

ROYAL OAK MINES Inc.
Yellowknife Division - Giant Mine
Mill Department

To: ~~K. Kim~~ *P. MacIntyre*
 CC: A. Jones
 From: P. O'Hara
 Date: *November*
~~October 22, 1994~~
 Subject: STACK TESTING RESULTS - *NOVEMBER 1,*
~~OCTOBER 14, 1994~~

The stack was sampled on Oct. 14 and the results are summarized below. The feed rate was steady at 55 seconds during the test. The test was started at 2:05 pm and completed at 5:15 pm.

Volumetric Flowrate *76,576*
~~39,948~~ m³/hr
 Arsenic Concentration *23.06* ~~27.04~~ mg/m³
 Arsenic Emission Rate *43.2* ~~29.2~~ kg/day -> ~~64.4~~ lb/day
93.4 lb/day

Data for recent stack tests is summarized below:

45072 *3.15*

Date	Flowrate (m ³ /hr)	Arsenic Conc (mg/m ³)	Arsenic Emission Rate	
			kg/day	lb/day
<i>Nov. 1/94</i>	<i>76,576</i>	<i>23.06</i>	<i>43.2</i>	<i>93.4</i>
Oct 14/93	39,948	27.04	29.2	64.4
Jun 24/91	38,718	16.34	15.2	33.5
Aug 17/90	45,041	34.29	37.1	81.8
Oct 11/89	45,321	24.04	26.2	57.7

FEED RATE
6.89
6.98

ROYAL OAK MINES Inc.

NWT Division - Giant Mine

Mill Department

STACK SAMPLING

Date: November 1, 1994

Run # 94-1

Excess water in impingers and gel

Barometric pressure (P_{bar})

Diameter of sampling nozzle

Volume of water vapour ($V_{w,ref}$)

Dry gas volume (V_m)

Moisture content (B_{wo})

Absolute stack pressure (P_s)

146.3 mL

98.7100 kPa

12.7 mm

0.1990 m

3.7527 m³

0.0564

98.7847 kPa

T_m (Ave Imp)

P_v (Table1)

Pitot Factor

(V_m)_{ref}

Volumetric Flow Rate (Q_v)

284.5 K -->

0.735 kPa

0.844

3.865 m³

11.3 °C

76,575.6

NORTH/SOUTH TRAVERSE DATA

SAMPLE POINT	SAMPLE TIME (min.)	STACK GAS TEMPERATURE		VELOCITY PRESSURE (in H2O)	VELOCITY PRESSURE (kPa)	ORIFICE PRESSURE (in H2O)	ORIFICE PRESSURE (kPa)	GAS METER VOLUME (ft)	GAS METER VOLUME (m)	DRY GAS TEMPERATURE		IMPINGER TEMP F	STACK GAS VELOCITY (m/s)	PER CENT ISOKINETIC %
		F	K							F	K			
00	5.0	60	289	0.100	0.0249	3.40	0.8469	2.91	0.0824	40	277	30	5.478	43.99%
01	5.0	60	289	0.085	0.0212	3.40	0.8469	3.43	0.0971	40	277	40	5.051	56.25%
02	5.0	155	341	0.070	0.0174	3.40	0.8469	3.91	0.1107	40	277	41	4.985	76.84%
03	5.0	195	364	0.065	0.0162	3.10	0.7722	3.81	0.1079	42	279	43	4.958	79.81%
04	5.0	205	369	0.070	0.0174	3.30	0.8220	4.42	0.1252	44	280	38	5.184	89.59%
05	5.0	215	375	0.075	0.0187	3.40	0.8469	4.99	0.1413	47	281	34	5.406	97.89%
06	5.0	210	372	0.085	0.0212	3.50	0.8718	5.03	0.1424	50	283	34	5.734	91.82%
07	5.0	210	372	0.085	0.0212	3.40	0.8469	4.82	0.1365	51	284	33	5.734	87.80%
08	5.0	210	372	0.090	0.0224	3.30	0.8220	4.86	0.1376	53	285	35	5.900	85.67%
09	5.0	205	369	0.080	0.0199	3.10	0.7722	4.69	0.1328	54	285	35	5.542	87.15%
10	5.0	210	372	0.075	0.0187	2.80	0.6974	4.55	0.1289	54	285	36	5.386	87.58%
11	5.0	210	372	0.065	0.0162	2.80	0.6974	4.48	0.1269	55	286	38	5.014	92.45%
12	5.0	210	372	0.075	0.0187	2.60	0.6476	4.39	0.1243	55	286	39	5.386	84.30%
13	5.0	210	372	0.080	0.0199	2.60	0.6476	4.47	0.1266	56	286	40	5.563	82.95%
14	5.0	215	375	0.090	0.0224	2.50	0.6227	4.33	0.1226	57	287	43	5.922	75.87%
15	5.0	215	375	0.090	0.0224	2.50	0.6227	4.39	0.1243	57	287	40	5.922	76.92%
16	5.0	215	375	0.090	0.0224	2.50	0.6227	4.41	0.1249	58	287	40	5.922	77.12%

