS	13.7	5.4	1.1	0.2	6.56	<1.0	16800	96
FB166JOH CARSL	20.7	8.8	1.5	0.3	6.64	<1.0	15700	127
FB43COL ONISL+Spike	---	13.0	6.4	8.0	---	---	---	195
Sample+Spike (expected)	---	11.8	6.0	10.6	---	---	---	196
Blank	<0.01	<0.2	<0.2	<0.2	---	<1.0	28	<5
QC Standard (found)	---	19.2	0.5	0.6	9.08	2.4	16300	161
QC Standard (expected)	---	20.4	0.6	0.7	9.38	2.4	16300	157
Repeat FB43COL ONISL	19.5	7.2	0.9	0.6	6.98	<1.0	10200	94

ANALYTICAL SERVICES

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18-Oct-2001

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Project: 21843

PO #:

Received: 10-Sep-2001 18:05

Job: 2158793

Status: Final

Soil Samples

Sample Id	Be ICAP ppm	Cd ICAP ppm	Co ICAP ppm	Cr ICAP ppm	Cu ICAP ppm	Fe ICAP ppm	Mn ICAP ppm	Mo ICAP ppm
FB43COL ONISL	0.4	1.1	15	16	95	17800	391	<3
FB491BEL PEARLS	0.8	1.3	13	23	62	21500	285	<3
FB166JOH CARSL	0.7	1.3	19	22	106	23500	323	<3
FB43COL ONISL+Spike	8.7	90.6	99	104	181	---	461	165
Sample+Spike (expected)	10.4	101.	114	115	195	---	490	200
Blank	<0.2	<0.5	<2	<1	<1	<50	<1	<3
QC Standard (found)	0.5	1.3	24	48	32	32900	1090	<3
QC Standard (expected)	0.6	<0.5	25	45	32	31100	1140	<3
Repeat FB43COL ONISL	0.4	0.7	14	16	92	17600	381	<3

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18-Oct-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
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Attn: Rob Walters
Project: 21843
PO #:
Received: 10-Sep-2001 18:05

Job: 2158793 Status: Final

Soil Samples

Sample Id	Ni ICAP ppm	P ICAP ppm	Pb ICAP ppm	Ti ICAP ppm	V ICAP ppm	Zn ICAP ppm
FB43COL ONISL	727	1150	46	39	21	151
FB491BEL PEARLS	352	1170	22	39	30	98
FB166JOH CARSL	679	2540	42	22	27	135
FB43COL ONISL+Spike	751	---	124	---	107	236
Sample+Spike (expected)	827	---	146	---	121	251
Blank	<2	<20	<5	<5	<1	<5
QC Standard (found)	44	882	22	828	45	125
QC Standard (expected)	43	810	21	882	48	126
Repeat FB43COL ONISL	680	1130	44	56	20	145

PSC

ANALYTICAL SERVICES

18-Oct-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
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Attn: Rob Walters
Project: 21843

PO #:

Received: 10-Sep-2001 18:05

Job: 2158793

Status: Final

All work recorded herein has been done in accordance with normal professional standards using accepted testing methodologies and QA/QC procedures. Philip Analytical is limited in liability to the actual cost of the pertinent analyses done unless otherwise agreed upon by contractual arrangement. Your samples will be retained by PASC for a period of 30 days following reporting or as per specific contractual arrangements.

Job approved by:

Signed: ....

Ralph Siebert, B.Sc.
Section Supervisor, Metals

PSC

ANALYTICAL SERVICES

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

11-Oct-2001

Attn: Rachel Gould
Project: 21843.1
PO #:
Received: 10-Sep-2001 18:05

Job: 2158792
Status: Final

Vegetation Samples

Sample Id	LOD Grav. %	Ag ICP/MS ppm	Al ICP/MS ppm	As ICP/MS ppm	Ba ICP/MS ppm	Be ICP/MS ppm	Bi ICP/MS ppm	Ca ICP/MS ppm
FB1288KIL HPEP	91.6	<0.01	4.4	<0.2	0.6	<0.1	<0.1	1670
FBWAIN BEET	92.5	<0.01	109.	<0.2	16.0	<0.1	<0.1	4510
FBWAIN PEPP	89.4	<0.01	5.3	<0.2	1.2	<0.1	<0.1	1480
FBWAIN PCH	90.1	<0.01	7.0	<0.2	0.6	<0.1	<0.1	511
FB11288KIL HPEP+Spike	---	---	10.9	6.2	6.6	5.9	---	---
Sample+Spike (expected)	---	---	10.4	6.0	6.6	6.0	---	---
Blank	<0.01	<0.01	<0.5	<0.2	<0.5	<0.1	<0.1	<50
QC Standard (found)	---	0.29	96.7	9.8	9.9	0.5	10.2	568
QC Standard (expected)	---	0.30	100.	10.0	10.0	0.5	10.0	500
Repeat FB1288KIL HPEP	91.2	<0.01	5.5	<0.2	0.6	<0.1	<0.1	1520

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ANALYTICAL SERVICES

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11-Oct-2001

Attn: Rachel Gould
Project: 21843.1
PO #:
Received: 10-Sep-2001 18:05

Job: 2158792
Status: Final

Vegetation Samples

Sample Id	Cd ICP/MS ppm	Co ICP/MS ppm	Cr ICP/MS ppm	Cu ICP/MS ppm	Fe ICP/MS ppm	K ICP/MS ppm	Mg ICP/MS ppm	Mn ICP/MS ppm
FB1288KIL HPEP	0.23	0.10	<0.5	14.9	63	31800	2340	11.2
FBWAIN BEET	0.28	0.07	<0.5	17.9	172	56000	4580	19.8
FBWAIN PEPP	0.47	0.11	<0.5	11.3	66	28500	1480	13.9
FBWAIN PCH	0.02	<0.01	<0.5	5.57	22	14700	714	5.1
FB11288KIL HPEP+Spike	6.06	5.94	6.1	20.7	---	---	---	16.4
Sample+Spike (expected)	6.22	6.10	6.0	20.9	---	---	---	17.2
Blank	<0.01	<0.01	<0.5	<0.05	4	<10	<5	<0.5
QC Standard (found)	4.85	4.80	5.1	4.98	101	90	94	5.0
QC Standard (expected)	5.00	5.00	5.0	5.00	100	100	100	5.0
Repeat FB1288KIL HPEP	0.21	0.10	<0.5	14.3	54	29800	2230	10.6

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ANALYTICAL SERVICES

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

11-Oct-2001

Attn: Rachel Gould
Project: 21843.1
PO #:
Received: 10-Sep-2001 18:05

Job: 2158792
Status: Final

Vegetation Samples

Sample Id	Mo ICP/MS ppm	Ni ICP/MS ppm	P ICP/MS ppm	Pb ICP/MS ppm	Sb ICP/MS ppm	Se ICP/MS ppm	Sr ICP/MS ppm	Ti ICP/MS ppm
FB1288KIL HPEP	0.3	21.9	3790	<0.05	<0.05	<0.2	4.1	<1
FBWAIN BEET	0.2	0.3	4920	0.16	<0.05	0.4	17.4	3
FBWAIN PEPP	<0.1	0.9	3480	<0.05	<0.05	<0.2	3.6	<1
FBWAIN PCH	<0.1	0.5	1510	<0.05	<0.05	<0.2	1.9	<1
FB11288KIL HPEP+Spike	6.2	27.2	---	5.91	6.14	6.0	---	6
Sample+Spike (expected)	6.3	27.8	---	6.00	6.00	6.0	---	6
Blank	<0.1	<0.1	<5	<0.05	<0.05	<0.2	<0.1	<1
QC Standard (found)	4.8	5.0	102	5.09	0.05	9.3	4.9	5
QC Standard (expected)	5.0	5.0	100	5.00	0.05	10.0	5.0	5
Repeat FB1288KIL HPEP	0.2	20.2	3580	0.09	<0.05	<0.2	3.7	<1

ANALYTICAL SERVICES

11-Oct-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
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Attn: Rachel Gould
Project: 21843.1
PO #:
Received: 10-Sep-2001 18:05

Job: 2158792 Status: Final

Vegetation Samples

Sample Id	Tl ICP/MS ppm	U ICP/MS ppm	V ICP/MS ppm	Zn ICP/MS ppm
FB1288KIL HPEP	0.033	<0.01	<0.05	29.6
FBWAIN BEET	0.038	0.02	0.25	46.1
FBWAIN PEPP	0.026	<0.01	<0.05	24.9
FBWAIN PCH	<0.005	<0.01	0.06	5.8
FB11288KIL HPEP+Spike	5.91	5.98	6.16	35.1
Sample+Spike (expected)	6.03	6.00	6.00	35.5
Blank	<0.005	<0.01	<0.05	<0.5
QC Standard (found)	9.87	0.43	5.08	28.5
QC Standard (expected)	10.0	0.40	5.00	29.1
Repeat FB1288KIL HPEP	0.031	<0.01	0.05	28.1

ANALYTICAL SERVICES

BEAK INTERNATIONAL INC.
14 Abacus Road
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11-Oct-2001

Attn: Rachel Gould
Project: 21843.1 PO #:
Received: 10-Sep-2001 18:05

Job: 2158792 Status: Final

Soil Samples

Sample Id	LOD Grav. %	As SW 7061 ppm	Se SW 7741 ppm	Sb SW 7041 ppm	pH SM 4500B pH Units	Ag ICAP ppm	Al ICAP ppm	Ba ICAP ppm
FB1288KIL HPEPS	16.9	6.4	1.2	<0.2	7.21	<1	15300	101
FB1288KIL HPEPS+Spike	---	12.7	6.7	3.6	---	---	---	197
Sample+Spike (expected)	---	11.4	6.2	5.0	---	---	---	200
Blank	<0.01	<0.2	<0.2	<0.2	---	<1	<20	<5
QC Standard (found)	---	22.8	0.6	0.6	9.26	2	16000	159
QC Standard (expected)	---	20.4	0.5	0.7	9.38	2	16300	157
Repeat FB1288KIL HPE	16.4	6.2	1.2	<0.2	7.19	1	15100	100

ANALYTICAL SERVICES

11-Oct-2001

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Attn: Rachel Gould
Project: 21843.1

Received: 10-Sep-2001 18:05

PO #:

Job: 2158792

Status: Final

Soil Samples

Sample Id	Be ICAP ppm	Cd ICAP ppm	Co ICAP ppm	Cr ICAP ppm	Cu ICAP ppm	Fe ICAP ppm	Mn ICAP ppm	Mo ICAP ppm
FB1288KIL HPEPS	0.7	0.6	12	20	58	20600	338	<3
FB1288KIL HPEPS+Spike	9.1	95.7	102	114	151	---	420	180
Sample+Spike (expected)	10.6	100.	112	120	158	---	437	200
Blank	<0.2	<0.5	<2	<1	<1	<50	<1	<3
QC Standard (found)	0.5	0.9	26	50	32	30900	1160	<3
QC Standard (expected)	0.6	<0.5	25	45	32	31100	1140	<3
Repeat FB1288KIL HPE	0.7	0.9	12	21	61	20800	342	<3

