

**THE DEPARTMENT OF RENEWABLE RESOURCES  
GOVERNMENT OF THE NORTHWEST TERRITORIES**

**Determination of Arsenic and  
Sulphur Dioxide Emissions from  
Stack Gas Analyses and  
Velocity Measurements  
at Giant Yellowknife Mines**

**August 28-29, 1991**

**Prepared By**

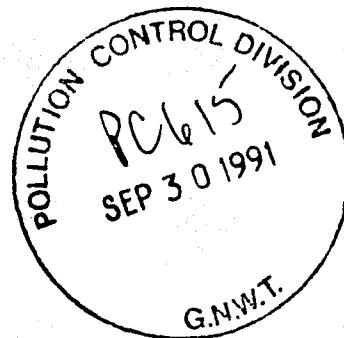
**Darcy B. Morgan**

**WESTERN RESEARCH**

**5280/91-1**

September 25, 1991

Pollution Control Division  
Department of Renewable Resources  
Government of the Northwest Territories  
P.O. Box 1320  
Yellowknife, Northwest Territories  
X1A 2L9



Attention: Mr. James Sparling

Dear Mr. Sparling:

Subject: Stack Emission Survey at the Giant Yellowknife Mines  
Western Research File Number 5280/91-1

The attached report presents the results of the source emission survey that was conducted on August 28 and 29, 1991.

The tests indicated the following averages:

**Arsenic**

- ppm v/v (dry)	9.2
- kg/h	2.46

**Sulphur Dioxide**

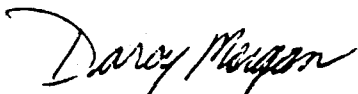
- ppm v/v (dry)	14922.6
- kg/h	3455.05

*= 91.4 tpd*

Should you have any questions regarding the survey results, please contact us at your convenience.

Yours truly,

**WESTERN RESEARCH**



Darcy B. Morgan, C.E.T.  
Senior Technologist  
Testing Analytical Services

DBM/ws  
attach.

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## INTRODUCTION

Western Research conducted a source emission survey at Giant Yellowknife Mines on August 28 and 29, 1991.

The purpose of this program was to determine the concentration and mass emission rate of arsenic and sulphur dioxide from the roaster stack.

## DISCUSSIONS

Three tests were conducted, and during each test, the following flue gas parameters were determined:

1. Velocity/temperature profiles and static pressure
2. Sulphur dioxide/arsenic/water content
3. Dry gas composition

Please note that some points on all three tests slightly exceeded the  $\pm 10\%$  isokinetic variation. This can be attributed to the field personnel using a specific gravity that was lower than the actual. We, however, feel that this does not affect the accuracy of the test results.