Average per cent isokinetic variation =

85.49%

2.0102

38.1

5.475

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STACK SAMPLING

Date: November 1, 1994

Run # 94-1

EAST/WEST TRAVERSE DATA

SAMPLE POINT	SAMPLE TIME (min)	STACK GAS TEMPERATURE		VELOCITY PRESSURE (in H2O)	VELOCITY PRESSURE (kPa)	ORIFICE PRESSURE (in H2O)	ORIFICE PRESSURE (kPa)	GAS METER VOLUME (ft)	GAS METER VOLUME (m)	DRY GAS TEMPERATURE		IMPINGER TEMP F	STACK GAS VELOCITY (m/s)	PER CENT ISOKINETIC %
		F	K							F	K			
00	5.0	75	297	0.045	0.0112	2.50	0.6227	4.42	0.1252	45	280	38	-	-
01	5.0	70	294	0.045	0.0112	2.50	0.6227	4.29	0.1215	48	282	26	3.710	95.86%
02	5.0	130	327	0.045	0.0112	2.40	0.5978	4.25	0.1204	51	284	26	3.915	99.58%
03	5.0	205	369	0.035	0.0087	1.68	0.4185	3.74	0.1059	53	285	26	3.666	104.90%
04	5.0	230	383	0.035	0.0087	1.62	0.4035	3.52	0.0997	53	285	24	3.734	100.55%
05	5.0	245	391	0.035	0.0087	1.65	0.4110	3.52	0.0997	53	285	24	3.774	101.65%
06	5.0	250	394	0.040	0.0100	1.82	0.4533	3.65	0.1034	53	285	30	4.049	98.99%
07	5.0	250	394	0.040	0.0100	1.82	0.4533	3.73	0.1056	53	285	35	4.049	101.16%
08	5.0	250	394	0.040	0.0100	1.82	0.4533	3.53	0.1000	53	285	38	4.049	95.73%
09	5.0	250	394	0.040	0.0100	1.82	0.4533	3.76	0.1065	55	286	39	4.049	101.57%
10	5.0	250	394	0.045	0.0112	2.06	0.5131	3.81	0.1079	55	286	39	4.295	97.10%
11	5.0	250	394	0.045	0.0112	2.06	0.5131	3.86	0.1093	56	286	40	4.295	98.18%
12	5.0	245	391	0.050	0.0125	1.80	0.4483	3.98	0.1127	56	286	41	4.511	95.64%
13	5.0	245	391	0.060	0.0149	1.90	0.4733	3.98	0.1127	56	286	42	4.942	87.33%
14	5.0	245	391	0.065	0.0162	1.90	0.4733	3.94	0.1116	57	287	45	5.143	82.90%
15	5.0	245	391	0.065	0.0162	1.90	0.4733	3.90	0.1104	57	287	45	5.143	82.05%
16	5.0	245	391	0.075	0.0187	1.90	0.4733	4.07	0.1153	57	287	45	5.525	79.72%

Average per cent isokinetic variation =

94.04%

1.7425296

35.3

4.303

Average isokinetic variation for the entire test =

89.77%

36.7 °F

2.6 °C

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STACK TESTING

DATE : November 1, 1994

RUN : 94-1

TEST CONDUCTED BY : P. O'Hara/ R. Hutchison

REF:STACKMST.WR1

IMPINGER #	IMPINGER CONTENTS	WEIGHT (g)	
1	100 mL water	Final Initial	1,531.0 1,417.4
		GAIN	113.6 (a)
2	100 mL water	Final Initial	1,496.0 1,411.5
		GAIN	84.5 (b)
3	100 mL water	Final Initial	1,342.2 1,417.4
		GAIN	(75.2) (c)
4	empty	Final Initial	1,294.0 1,286.2
		GAIN	7.8 (d)
5	200 g silica gel	Final Initial	1,511.3 1,495.7
		GAIN	15.6 (e)

Total volume of excess water = a + b + c + d + e = 146.3mL

DATE : November 1, 1994
RUN : 94-1

STACK SAMPLING - CONDITIONS DURING SAMPLING

STACK CONDITIONS

Fair.

ROASTER CONDITIONS

Stack fan setting : C 1/2

Feed rate : 6.89 tph

COTTRELL CONDITIONS

Inlet temperature : 730 degrees F

Outlet temperature : 640 degrees F

BAGHOUSE CONDITIONS

Inlet temperature : 225 degrees F

Pressure drops : -1 in H₂O

Shaking cycle : 5 %

COMMENTS

The day was clear and sunny, no wind and the temp was slightly below freezing

DATE : November 1, 1994
RUN : 94-1

STACK SAMPLING - CALCULATIONS

PARTICULATE LOADING

Weight of filter	Final	0.619mg
	Initial	0.575mg

Total particulate weight		0.044 mg

ARSENIC LOADING

PARTICULATE

Total particulate weight	0.044 mg
Diluted volume	100.0 mL
Arsenic concentration	11.4 ppm
Total As in particulate	1.1 mg

VAPOUR

Total wash water volume	2,000 mL
Arsenic concentration	44.0 ppm
Total As in vapour	88.0 mg

TOTAL ARSENIC LOADING	89.1 mg
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ARSENIC CONCENTRATION	23.06 mg/m ³
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VOLUMETRIC FLOWRATE	76,576 m ³ /hr
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ARSENIC MASS EMISSION RATE	1.8 kg/hr	or	93.4 lb/day
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