

ROYAL OAK MINES INC.
Yellowknife Division - Giant Mine

MEMO TO: S. Kerr
C.C.: B. Hagan/D. Dickson
FROM: G.B. Halverson
DATE: November 12, 1991
SUBJECT: ARSENIC/RESPIRATORY DUST AND GAS EXPOSURE

- 1.0 There has been some concern over arsenic exposure in the milling environment due to B. Kelso, who had a high arsenic level and T. Brown who had an elevated level. Both of these individuals had total arsenic done and not speciated sampling. B. Kelso's results were determined to be high from his working on a baghouse cleanout and T. Brown's high readings were attributed to shovelling calcine dust.

Both of the aforementioned incidents are not normal if proper personal hygiene is maintained along with respiratory protection.

- 2.0 The mill environment is monitored for both respirable and arsenic dust concentrations. The mill is also monitored for cyanide, sulfur dioxide, and arsine gas. In all areas these levels are within established TLV guidelines.
- 3.0 High risk jobs are deemed as those areas in which jobs are done which have the potential to increase one's exposure. Wearing of recommended personal protective equipment and personal hygiene results in acceptable TLV exposure to the employees.
- 4.0 Jobs that have a higher risk potential are as follows:

<u>Job</u>	<u>Frequency</u>	<u>Duration</u>
Press cleaning	-every 2 weeks	-4 hours
Baghouse overhauls	-every 3 months	-1 week
Cottrell overhauls	-every 3 years	-3 months
Refining	-every 2 weeks	-2 days
Roaster cleanout	-every 1 year	-24 hours

Maintenance work done in the cottrell/baghouse has a higher risk potential.

ARSENIC/RESPIRATORY DUST AND GAS EXPOSURE

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5.0 Areas of monitoring for dust and gas exposure levels:

<u>Area</u>	<u>Exposure</u>
Crusher	-respiratory dust
Grinding	-respiratory dust
Flotations	-respiratory dust
Solutions	-respiratory dust/arsine/cyanide
Roaster	-respiratory dust/arsenic/sulfer dioxide
Carbon Plant	-respiratory dust/arsenic/cyanide
Cottrell/Baghouse	-respiratory dust/arsenic/sulfer dioxide

6.0 Refer to the attached floor drawings for reference to these areas/air sampling reports/and gas monitoring logbook.

Any readings which are above TLV would be corrected immediately. The work environment is kept safe and monitored to detect any potential problems including worker monitoring.

GBH

G.B. Halverson
Mill Superintendent

GBH/sj
Attach.