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BEAK INTERNATIONAL INC.
14 Abacus Road
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L6T 5B7

11-Oct-2001

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Attn: Rachel Gould
Project: 21843.1
PO #:
Received: 10-Sep-2001 18:05

Job: 2158792
Status: Final

Soil Samples

Sample Id	Ni ICAP ppm	P ICAP ppm	Pb ICAP ppm	Ti ICAP ppm	V ICAP ppm	Zn ICAP ppm
FB1288KIL HPEPS	321	859	42	103	30	181
FB1288KIL HPEPS+Spike	401	---	131	190	122	268
Sample+Spike (expected)	421	---	141	203	129	280
Blank	<2	<20	<5	<5	<1	<5
QC Standard (found)	45	954	23	1060	51	126
QC Standard (expected)	43	810	21	882	48	126
Repeat FB1288KIL HPE	325	849	47	103	30	183

ANALYTICAL SERVICES

11-Oct-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
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Attn: Rachel Gould
Project: 21843.1

PO #:

Received: 10-Sep-2001 18:05

Job: 2158792

Status: Final

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Job approved by:

Signed: ....
Ralph Siebert, B.Sc.
Section Supervisor, Metals

ANALYTICAL SERVICES

24-Oct-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

Attn: Rachel Gould
Project: 21843.1

Received: 10-Sep-2001 18:05
PO #: INCO

Job: 2158795 Status: Final

Vegetation Samples

Sample Id	LOD Grav. %	Ag ICP/MS ppm	Al ICP/MS ppm	As ICP/MS ppm	Ba ICP/MS ppm	Be ICP/MS ppm
FB158WEL CAR	91.5	<0.01	11.5	<0.2	8.9	<0.1
FB977KIL BEA	93.5	<0.02	16.5	<0.4	4.4	<0.2
FB856WEA CHA	87.3	<0.01	34.5	<0.2	49.0	<0.1
FB856WEA CAB	93.1	<0.01	2.2	<0.2	2.1	<0.1
FB1324KIL ONI	92.9	<0.01	6.6	<0.2	5.8	<0.1
FB1007KIL CUC	94.1	<0.02	17.9	<0.4	4.6	<0.2
FB1007KIL BLKBER	86.4	<0.01	6.3	<0.2	3.8	<0.1
Sample+Spike (found)	---	---	---	4.2	---	4.0
Sample+Spike (expected)	---	---	---	3.9	---	3.9
Blank	<0.01	<0.01	<0.5	<0.2	<0.5	<0.1
QC Standard (found)	---	0.35	88.8	8.9	9.2	0.4
QC Standard (expected)	---	0.30	100.	10.0	10.0	0.5
Repeat FB856WEA CHA	87.3	<0.01	29.7	<0.2	46.9	<0.1

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Attn: Rachel Gould
Project: 21843.1

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PO #: INCO

Job: 2158795 Status: Final

Vegetation Samples

Sample Id	Bi ICP/MS ppm	Ca ICP/MS ppm	Cd ICP/MS ppm	Co ICP/MS ppm	Cr ICP/MS ppm	Cu ICP/MS ppm
FB158WEL CAR	<0.1	3590	0.91	0.04	<0.5	10.9
FB977KIL BEA	<0.2	2890	<0.02	0.08	<1.0	13.2
FB856WEA CHA	<0.1	14800	0.49	0.05	<0.5	6.10
FB856WEA CAB	<0.1	7110	0.05	0.03	<0.5	5.34
FB1324KIL ONI	<0.1	6980	0.25	0.03	<0.5	7.61
FB1007KIL CUC	<0.2	3180	0.07	0.04	<1.0	8.84
FB1007KIL BLKBER	<0.1	3810	<0.01	0.08	<0.5	11.4
Sample+Spike (found)	---	---	3.96	3.83	4.1	9.52
Sample+Spike (expected)	---	---	4.40	3.90	4.3	10.0
Blank	<0.1	<50	<0.01	<0.01	<0.5	<0.05
QC Standard (found)	9.6	450	4.35	4.46	4.8	4.71
QC Standard (expected)	10.0	500	5.00	5.00	5.0	5.00
Repeat FB856WEA CHA	<0.1	14800	0.48	0.05	<0.5	6.05

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Vegetation Samples

Sample Id	Fe ICP/MS ppm	K ICP/MS ppm	Mg ICP/MS ppm	Mn ICP/MS ppm	Mo ICP/MS ppm	Ni ICP/MS ppm
FB158WEL CAR	40	49900	1780	8.7	0.4	1.4
FB977KIL BEA	77	30200	2160	10.9	12.1	10.4
FB856WEA CHA	60	67100	27300	51.3	2.1	1.8
FB856WEA CAB	46	45300	2450	15.5	3.1	6.1
FB1324KIL ONI	41	12500	1420	12.6	0.1	5.5
FB1007KIL CUC	72	40900	3100	9.8	1.9	4.7
FB1007KIL BLKBER	49	3090	1440	7.6	0.2	1.5
Sample+Spike (found)	---	---	---	---	6.4	5.5
Sample+Spike (expected)	---	---	---	---	6.0	5.7
Blank	<5	<10	<5	<0.5	<0.1	<0.1
QC Standard (found)	196	86	89	4.6	4.5	4.7
QC Standard (expected)	100	100	100	5.0	5.0	5.0
Repeat FB856WEA CHA	56	67900	27400	50.1	2.3	1.8

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Vegetation Samples

Sample Id	P ICP/MS ppm	Pb ICP/MS ppm	Sb ICP/MS ppm	Se ICP/MS ppm	Sr ICP/MS ppm	Ti ICP/MS ppm
FB158WEL CAR	4530	0.19	<0.05	<0.2	40.3	<1
FB977KIL BEA	4090	0.12	<0.10	<0.4	22.7	<2
FB856WEA CHA	1990	0.23	<0.05	<0.2	52.2	<1
FB856WEA CAB	6010	0.87	0.07	<0.2	29.8	<1
FB1324KIL ONI	3330	0.07	<0.05	<0.2	43.3	<1
FB1007KIL CUC	3860	<0.10	<0.10	<0.4	14.6	<2
FB1007KIL BLKBER	2000	0.25	<0.05	<0.2	27.9	<1
Sample+Spike (found)	---	2.74	4.19	4.0	---	4
Sample+Spike (expected)	---	4.10	3.90	4.1	---	5
Blank	<5	<0.05	<0.05	<0.2	<0.1	<1
QC Standard (found)	93	4.72	0.38	8.7	4.7	5
QC Standard (expected)	100	5.00	0.40	10.0	5.0	5
Repeat FB856WEA CHA	1940	0.27	<0.05	<0.2	51.2	<1

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Vegetation Samples

Sample Id	Tl ICP/MS ppm	U ICP/MS ppm	V ICP/MS ppm	Zn ICP/MS ppm
FB158WEL CAR	0.006	0.01	0.13	56.6
FB977KIL BEA	<0.010	<0.02	0.10	41.8
FB856WEA CHA	0.005	<0.01	0.11	48.6
FB856WEA CAB	<0.005	0.01	<0.05	50.5
FB1324KIL ONI	0.011	<0.01	<0.05	25.0
FB1007KIL CUC	<0.010	<0.02	<0.10	28.5
FB1007KIL BLKBER	<0.005	<0.01	<0.05	21.6
Sample+Spike (found)	3.60	3.67	4.01	---
Sample+Spike (expected)	3.90	3.90	4.00	---
Blank	<0.005	<0.01	<0.05	<0.5
QC Standard (found)	9.26	0.40	4.73	27.6
QC Standard (expected)	10.0	0.40	5.00	29.0
Repeat FB856WEA CHA	0.005	<0.01	0.09	48.2

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Attn: Rachel Gould
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Soil Samples

Sample Id	LOD Grav. %	As SW 7061 ppm	Se SW 7741 ppm	Sb SW 7041 ppm	pH SM 4500B pH Units	Ag ICAP ppm	Al ICAP ppm	Ba ICAP ppm
FB158WEL CARSL	29.2	2.0	0.3	<0.2	6.67	<1.0	4310	46
FB977KIL BEASL	16.6	7.5	1.0	0.3	7.69	<1.0	12800	96
FB856WEA CHASL	13.3	5.3	0.6	<0.2	7.10	<1.0	10600	81
FB856WEA CABSL	12.9	5.3	0.5	<0.2	6.23	<1.0	5100	64
FB1324KIL ONISL	16.6	4.9	0.8	<0.2	6.82	<1.0	15200	89
FB1007KIL CUCSL	5.74	5.5	0.5	<0.2	6.99	<1.0	20500	129
FB1007KIL BLKBE	8.61	3.6	0.3	<0.2	7.57	<1.0	9270	53
FB800LOR LIMSL	20.7	2.0	<0.2	<0.2	7.31	<1.0	4450	38
Sample+Spike (found)	---	7.6	5.8	3.6	---	---	---	147
Sample+Spike (expected)	---	7.0	5.3	5.0	---	---	---	145
Blank	<0.01	<0.2	<0.2	<0.2	---	<1.0	23	<5
QC Standard (found)	---	22.0	0.5	0.7	9.22	2.9	16300	156
QC Standard (expected)	---	20.4	0.5	0.7	9.38	2.4	16300	157
Repeat FB158WEL CARS	30.9	1.9	0.4	<0.2	6.72	<1.0	4740	48

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Soil Samples

Sample Id	Be ICAP ppm	Cd ICAP ppm	Co ICAP ppm	Cr ICAP ppm	Cu ICAP ppm	Fe ICAP ppm	Mn ICAP ppm	Mo ICAP ppm
FB158WEL CARSL	0.2	<0.5	4	7	23	7700	317	<3
FB977KIL BEASL	0.6	0.8	15	20	84	20300	465	<3
FB856WEA CHASL	0.4	<0.5	7	14	42	13700	268	<3
FB856WEA CABSL	0.2	0.7	5	10	34	8570	204	<3
FB1324KIL ONISL	0.7	0.6	9	21	60	19900	458	<3
FB1007KIL CUCSL	0.9	0.6	14	26	44	28200	603	<3
FB1007KIL BLKBE	0.3	<0.5	6	13	23	13800	385	<3
FB800LOR LIMSL	<0.2	<0.5	3	8	19	8850	421	<3
Sample+Spike (found)	9.3	94.3	94	100	118	---	428	171
Sample+Spike (expected)	10.2	100.	104	107	123	---	416	200
Blank	<0.2	<0.5	<2	<1	1	<50	<1	<3
QC Standard (found)	0.6	0.6	26	48	31	30700	1160	<3
QC Standard (expected)	0.6	<0.5	25	45	32	31100	1140	<3
Repeat FB158WEL CARS	0.2	<0.5	4	8	24	8040	330	<3

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Soil Samples

Sample Id	Ni ICAP ppm	P ICAP ppm	Pb ICAP ppm	Ti ICAP ppm	V ICAP ppm	Zn ICAP ppm
FB158WEL CARSL	60	1900	11	15	11	75
FB977KIL BEASL	422	1150	195	39	27	176
FB856WEA CHASL	231	1290	86	64	21	156
FB856WEA CABSL	146	1830	73	112	15	159
FB1324KIL ONISL	252	931	33	39	28	92
FB1007KIL CUCSL	260	1180	20	48	35	110
FB1007KIL BLKBE	78	799	69	60	20	68
FB800LOR LIMSL	10	1790	<5	15	12	61
Sample+Spike (found)	158	---	104	---	103	177
Sample+Spike (expected)	160	---	111	---	110	175
Blank	<2	<20	<5	<5	<1	<5
QC Standard (found)	43	939	22	924	46	126
QC Standard (expected)	43	810	21	882	48	126
Repeat FB158WEL CARS	65	2050	10	17	12	81

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Note: EQLs for vegetation adjusted for moisture content.

