EXPERT OPINION OF PAUL B. QUENEAU

PAKOOTAS, ET AL. v. TECK COMINCO METALS LTD

August 1, 2014

I. INTRODUCTION

My name is Paul B. Queneau. I am President of P. B. Queneau & Associates, Inc. (PBQ & Associates), Principal Metallurgical Engineer at the Bear Group, and an Adjunct Professor in Civil and Environmental Engineering at the Colorado School of Mines (CSM).

In the Fall of 2009 I was asked to apply my metallurgical education and experience to provide opinions related to known and calculated amounts of effluents from Teck Cominco's Trail smelting complex that entered the Columbia River from 1896 to 2005. These effluents included slag. P. B. Queneau & Associates, Inc. was compensated at a rate of $300 an hour for my time in preparation of this report. P. B. Queneau & Associates, Inc. was also compensated at the rate of $200 an hour for time spent by a member of the Bear Group working under my direction on this project.

In January 2014 I was asked to update my May 12, 2011, Expert Opinion for Phase 2 – Air Pathways, specifically to apply my metallurgical education and experience to provide opinions related to known and calculated amounts of emissions from Teck Cominco's Trail smelting complex from 1896 to 2002.

P. B. Queneau & Associates, Inc. was again compensated at a rate of $300 an hour for my time in preparation of this updated report. P. B. Queneau & Associates, Inc. was also compensated at the rate of $200 an hour for time spent by a member of the Bear Group working under my direction on this project.

II. QUALIFICATIONS

I graduated from Cornell University, Ithaca, New York, with a B.S. in Metallurgical Engineering in 1964, and from the University of Minnesota, Minneapolis, Minnesota, with a Ph.D. in Metallurgical Engineering in 1967.

I am a member of the American Institute of Mining, Metallurgical and Petroleum Engineers, The Metallurgical Society (AIME-TMS), the Mining and Metallurgical Society of America (MMSA), and the Canadian Institute of Mining and Metallurgy (CIM). In 2001, I was presented the AIME-TMS

Extraction & Processing Distinguished Lecturer Award. I was elected to membership in Tau Beta Pi, and am a Registered Professional Engineer in Colorado. I am a Past President of the Denver Section, Extractive Metallurgy Division of AIME.

For over 25 years I have presented short courses on recycling metals from industrial waste. Locations have included CSM (up to 100 attendees, from many countries; held annually for 22 years), AIME and CIM annual meetings, the U.S. EPA's Office of Solid Waste in Washington, a DOE site and a waste management facility. A copy of my C.V. is attached in Appendix D.

III. CASES IN WHICH PAUL B. QUENEAU TESTIFIED AS AN EXPERT AT TRIAL OR BY DEPOSITION DURING THE PAST SEVEN YEARS

During the past seven years, I have testified as an expert at trial or by deposition in two cases:

PAKOOTAS, ET AL. v. TECK COMINCO METALS LTD, 2011: I was asked to apply my metallurgical education and experience to provide opinions related to known and calculated amounts of effluents from Teck Cominco's Trail smelting complex that entered the Columbia River from 1896 to 2005.

PERINE v. E.I. DUPONT ET AL., 2007: I was asked to apply my metallurgical education and experience to provide opinions related to zinc production at Spelter, WV, from 1911 until secondary operations ceased in the early 2000s.

IV. BASES AND SUPPORTING INFORMATION

The opinions contained in the report are based on 46 years of experience as a practicing extractive metallurgist, and 24 years as an Adjunct Professor in the Department of Environmental Science and Engineering (now Civil and Environmental Engineering) at the Colorado School of Mines. In addition to my personal experience I have examined, at least briefly, the technical papers, books, and documents listed in Appendix B.

V. PRIOR REPORTS PREPARED BY PAUL B. QUENEAU ON TRAIL'S SMELTER OPERATIONS

I have previously completed two reports on Trail's smelter operations:

- Expert Opinion of Paul B. Queneau (September 15, 2010)
- Expert Opinion of Paul B. Queneau and Rebuttal of the Expert Opinion of J.F. Higginson (May 12, 2011)

For the September 2010 and May 2011 reports I applied my metallurgical education and experience to provide opinions related to known and calculated amounts of effluents from Teck Cominco's Trail smelting complex that entered the Columbia River from 1896 to 2005. These effluents included slag.