Carbon Plant Operation

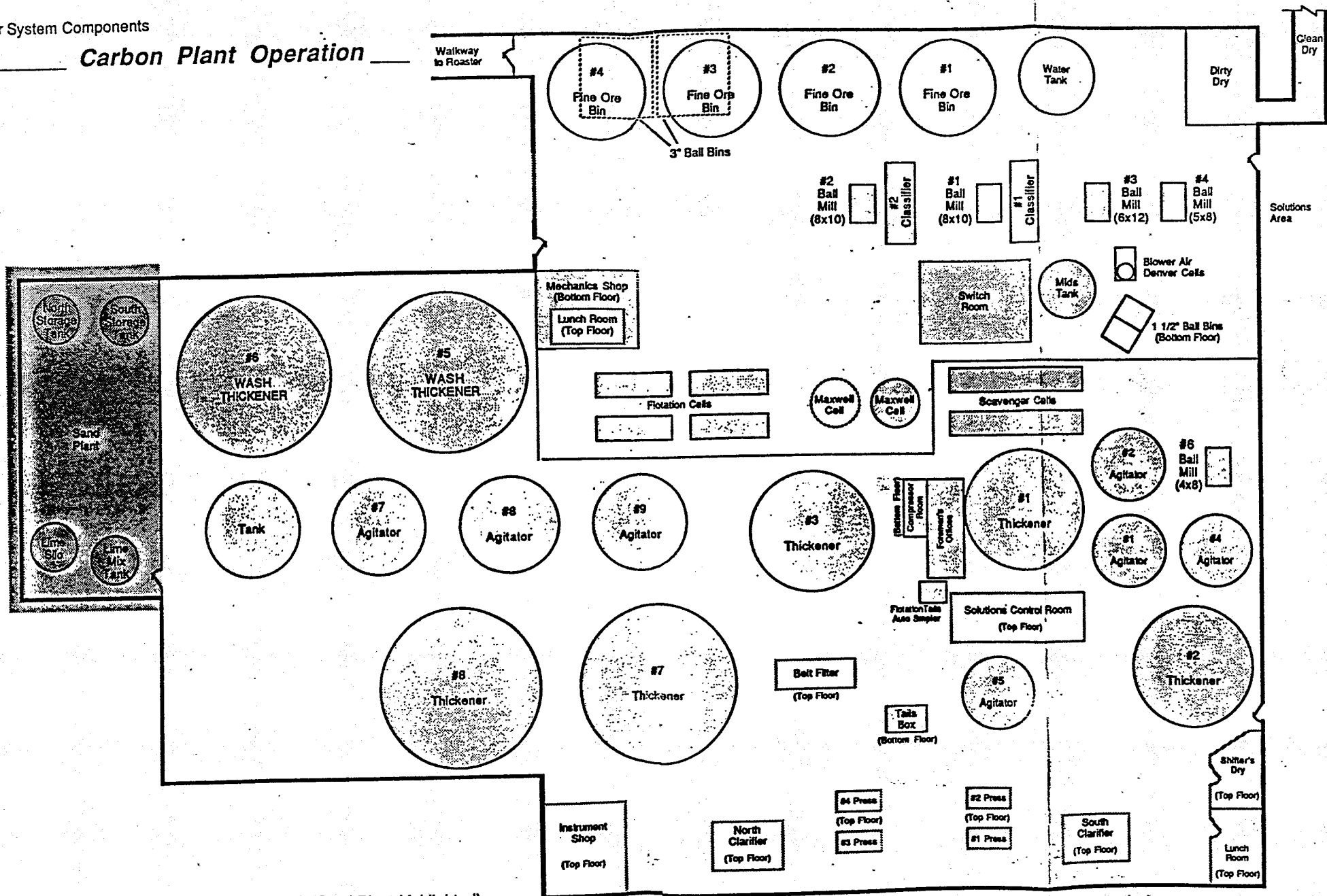


Figure 2: FLOOR PLAN OF MILL BUILDING (Sand Plant highlighted)

Carbon Plant Operation

- Roaster
- Cottrell
- Baghouse
- Carbon Plant
- AC Roaster Bldg.