Note: Lead spike for vegetation sample FB856WEA CHA is below acceptance criteria of 70% - 130% recovery (Spike recovery 64%). Please view lead results with discretion.

All work recorded herein has been done in accordance with normal professional standards using accepted testing methodologies and QA/QC procedures. Philip Analytical is limited in liability to the actual cost of the pertinent analyses done unless otherwise agreed upon by contractual arrangement. Your samples will be retained by PASC for a period of 30 days following reporting or as per specific contractual arrangements.

Job approved by:

Signed: ....
Ralph Siebert, B.Sc.
Section Supervisor, Metals

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11-Oct-2001

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14 Abacus Road
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Attn: Rob Walters
Project: 21843.1

Received: 10-Sep-2001 18:05
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Job: 2158794

Status: Final

Vegetation Samples

Sample Id	LOD Grav. %	Ag ICP/MS ppm	Al ICP/MS ppm	As ICP/MS ppm	Ba ICP/MS ppm	Be ICP/MS ppm	Bi ICP/MS ppm	Ca ICP/MS ppm
FB91ROD TOM	93.2	0.02	2.5	<0.4	1.1	<0.2	<0.2	1320
FB98COL BEA	90.7	<0.01	3.7	<0.2	3.0	<0.1	<0.1	3710
FB525KIL ONI	84.4	<0.01	5.7	<0.2	1.6	<0.1	<0.1	3280
FB525KIL FEN	93.6	<0.02	7.9	<0.4	2.1	<0.2	<0.2	5070
FB529KIL BEE	90.1	0.02	32.3	<0.2	27.3	<0.1	<0.1	2390
FB529KIL PAR	81.7	<0.01	40.7	<0.2	10.1	<0.1	<0.1	2840
FB91ROD TOM+Spike	---	---	10.1	7.7	8.4	7.4	---	---
Sample+Spike (expected)	---	---	9.8	7.4	8.5	7.4	---	---
Blank	---	<0.01	<0.5	<0.2	<0.5	<0.1	<0.1	<50
QC Standard (found)	---	0.35	88.8	8.9	9.2	0.4	9.6	450
QC Standard (expected)	---	0.30	100.	10.0	10.0	0.5	10.0	500
Repeat FB91ROD TOM	94.1	0.02	2.6	<0.4	1.2	<0.2	<0.2	1490

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Vegetation Samples

Sample Id	Cd ICP/MS ppm	Co ICP/MS ppm	Cr ICP/MS ppm	Cu ICP/MS ppm	Fe ICP/MS ppm	K ICP/MS ppm	Mg ICP/MS ppm	Mn ICP/MS ppm
FB91ROD TOM	0.14	0.06	<1.0	10.8	40	27800	1600	10.2
FB98COL BEA	0.01	0.23	<0.5	8.50	71	22800	2400	9.4
FB525KIL ONI	0.06	0.02	<0.5	3.95	31	15800	930	5.9
FB525KIL FEN	0.08	0.03	<1.0	12.9	44	79800	3180	9.4
FB529KIL BEE	0.24	0.12	<0.5	12.4	57	46800	2890	10.4
FB529KIL PAR	0.02	0.08	<0.5	11.1	76	32000	2910	20.6
FB91ROD TOM+Spike	7.23	7.28	7.7	18.4	---	---	---	18.3
Sample+Spike (expected)	7.50	7.40	7.4	18.2	---	---	---	17.6
Blank	<0.01	<0.01	<0.5	<0.05	<3	<10	<5	<0.5
QC Standard (found)	4.35	4.46	4.8	4.71	96	86	89	4.6
QC Standard (expected)	5.00	5.00	5.0	5.00	100	100	100	5.0
Repeat FB91ROD TOM	0.17	0.07	<1.0	12.6	61	31900	1880	14.5

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Vegetation Samples

Sample Id	Mo ICP/MS ppm	Ni ICP/MS ppm	P ICP/MS ppm	Pb ICP/MS ppm	Sb ICP/MS ppm	Se ICP/MS ppm	Sr ICP/MS ppm	Ti ICP/MS ppm
FB91ROD TOM	1.2	16.3	3710	0.13	<0.10	3.8	5.8	<2.0
FB98COL BEA	9.1	16.7	4770	0.07	<0.05	1.2	15.1	<1.0
FB525KIL ONI	0.7	8.1	3170	0.15	<0.05	1.5	20.2	<1.0
FB525KIL FEN	0.4	7.5	5130	0.12	<0.10	<0.4	31.4	<2.0
FB529KIL BEE	0.2	19.3	3960	0.34	<0.05	0.2	28.8	<1.0
FB529KIL PAR	1.0	17.0	3620	0.64	<0.05	0.3	34.5	<1.0
FB91ROD TOM+Spike	8.5	23.1	---	7.14	7.51	10.9	---	7.0
Sample+Spike (expected)	8.6	23.7	---	7.50	7.40	11.1	---	7.4
Blank	<0.1	<0.1	<5	<0.05	<0.05	<0.2	<0.1	<1.0
QC Standard (found)	4.5	4.7	93	4.72	0.05	8.7	4.7	4.7
QC Standard (expected)	5.0	5.0	100	5.00	0.06	10.0	5.0	5.0
Repeat FB91ROD TOM	1.4	18.9	4540	<0.10	<0.10	4.5	6.4	<2.0

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Vegetation Samples

Sample Id	Tl ICP/MS ppm	U ICP/MS ppm	V ICP/MS ppm	Zn ICP/MS ppm
FB91ROD TOM	<0.010	<0.02	<0.10	25.3
FB98COL BEA	<0.005	<0.01	<0.05	34.5
FB525KIL ONI	<0.005	<0.01	<0.05	23.7
FB525KIL FEN	<0.010	<0.02	<0.10	38.6
FB529KIL BEE	0.019	<0.01	0.11	47.9
FB529KIL PAR	0.014	<0.01	0.11	20.7
FB91ROD TOM+Spike	7.07	7.09	7.73	32.7
Sample+Spike (expected)	7.40	7.40	7.40	32.7
Blank	<0.005	<0.01	<0.05	<0.5
QC Standard (found)	9.26	0.40	4.73	28.4
QC Standard (expected)	10.0	0.40	5.00	30.9
Repeat FB91ROD TOM	<0.010	<0.02	<0.10	30.2

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Attn: Rob Walters
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Job: 2158794 Status: Final

Soil Samples

Sample Id	LOD Grav. %	As SW 7061 ppm	Se SW 7741 ppm	Sb SW 7041 ppm	pH SM 4500B pH Units	Ag ICAP ppm	Al ICAP ppm	Ba ICAP ppm
FB91ROD CARSL	23.2	23.4	2.9	0.6	7.36	1.6	6460	89
FBCOL BEASL	31.4	14.5	2.1	0.6	7.15	<1.0	16900	149
FB525KIL ONISL	13.0	12.7	1.5	0.5	6.73	<1.0	11800	115
FB525KIL FENSL	18.6	9.1	1.1	0.2	6.62	<1.0	14200	95
FB529KIL BEESL	18.2	20.8	1.8	0.7	6.86	<1.0	12800	154
FB529KIL PARSL	13.4	22.5	1.8	0.8	7.04	1.4	13500	147
FB91ROD CARSL+Spike	---	---	8.0	4.3	---	---	---	176
Sample+Spike (expected)	---	---	7.9	5.6	---	---	---	189
Blank	<0.01	<0.2	<0.2	<0.2	---	<1.0	34	<5
QC Standard (found)	---	22.0	0.5	0.7	9.26	2.6	16300	159
QC Standard (expected)	---	20.4	0.5	0.7	9.38	2.4	16300	157
Repeat FB91ROD CARSL	25.2	23.4	2.8	0.6	7.33	1.7	6450	80

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Job: 2158794

Status: Final

Soil Samples

Sample Id	Be ICAP ppm	Cd ICAP ppm	Co ICAP ppm	Cr ICAP ppm	Cu ICAP ppm	Fe ICAP ppm	Mn ICAP ppm	Mo ICAP ppm
FB91ROD CARSL	0.4	2.0	56	23	308	38500	545	<3
FBCOL BEASL	0.7	1.4	37	25	227	23500	395	<3
FB525KIL ONISL	0.5	1.3	26	21	162	20100	402	<3
FB525KIL FENSL	0.5	1.0	18	19	132	22500	431	<3
FB529KIL BEESL	0.5	1.7	24	21	310	23800	368	<3
FB529KIL PARSL	0.5	1.6	26	21	364	23500	360	<3
FB91ROD CARSL+Spike	8.5	89.8	137	107	377	---	585	169
Sample+Spike (expected)	10.4	101.	155	123	408	---	644	200
Blank	<0.2	<0.5	<2	<1	1	<50	<1	<3
QC Standard (found)	0.5	0.9	25	45	32	32700	1120	<3
QC Standard (expected)	0.6	<0.5	25	45	32	31100	1140	<3
Repeat FB91ROD CARSL	0.4	1.6	52	24	280	37600	498	<3

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Project: 21843.1 PO #: Received: 10-Sep-2001 18:05

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Soil Samples

Sample Id	Ni ICAP ppm	P ICAP ppm	Pb ICAP ppm	Ti ICAP ppm	V ICAP ppm	Zn ICAP ppm
FB91ROD CARSL	3270	894	144	98	19	427
FBCOL BEASL	1740	1560	289	111	32	185
FB525KIL ONISL	1290	1720	136	120	25	334
FB525KIL FENSL	907	2240	37	63	28	166
FB529KIL BEESL	1500	2130	120	78	23	292
FB529KIL PARSL	1420	1950	120	111	25	271
FB91ROD CARSL+Spike	---	---	210	---	106	489
Sample+Spike (expected)	---	---	214	---	119	526
Blank	<2	<20	5	<5	<1	<5
QC Standard (found)	44	882	23	792	43	124
QC Standard (expected)	43	810	21	882	48	126
Repeat FB91ROD CARSL	3060	830	130	157	20	409

ANALYTICAL SERVICES

BEAK INTERNATIONAL INC.
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Attn: Rob Walters
Project: 21843.1

PO #:

Received: 10-Sep-2001 18:05

Job: 2158794

Status: Final

Note: EQLs for vegetation adjusted for moisture content.