VI. FOCUS OF THE PRESENT REPORT

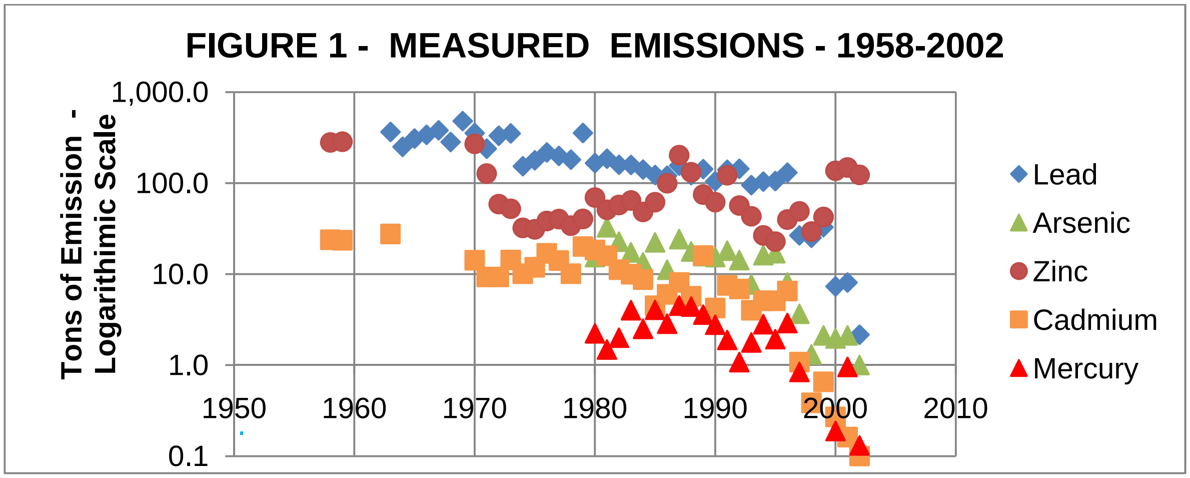
The focus of this report is air emissions from Trail's lead and zinc smelting and refining operations, specifically lead, zinc, arsenic, cadmium, and mercury. Emissions include gases, dust, and fume. The scope includes discovering measured values reported in Teck documents and, where reported measured values were not discovered, using the available information to calculate year-by-year tonnages of these five elemental emissions from Trail's smelter operations. This report covers 1923 through 2002.

In the course of this current focus on air emissions, I have continued my study of the associated unit operations at Trail. This study has been an important part of the basis for my opinions. Details are included in Appendix A.

VII. OPINIONS

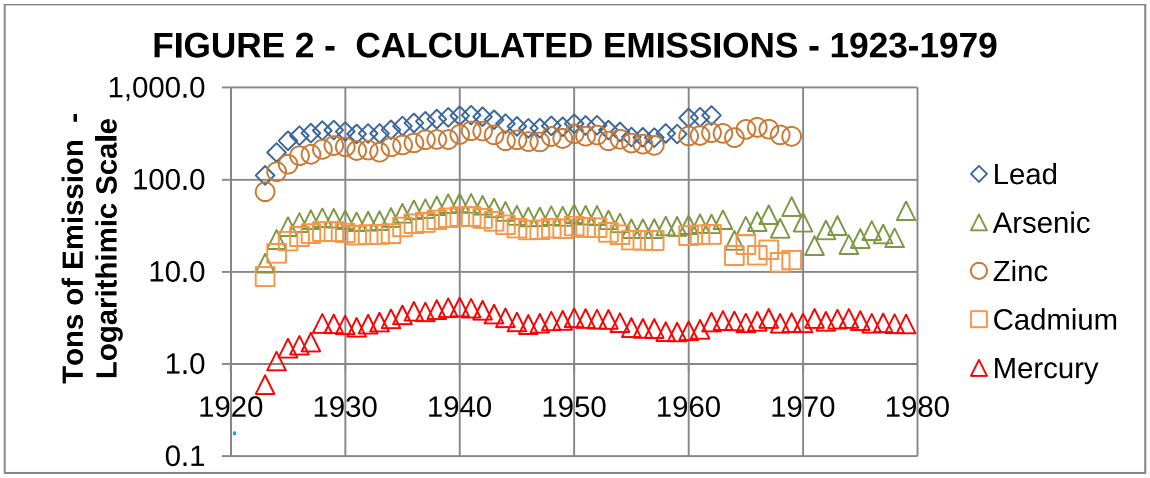
Opinion #1: The minimum tonnage of lead, arsenic, zinc, cadmium, and mercury emissions from the Trail smelter using known reported measured values for each metal were evaluated. The discovered reported measured values are credible and consistent with the operations and processes at the smelter during the given timeframe. Table 1 identifies the discovered reported measured minimum tonnage of metals emitted from the Trail smelter. These annual measured emissions are plotted in Figure 1.

Table 1: TABULATION OF MINIMUM REPORTED MEASURED AIR EMISSIONS FROM THE TRAIL SMELTER – 1958-2002	
Metal	**Total Reported Measured Value**
Lead Emissions	**7,359**
Arsenic Emissions	**302**
Zinc Emissions	**3,053**
Cadmium Emissions	**352**
Mercury Emissions	**49**



Opinion #2: The tonnage of lead, arsenic, zinc, cadmium, and mercury emissions from the Trail smelter for years in which there was no discovered reported measured value were evaluated. Table 2 shows the calculated minimum tonnage of metals emitted from the Trail smelter. In the years in which measured emission values for a given element were discovered, these values were not included when calculating the minimum tonnages as shown in Table 2 and Figure 2. The annual calculated emissions are plotted in Figure 2.