## CALCULATIONS AND RESULTS

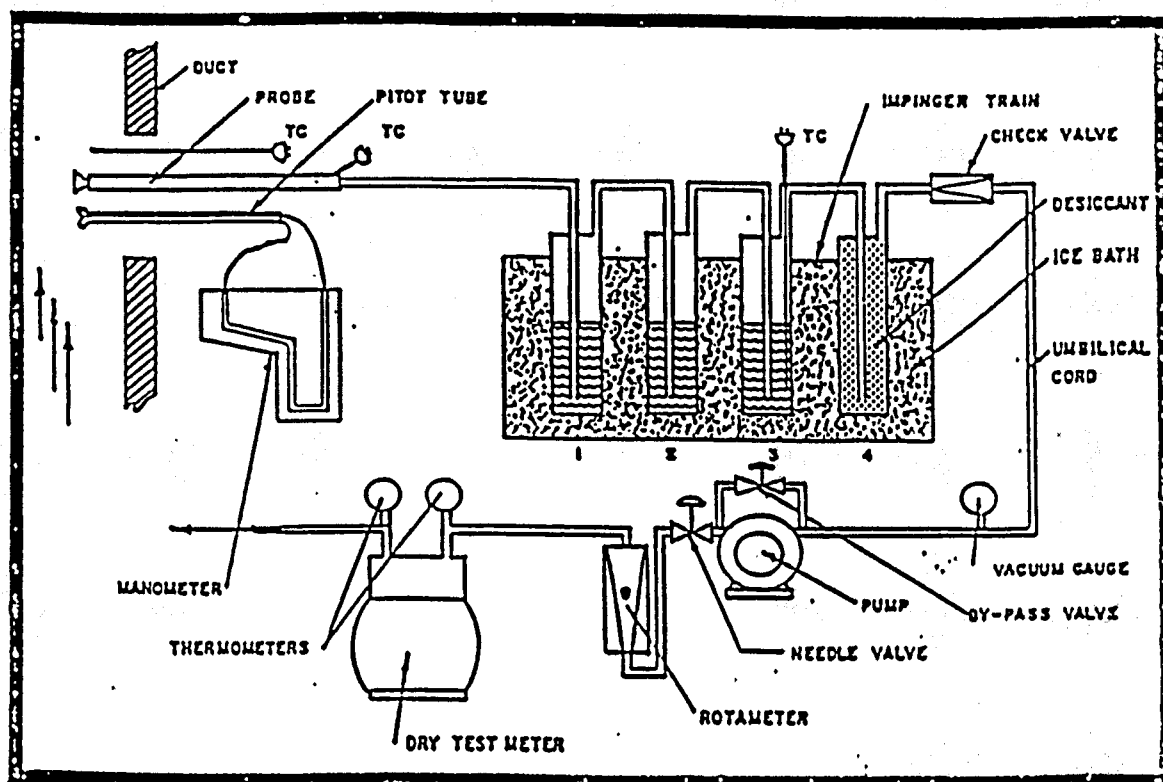
The final results of the test are summarized in Table One. Appendix A contains the computer output. Appendix B contains copies of the field data sheets, while Appendix C contains velocity profiles. Appendix D contains point by point isokinetics and calibration data sheets.

## METHODS AND PROCEDURES

Testing for arsenic was conducted as per the Environment Canada method; Measurement of Emissions of Arsenic from Gold Roasting Operations, Report EPS 1-AP-79-1. Sulphur dioxide was sampled in a separate absorption train utilizing 6% hydrogen peroxide solution. The subsequent analysis of sulphur dioxide was performed on an ion chromatograph.

The sampling trains used were last calibrated in June and March, 1991. The pitot tube used was last calibrated April, 1991.

## Determination of $\text{SO}_2$ and $\text{H}_2\text{O}$ in Gas Streams



The sampling train detailed above is used for the determination of  $\text{SO}_2$  in gas streams. The gas sample is drawn at a constant rate through a stainless steel probe from a single point near the centre of the duct. The appropriate sampling train parameters are monitored and recorded at regular intervals during the sampling period.

The  $\text{SO}_2$  reacts quantitatively with the aqueous  $\text{H}_2\text{O}_2$  absorbing solution. The resulting  $\text{H}_2\text{SO}_4$  is determined by analysis on Ion Chromatograph.

The probe is heated to keep the gas sample temperature above the  $\text{H}_2\text{O}$  dewpoint.

By measuring the initial and final total volumes of the absorbing solutions, the  $\text{H}_2\text{O}$  concentration in the stream can also be obtained. The  $\text{H}_2\text{O}$  vapor that escapes from impinger 3, and is absorbed by the desiccant, is accounted for by one of two methods -by a computational method under the assumption that the gas sample stream is saturated at impinger 3 outlet temperature and pressure or by the mass gain of the desiccant.

**TABLE 1****ROASTER STACK AT GIANT YELLOWKNIFE MINES**

The Department of Renewable Resources  
Government of the Northwest Territories

August 28-29, 1991  
Western Research File: 5280/91-1

Parameter	Test One	Test Two	Test Three	Average
Test Period	12:37-15:44	09:00-12:00	13:01-16:01	
Average Gas Temperature - °C	91	90	90	90
Average Gas Velocity - m/s	5.2	5.4	5.8	5.5
Total Effluent Flow Rate - m <sup>3</sup> /s*	24.8	26.1	28.2	26.4
- kg mol/h	3656.7	3844.8	4158.6	3886.7
Water Content - mole %	8.0	7.7	8.3	8.0
Arsenic - ppm v/v (dry)	9.3	7.5	10.7	9.2
- kg/h	2.34	1.98	3.07	2.46
Sulphur Dioxide - ppm v/v (dry)	15623.8	14858.1	14285.9	14922.6
- kg/h	3408.88	3421.09	3535.18	3455.05
Isokinetic Variation	107.6	105.6	106.0	