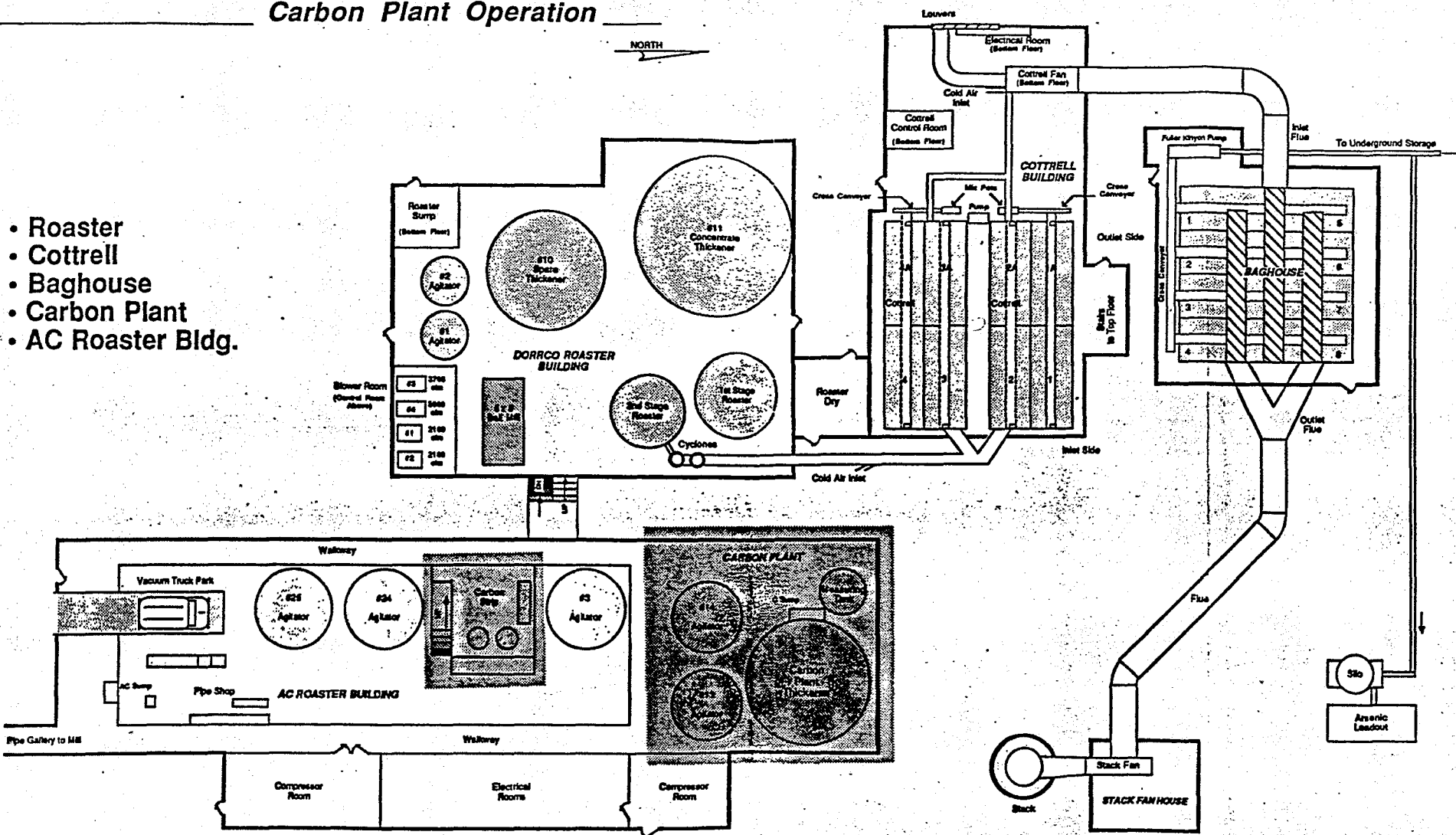


Figure 1: FLOOR PLAN OF AC ROASTER BUILDING
(Carbon Plant and Carbon Strip areas highlighted)

TABLE 3
1990 AIR SAMPLING ANNUAL REPORT

		JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	AVG
WOOD PICKER	TOTAL /RESP DUST mg/m3 SILICA mg/m3		RESP 1.25			RESP 0.58			RESP 0.42			RESP 0.49		0.69
JAW CRUSHER	TOTAL /RESP DUST mg/m3 SILICA mg/m3		RESP 1.07			RESP 0.71			RESP 0.75			RESP 0.55		0.77
CONE CRUSHER	TOTAL /RESP DUST mg/m3 SILICA mg/m3		RESP 0.78			RESP 0.83			RESP 0.83			RESP 3.40		1.46
SCREEN FLOOR	TOTAL /RESP DUST mg/m3 SILICA mg/m3					RESP 1.07			RESP 1.23			RESP 1.82		1.37
TOP OF ORE BINS	TOTAL /RESP DUST mg/m3 SILICA mg/m3		RESP 1.11			RESP 1.21			RESP 1.00			RESP 0.69		1.00
CRUSHER SETTING ROOM	TOTAL /RESP DUST mg/m3 SILICA mg/m3					RESP 0.19								0.19
#2 A GALLERY	TOTAL /RESP DUST mg/m3 SILICA mg/m3													
CRUSHER CONTROL	TOTAL /RESP DUST mg/m3 SILICA mg/m3		RESP 0.19			RESP 0.17			RESP 0.39			RESP 0.37		0.28
CRUSHER HELPER	TOTAL /RESP DUST mg/m3													
UNDER ORE BINS	TOTAL /RESP DUST mg/m3	RESP 0.80			RESP 0.79			RESP 0.73			RESP 0.68			0.75
#2 MILL	TOTAL /RESP DUST mg/m3	RESP 0.44			RESP 0.48			RESP 0.38			RESP 0.80			0.53
FLOT BENCH	TOTAL /RESP DUST mg/m3	RESP 0.32			RESP 0.33			RESP 0.54			RESP 0.61			0.45
SOLUTION DESK	TOTAL /RESP DUST mg/m3	RESP 0.29			RESP 0.45			RESP 0.70			RESP 0.57			0.50
CYANIDE MIX AREA	TOTAL /RESP DUST mg/m3	RESP 0.77			RESP 0.38			RESP 0.97			RESP 0.74			0.72
MILL OIL SHED	TOTAL /RESP DUST mg/m3													

Threshold Limit Values: Resp Dust = 5.00 milligrams per cubic metre. * indicates personal sample