Table 2: TABULATION OF MINIMUM CALCULATED AIR EMISSIONS FROM THE TRAIL SMELTER – 1923-1979	
Metal	**Total Calculated Value**
Lead Emissions	**14,617**
Arsenic Emissions	**2,070**
Zinc Emissions	**11,821**
Cadmium Emissions	**1,160**
Mercury Emissions	**161**



Opinion #3: The total minimum tonnage of lead, arsenic, zinc, cadmium, and mercury emissions were calculated for Trail's smelters from 1923 through 2002 by adding the discovered reported measured values contained in Opinion #1 to the calculated values contained in Opinion #2. The total minimum tonnages of the following metals were emitted from the Trail smelter from 1923 through 2002 as shown in Table 3. Decade-by-decade tonnages of minimum total air emissions (calculated and measured) from 1923 to 2002 are tabulated in Table 4. The annual total emissions are plotted in Figure 3.

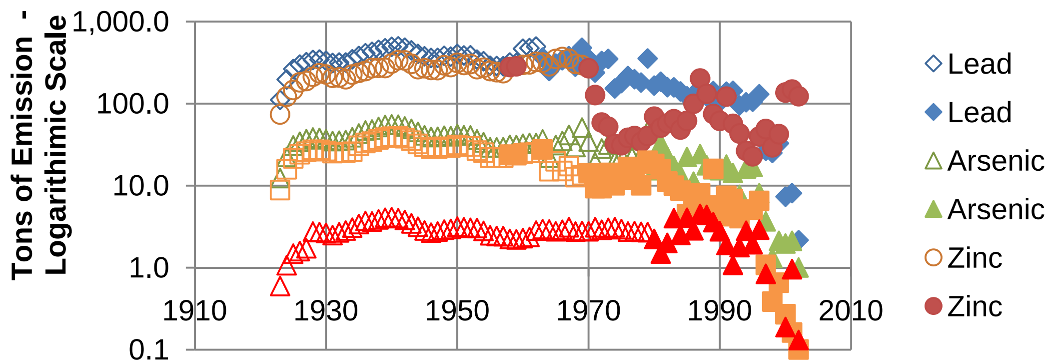
Table 3: TABULATION OF TOTAL MINIMUM AIR EMISSIONS FROM THE TRAIL SMELTER

Metal	Total Value
Lead Emissions	21,976
Arsenic Emissions	2,372
Zinc Emissions	14,874
Cadmium Emissions	1,512
Mercury Emissions	210

Table 4: TABULATION OF TOTAL MINIMUM AIR EMISSIONS FROM THE TRAIL SMELTER: 1923 THROUGH 2002

	Lead Production	Zinc Production	Lead	Arsenic	Zinc	Cadmium	Mercury
	Total Tons for the Time Period						
1923-1929	838,918	433,967	1,876	213	1,160	151	12
1930-1939	1,648,409	1,144,930	3,774	427	2,371	301	32
1940-1949	1,862,270	1,432,173	4,182	459	2,911	330	32.7
1950-1959	1,567,982	1,775,047	3,346	345	2,745	257	27
1960-1969	1,709,895	2,051,623	3,843	346	3,198	196	28
1970-1979	1,542,747	2,281,803	2,558	279	725	130	29
1980-1989	1,174,185	2,479,942	1,473	193	861	105	32
1990-1999	924,320	2,831,476	907	104	494	41	16
2000-2002	250,446	782,633	18	5.1	408	0.53	1.3
1923-2002	11,519,172	15,213,594	21,976	2,372	14,874	1512	210

FIGURE 3 - MEASURED AND CALCULATED EMISSIONS - 1923-2002



Filled markers – 70 to 100% measured weights.
Unfilled markers – less than 70% measured weights.

I reserve the right to modify my report if additional information becomes available.

VIII. BASIS FOR OPINION AND METHODOLOGY

A. Methodology Used in this Report

Teck's reported measured emission values were used where possible and various minimum emission values were calculated when no discovered measured values were available. Most of the data used to prepare these calculations were provided by Teck Metals, various environmental authorities, and technical publications. This data proved to be reasonably internally consistent, and credible.

This report employed measures to ensure that calculated values were minimum amounts:

1. Numerous point sources of emissions in the Trail facility were excluded due to lack of comprehensive emissions data for the relevant period.

2. Calculating emissions during early years of Trail smelter operations based on data from the post-1980 period gives the earlier years the benefit of the more rigorous emission controls employed in the later years. Because the earlier years did not employ the more rigorous emissions controls, this methodology ensures that the discovered total emission values are conservative values.

3. I did not calculate emissions before 1923, even though the Trail facility had been in operation since 1896. Significant Pb, As, Zn, Cd, and Hg emissions from the zinc and lead smelters occurred prior to the years included in this report. These emissions were substantial because fugitive emissions of volatile substances in a well-run plant can make up half of total emissions.

4. This report does not include emissions from the copper smelter.

5. Other documents from Teck show air releases for metals in higher quantities than the measured numbers used in this report, such as "Cominco Trail Operations Emissions and Reductions Tonnes per Year," CCT1-003614.

Key documents reviewed included:

Zinc Plant Annual Area Metallurgical Reports - TECK 1124715
Tadanac Metallurgical Statements - TECK 1554362
Lead Plant: Smelter Losses - TECK 1554218
Zinc Department Analysis of Losses - TECK 1554447
Mercury Balances - Lead Smelting - TECK 1122416

A list of the other documents considered or relied upon is in Appendix E.