\* At 25°C, 760 mmHg

## APPENDIX A

Computer Output

FILE NUMBER 5290  
91/08/08

TEST ONE

PAGE 1

ROASTER STACK

LOCATION OF SAMPLING POINT	21.0	METRE LEVEL
STACK DIAMETER OR TRAVERSE LENGTH	2.743	METRES
RECTANGULAR DUCT WIDTH	0.000	METRES
BAROMETRIC PRESSURE	742.4	MM HG
AMBIENT TEMPERATURE	7.0	DEG.C

AVERAGE COMPOSITION OF FLUE GAS

	DRY BASIS PERCENT	WET BASIS PERCENT
O2	19.064	17.531
CO2	0.065	0.060
N2 *	80.871	74.368
H2O		8.041
CO	0.000	0.000

\* BY DIFFERENCE

SPECIFIC GRAVITY OF FLUE GAS (AIR = 1.0)	0.963
MOLECULAR WEIGHT OF FLUE GAS	27.907 KG/KGMOLE
MOLECULAR WEIGHT OF FLUE GAS (DRY BASIS)	28.773 KG/KGMOLE
EXCESS AIR PERCENTAGE	NA
[P150 DRY	NA
[P150 WET	NA

STACK GAS FLOW RATE DATA AND CALCULATIONS

AVERAGE SQUARE ROOT VELOCITY HEAD	0.279
STATIC PRESSURE	-0.430 MM HG
AVERAGE STACK GAS TEMPERATURE	91.0 DEG.C
PITOT CALIBRATION FACTOR	0.805
AVERAGE STACK GAS VELOCITY	5.259 M/S
TOTAL EFFLUENT FLOW RATE	24.840 M3/S ** 3656.677 KGMOLE/H
DRY EFFLUENT FLOW RATE	22.943 M3/S ** 3362.662 KGMOLE/H

-----

\*\* AT REFERENCE : 25 DEG.C AND 760 MM HG



ROASTER STACK

POLLUTANT DATA AND CALCULATIONS - ISOKINETIC SAMPLING TRAIN

TEST PERIOD	12:37	-	15:44	
ORIFICE PRESSURE				0.2691 MM HG
VOLUME OF FLUE GAS METERED				1.1698 M3
DRY GAS METER TEMPERATURE				12.8 DEG.C
VACUUM AT CONDENSER				30.5 MM HG
WATER VAPOUR PRESSURE				0.0000 MM HG
VOLUME OF WATER CONDENSED				76.9 ML
VOLUME OF FLUE GAS METERED AT REF.				1.1921 M3
-----				
PARTICULATES - FRONT HALF		WEIGHT		NA MG
CONCENTRATION ACTUAL - WET				NA KG/1000KG
CONCENTRATION ACTUAL - DRY				NA MG/M3 DRY
- WET				NA WET
CONCENTRATION AT 50 % EXCESS AIR - DRY				NA MG/M3 DRY
- WET				NA WET
MASS FLOW				NA KG/H
-----				
PARTICULATES - TOTAL TRAIN		WEIGHT		NA MG
CONCENTRATION ACTUAL - DRY				NA KG/1000KG
- DRY				NA MG/M3 DRY
- WET				NA KG/1000KG
- WET				NA MG/M3 WET
CONCENTRATION AT 50 % EXCESS AIR - DRY				NA KG/1000KG
- DRY				NA MG/M3 DRY
- WET				NA KG/1000KG
- WET				NA MG/M3 WET
MASS FLOW				NA KG/H
-----				
ARSENIC				
WEIGHT				34.0000 MG
CONCENTRATION ACTUAL - DRY				28.5211 MG/M3 DRY
- WET				28.2279 WET
CONCENTRATION AT 50 % EXCESS AIR - DRY				NA MG/M3 DRY
- WET				NA WET
MASS FLOW				2.1454 KG/H
-----				
Not applicable				
WEIGHT				NA MG
CONCENTRATION ACTUAL - DRY				NA MG/M3 DRY
- WET				NA WET
CONCENTRATION AT 50 % EXCESS AIR - DRY				NA MG/M3 DRY
- WET				NA WET
MASS FLOW				NA KG/H
-----				