TABLE 3 Continued
1990 AIR SAMPLING ANNUAL REPORT

STATION		JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	AVG
Roaster Filter Floor	Total / Resp			Resp			Resp			Resp			Resp	
	Dust mg/m3			0.58			0.34			0.21			0.28	0.35
	As ug/m3			2.04			2.41			2.12			2.68	2.31
Roaster Control Room	Total / Resp			Resp			Resp			Resp			Resp	
	Dust mg/m3			0.49			0.24			0.13			0.12	0.25
	As ug/m3			2.00			1.61			1.55			1.98	1.79
Roaster Top Fir	Total / Resp			Resp			Resp			Resp			Resp	
	Dust mg/m3			1.39			0.52			0.65			0.71	0.82
	As ug/m3			1.97			3.92			3.60			4.00	3.37
Cottrell Top Fir	Total / Resp			Resp			Resp			Resp			Resp	
	Dust mg/m3			0.62			0.49			0.58			0.66	0.59
	As ug/m3			2.11			1.77			2.08			2.28	2.06
Cottrell Bottom Floor	Total / Resp			Resp			Resp			Resp			Resp	
	Dust mg/m3			0.55			0.35			0.43			0.48	0.45
	As ug/m3			2.00			3.45			2.90			2.72	2.77
Cottrell Control Room	Total / Resp			Resp			Resp			Resp			Resp	
	Dust mg/m3			0.29			0.15			0.18			0.10	0.18
	As ug/m3			1.50			1.68			1.58			1.49	1.56
Cottrell Operator	Total / Resp													
	Dust mg/m3													
	As ug/m3													
Baghouse Bottom Floor	Total / Resp			Resp			Resp			Resp			Resp	
	Dust mg/m3			0.49			0.39			0.44			0.43	0.44
	As ug/m3			2.50			1.25			2.30			2.24	2.07
Baghouse Top Fir	Total / Resp			Resp			Resp			Resp			Resp	
	Dust mg/m3			0.22			0.66			0.58			0.60	0.52
	As ug/m3			1.60			1.00			2.05			2.10	1.69
Refinery Furnace Area	Total / Resp	Resp	Resp	Resp	Resp	Resp	Resp	Resp	Resp	Resp	Resp	Resp	Resp	
	Dust mg/m3	1.97	3.19	2.75	2.72	2.68	2.12	3.57	3.17	1.85	1.69	2.26	2.12	2.51
	As ug/m3	1.34	1.28	1.11	3.89	4.90	4.75	4.90	5.87	4.99	5.00	18.10	16.42	6.05
Refinery Control Room	Total / Resp		Resp	Resp		Resp	Resp	Resp	Resp		Resp	Resp	Resp	
	Dust mg/m3		0.72	1.09		0.98	1.00	1.08	0.98		0.69	0.41	0.58	0.84
	As ug/m3		0.33	0.97		2.65	2.85	2.09	2.26		2.18	2.20	2.40	1.99
Refinery Helper	Total / Resp	Resp												
	Dust mg/m3	1.56												1.56
	As ug/m3	1.23												1.23
Carbon Plant	Total / Resp			Resp			Resp			Resp			Resp	
	Dust mg/m3			0.73			0.50			0.17			0.09	0.37
	As ug/m3			2.20			3.22			3.98			4.64	3.51

Threshold Limit Values: Total Arsenic = 50 micro-grams per cubic metre.

Respirable Dust = 5.0 milli-grams per cubic metre.