B. Known Measured Air Emissions

Beginning in 1964, the annual Tadanac Metallurgical Statement included stack losses for both the lead smelter stack and the zinc smelter stack. These data was used calculate emissions for this period. In 1980, Cominco began sampling most if not all of the emissions from the Trail plant and it reported emissions totals in documents that have been used for this report. Table 5 below identifies all of the measured air emissions for each year in which there are known reported values. The known reported measured values were obtained by reviewing available documents (Tadanac Metallurgical Statements and Environmental Reports), and where required, applying the appropriate conversion (kg per day to tons per year). It is assumed that the Teck plant is 96% on stream, and therefore is operating 350 days per year. Some of the documents did not identify total plant emissions, but instead identified emissions from various operations at the plant. In those instances, the sum of the emissions from each operation was used. The Inputs and Distribution Spreadsheets attached to this report as Appendix C includes the specific calculations to obtain the known measure values, and also identifies the source document(s).

For example, Table 5 shows that 158 tons of lead was measured as being emitted from the Trail plant in 1983. TECK0062877 states that 410 kg/day of lead was emitting from the entire smelter in 1983. When converted to tons and multiplied by the number of days the plant operated (350 days), the result is 158 total tons of lead were emitted for the year.

TABLE 5 –REPORTED MEASURED AIR EMISSIONS

	Lead	Arsenic	Zinc	Cadmium	Mercury
	Total Tons per Year				
1963	284*		91*	24*	
1964	170**		286	15	
1965	242**		351	20	
1966	272**		369	15	
1967	322**		352	17	
1968	230**		306	13	
1969	395**				
1970	268**		270	14	
1971	149**		127	9	
1972	220**		59	9	
1973	246**		52	14	

1974	**153**		**32**	**10**	
1975	**178**		**31**	**12**	
1976	**217**		**38**	**17**	
1977	**199**		**40**	**14**	
1978	**181**		**34**	**10**	
1979	**355**		**40**	**20**	
1980	**166**	**15**	**69**	**18**	**2.2**
1981	**185**	**33**	**51**	**16**	**1.5**
1982	**159**	**23**	**57**	**11**	**2.0**
1983	**158**	**17**	**64**	**10.0**	**4.0**
1984	**141**	**14**	**48**	**8.7**	**2.5**
1985	**123**	**22**	**62**	**4.5**	**4.1**
1986	**120**	**11**	**100**	**6.0**	**2.9**
1987	**156**	**24**	**203**	**8.1**	**4.5**
1988	**122**	**18**	**132**	**5.7**	**4.4**
1989	**142**	**16**	**75**	**16.0**	**3.6**
1990	**105**	**15**	**62**	**4.2**	**2.8**
1991	**140**	**18**	**122**	**7.5**	**1.9**
1992	**144**	**14**	**57**	**6.9**	**1.1**
1993	**95**	**7.7**	**43**	**4.0**	**1.8**
1994	**104**	**16**	**27**	**5.1**	**2.8**
1995	**105**	**17**	**23**	**5.1**	**1.9**
1996	**130**	**8.1**	**40**	**6.5**	**2.9**
1997	**27**	**3.7**	**49**	**1.08**	**0.8**
1998	**25**	**1.3**	**29**	**0.39**	**0.1**
1999	**33**	**2.1**	**42**	**0.66**	**0.1**
2000	**7**	**2**	**137**	**0.3**	**0.2**
2001	**8**	**2**	**149**	**0.2**	**1.0**
2002	**2**	**1**	**123**	**0.1**	**0.1**

* Measured values for lead, zinc, and cadmium emitted from the lead smelter were discovered for the year 1963. The measured values included emissions from the Sintering Stack, the Blast Furnace Stack, and the Slag Fuming Stack (TECK_1554218). The sum of these 1963 values therefore serves as the partial smelter emission for that year. Note: The 1963 emissions from 1) Blended cinders and recycled sludge advanced to the sludge dryer, and 2) Fugitive emissions from sintering, BF operation, and slag fuming, were not found. Because no means was found to calculate these losses, these latter emissions are included as nil.

** The Tadanac Metallurgical Statements produced between 1964 and 1973 did not include measured lead values from the Zinc Smelter, but did contain measured values for lead from the Lead Smelter. Therefore, the reported measured values with an ** are only partial emissions from the Smelter for those years.

C. Calculated Air Emissions:

The measured and calculated losses for both the lead and zinc smelters from 1923 to 2002 are listed in Appendix C, "Sheet 16, M&C Emissions."

Air emissions for those years in which there are no known reported measured values were calculated. Lead, zinc, and cadmium values are calculated independently for the lead smelter and zinc smelter and then combined to determine the minimum calculated amounts for those metals. Data for mercury and arsenic are not available from individual smelters, but are only available for the smelter as a whole. Therefore, mercury and arsenic values are calculated for the entire smelter.