\*\* AT REFERENCE / 25 DEG.C AND 760 MM HG  
- NEGATIVE VALUE DENOTES LESS THAN

FILE NUMBER 5250  
91/09/29

TEST ONE

PAGE 3

ROASTER STACK

POLLUTANT DATA AND CALCULATIONS - PROPORTIONAL AND NOX TRAINS

TEST PERIOD	12:38	-	13:39	
ORIFICE PRESSURE				0.0000 MM HG
VOLUME OF FLUE GAS METERED				0.4133 M3
DRY GAS METER TEMPERATURE				9.9 DEG.C
VACUUM AT CONDENSER				94.0 MM HG
WATER VAPOUR PRESSURE				6.6350 MM HG
VOLUME OF FLUE GAS METERED AT REF.				0.4253 M3

---

SO2				
WEIGHT				17632.0000 MG
CONCENTRATION ACTUAL - DRY				41453.4587 MG/M3 DRY
- WET				38120.3912 WET
CONCENTRATION AT 50 % EXCESS AIR - DRY				NA MG/M3 DRY
- WET				NA WET
MASS FLOW				3408.8801 KG/H

---

OXIDES OF NITROGEN DETERMINATION

	BOMB 1	BOMB 2	
BOMB NUMBER	NA	NA	
SAMPLE TIME	NA	NA	
FLASK VOLUME	NA	NA	ML
SOL.VOLUME	NA	NA	ML
INITIAL PRES.	NA	NA	MM HG
FINAL PRES.	NA	NA	MM HG
INITIAL TEMP.	NA	NA	C
FINAL TEMP.	NA	NA	C
ABSORBANCE	NA	NA	
F (dilution)	NA	NA	
CAL. SLOPE	NA	NA	
INT.	NA	NA	
WEIGHT OF NO2 - MG	NA	NA	AVERAGES
CONC. ACTUAL - DRY	NA	NA	NA MG/M3 DRY
- WET	NA	NA	NA WET
CONC.@ 50% XS - DRY	NA	NA	NA MG/M3 DRY
- WET	NA	NA	NA WET
NO2 MASS FLOW	NA	NA	NA KG/H

---

NA AT REFERENCE ( 25 DEG.C AND 760 MM HG )  
- NEGATIVE VALUE DENOTES LESS THAN

FILE NUMBER 5290  
91/08/29

TEST TWO

PAGE 1

ROASTER STACK

LOCATION OF SAMPLING POINT  
STACK DIAMETER OR TRAVERSE LENGTH  
RECTANGULAR DUCT WIDTH

21.0 METRE LEVEL  
2.743 METRES  
0.000 METRES

BAROMETRIC PRESSURE  
AMBIENT TEMPERATURE

760.2 MM HG  
8.0 DEG.C

AVERAGE COMPOSITION OF FLUE GAS

	DRY BASIS PERCENT	WET BASIS PERCENT
O2	20.658	19.067
CO2	0.044	0.040
N2 *	79.298	73.188
H2O		7.705
CO	0.000	0.000

\* BY DIFFERENCE

SPECIFIC GRAVITY OF FLUE GAS (AIR = 1.0)  
MOLECULAR WEIGHT OF FLUE GAS  
MOLECULAR WEIGHT OF FLUE GAS (DRY BASIS)  
EXCESS AIR PERCENTAGE  
[P150 DRY  
[P150 WET

0.966  
27.999 KG/KGMOLE  
29.303 KG/KGMOLE  
NA  
NA  
NA

STACK GAS FLOW RATE DATA AND CALCULATIONS

AVERAGE SQUARE ROOT VELOCITY HEAD  
STATIC PRESSURE  
AVERAGE STACK GAS TEMPERATURE  
PITOT CALIBRATION FACTOR  
AVERAGE STACK GAS VELOCITY

0.291  
-0.374 MM HG  
90.4 DEG.C  
0.805  
5.391 M/S

TOTAL EFFLUENT FLOW RATE

26.118 M3/S \*\*  
3844.857 KGMOLE/H

DRY EFFLUENT FLOW RATE

24.106 M3/S \*\*  
3548.626 KGMOLE/H

-----  
\*\* AT REFERENCE : 25 DEG.C AND 760 MM HG :