All work recorded herein has been done in accordance with normal professional standards using accepted testing methodologies and QA/QC procedures. Philip Analytical is limited in liability to the actual cost of the pertinent analyses done unless otherwise agreed upon by contractual arrangement. Your samples will be retained by PASC for a period of 30 days following reporting or as per specific contractual arrangements.

Job approved by:

Signed: ....
Ralph Siebert, B.Sc.
Section Supervisor, Metals

ANALYTICAL SERVICES

24-Oct-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
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L6T 5B7

Page: 1
Copy: 1 of 2

Attn: Rachel Gould
Project: 21843.1
Received: 12-Sep-2001 18:11
PO #: INCO

Job: 2158863
Status: Final

Vegetation Samples

Sample Id	LOD Grav. %	Ag ICP/MS ppm	Al ICP/MS ppm	As ICP/MS ppm	Ba ICP/MS ppm	Be ICP/MS ppm
FB650LORR POT	78.3	<0.01	1.8	<0.2	<0.5	<0.1
FB1268KIL BEET	83.5	<0.01	6.8	<0.2	15.6	<0.1
FB221XMAS CRT	90.0	<0.01	29.5	<0.2	4.3	<0.1
FB49XMAS BEET	88.2	<0.01	9.1	<0.2	28.3	<0.1
FBVIN ONN	92.4	<0.01	2.2	<0.2	6.0	<0.1
FBVIN APP	85.4	<0.01	1.7	<0.2	0.6	<0.1
Sample+Spike (found)	---	---	4.1	2.5	2.4	2.3
Sample+Spike (expected)	---	---	4.1	2.3	2.3	2.3
Blank	<0.01	<0.01	<0.5	<0.2	<0.5	<0.1
QC Standard (found)	---	0.19	94.8	9.4	9.3	0.5
QC Standard (expected)	---	0.30	100.	10.0	10.0	0.5
Repeat FB650LORR POT	78.7	<0.01	1.5	<0.2	<0.5	<0.1

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BEAK INTERNATIONAL INC.
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24-Oct-2001

Attn: Rachel Gould
Project: 21843.1

Received: 12-Sep-2001 18:11
PO #: INCO

Job: 2158863

Status: Final

Vegetation Samples

Sample Id	Bi ICP/MS ppm	Ca ICP/MS ppm	Cd ICP/MS ppm	Co ICP/MS ppm	Cr ICP/MS ppm	Cu ICP/MS ppm
FB650LORR POT	<0.1	169	0.14	0.03	<0.5	10.0
FB1268KIL BEET	<0.1	992	0.29	0.03	<0.5	5.95
FB221XMAS CRT	<0.1	2260	0.13	0.03	<0.5	3.89
FB49XMAS BEET	<0.1	1350	0.27	0.06	<0.5	7.33
FBVIN ONN	<0.1	1980	0.22	0.03	<0.5	6.34
FBVIN APP	<0.1	268	<0.01	<0.01	<0.5	2.63
Sample+Spike (found)	---	---	2.41	2.30	2.4	12.9
Sample+Spike (expected)	---	---	2.43	2.33	2.3	12.3
Blank	<0.1	<50	<0.01	<0.01	<0.5	<0.05
QC Standard (found)	9.4	465	4.73	4.65	4.9	4.85
QC Standard (expected)	10.0	500	5.00	5.00	5.0	5.00
Repeat FB650LORR POT	<0.1	159	0.14	0.03	<0.5	9.65

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Page: 3
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Attn: Rachel Gould
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Job: 2158863 Status: Final

Vegetation Samples

Sample Id	Fe ICP/MS ppm	K ICP/MS ppm	Mg ICP/MS ppm	Mn ICP/MS ppm	Mo ICP/MS ppm	Ni ICP/MS ppm
FB650LORR POT	26	29500	1300	5.7	0.8	2.1
FB1268KIL BEET	22	16100	1420	14.9	<0.1	2.8
FB221XMAS CRT	43	21900	1470	4.9	0.1	1.5
FB49XMAS BEET	42	42000	2820	22.6	0.2	16.7
FBVIN ONN	25	14700	924	13.8	<0.1	0.1
FBVIN APP	10	6240	281	3.5	<0.1	<0.1
Sample+Spike (found)	---	---	---	8.4	3.1	4.5
Sample+Spike (expected)	---	---	---	8.0	3.1	4.4
Blank	<5	<10	<5	<0.5	<0.1	<0.1
QC Standard (found)	93	101	93	4.8	4.7	4.9
QC Standard (expected)	100	100	100	5.0	5.0	5.0
Repeat FB650LORR POT	27	26700	1240	5.4	0.8	2.0

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Project: 21843.1

Received: 12-Sep-2001 18:11
PO #: INCO

Job: 2158863 Status: Final

Vegetation Samples

Sample Id	P ICP/MS ppm	Pb ICP/MS ppm	Sb ICP/MS ppm	Se ICP/MS ppm	Sr ICP/MS ppm	Ti ICP/MS ppm
FB650LORR POT	4500	0.11	<0.05	<0.2	0.3	<1.0
FB1268KIL BEET	1900	0.08	<0.05	<0.2	9.6	<1.0
FB221XMAS CRT	3040	0.14	<0.05	<0.2	15.8	<1.0
FB49XMAS BEET	2860	0.22	<0.05	<0.2	10.6	<1.0
FBVIN ONN	2530	0.09	<0.05	<0.2	10.4	<1.0
FBVIN APP	721	0.06	<0.05	<0.2	0.8	<1.0
Sample+Spike (found)	---	2.30	2.39	2.3	---	2.2
Sample+Spike (expected)	---	2.41	2.30	2.3	---	2.3
Blank	<5	<0.05	<0.05	<0.2	<0.1	<1.0
QC Standard (found)	103	4.79	6.65	9.3	4.9	4.7
QC Standard (expected)	100	5.00	10.0	10.0	5.0	5.0
Repeat FB650LORR POT	4310	0.19	<0.05	<0.2	0.2	<1.0

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Attn: Rachel Gould
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PO #: INCO

Job: 2158863 Status: Final

Vegetation Samples

Sample Id	Tl ICP/MS ppm	U ICP/MS ppm	V ICP/MS ppm	Zn ICP/MS ppm
FB650LORR POT	<0.005	<0.01	<0.05	19.9
FB1268KIL BEET	<0.005	<0.01	<0.05	20.1
FB221XMAS CRT	<0.005	<0.01	0.07	13.8
FB49XMAS BEET	0.015	<0.01	<0.05	51.1
FBVIN ONN	<0.005	<0.01	<0.05	16.5
FBVIN APP	<0.005	<0.01	<0.05	1.6
Sample+Spike (found)	2.03	2.06	2.31	---
Sample+Spike (expected)	2.30	2.30	2.30	---
Blank	<0.005	<0.01	<0.05	<0.5
QC Standard (found)	9.22	0.39	4.78	5.7
QC Standard (expected)	10.0	0.40	5.00	5.0
Repeat FB650LORR POT	<0.005	<0.01	<0.05	19.3

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24-Oct-2001

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Attn: Rachel Gould
Project: 21843.1

Received: 12-Sep-2001 18:11
PO #: INCO

Job: 2158863 Status: Final

Soil Samples

Sample Id	LOD Grav. %	pH SM 4500B pH Units	As SW 7061 ppm	Se SW 7741 ppm	Sb SW 7041 ppm	Ag ICAP ppm	Al ICAP ppm	Ba ICAP ppm
FB650LORR POTSL	9.43	5.77	6.0	1.2	0.5	<1.0	5180	70
FB1268KIL BEETS	12.0	7.19	5.6	0.8	0.3	<1.0	8140	74
FB221XMAS CRTSL	16.5	6.90	6.0	0.4	0.3	<1.0	9120	82
FB49XMAS BEETSL	10.7	6.56	4.9	0.6	<0.2	<1.0	6260	52
Sample+Spike(found)	---	---	10.0	6.7	4.3	---	---	167
Sample+Spike (expected)	---	---	11.0	6.2	5.5	---	---	170
Blank	<0.01	---	<0.2	<0.2	<0.2	<1.0	<20	<5
QC Standard (found)	---	9.27	19.0	0.4	0.7	2.1	15100	156
QC Standard (expected)	---	9.38	20.4	0.5	0.7	2.4	16300	157
Repeat FB650LORR	9.43	5.75	5.8	1.2	0.5	<1.0	5170	71

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Attn: Rachel Gould
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Received: 12-Sep-2001 18:11
PO #: INCO

Job: 2158863 Status: Final

Soil Samples

Sample Id	Be ICAP ppm	Cd ICAP ppm	Co ICAP ppm	Cr ICAP ppm	Cu ICAP ppm	Fe ICAP ppm	Mn ICAP ppm	Mo ICAP ppm
FB650LORR POTSL	0.3	0.5	9	10	70	13600	328	<3
FB1268KIL BEETS	0.5	<0.5	8	12	72	16100	459	<3
FB221XMAS CRTSL	0.5	0.5	8	13	38	17400	348	<3
FB49XMAS BEETSL	0.3	<0.5	7	10	49	11400	334	<3
Sample+Spike(found)	9.3	94.2	99	101	166	---	430	175
Sample+Spike (expected)	10.3	100.	108	110	169	---	427	200
Blank	<0.2	<0.5	<2	<1	1	<50	<1	<3
QC Standard (found)	0.5	0.3	25	46	31	30700	1130	<3
QC Standard (expected)	0.6	<0.5	25	45	32	31100	1140	<3
Repeat FB650LORR	0.4	0.7	9	11	72	13400	317	<3

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Attn: Rachel Gould
Project: 21843.1

Received: 12-Sep-2001 18:11
PO #: INCO

Job: 2158863 Status: Final

Soil Samples

Sample Id	Ni ICAP ppm	P ICAP ppm	Pb ICAP ppm	Ti ICAP ppm	V ICAP ppm	Zn ICAP ppm
FB650LORR POTSL	283	3540	79	46	13	465
FB1268KIL BEETS	190	1560	20	86	19	87
FB221XMAS CRTSL	158	1390	22	90	21	77
FB49XMAS BEETSL	240	1210	33	86	16	74
Sample+Spike(found)	384	---	174	---	104	578
Sample+Spike (expected)	383	---	178	---	113	565
Blank	<2	<20	<5	<5	<1	<5
QC Standard (found)	43	954	15	904	45	130
QC Standard (expected)	43	810	21	882	48	126
Repeat FB650LORR	274	3600	87	46	13	463

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Attn: Rachel Gould
Project: 21843.1

Received: 12-Sep-2001 18:11
PO #: INCO

Job: 2158863 Status: Final

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Job approved by:

Signed: ....
Ralph Siebert, B.Sc.
Section Supervisor, Metals

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APPENDIX E

QA/QC Analytical Data for Maple Sap

ANALYTICAL SERVICES

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

23-Mar-2001

Attn: Steve Denstedt
Project: 21843.1

Received: 15-Mar-2001 17:15
PO #: 21843.1

Job: 2152162 Status: Final

Liquid Samples

Sample Id	Ag ICP/MS mg/L	Al ICP/MS mg/L	As ICP/MS mg/L	B ICP/MS mg/L	Ba ICP/MS mg/L	Be ICP/MS mg/L	Bi ICP/MS mg/L	Ca ICP/MS mg/L
MOSKALYK 5-1	<0.0001	0.004	<0.002	0.063	0.005	<0.001	<0.001	15.6
FREEY 4-2	<0.0001	<0.005	<0.002	0.082	0.019	<0.001	<0.001	29.9
MOORE 3-2	<0.0001	0.005	<0.002	0.061	0.015	<0.001	<0.001	30.5
MILLER 2-2	<0.0001	<0.005	<0.002	0.081	0.020	<0.001	<0.001	21.9
INCO 1-2	<0.0001	<0.005	<0.002	0.071	0.023	<0.001	<0.001	35.3
VAN KRALINGEN 7-1	<0.0001	0.068	<0.002	0.107	0.161	<0.001	<0.001	162.
Sample+Spike (found)	0.0020	1.13	0.114	0.116	0.110	0.006	0.106	21.0
Sample+Spike (expected)	0.0030	1.00	0.100	0.112	0.105	0.005	0.100	20.6
Blank	<0.0001	<0.005	<0.002	<0.005	<0.005	<0.001	<0.001	<0.5
QC Standard (found)	0.0031	1.11	0.109	0.055	0.111	0.006	0.109	5.4
QC Standard (expected)	0.0030	1.00	0.100	0.050	0.100	0.005	0.100	5.0
Repeat MOSKALYK 5-1	<0.0001	0.005	<0.002	0.063	0.005	<0.001	<0.001	16.6

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23-Mar-2001

Attn: Steve Denstedt
Project: 21843.1

Received: 15-Mar-2001 17:15
PO #: 21843.1

Job: 2152162 Status: Final

Liquid Samples

Sample Id	Cd ICP/MS mg/L	Co ICP/MS mg/L	Cr ICP/MS mg/L	Cu ICP/MS mg/L	Fe ICP/MS mg/L	K ICP/MS mg/L	Mg ICP/MS mg/L	Mn ICP/MS mg/L
MOSKALYK 5-1	<0.0001	0.0004	0.005	0.0075	<0.03	74.1	3.82	0.059
FREEY 4-2	0.0001	0.0014	0.012	0.0105	0.06	113.	8.11	0.472
MOORE 3-2	0.0001	0.0003	0.007	0.0062	<0.03	72.4	7.78	0.298
MILLER 2-2	<0.0001	0.0011	0.007	0.0091	<0.03	47.2	3.64	0.069
INCO 1-2	<0.0001	0.0023	0.007	0.0029	<0.03	63.2	3.14	0.430
VAN KRALINGEN 7-1	0.0023	0.0006	0.010	0.0135	<0.03	71.9	14.6	2.55
Sample+Spike (found)	0.0510	0.0549	0.060	0.0617	1.08	---	4.88	0.113
Sample+Spike (expected)	0.0500	0.0500	0.055	0.0574	1.00	---	4.82	0.109
Blank	<0.0001	<0.0001	<0.005	<0.0005	<0.03	<0.1	<0.05	<0.005
QC Standard (found)	0.0532	0.0549	0.057	0.0562	1.11	1.0	1.07	0.055
QC Standard (expected)	0.0500	0.0500	0.050	0.0500	1.00	1.0	1.00	0.050
Repeat MOSKALYK 5-1	<0.0001	0.0004	0.005	0.0081	<0.03	77.9	3.93	0.060

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23-Mar-2001

Attn: Steve Denstedt
Project: 21843.1

Received: 15-Mar-2001 17:15
PO #: 21843.1

Job: 2152162

Status: Final

Liquid Samples

Sample Id	Mo ICP/MS mg/L	Na ICP/MS mg/L	Ni ICP/MS mg/L	P ICP/MS mg/L	Pb ICP/MS mg/L	Sb ICP/MS mg/L	Se ICP/MS mg/L	Sn ICP/MS mg/L
MOSKALYK 5-1	<0.001	0.4	0.013	5.93	<0.0005	<0.0005	<0.002	0.058
FREEY 4-2	<0.001	2.0	0.014	19.5	<0.0005	<0.0005	<0.002	0.012
MOORE 3-2	<0.001	1.4	<0.001	12.7	<0.0005	<0.0005	<0.002	0.007
MILLER 2-2	<0.001	1.3	0.041	1.22	<0.0005	<0.0005	<0.002	0.015
INCO 1-2	<0.001	2.4	0.033	0.28	<0.0005	<0.0005	<0.002	0.016
VAN KRALINGEN 7-1	<0.001	1.4	0.341	0.96	<0.0005	<0.0005	<0.002	0.011
Sample+Spike (found)	0.054	5.5	0.067	7.04	0.0525	0.102	0.117	0.166
Sample+Spike (expected)	0.500	5.4	0.063	6.93	0.0500	0.100	0.100	0.158
Blank	<0.001	<0.1	<0.001	<0.05	<0.0005	<0.0005	<0.002	<0.001
QC Standard (found)	0.055	5.1	0.055	1.11	0.0550	0.107	0.104	0.112
QC Standard (expected)	0.050	5.0	0.050	1.00	0.0500	0.100	0.100	0.100
Repeat MOSKALYK 5-1	<0.001	0.4	0.013	6.06	<0.0005	<0.0005	<0.002	0.058

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BEAK INTERNATIONAL INC.
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23-Mar-2001

Attn: Steve Denstedt
Project: 21843.1

Received: 15-Mar-2001 17:15
PO #: 21843.1

Job: 2152162 Status: Final

Liquid Samples

Sample Id	Sr ICP/MS mg/L	Ti ICP/MS mg/L	Tl ICP/MS mg/L	U ICP/MS mg/L	V ICP/MS mg/L	Zn ICP/MS mg/L
MOSKALYK 5-1	0.040	<0.005	<0.00005	<0.0001	<0.0005	0.162
FREEY 4-2	0.234	<0.005	<0.00005	<0.0001	<0.0005	0.058
MOORE 3-2	0.074	<0.005	<0.00005	<0.0001	<0.0005	0.068
MILLER 2-2	0.086	<0.005	<0.00005	<0.0001	<0.0005	0.144
INCO 1-2	0.260	<0.005	<0.00005	<0.0001	<0.0005	0.082
VAN KRALINGEN 7-1	0.231	<0.005	<0.00005	<0.0001	<0.0005	0.141
Sample+Spike (found)	0.093	0.056	0.108	0.0042	0.0552	0.210
Sample+Spike (expected)	0.090	0.500	0.100	0.0040	0.0500	0.212
Blank	<0.001	<0.005	<0.00005	<0.0001	<0.0005	<0.005
QC Standard (found)	0.055	0.056	0.113	0.0044	0.0553	0.053
QC Standard (expected)	0.050	0.050	0.100	0.0040	0.0500	0.050
Repeat MOSKALYK 5-1	0.041	<0.005	<0.00005	<0.0001	<0.0005	0.158

ANALYTICAL SERVICES

BEAK INTERNATIONAL INC.
14 Abacus Road
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Attn: Steve Denstedt
Project: 21843.1

Received: 15-Mar-2001 17:15
PO #: 21843.1

Job: 2152162 Status: Final

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Job approved by:

Signed: ....
Ralph Siebert, B.Sc.
Project Manager

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PSC
ANALYTICAL SERVICES

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

6-Apr-2001

Attn: Steve Denstedt
Project: 21843.1

Received: 29-Mar-2001 13:37
PO #: 21843.1

Job: 2152629 Status: Final

Liquid Samples

Sample Id	Ag ICP/MS mg/L	Al ICP/MS mg/L	As ICP/MS mg/L	B ICP/MS mg/L	Ba ICP/MS mg/L	Be ICP/MS mg/L	Bi ICP/MS mg/L	Ca ICP/MS mg/L
MILLER 2-4	<0.0001	0.006	<0.002	0.102	0.009	<0.001	<0.001	10.5
INCO 1-2	<0.0001	0.006	<0.002	0.091	0.068	<0.001	<0.001	83.0
Sample+Spike (found)	0.0010	1.05	0.116	0.155	0.104	0.005	0.096	15.9
Sample+Spike (expected)	0.0030	1.00	0.100	0.151	0.108	0.005	0.100	15.4
Blank	<0.0001	<0.005	<0.002	<0.005	<0.005	<0.001	<0.001	<0.5
QC Standard (found)	0.0028	1.03	0.103	0.052	0.098	0.005	0.096	5.5
QC Standard (expected)	0.0030	1.00	0.100	0.050	0.100	0.005	0.100	5.0
Repeat MILLER 204	<0.0001	0.006	<0.002	0.101	0.009	<0.001	<0.001	10.6

Sample Id	Cd ICP/MS mg/L	Co ICP/MS mg/L	Cr ICP/MS mg/L	Cu ICP/MS mg/L	Fe ICP/MS mg/L	K ICP/MS mg/L	Mg ICP/MS mg/L	Mn ICP/MS mg/L
MILLER 2-4	<0.0001	0.0004	0.006	0.0028	<0.03	37.9	3.61	0.075
INCO 1-2	0.0002	0.0018	<0.005	0.0036	<0.03	137.	8.49	0.609
Sample+Spike (found)	0.0495	0.0471	0.058	0.0539	0.95	39.0	4.60	0.123
Sample+Spike (expected)	0.0500	0.0504	0.056	0.0528	1.00	38.9	4.61	0.125
Blank	<0.0001	<0.0001	<0.005	<0.0005	<0.03	<0.1	<0.05	<0.005
QC Standard (found)	0.0504	0.0467	0.051	0.0527	0.95	1.1	0.99	0.047
QC Standard (expected)	0.0500	0.0500	0.050	0.0500	1.00	1.0	1.00	0.050
Repeat MILLER 204	<0.0001	0.0004	0.007	0.0027	<0.03	37.9	3.54	0.076