1. <u>Calculated Emissions for Lead, Zinc, and Cadmium</u>:

a. Lead Smelter Calculated Emissions for lead, zinc, and cadmium:

The smelter emission values for lead, zinc and cadmium before 1963 were calculated by taking the concentration of lead contained in each year's concentrate feed between 1923 and 1962, and dividing that amount by the amount of lead contained in the 1963 concentrate feed. This ratio (this year's lead feed concentrate/1963 lead feed concentrate) was then multiplied by the reported measured value for lead, zinc, or cadmium emissions reported in 1963. To minimize the effect of year-to-year inventory variations, a five-year moving average was used to calculate the tons of lead in each year's feed.

For example, the 1930 calculation for lead was determined as follows:
(1) The normalized lead concentrate feed for 1930 (Sheet 17, Column Q14) was divided by the 1963 normalized lead concentrate feed (Sheet 19, Column Q49).
(2) The ratio from number 1, was multiplied by the reported measured value for lead emission in 1963, 284.3. (Sheet 17, Column C52).
(3) The calculated number for lead emissions in 1930 is 284: 141,063/140,971 x 284.3 = 284.

The measured and calculated emissions for lead, arsenic, zinc, and cadmium from the lead smelter are listed in "Sheet 17, Lead Calculations."

b. Zinc Smelter Calculated Emissions for lead, zinc, and cadmium:

There are no measured values for lead, zinc or cadmium emissions prior to 1963, so values prior to that time are calculated. Three documents from 1958 and 1959 report the tons of dust collected from the zinc smelter flues and other sources and provide an analysis of lead, zinc, and cadmium in the dust (TECK 1122231, TECK 1124701, and TECK 1124715). These documents provide a basis for calculating lead, zinc and cadmium emissions.

Dividing the 1958 and 1959 dust weights by the 1958 and 1959 amount of zinc in the concentrate feed provides a percentage of zinc dust per ton of zinc concentrate feed. This percentage (19.75%) can then be used to determine how much dust was generated each year between 1923 and 1963.

An average of the analyses of lead, zinc and cadmium in the 1958 and 1959 dust can then be multiplied by the amounts of dust calculated for each year to determine the weights of lead, zinc, and cadmium in each year's collected dust from 1923 to 1963. The loss of dust as emission is assumed as 1% of the collected dust. The 1% factor put the zinc emissions in the same range as the measured emissions from the 1960s. This assumption enables calculation of the lead, zinc and cadmium emission for the zinc smelter from 1923 to 1979.

The 1930 calculation of lead is provided as an example:

(1) The average of 1958/1959 dust (Sheet 18, Column M 42,43) is divided by the average of 1958/1959 zinc in concentrate (Sheet 20, Column P 42,43).
(2) The ratio from number 1 is multiplied by zinc in zinc concentrate (Sheet 18, Column P, 14) for 1930.
(3) The value from number 2 (dust produced in 1930) is multiplied by the average of 1958/1959 dust lead analyses (Sheet 18, Column B, 42,43) for the total lead lost as dust.
(4) The value from number 3 (total lead in dust) is multiplied by the 1% loss as emission (Sheet 18, Column R, %).
(5) ((36,600+37,000)/2) / ((158,160 + 181,276)/2) x 111,151 x ((20.3% + 19.2%)/2) x 1% = 47.5.

The measured and calculated emissions for lead, zinc, and cadmium from the zinc smelter are listed in Appendix C, "Sheet 18, Zinc Calculations."

2. Calculated Values for the Arsenic and Mercury

As noted, measured values for arsenic and mercury are only available from 1980 to 2002, and those values were not broken down between the various operations. Therefore, values for arsenic and mercury are calculated for the entire smelter as opposed to the individual operations.

a. Calculated Emissions for Arsenic:

All arsenic emissions prior to 1980 are calculated. Between 1980 and 1992, the reported measured arsenic emissions for the smelter averaged12.96% of the measured lead emission. The median for these years was 12.95% and the standard deviation was 3.16%. These statistical values indicate that by calculating the arsenic emissions from 1923 through 1979 as 12.9% of the lead emissions for each year between 1923 and 1979, would determine values that were within plus or minus 25% of the actual value.

As an example, the calculation for arsenic emissions for 1930 is provided:

(1) The lead loss for 1930 (284 tons, Sheet 17, Column R14) is multiplied by arsenic as percent of lead loss between 1980 and 1992 (12.9%) (Sheet 17, Column H229).
(2) 284 x 12.9% = 36.6 tons arsenic.

b. Calculated Emissions for Mercury:

Nearly all of the mercury emissions were from the lead smelter. Known reported measured values for mercury were only available from 1980 through 2002. Therefore, all mercury values before 1980 are calculated. The calculations were made by evaluating the amount of mercury emitted from the Lead Smelter in 1982 and 1983, and comparing it to the amount of lead contained in the concentrate feed coming into the lead smelter during the same period.

Mercury balances in 1982 and 1983 (TECK_1122416) showed that, because of the mercury being recycled from the zinc smelter into the lead smelter, the mercury emissions from the lead smelter were 2.5 to 3.6 times the calculated amount of mercury contained in the lead-smelter concentrate feed.