FILE NUMBER 5280  
91/08/29

TEST TWO

PAGE 2

ROASTER STACK

POLLUTANT DATA AND CALCULATIONS - ISOKINETIC SAMPLING TRAIN

TEST PERIOD 09:00 - 12:00

ORIFICE PRESSURE	0.2803	MM HG
VOLUME OF FLUE GAS METERED	1.1757	M3
DRY GAS METER TEMPERATURE	11.5	DEG.C
VACUUM AT CONDENSER	25.4	MM HG
WATER VAPOUR PRESSURE	0.0000	MM HG
VOLUME OF WATER CONDENSED	75.9	ML
VOLUME OF FLUE GAS METERED AT REF.	1.2324	M3

---

PARTICULATES - FRONT HALF	WEIGHT	NA	MG
CONCENTRATION ACTUAL - WET		NA	KG/1000KG
CONCENTRATION ACTUAL - DRY		NA	MG/M3 DRY
- WET		NA	WET
CONCENTRATION AT 50 % EXCESS AIR - DRY		NA	MG/M3 DRY
- WET		NA	WET
MASS FLOW		NA	KG/H

---

PARTICULATES - TOTAL TRAIN	WEIGHT	NA	MG
CONCENTRATION ACTUAL - DRY		NA	KG/1000KG
- DRY		NA	MG/M3 DRY
- WET		NA	KG/1000KG
- WET		NA	MG/M3 WET

CONCENTRATION AT 50 % EXCESS AIR - DRY	NA	KG/1000KG
- DRY	NA	MG/M3 DRY
- WET	NA	KG/1000KG
- WET	NA	MG/M3 WET
MASS FLOW	NA	KG/H

---

ARSENIC		
WEIGHT	29.2000	MG
CONCENTRATION ACTUAL - DRY	22.9824	MG/M3 DRY
- WET	21.1194	WET

CONCENTRATION AT 50 % EXCESS AIR - DRY	NA	MG/M3 DRY
- WET	NA	WET
MASS FLOW	1.9958	KG/H

---

not applicable		
WEIGHT	NA	MG
CONCENTRATION ACTUAL - DRY	NA	MG/M3 DRY
- WET	NA	WET

CONCENTRATION AT 50 % EXCESS AIR - DRY	NA	MG/M3 DRY
- WET	NA	WET
MASS FLOW	NA	KG/H

\*\* AT REFERENCE ( 25 DEG.C AND 760 MM HG )  
- NEGATIVE VALUE DENOTES LESS THAN

ROASTER STACK

POLLUTANT DATA AND CALCULATIONS - PROPORTIONAL AND NOX TRAINS

TEST PERIOD	10:42	-	11:42	
ORIFICE PRESSURE				0.0000 MM HG
VOLUME OF FLUE GAS METERED				0.4269 M3
DRY GAS METER TEMPERATURE				10.7 DEG.C
VACUUM AT CONDENSER				101.6 MM HG
WATER VAPOUR PRESSURE				6.6350 MM HG
VOLUME OF FLUE GAS METERED AT REF.				0.4486 M3

---

SO2			
WEIGHT		17684.0000	MG
CONCENTRATION ACTUAL - DRY		39421.8373	MG/M3 DRY
- WET		36384.5496	WET
CONCENTRATION AT 50 % EXCESS AIR - DRY		NA	MG/M3 DRY
- WET		NA	WET
MASS FLOW		3421.0930	KG/H

---

OXIDES OF NITROGEN DETERMINATION

	BOMB 1	BOMB 2	
BOMB NUMBER	NA	NA	
SAMPLE TIME	NA	NA	
FLASK VOLUME	NA	NA	ML
SOL. VOLUME	NA	NA	ML
INITIAL PRES.	NA	NA	MM HG
FINAL PRES.	NA	NA	MM HG
INITIAL TEMP.	NA	NA	C
FINAL TEMP.	NA	NA	C
ABSORBANCE	NA	NA	
F (dilution)	NA	NA	
CAL. SLOPE	NA	NA	
INT.	NA	NA	
WEIGHT OF NO2 - MG	NA	NA	AVERAGES
CONC. ACTUAL - DRY	NA	NA	NA MG/M3 DRY
- WET	NA	NA	NA WET
CONC. @ 50% XS - DRY	NA	NA	NA MG/M3 DRY
- WET	NA	NA	NA WET
NO2 MASS FLOW	NA	NA	NA KG/H