ANALYTICAL SERVICES

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

6-Apr-2001

Attn: Steve Denstedt
Project: 21843.1

Received: 29-Mar-2001 13:37
PO #: 21843.1

Job: 2152629

Status: Final

Liquid Samples

Sample Id	Mo ICP/MS mg/L	Na ICP/MS mg/L	Ni ICP/MS mg/L	P ICP/MS mg/L	Pb ICP/MS mg/L	Sb ICP/MS mg/L	Sn ICP/MS mg/L	Sr ICP/MS mg/L
MILLER 2-4	<0.001	0.8	0.004	2.14	<0.0005	<0.0005	0.131	0.100
INCO 1-2	<0.001	0.5	0.029	1.29	<0.0005	<0.0005	0.159	0.566
Sample+Spike (found)	0.052	5.9	0.055	3.23	0.0500	0.104	0.241	0.149
Sample+Spike (expected)	0.050	5.8	0.054	3.14	0.0500	0.100	0.231	0.150
Blank	<0.001	<0.1	<0.001	0.09	<0.0005	<0.0005	<0.001	<0.001
QC Standard (found)	0.052	4.9	0.051	1.12	0.0512	0.104	0.108	0.053
QC Standard (expected)	0.050	5.0	0.050	1.00	0.0500	0.100	0.100	0.050
Repeat MILLER 204	<0.001	0.8	0.004	2.13	<0.0005	<0.0005	0.138	0.100

Sample Id	Ti ICP/MS mg/L	Tl ICP/MS mg/L	U ICP/MS mg/L	V ICP/MS mg/L	Zn ICP/MS mg/L
MILLER 2-4	<0.005	<0.00005	<0.0001	<0.0005	0.052
INCO 1-2	<0.005	<0.00005	<0.0001	<0.0005	0.155
Sample+Spike (found)	0.053	0.0963	0.0037	0.0537	0.101
Sample+Spike (expected)	0.050	0.100	0.0040	0.0500	0.101
Blank	<0.005	<0.00005	<0.0001	<0.0005	<0.005
QC Standard (found)	0.054	0.0990	0.0038	0.0520	0.050
QC Standard (expected)	0.050	0.100	0.0040	0.0500	0.050
Repeat MILLER 204	<0.005	<0.00005	<0.0001	<0.0005	0.053

ANALYTICAL SERVICES

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

Attn: Steve Denstedt
Received: 29-Mar-2001 13:37
Project: 21843.1
PO #: 21843.1

Job: 2152629 Status: Final

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Job approved by:

Signed: ....
Ralph Siebert, B.Sc.
Project Manager

APPENDIX F

QA/QC Analytical Data for Soils near Maple Trees

ANALYTICAL SERVICES

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

11-May-2001

Attn: Steve Denstedt
Received: 2-May-2001 15:02
Project: 21843.1
PO #: 21843.1

Job: 2153819
Status: Final

Soil Samples

Sample Id	Se SW 7741 ppm	As SW 7061 ppm	Ag ICAP ppm	Al ICAP ppm	Ba ICAP ppm	Be ICAP ppm	Ca ICAP ppm	Cd ICAP ppm
MOORE SS 3-3A	0.3	2.4	<1	12300	82	0.6	9280	<0.5
MOORE SS 3-3B	0.2	2.4	<1	11800	74	0.5	6570	<0.5
INCO SS 1-2A	10.2	25.7	3	7680	93	0.5	27300	1.1
INCO SS 102B	12.1	31.0	3	5710	88	0.4	29400	1.2
Blank	<0.2	<0.2	<1	<20	<5	<0.2	133	<0.5
QC Standard (found)	0.5	22.3	2	16100	154	0.6	6240	<0.5
QC Standard (expected)	0.5	20.4	2	16300	157	0.6	6210	<0.5
Repeat MOORE SS 3-3A	0.3	2.4	<1	13100	85	0.6	9370	<0.5

Sample Id	Co ICAP ppm	Cr ICAP ppm	Cu ICAP ppm	Fe ICAP ppm	K ICAP ppm	Mg ICAP ppm	Mn ICAP ppm	Mo ICAP ppm
MOORE SS 3-3A	5	16	18	14300	1280	5110	238	<3
MOORE SS 3-3B	4	14	14	13400	1050	4000	222	<3
INCO SS 1-2A	85	18	735	16200	1070	4500	351	<3
INCO SS 102B	95	16	848	15200	907	3460	392	<3
Blank	<2	<1	<1	<50	<100	<20	<1	<3
QC Standard (found)	25	48	31	30600	2510	8050	1110	<3
QC Standard (expected)	25	45	32	31100	2630	8060	1140	<3
Repeat MOORE SS 3-3A	5	16	18	15900	1340	5300	246	<3

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ANALYTICAL SERVICES

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

11-May-2001

Attn: Steve Denstedt
Project: 21843.1

Received: 2-May-2001 15:02
PO #: 21843.1

Job: 2153819

Status: Final

Soil Samples

Sample Id	Na ICAP ppm	Ni ICAP ppm	P ICAP ppm	Pb ICAP ppm	Sr ICAP ppm	Ti ICAP ppm	V ICAP ppm	Zn ICAP ppm
MOORE SS 3-3A	132	33	656	17	22.5	53	25	70
MOORE SS 3-3B	72	28	528	17	18.7	41	24	61
INCO SS 1-2A	123	4970	723	75	238.	55	22	151
INCO SS 102B	129	5910	815	79	261.	56	19	159
Blank	<50	<2	<20	<5	<0.3	<5	<1	<5
QC Standard (found)	352	42	878	20	26.7	868	48	122
QC Standard (expected)	337	43	810	21	26.0	882	48	126
Repeat MOORE SS 3-3A	135	37	677	17	23.3	56	26	74

ANALYTICAL SERVICES

11-May-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

Attn: Steve Denstedt
Project: 21843.1

Received: 2-May-2001 15:02
PO #: 21843.1

Job: 2153819 Status: Final

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Job approved by:

Signed: ....
Ralph Siebert, B.Sc.
Project Manager

ANALYTICAL SERVICES

15-May-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

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Attn: Richard Gould
Project: 21843.1

Received: 5-May-2001 13:46
PO #: 21843.1

Job: 2153954

Status: Final

Soil Samples

Sample Id	As SW 7061 ppm	Se SW 7741 ppm	Ag ICAP ppm	Al ICAP ppm	Ba ICAP ppm	Be ICAP ppm	Ca ICAP ppm	Cd ICAP ppm
MILLER SS2-4A	6.4	2.3	<1	16100	185	0.7	9590	0.9
MILLER SS2-4B	6.7	2.2	<1	16900	202	0.7	9300	0.5
FREY SS4-2A	5.0	1.2	<1	26800	180	1.2	6730	<0.5
FREY SS4-2B	5.5	1.3	<1	27100	177	1.2	6230	0.5
FREY SS4-1A	6.4	2.5	<1	24800	181	1.2	9030	1.0
FREY SS4-4B	7.5	2.2	<1	25700	184	1.4	7990	0.8
Blank	<0.2	<0.2	<1	<20	<5	<0.2	<50	<0.5
QC Standard (found)	22.8	0.4	2	15900	161	0.6	6040	<0.5
QC Standard (expected)	20.4	0.5	2	16300	157	0.6	6210	<0.5
Repeat MILLER SS2-4A	6.4	2.3	<1	16700	191	0.7	9730	0.8

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ANALYTICAL SERVICES

15-May-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
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Page: 2
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Attn: Richard Gould
Project: 21843.1

Received: 5-May-2001 13:46
PO #: 21843.1

Job: 2153954

Status: Final

Soil Samples

Sample Id	Co ICAP ppm	Cr ICAP ppm	Cu ICAP ppm	Fe ICAP ppm	K ICAP ppm	Mg ICAP ppm	Mn ICAP ppm	Mo ICAP ppm
MILLER SS2-4A	19	19	103	14600	1850	4100	200	<3
MILLER SS2-4B	18	19	100	16100	1700	4110	181	<3
FREY SS4-2A	13	31	64	25600	3520	6370	373	<3
FREY SS4-2B	12	31	63	24000	3320	5980	314	<3
FREY SS4-1A	17	30	115	22100	2810	5590	227	<3
FREY SS4-4B	13	31	101	20000	2690	5030	179	<3
Blank	<2	<1	<1	<50	<100	<20	<1	<3
QC Standard (found)	25	48	31	30900	2570	7850	1100	<3
QC Standard (expected)	25	45	32	31100	2630	8060	1140	<3
Repeat MILLER SS2-4A	19	19	106	16200	1880	4200	202	<3

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ANALYTICAL SERVICES

15-May-2001

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14 Abacus Road
Brampton, ON
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Attn: Richard Gould
Project: 21843.1

Received: 5-May-2001 13:46
PO #: 21843.1

Job: 2153954 Status: Final

Soil Samples

Sample Id	Na ICAP ppm	Ni ICAP ppm	P ICAP ppm	Pb ICAP ppm	Sr ICAP ppm	Ti ICAP ppm	V ICAP ppm	Zn ICAP ppm
MILLER SS2-4A	55	665	1190	37	49.0	35	25	118
MILLER SS2-4B	51	657	1170	35	48.9	31	26	117
FREY SS4-2A	88	331	1370	24	61.6	41	40	128
FREY SS4-2B	87	330	1280	26	60.0	30	39	123
FREY SS4-1A	93	679	1720	43	82.9	28	38	136
FREY SS4-4B	87	544	1620	35	80.9	22	38	124
Blank	<50	<2	<20	<5	<0.3	<5	<1	<5
QC Standard (found)	347	42	880	17	27.5	926	49	118
QC Standard (expected)	337	43	810	21	26.0	882	48	126
Repeat MILLER SS2-4A	57	684	1230	33	50.7	32	26	124

ANALYTICAL SERVICES

15-May-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
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Attn: Richard Gould
Project: 21843.1

Received: 5-May-2001 13:46
PO #: 21843.1

Job: 2153954 Status: Final

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Job approved by:

Signed: ....
Ralph Siebert, B.Sc.
Project Manager

APPENDIX G

QA/QC Analytical Data for Soil Test Pits

ANALYTICAL SERVICES

22-Oct-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

Attn: Mike Dutton
Project: 22273.102

Received: 20-Sep-2001 18:58
PO #: 22273.102

Job: 2159180 Status: Final

Soil Samples

Sample Id	As SW 7061 ppm	Se SW 7741 ppm	Sb SW 7041 ppm	Hg SW 7470 ppm	Cl- SM 4110B ppm	SO4= SM 4110B ppm	LOD Grav. %	Ag ICAP ppm
E1 BEDROCK	1.5	<0.2	<0.2	0.01	128	35	0.48	<1
E1 20-25	5.8	1.7	0.3	0.03	9	81	11.2	<1
E2 20-25	6.0	1.6	0.3	0.05	10	22	17.0	<1
E2 25-30	2.1	0.3	<0.2	0.04	7	6	15.4	<1
E2 45-50	3.8	<0.2	0.3	0.03	8	76	16.4	<1
E2 70-75	3.9	<0.2	0.3	0.01	11	168	16.2	<1
E3 20-25	21.1	6.9	0.9	0.12	55	141	23.1	2
E3 25-30	1.9	0.2	<0.2	0.03	34	82	13.4	<1
E3 30-35	2.1	0.2	<0.2	0.03	38	170	16.8	<1
E3 45-50	3.8	<0.2	0.3	0.03	74	311	17.6	<1
E5 5-10	53.3	8.6	1.5	0.10	11	101	23.8	4
E5 15-20	2.1	0.8	<0.2	0.03	<5	32	14.7	<1
E6 10-15	18.0	4.3	0.7	0.05	<5	228	36.6	1
E8 45-50	0.8	3.4	<0.2	0.07	29	280	71.7	<1
E10 0-2.5	6.1	1.6	0.9	0.21	15	48	12.2	<1
E10 5-10	7.5	1.4	1.4	0.21	6	27	6.36	<1
E10 40-45	6.8	0.5	0.4	0.02	9	10	5.63	<1
E11 2.5-5	10.2	1.5	0.8	0.56	<5	42	---	<1
E13 2.5-5	34.3	1.6	1.1	0.11	7	284	3.54	<1
E14 COAL	<0.2	0.7	<0.2	<0.01	9	11	18.5	<1