* indicates a personal sample

1989

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TABLE 3 CONT'D

GIANT YELLOWKNIFE MINES LTD
MONTHLY AIR SAMPLING REPORT

1989

STATION		JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	AVG
Roaster	Total / Resp				Resp		Resp			Resp		Resp		
Filter	Dust mg/m ³				0.30		0.88			0.20		0.15		0.28
Floor	As ug/m ³				<2.8		0.01			0.08		0.12		<2.8
Roaster	Total / Resp				Resp		Resp			Resp		Resp		
Control	Dust mg/m ³				0.27		0.46			0.14		0.12		0.19
Room	As ug/m ³				<2.8		0.01			0.03		0.05		<2.8
Roaster	Total / Resp				Resp		Resp			Resp		Resp		
Top Flr	Dust mg/m ³				0.62		0.28			0.16		0.23		0.27
	As ug/m ³				<2.8		0.04			0.20		0.12		<2.8
Cottrell	Total / Resp				Resp		Resp			Resp		Resp		
Top Flr	Dust mg/m ³				0.07		0.75			0.08		0.31		0.21
	As ug/m ³				<2.8		0.02			0.10		0.05		<2.8
Cottrell	Total / Resp				Resp		Resp			Resp		Resp		
Bottom	Dust mg/m ³				0.12		0.17			0.14		0.21		0.18
Floor	As ug/m ³				<2.8		0.01			0.17		0.1		<2.8
Cottrell	Total / Resp				Resp		Resp			Resp		Resp		
Control	Dust mg/m ³				0.18		0.15			0.07		0.09		0.12
Room	As ug/m ³				<2.8		0.01			0.05		0.03		<2.8
Cottrell	Total / Resp													
Operator	Dust mg/m ³													
	As ug/m ³													
Baghouse	Total / Resp				Resp		Resp			Resp		Resp		
Bottom	Dust mg/m ³				0.24		0.44			0.28		0.19		0.25
Floor	As ug/m ³				<2.8		0.02			0.05		0.10		<2.8
Baghouse	Total / Resp				Resp		Resp			Resp		Resp		
Top Flr	Dust mg/m ³				0.10		0.73			0.06		0.25		0.23
	As ug/m ³				<2.8		0.04			0.09		0.10		<2.8
Refinery	Total / Resp	Resp		Resp	Resp	Resp	Resp	Resp	Resp	Resp	Resp	Resp	Resp	
	Dust mg/m ³	0.20		0.99	0.65	1.47	1.40	0.96	0.91	0.20	2.54	1.25	1.09	1.18
	As ug/m ³	3.90		1.24	<2.8	1.38	0.30	1.18	0.98	1.39	1.25	2.46	2.18	<2.8
Refinery	Total / Resp									Resp				
Operator	Dust mg/m ³									1.32				
	As ug/m ³									0.98				
Refinery	Total / Resp													
Helper	Dust mg/m ³													
	As ug/m ³													
Carbon	Total / Resp				Resp		Resp			Resp		Resp		
Plant	Dust mg/m ³				0.10		0.87			0.10		0.16		0.22
	As ug/m ³				<2.8		0.01			0.15		0.09		<2.8

Threshold Limit Values: Total Arsenic = 50 micro-grans per cubic metre.

Respirable Dust = 5.0 milli-grans per cubic metre.

~~MILL STATION 5~~ / ~~CRUSHER STATION~~

TABLE 3
ROYAL OAK MINES Inc.
MONTHLY AIR SAMPLING REPORT,
OCTOBER, 1991

		JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	AVG
WOOD PICKER	TOTAL /RESP					RESP			RESP					
	DUST mg/m3					1.00			1.20					1.10
	SILICA mg/m3													
JAW CRUSHER	TOTAL /RESP					RESP			RESP					
	DUST mg/m3					1.05			1.32					1.19
	SILICA mg/m3													
CONE CRUSHER	TOTAL /RESP					RESP			RESP					
	DUST mg/m3					2.98			2.50					2.74
	SILICA mg/m3													
SCREEN FLOOR	TOTAL /RESP					RESP			RESP					
	DUST mg/m3					2.00			2.00					2.00
	SILICA mg/m3													
TOP OF ORE BINS	TOTAL /RESP	RESP				RESP			RESP					
	DUST mg/m3	1.01				1.25			2.95					2.10
	SILICA mg/m3													
CRUSHER SETTING ROOM	TOTAL /RESP													
	DUST mg/m3													
	SILICA mg/m3													
#2 A GALLERY	TOTAL /RESP													
	DUST mg/m3													
	SILICA mg/m3													
CRUSHER CONTROL	TOTAL /RESP					RESP			RESP					
	DUST mg/m3					0.41			0.30					0.36
	SILICA mg/m3													
CRUSHER HELPER	TOTAL /RESP													
	DUST mg/m3													
	SILICA mg/m3													
UNDER ORE BINS	TOTAL /RESP	RESP			RESP			RESP			RESP			
	DUST mg/m3	0.93			1.05			1.19			0.99			1.04
	SILICA mg/m3													
#2 MILL	TOTAL /RESP	RESP			RESP			RESP			RESP			
	DUST mg/m3	0.91			0.73			0.96			0.61			0.81
	SILICA mg/m3													
FLOT BENCH	TOTAL /RESP	RESP			RESP			RESP			RESP			
	DUST mg/m3	0.56			0.29			0.81			0.64			0.58
	SILICA mg/m3													
SOLUTION DESK	TOTAL /RESP	RESP			RESP			RESP			RESP			
	DUST mg/m3	0.62			0.68			0.70			0.59			0.65
	SILICA mg/m3													
CYANIDE MIX AREA	TOTAL /RESP	RESP			RESP			RESP			RESP			
	DUST mg/m3	0.79			0.98			1.20			0.95			0.98
	SILICA mg/m3													
MILL OIL SHED	TOTAL /RESP													
	DUST mg/m3													
	SILICA mg/m3													