---

\*\* AT REFERENCE ( 25 DEG.C AND 760 MM HG )  
- NEGATIVE VALUE DENOTES LESS THAN

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TEST THREE

PAGE 1

ROASTER STACK

LOCATION OF SAMPLING POINT  
STACK DIAMETER OR TRAVERSE LENGTH  
RECTANGULAR DUCT WIDTH

21.0 METRE LEVEL  
2.743 METRES  
0.000 METRES

BAROMETRIC PRESSURE  
AMBIENT TEMPERATURE

760.2 MM HG  
7.0 DEG.C

AVERAGE COMPOSITION OF FLUE GAS

	DRY BASIS PERCENT	WET BASIS PERCENT
O2	20.538	18.205
CO2	0.046	0.042
N2 *	79.417	72.832
H2O		8.291
CO	0.000	0.000

\* BY DIFFERENCE

SPECIFIC GRAVITY OF FLUE GAS (AIR = 1.0)  
MOLECULAR WEIGHT OF FLUE GAS  
MOLECULAR WEIGHT OF FLUE GAS (DRY BASIS)  
EXCESS AIR PERCENTAGE  
[P]50 DRY  
[P]50 WET

0.954  
27.931 KG/KGMOLE  
28.829 KG/KGMOLE  
NA  
NA  
NA

STACK GAS FLOW RATE DATA AND CALCULATIONS

AVERAGE SQUARE ROOT VELOCITY HEAD  
STATIC PRESSURE  
AVERAGE STACK GAS TEMPERATURE  
PITOT CALIBRATION FACTOR  
AVERAGE STACK GAS VELOCITY

0.314  
-0.374 MM HG  
90.2 DEG.C  
0.905  
5.927 M/S

TOTAL EFFLUENT FLOW RATE

28.250 M3/S \*\*  
4158.623 KGMOLE/H

DRY EFFLUENT FLOW RATE

25.908 M3/S \*\*  
2813.831 KGMOLE/H

-----  
\*\* AT REFERENCE ( 25 DEG.C AND 760 MM HG )

FILE NUMBER 5280  
91/09/29

TEST THREE

PAGE 2

ROASTER STACK

POLLUTANT DATA AND CALCULATIONS - ISOKINETIC SAMPLING TRAIN

TEST PERIOD 13:01 - 16:01

ORIFICE PRESSURE	0.3236 MM HG
VOLUME OF FLUE GAS METERED	1.2635 M3
DRY GAS METER TEMPERATURE	10.0 DEG.C
VACUUM AT CONDENSER	33.0 MM HG
WATER VAPOUR PRESSURE	0.0000 MM HG
VOLUME OF WATER CONDENSED	98.8 ML
VOLUME OF FLUE GAS METERED AT REF.	1.3313 M3

---

PARTICULATES - FRONT HALF	WEIGHT	NA MG
CONCENTRATION ACTUAL - WET		NA KG/1000KG
CONCENTRATION ACTUAL - DRY		NA MG/M3 DRY
- WET		NA WET
CONCENTRATION AT 50 % EXCESS AIR - DRY		NA MG/M3 DRY
- WET		NA WET
MASS FLOW		NA KG/H

---

PARTICULATES - TOTAL TRAIN	WEIGHT	NA MG
CONCENTRATION ACTUAL - DRY		NA KG/1000KG
- DRY		NA MG/M3 DRY
- WET		NA KG/1000KG
- WET		NA MG/M3 WET

CONCENTRATION AT 50 % EXCESS AIR - DRY	NA KG/1000KG
- DRY	NA MG/M3 DRY
- WET	NA KG/1000KG
- WET	NA MG/M3 WET
MASS FLOW	NA KG/H

---

ARSENIC	
WEIGHT	43.9000 MG
CONCENTRATION ACTUAL - DRY	32.9990 MG/M3 DRY
- WET	30.1713 WET

CONCENTRATION AT 50 % EXCESS AIR - DRY	NA MG/M3 DRY
- WET	NA WET
MASS FLOW	3.0694 KG/H

---

not applicable	
WEIGHT	NA MG
CONCENTRATION ACTUAL - DRY	NA MG/M3 DRY
- WET	NA WET