ANALYTICAL SERVICES

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

22-Oct-2001

Attn: Mike Dutton
Project: 22273.102

Received: 20-Sep-2001 18:58
PO #: 22273.102

Job: 2159180 Status: Final

Sample Id	As SW 7061 ppm	Se SW 7741 ppm	Sb SW 7041 ppm	Hg SW 7470 ppm	Cl- SM 4110B ppm	SO4= SM 4110B ppm	LOD Grav. %	Ag ICAP ppm
Sample +Spike (found)	6.6	5.8	4.8	0.59	---	---	---	not ava
Sample+Spike (expected)	6.5	5.0	5.0	0.51	---	---	---	not ava
Blank	<0.2	<0.2	<0.2	<0.10	<5	<5	<0.01	<1
QC Standard (found)	19.8	0.5	0.7	0.28	345	443	---	3
QC Standard (expected)	20.4	0.5	0.7	0.29	350	450	---	2
Repeat E1 BEDROCK	1.5	<0.2	<0.2	0.01	123	39	0.51	<1
Soil Samples								
E15 45-50	3.4	<0.2	<0.2	0.13	<5	35	13.6	<1
E16 2.5-5✓	39.6	7.2	1.3	0.07	17	43	19.9	3
E16 15-20?	3.0	0.4	<0.2	0.02	<5	26	13.2	<1
SOIL ADDITIVE	25.6	2.7	1.1	0.04	9	71	25.6	2
E9 2.5-5	32.5	5.3	1.6	0.18	24	69	22.9	3
E9 7.5-10	75.4	11.5	2.7	0.07	15	34	18.5	6
E9 12.5-15	48.6	5.5	1.6	0.11	<5	25	15.0	4
E9 20-22.5	15.4	1.6	1.0	0.28	7	18	23.0	1
E9 30-35	13.7	1.7	0.6	0.17	7	28	36.9	<1
E9 40-45	8.6	2.2	0.4	0.08	12	28	44.5	<1
TP17 { ED 2.5-5✓	34.3	4.7	1.8	0.10	5	28	18.7	3
ED 7.5-10✓	75.4	4.7	2.0	0.03	9	11	13.5	4
ED 12.5-15✓	11.1	1.2	0.5	0.07	<5	<5	10.4	<1

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ANALYTICAL SERVICES

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

22-Oct-2001

Attn: Mike Dutton
Project: 22273.102

Received: 20-Sep-2001 18:58
PO #: 22273.102

Job: 2159180 Status: Final

Soil Samples

Sample Id	As SW 7061 ppm	Se SW 7741 ppm	Sb SW 7041 ppm	Hg SW 7470 ppm	Cl- SM 4110B ppm	SO4= SM 4110B ppm	LOD Grav. %	Ag ICAP ppm
TP17 ED 30-35✓	5.3	1.0	0.2	0.06	7	5	10.2	<1
ED 40-45✓	11.1	0.2	0.2	0.01	<5	<5	4.33	<1
ED 70-75	0.6	<0.2	<0.2	<0.01	<5	<5	4.78	<1
E11 20-25	36.9	1.7	1.5	0.02	6	<5	2.06	2
PELLETS	18.8	<0.2	1.3	<0.01	17	62	0.03	<1
E15 20-25	4.9	0.6	0.3	0.13	7	19	8.73	<1
E15 35-40	5.0	0.6	0.6	0.08	8	19	12.0	<1
Sample+Spike (found)	9.2	5.5	3.7	0.73	---	---	---	---
Sample+Spike (expected)	8.4	5.0	5.0	0.63	---	---	---	---
Blank	<0.2	<0.2	<0.2	<0.01	<5	<5	<0.01	<1
QC Standard (found)	19.8	0.5	0.8	0.31	345	443	---	3
QC Standard (expected)	20.4	0.5	0.7	0.29	350	450	---	2
Repeat E15 45-50	3.0	<0.2	<0.2	0.11	<5	32	16.2	<1

ANALYTICAL SERVICES

22-Oct-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
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Attn: Mike Dutton
Project: 22273.102

Received: 20-Sep-2001 18:58
PO #: 22273.102

Job: 2159180 Status: Final

Soil Samples

Sample Id	Al ICAP ppm	Ba ICAP ppm	Be ICAP ppm	Ca ICAP ppm	Cd ICAP ppm	Co ICAP ppm	Cr ICAP ppm	Cu ICAP ppm
E1 BEDROCK	670	8	<0.2	223000	<0.5	<2	33	8
E1 20-25	11900	110	0.6	33900	1.1	26	19	203
E2 20-25	16400	146	0.9	4340	1.0	20	22	171
E2 25-30	13800	103	0.7	3140	<0.5	8	20	32
E2 45-50	20100	165	1.0	5000	0.7	15	29	39
E2 70-75	13800	138	0.8	34300	0.8	11	21	25
E3 20-25	17400	161	1.3	7490	2.2	68	27	696
E3 25-30	15000	112	0.7	2620	0.7	12	22	20
E3 30-35	16700	133	0.9	3140	0.6	19	25	24
E3 45-50	21900	182	1.1	4910	0.7	16	31	36
E5 5-10	26600	223	1.9	6350	3.5	138	39	1280
E5 15-20	16000	111	0.9	3040	0.7	11	24	21
E6 10-15	18300	166	1.1	4950	1.7	47	26	421
E8 45-50	1850	44	<0.2	29200	<0.5	3	3	25
E10 0-2.5	10700	142	0.8	24800	1.1	35	16	147
E10 5-10	12700	150	0.9	40800	1.4	24	18	121
E10 40-45	1930	20	<0.2	3090	1.0	13	8	88
E11 2.5-5	6630	112	0.9	50800	1.5	37	16	198
E13 2.5-5	8510	119	0.8	90600	1.9	19	57	111
E14 COAL	296	11	<0.2	1520	<0.5	<2	1	5

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ANALYTICAL SERVICES

22-Oct-2001

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

Attn: Mike Dutton
Project: 22273.102

Received: 20-Sep-2001 18:58
PO #: 22273.102

Job: 2159180 Status: Final

Sample Id	Al ICAP ppm	Ba ICAP ppm	Be ICAP ppm	Ca ICAP ppm	Cd ICAP ppm	Co ICAP ppm	Cr ICAP ppm	Cu ICAP ppm
Sample +Spike (found)	not ava	100	8.5	---	97.1	88	124	99
Sample+Spike (expected)	not ava	108	10.0	---	100.	101	132	107
Blank	<20	<5	<0.2	<50	<0.5	<2	<1	<1
QC Standard (found)	14000	153	0.5	5350	0.7	26	44	33
QC Standard (expected)	16300	157	0.6	6210	0.5	25	45	32
Repeat E1 BEDROCK	691	9	<0.2	235000	0.8	<2	35	6
Soil Samples								
E15 45-50	15100	126	0.8	29500	0.7	16	22	35
E16 2.5-5	16800	171	1.0	3790	1.8	121	35	1170
E16 15-20	13800	107	0.7	2290	0.8	23	21	25
SOIL ADDITIVE	37500	243	2.5	6040	3.4	30	40	431
E9 2.5-5	5730	142	0.5	23700	2.5	86	26	499
E9 7.5-10	7720	169	0.9	27700	5.6	149	57	992
E9 12.5-15	9920	174	0.7	28100	3.5	80	26	625
E9 20-22.5	4850	146	0.5	25100	1.1	19	11	450
E9 30-35	3040	80	0.2	21500	1.4	14	9	163
E9 40-45	2670	54	<0.2	16800	0.8	7	6	70
ED 2.5-5	4720	121	0.5	11800	3.0	110	45	551
ED 7.5-10	4040	113	0.4	7810	4.3	112	39	923
ED 12.5-15	5220	80	0.4	11900	1.3	8	8	161

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ANALYTICAL SERVICES

BEAK INTERNATIONAL INC.
14 Abacus Road
Brampton, ON
L6T 5B7

22-Oct-2001

Attn: Mike Dutton
Project: 22273.102

Received: 20-Sep-2001 18:58
PO #: 22273.102

Job: 2159180

Status: Final

Soil Samples

Sample Id	Al ICAP ppm	Ba ICAP ppm	Be ICAP ppm	Ca ICAP ppm	Cd ICAP ppm	Co ICAP ppm	Cr ICAP ppm	Cu ICAP ppm
ED 30-35	2470	45	<0.2	13700	1.0	9	7	46
ED 40-45	1980	18	<0.2	3940	<0.5	2	5	13
ED 70-75	2660	8	<0.2	1330	0.6	<2	4	4
E11 20-25	4170	90	0.5	30200	3.7	54	21	308
PELLETS	803	8	<0.2	1570	0.7	5	53	13
E15 20-25	10600	108	0.6	38800	1.0	10	16	49
E15 35-40	14200	113	0.8	32300	0.8	13	21	57
Sample+Spike (found)	---	232	10.2	---	97.5	107	117	132
Sample+Spike (expected)	---	234	10.9	---	100.	116	123	136
Blank	<20	<5	<0.2	<50	<0.5	<2	<1	<1
QC Standard (found)	15700	164	0.5	5870	0.5	26	48	33
QC Standard (expected)	16300	157	0.6	6210	0.5	25	45	32
Repeat E15 45-50	11900	104	0.7	24500	0.5	14	18	35

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Sample Id	Fe ICAP ppm	K ICAP ppm	Mg ICAP ppm	Mn ICAP ppm	Mo ICAP ppm	Na ICAP ppm	Ni ICAP ppm	P ICAP ppm
E1 BEDROCK	3120	315	4250	98	<3	185	14	118
E1 20-25	24200	1220	10600	410	<3	220	1510	532
E2 20-25	14500	1540	3900	166	<3	240	1000	519
E2 25-30	13800	985	4230	157	<3	190	114	242
E2 45-50	36500	1620	9220	634	<3	281	101	674
E2 70-75	27600	1350	13100	463	<3	261	41	517
E3 20-25	20200	1560	4040	167	<3	221	4800	1000
E3 25-30	22000	1140	4710	142	<3	147	77	199
E3 30-35	27000	1450	6050	241	<3	179	52	365
E3 45-50	37200	1890	9640	386	<3	245	72	765
E5 5-10	31500	2630	4860	344	<3	159	10300	1980
E5 15-20	19600	1190	5480	149	<3	54	112	177
E6 10-15	18200	1590	4070	158	<3	153	2990	689
E8 45-50	3390	217	2290	186	<3	76	144	541
E10 0-2.5	19900	1650	9730	414	<3	119	1010	931
E10 5-10	25400	1500	14200	591	<3	123	711	695
E10 40-45	11400	<100	816	185	<3	<50	605	278
E11 2.5-5	37000	696	15300	914	<3	206	1260	570
E13 2.5-5	51400	830	13700	1810	<3	174	289	581
E14 COAL	445	<100	341	16	<3	54	6	25