TABLE 3 CONTD

GIANT YELLOWKNIFE MINES LTD
MONTHLY AIR SAMPLING REPORT
SEPTEMBER, 1991

STATION		JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	AVG
Roaster Filter Floor	Total / Resp						RESP			RESP				
	Dust mg/m3						0.25			0.57				0.41
	As ug/m3						2.76			6.40				4.58
Roaster Control Room	Total / Resp						RESP			RESP				
	Dust mg/m3						0.18			0.77				0.48
	As ug/m3						1.40			4.30				2.85
Roaster Top Flr	Total / Resp						RESP			RESP				
	Dust mg/m3						0.80			1.00				0.90
	As ug/m3						3.50			10.85				7.14
Cottrell Top Flr	Total / Resp						RESP			RESP				
	Dust mg/m3						1.75			1.30				1.53
	As ug/m3						3.00			6.20				4.60
Cottrell Bottom Floor	Total / Resp						RESP			RESP				
	Dust mg/m3						0.14			0.61				0.38
	As ug/m3						2.80			4.95				4.23
Cottrell Control Room	Total / Resp						RESP			0.52				
	Dust mg/m3						0.10			2.95				0.31
	As ug/m3						1.22							2.09
Cottrell Operator	Total / Resp													
	Dust mg/m3													
	As ug/m3													
Baghouse Bottom Floor	Total / Resp						RESP			RESP				
	Dust mg/m3						0.78			1.05				0.92
	As ug/m3						3.00			4.80				3.90
Baghouse Top Flr	Total / Resp						RESP			RESP				
	Dust mg/m3						1.80			1.96				1.88
	As ug/m3						3.20			6.10				4.65
Refinery Furnace Area	Total / Resp	RESP			RESP	RESP	RESP	RESP	RESP	RESP				
	Dust mg/m3	2.51			0.82	0.77	2.60	2.12	1.90	2.06	1.37			1.76
	As ug/m3	22.05			16.14	18.50	24.50	22.80	19.90	27.90	41.67			21.70
Refinery Control Room	Total / Resp	RESP			RESP	RESP	RESP	RESP	RESP	RESP				
	Dust mg/m3	0.29			0.35	0.39	0.32	0.45	0.50	0.42	0.36			0.36
	As ug/m3	2.96			3.10	4.00	2.75	4.95	5.50	4.50	7.50			5.00
Refinery Helper	Total / Resp													
	Dust mg/m3													
	As ug/m3													
Carbon Plant	Total / Resp						RESP			RESP				
	Dust mg/m3						0.59			0.76				0.68
	As ug/m3						4.40			10.05				7.21

Threshold Limit Values: Total Arsenic = 50 micro-grams per cubic metre.

Respirable Dust = 5.0 milli-grams per cubic metre.

* indicates a personal sample

		HCL			HCL			SIGNATURES	
DATE	AGITATOR	MIXING	RESINE	CARBON PLANT	SO2	SIFTER	SUPER		
				STRIP	PLANT				
May 29/91	3 PPM	1 PPM	0	2 PPM	20 PPM	2 PPM			
June 5/91	4 PPM	1	0	4	3	2			
JUNE 16/91		SPECIAL	TEST	N ROASTER		2			
JUNE 20/91	3 PPM	5 PPM	0	5 PPM	3 PPM	0			
JUN 30/91	2 PPM	6 PPM	0	3 PPM	8 PPM	0			
JULY 3/91	5 PPM	2 PPM	0	2 PPM	6 PPM	0			
Aug 7/91	7 PPM	2 PPM	0	4 PPM	7 PPM	0			
Aug 16/91				# 24+25 Agt 30+ ppm	15 ppm				
Aug 21/91	2 PPM	2 PPM	0	20 PPM	10 PPM	0			
Aug 30/91	2 PPM	2 PPM	0	10 PPM	5 PPM	0			
SEP 11/91	7 PPM	2 PPM	0	5 PPM	6 PPM	0			
Sept 27/91	3 PPM	1 PPM	0	4 PPM	3 PPM	0			DBH
Oct 10/91	2 PPM	1 PPM	0	2 PPM	3 PPM	0			
OCT 20/91	5	1	Press Floor & Cornish to 5	2	5	0			DBH
OCT 23/91	5	2	0	2	5	0			DBH
OCT 30/91	8	1	0	2	2	1			DBH
Nov 15/91	8	2	0	2	5	0			DBH