The calculated assay values of mercury contained in the ores/concentrates/other feed coming into the lead smelter in 1982 and 1983 ranged from 5 to 10 ppm. Based upon these known values, the ratio of mercury in the concentrate feed to mercury emitted from the lead smelter was determined.

The tons of mercury in the concentrate feed for each year are calculated by applying a value of 8 ppm mercury content in the lead ores/concentrates/other feed. The calculated tons of mercury are then factored by using the gain from recycled mercury to determine the mercury emission. For the period 1923 to 1927, a factor of “1" is used, because recycling would have been minimal. A factor of “1.5" is used from 1928 forward.

To minimize inventory effects, lead concentrate 1923 to 1979 receipt weights are normalized using a five-year moving average.

To validate the calculation, the calculated mercury emissions were compared with measured mercury emissions for the period of 1980 to 1986. The calculated emissions totaled 98% of the measured emissions for those years.

The calculation for mercury emissions in 1930 is provided below:

(1) The normalized lead concentrate value (Sheet 19, Column C32) is multiplied by the ppm mercury (Sheet 19, Column E32).
(2) The result from number 1 is multiplied by the emission factor (Sheet 19, Column G32).
(3) 220,600 (normalized lead concentrate) x 8/1,000,000 (Hg ppm) x 1.5 (emission factor) = 2.65 (tons mercury).

The calculated emissions for mercury from the lead smelter are listed in Appendix C, “Sheet 19, Misc Emissions.”

D. Total Air Emissions

Total air emissions from the Trail plant for the period 1923 to 2002 were determined by adding the measured values and the calculated values. The figures below identify the year-by-year emissions for each of the metals reviewed.

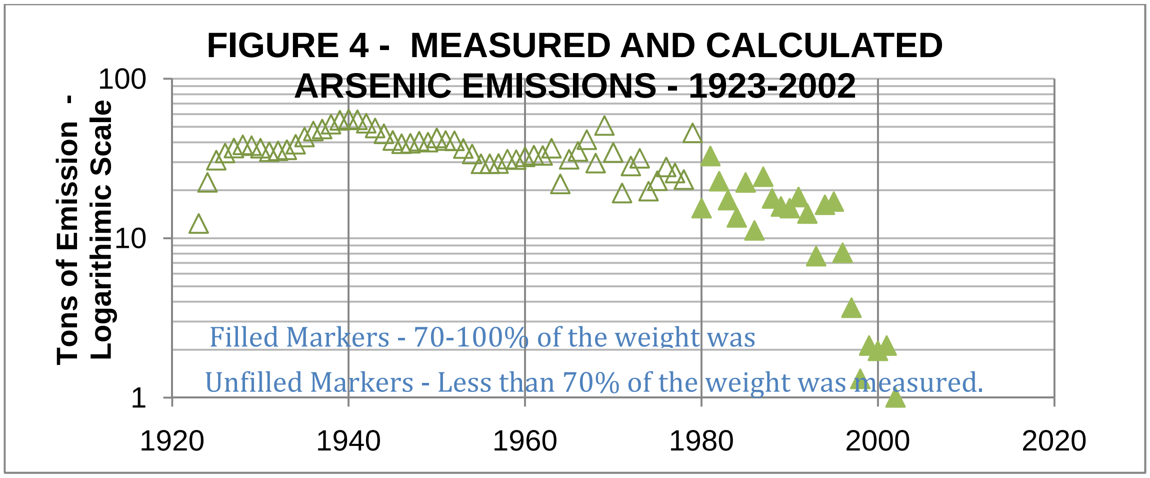


FIGURE 4 - MEASURED AND CALCULATED ARSENIC EMISSIONS - 1923-2002
Tons of Emission - Logarithimic Scale
100
10
1
1920
1940
1960
1980
2000
2020
Filled Markers - 70-100% of the weight was
Unfilled Markers - Less than 70% of the weight was measured.