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Sample Id	Fe ICAP ppm	K ICAP ppm	Mg ICAP ppm	Mn ICAP ppm	Mo ICAP ppm	Na ICAP ppm	Ni ICAP ppm	P ICAP ppm
Sample +Spike (found)	---	---	---	189	182	---	100	---
Sample+Spike (expected)	---	---	---	198	202	---	113	---
Blank	<50	<100	<20	<1	<3	<50	<2	<20
QC Standard (found)	30400	2310	7550	1150	<3	237	43	963
QC Standard (expected)	31100	2630	8060	1140	<3	337	43	810
Repeat E1 BEDROCK	3270	254	4450	103	<3	184	14	116
Soil Samples								
E15 45-50	28700	1440	12600	402	<3	91	221	618
E16 2.5-5	21000	1750	3680	161	<3	141	7570	935
E16 15-20	21300	1110	4080	138	<3	102	458	225
SOIL ADDITIVE	31200	4030	5120	314	<3	303	2730	2870
E9 2.5-5	44300	844	8600	697	<3	105	4760	1050
E9 7.5-10	96500	985	9020	1200	9	164	9740	1030
E9 12.5-15	50500	1090	9530	720	<3	127	5790	837
E9 20-22.5	27600	582	5870	476	<3	114	3010	992
E9 30-35	16700	274	4550	288	<3	85	1160	761
E9 40-45	8190	223	2010	130	<3	63	477	613
ED 2.5-5	59800	544	3340	927	3	82	5060	1400
ED 7.5-10	93400	354	2730	1130	4	99	9350	936
ED 12.5-15	14000	328	4170	273	<3	61	991	599

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Sample Id	Fe ICAP ppm	K ICAP ppm	Mg ICAP ppm	Mn ICAP ppm	Mo ICAP ppm	Na ICAP ppm	Ni ICAP ppm	P ICAP ppm
ED 30-35	9580	192	2430	167	<3	55	382	611
ED 40-45	3040	<100	618	39	<3	<50	105	283
ED 70-75	3470	<100	879	28	<3	<50	7	317
E11 20-25	94600	551	6980	1750	5	131	2500	534
PELLETS	99300	<100	935	1110	4	<50	47	114
E15 20-25	19000	1160	14900	354	<3	100	198	686
E15 35-40	24600	1470	11800	415	<3	90	218	734
Sample+Spike (found)	---	---	---	522	186	---	333	---
Sample+Spike (expected)	---	---	---	529	200	---	341	---
Blank	<50	207	<20	<1	<3	<50	<2	<20
QC Standard (found)	32900	2560	8130	1210	<3	250	45	968
QC Standard (expected)	31100	2630	8060	1140	<3	337	43	810
Repeat E15 45-50	23400	1140	10300	340	<3	64	200	509

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Sample Id	Pb ICAP ppm	Sr ICAP ppm	Ti ICAP ppm	V ICAP ppm	Zn ICAP ppm
E1 BEDROCK	<5	152.	13	3	9
E1 20-25	15	68.6	165	26	70
E2 20-25	11	31.7	78	28	68
E2 25-30	7	23.6	81	25	59
E2 45-50	15	37.5	164	38	81
E2 70-75	11	69.2	161	28	66
E3 20-25	41	137.	97	31	143
E3 25-30	8	73.2	117	34	72
E3 30-35	13	112.	149	33	75
E3 45-50	12	198.	204	41	92
E5 5-10	73	91.6	149	52	240
E5 15-20	14	36.8	114	37	72
E6 10-15	25	74.3	92	37	120
E8 45-50	<5	114.	32	5	26
E10 0-2.5	133	98.6	141	24	197
E10 5-10	166	143.	147	27	334
E10 40-45	21	31.3	91	5	157
E11 2.5-5	117	90.2	165	17	273
E13 2.5-5	132	140.	173	48	453
E14 COAL	<5	26.4	69	4	7

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Sample Id	Pb ICAP ppm	Sr ICAP ppm	Ti ICAP ppm	V ICAP ppm	Zn ICAP ppm
Sample +Spike (found)	86	247.	---	93	103
Sample+Spike (expected)	100	252.	---	103	109
Blank	<5	<0.3	<5	<1	<5
QC Standard (found)	24	20.1	759	44	127
QC Standard (expected)	21	26.0	882	48	126
Repeat E1 BEDROCK	<5	160.	13	3	8
Soil Samples					
E15 45-50	16	76.8	148	30	75
E16 2.5-5	44	31.4	103	35	174
E16 15-20	14	18.2	102	40	59
SOIL ADDITIVE	33	114.	181	55	164
E9 2.5-5	329	64.0	118	24	583
E9 7.5-10	400	69.7	154	31	1120
E9 12.5-15	316	66.0	153	27	726
E9 20-22.5	239	80.1	132	18	354
E9 30-35	96	69.3	93	13	175
E9 40-45	31	68.0	84	10	71
ED 2.5-5	414	36.6	102	27	760
ED 7.5-10	497	26.5	123	21	1070
ED 12.5-15	66	28.3	148	14	153

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Soil Samples

Sample Id	Pb ICAP ppm	Sr ICAP ppm	Ti ICAP ppm	V ICAP ppm	Zn ICAP ppm
ED 30-35	58	37.7	130	10	99
ED 40-45	12	16.6	172	8	22
ED 70-75	<5	8.4	149	11	18
E11 20-25	210	65.3	236	24	903
PELLETS	<5	4.4	66	7	33
E15 20-25	62	81.0	130	23	118
E15 35-40	54	87.9	136	30	109
Sample+Spike (found)	110	176.	---	125	176
Sample+Spike (expected)	116	182.	---	132	177
Blank	<5	<0.3	<5	<1	<5
QC Standard (found)	18	22.7	896	47	131
QC Standard (expected)	21	26.0	882	48	126
Repeat E15 45-50	15	64.0	119	24	61

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Job: 2159180 Status: Final

Vegetation Samples

Sample Id	LOD Grav. %	Cl- SM 4110B ppm	SO4= SM 4110B ppm	Hg SW 7470 ppm	Ag ICP/MS ppm	Al ICP/MS ppm	As ICP/MS ppm	B ICP/MS ppm
E16 MOSS	25.1	90	494	0.23	0.75	9160.	13.4	62.4
Sample+Spike (found)	---	298	656	0.71	---	---	14.3	---
Sample+Spike (expected)	---	295	604	0.89	---	---	16.7	---
Blank	<0.01	<10	<10	<0.01	<0.01	<0.5	<0.2	<0.5
QC Standard (found)	---	342	437	0.28	0.23	91.8	9.5	1.9
QC Standard (expected)	---	350	450	0.29	0.30	100.	10.0	5.0
Repeat E16 MOSS	25.1	92	485	0.24	0.64	8930.	12.1	62.7

Sample Id	Ba ICP/MS ppm	Be ICP/MS ppm	Bi ICP/MS ppm	Ca ICP/MS ppm	Cd ICP/MS ppm	Co ICP/MS ppm	Cr ICP/MS ppm	Cu ICP/MS ppm
E16 MOSS	154.	0.3	2.0	13300	0.82	184.	38.7	540.
Sample+Spike (found)	---	3.8	---	---	3.94	---	---	---
Sample+Spike (expected)	---	3.7	---	---	4.16	---	---	---
Blank	<0.5	<0.1	<0.1	<50	<0.01	<0.01	<0.5	<0.05
QC Standard (found)	9.8	0.5	9.9	435	4.88	4.79	5.2	4.85
QC Standard (expected)	10.0	0.5	10.0	500	5.00	5.00	5.0	5.00
Repeat E16 MOSS	149.	0.3	1.7	13700	0.80	170.	34.4	498.

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Vegetation Samples

Sample Id	Fe ICP/MS ppm	K ICP/MS ppm	Mg ICP/MS ppm	Mn ICP/MS ppm	Mo ICP/MS ppm	Na ICP/MS ppm	Ni ICP/MS ppm	P ICP/MS ppm
E16 MOSS	7540	3860	3520	257.	2.1	177	5400.	1330
Sample+Spike (found)	---	---	---	---	5.1	---	---	---
Sample+Spike (expected)	---	---	---	---	5.4	---	---	---
Blank	3	<10	<5	<0.5	<0.1	<10	<0.1	<5
QC Standard (found)	99	78	89	5.1	4.9	419	4.9	94
QC Standard (expected)	100	100	100	5.0	5.0	500	5.0	100
Repeat E16 MOSS	6830	3800	3600	239.	2.0	173	4940.	1340

Sample Id	Pb ICP/MS ppm	Sb ICP/MS ppm	Se ICP/MS ppm	Si ICP/MS ppm	Sn ICP/MS ppm	Sr ICP/MS ppm	Ti ICP/MS ppm	Tl ICP/MS ppm
E16 MOSS	47.1	0.67	7.5	257	1.2	74.2	53	0.149
Sample+Spike (found)	---	2.71	9.4	---	---	---	---	3.35
Sample+Spike (expected)	---	4.01	10.8	---	---	---	---	3.48
Blank	<0.05	<0.05	<0.2	<5	<0.1	<0.1	<1	<0.005
QC Standard (found)	4.97	5.56	9.2	31	9.5	4.9	5	9.68
QC Standard (expected)	5.00	10.0	10.0	100	10.0	5.0	5	10.0
Repeat E16 MOSS	42.7	0.69	6.9	275	0.9	74.5	50	0.138

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Sample Id	U ICP/MS ppm	V ICP/MS ppm	Zn ICP/MS ppm
E16 MOSS	0.29	23.3	119.
Sample+Spike (found)	3.34	---	---
Sample+Spike (expected)	3.63	---	---
Blank	<0.01	<0.05	<0.5
QC Standard (found)	0.41	5.15	5.8
QC Standard (expected)	0.40	5.00	5.0
Repeat E16 MOSS	0.27	20.9	110.

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Note: ICP/MS spike data for many elements is not available due to the high amount of metals in the sample. Spike of 3.3 ppm is less than 10% of the sample value for most elements.

All work recorded herein has been done in accordance with normal professional standards using accepted testing methodologies and QA/QC procedures. Philip Analytical is limited in liability to the actual cost of the pertinent analyses done unless otherwise agreed upon by contractual arrangement. Your samples will be retained by PASC for a period of 30 days following reporting or as per specific contractual arrangements.

Job approved by:

Signed: ....
Ralph Siebert, B.Sc.
Section Supervisor, Metals