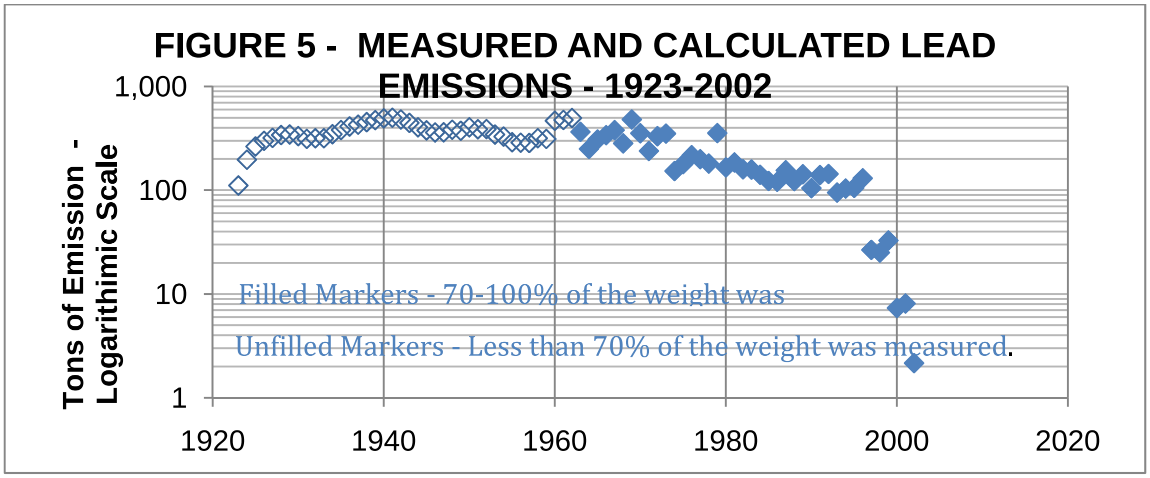


FIGURE 5 - MEASURED AND CALCULATED LEAD EMISSIONS - 1923-2002
Tons of Emission - Logarithimic Scale
1,000
100
10
1
1920
1940
1960
1980
2000
2020
Filled Markers - 70-100% of the weight was
Unfilled Markers - Less than 70% of the weight was measured.

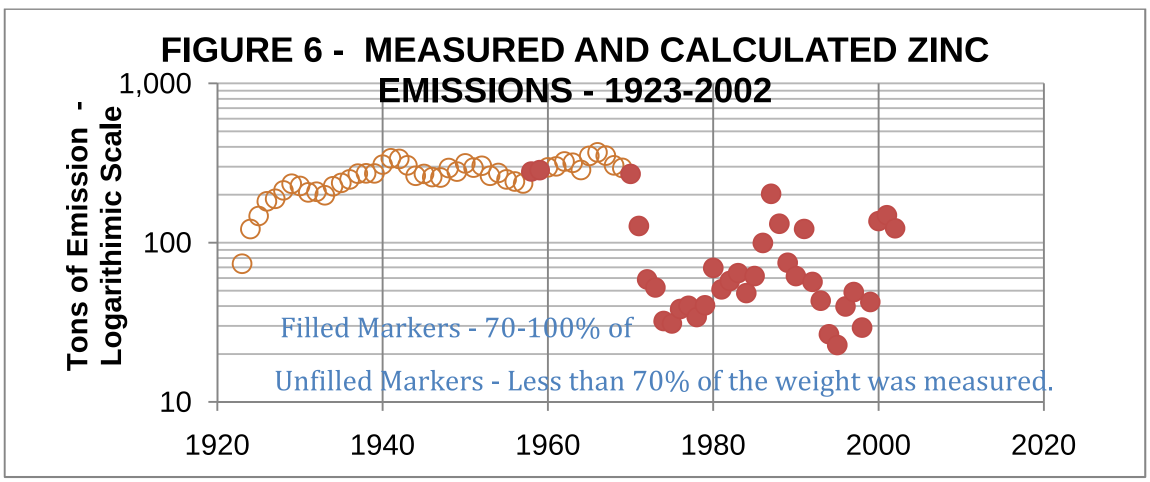
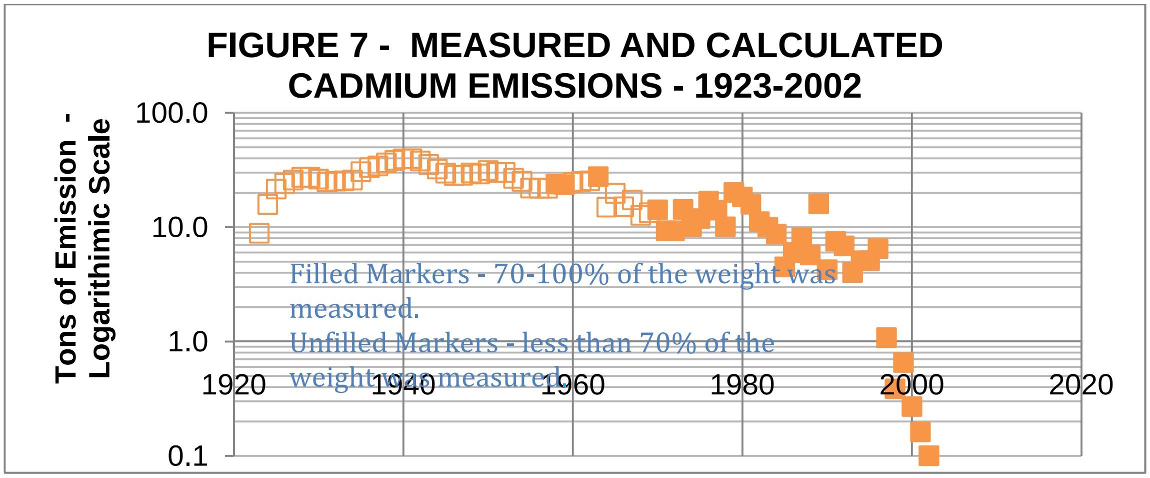
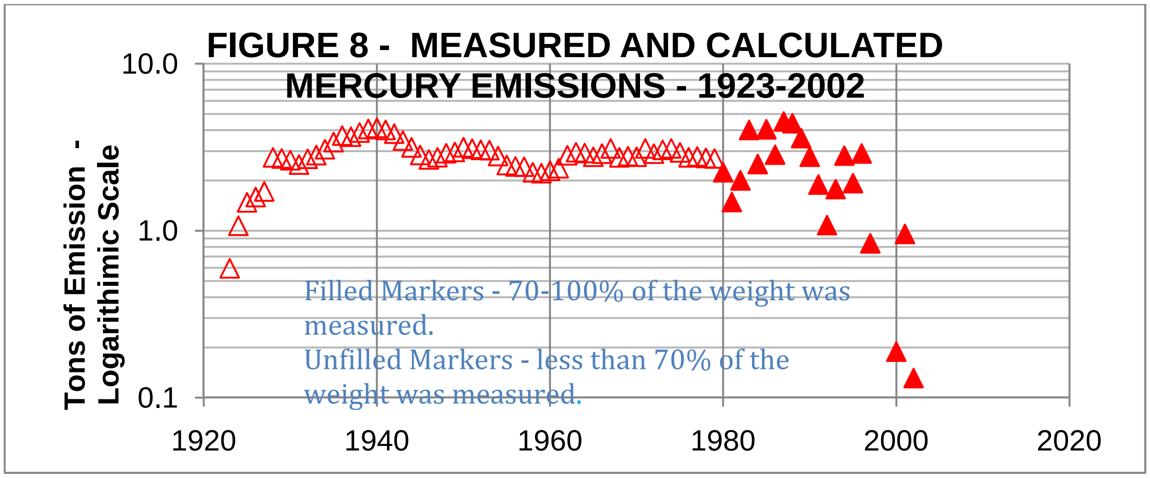


FIGURE 6 - MEASURED AND CALCULATED ZINC EMISSIONS - 1923-2002
Tons of Emission - Logarithimic Scale
1,000
100
10
1920
1940
1960
1980
2000
2020
Filled Markers - 70-100% of
Unfilled Markers - Less than 70% of the weight was measured.





E. Appendix C: Input and Distribution Spreadsheets

Attached as Appendix C to this report are spreadsheets that contain the calculations and values used in this report. Below is a brief description of each spreadsheet.

Sheet 1: Lead Concentrate Analyses

Assays are provided for Sullivan and Red Dog lead concentrates. Average annual custom feedstock assays were determined when found in the disclosed documents; otherwise, Sullivan lead concentrate analyses were used to represent the custom feeds.

Sheet 2: Zinc Concentrate Analyses

Assays are provided for Sullivan, Pine Point, and Red Dog zinc concentrates. Where custom feedstock assays were not discovered, Sullivan zinc concentrate analyses were used.

Sheet 3: Lead, Zinc, Cadmium, and Copper Production

Calculations of Trail's lead, zinc, and cadmium, and copper production (1920 to 2005) are provided for most dates, except in the case of copper.

Sheet 4: Calculated Feedstock Tonnage (1920 to 2005)

Calculated annual tonnages of Sullivan, Pine Point, and Red Dog feedstocks are provided.

Sheet 5: Lead Blast Furnace and Fumed Slag Analyses

Typical fumed (1930 to 2005) slag analyses are provided. Slag entering and leaving inventory is accounted for.

Sheet 6: Production of Sulfuric Acid (100% Basis)

The primary basis used in Sheet 6 to calculate acid production was available acid-plant capacity. Acid output (1923 – 2004) was based on plant capacity because published data on annual sulfur conversion at Trail were contradictory.

Sheet 7: Inventoried and Unaccounted Metals

The difference between the tonnage of feed inputs and the tonnage of (products + outputs + emissions) is material that is in inventory or unaccounted for.

Unaccounted-for material can arise from incorrect feed assays, incorrect feed weights, and undocumented material exiting from Trail's metallurgical facility, e.g., as product, river discharges, emissions, or theft.

Sheet 8: Emissions of Metals to Atmosphere

Detailed measured emissions data span from 1980 to 2002. Prior measured emissions values were available in some of the disclosed documents. Where measured emissions were not available, they were calculated.

Sheet 9: Arsenic Balance

Sheet 9 provides the annual input/output balance for arsenic.

Sheet 10: Cadmium Balance

Sheet 10 provides the annual input/output balance for cadmium.

Sheet 11: Lead Balance

Sheet 11 provides the annual input/output balance for lead.

Sheet 12: Mercury Balance

Sheet 12 provides the annual input/output balance for mercury.

Sheet 13: Zinc Balance

Sheet 13 provides the annual input/output balance for zinc.

Sheet 14: Inventory of Slag, Sulfide Residue, and ETP Solids

Sheet 14 provides in-process inventory.

Sheet 15: Fertilizer Balance

Sheet 15 provides the Hg inputs and outputs in the fertilizer plant.

Sheet 16: Measured and Calculated Emissions

Sheet 16 contains the measured and calculated emissions for the lead smelter and the zinc smelter plus the document references for the measured values.

Sheet 17: Lead Smelter Calculated Emissions

Sheet 18: Zinc Smelter Calculated Emissions

Sheet 19: Miscellaneous Calculated Emissions

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