CONCENTRATION AT 50 % EXCESS AIR - DRY	NA MG/M3 DRY
- WET	NA WET
MASS FLOW	NA KG/H

\*\* AT REFERENCE ( 25 DEG.C AND 760 MM HG )  
- NEGATIVE VALUE DENOTES LESS THAN

FILE NUMBER 5280  
91/08/29

TEST THREE

PAGE 4

ROASTER STACK

POLLUTANT DATA AND CALCULATIONS - PROPORTIONAL AND NOX TRAINS

TEST PERIOD	13:01	-	14:01	
ORIFICE PRESSURE				0.0000 MM HG
VOLUME OF FLUE GAS METERED				0.3975 M3
DRY GAS METER TEMPERATURE				13.0 DEG.C
VACUUM AT CONDENSER				101.6 MM HG
WATER VAPOUR PRESSURE				6.6350 MM HG
VOLUME OF FLUE GAS METERED AT REF.				0.4143 M3

---

SO2			
WEIGHT		15704.0000	MG
CONCENTRATION ACTUAL - DRY		37903.8248	MG/M3 DRY
- WET		34761.2088	WET
CONCENTRATION AT 50 % EXCESS AIR - DRY		NA	MG/M3 DRY
- WET		NA	WET
MASS FLOW		3535.1851	KG/H

---

OXIDES OF NITROGEN DETERMINATION

	BOMB 1	BOMB 2	
BOMB NUMBER	NA	NA	
SAMPLE TIME	NA	NA	
FLASK VOLUME	NA	NA	ML
SOL.VOLUME	NA	NA	ML
INITIAL PRES.	NA	NA	MM HG
FINAL PRES.	NA	NA	MM HG
INITIAL TEMP.	NA	NA	C
FINAL TEMP.	NA	NA	C
ABSORBANCE	NA	NA	
F (dilution)	NA	NA	
CAL. SLOPE	NA	NA	
INT.	NA	NA	
WEIGHT OF NO2 - MG	NA	NA	AVERAGES
CONC. ACTUAL - DRY	NA	NA	NA MG/M3 DRY
- WET	NA	NA	NA WET
CONC.@ 50% XS - DRY	NA	NA	NA MG/M3 DRY
- WET	NA	NA	NA WET
NO2 MASS FLOW	NA	NA	NA KG/H

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\*\* AT REFERENCE ( 25 DEG.C AND 760 MM HG )  
- NEGATIVE VALUE DENOTES LESS THAN



## APPENDIX B

Field Data Sheets

22011

.805

COMPANY NAME	Grant Yellowknife M.C.	TEST DATE	Aug 28/91	PITOT FACTOR/# 27	<del>27</del> 28
PLANT LOCATION	Yellowknife	JOB NUMBER	2220	TIME/POINT	5 min
SOURCE TESTED	Reactor	TEST NUMBER	ONE	H2O	6.4
OPERATOR	MAF	BAROMETRIC PRESSURE	29.23 mm Hg.	SPECIFIC GRAVITY	0.982
KIT USED	MM5 # 2	AMBIENT TEMPERATURE	+7 C	NOZZLE I.D. in.	243

FILTER NUMBER	<del>7</del> 624	CYCLONIC	YES/NO	ANGLE
PLANT LOAD		STATIC	.23 in.H2O	+K
STACK DIMENSIONS		PRESSURE CHECK	BEFORE	AFTER
H2O CONDENSED	76.9 lbs ✓	<del>76.9 lbs</del>	(YES)/NO	(YES)/NO

South East ←

$$v\rho = c$$
[illegible]

Initial	Final
564.3	682.0
Western Research, Calgary, Alberta	
603.2	609.4
593.1	536.1
467.3	467.9

Silica gel	659.0	673.7	1 of 2
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## ISOKINETIC TEST DATA

COMPANY NAME	Grant Yellowknife Mv.	TEST DATE	Aug. 28/61	PITOT FACTOR/±	.805
PLANT LOCATION	Yellowknife	JOB NUMBER		TIME/POINT	5 min
SOURCE TESTED	Roaster Stack	TEST NUMBER	ONE	H2O	6.4
OPERATOR	MAT	BAROMETRIC PRESSURE	29.23 mm Hg.	SPECIFIC GRAVITY	.88
KIT USED	MM5 #2	AMBIENT TEMPERATURE	C	NOZZLE I.D. in.	.243

FILTER NUMBER	624	CYCLONIC	YES/NO	ANGLE
PLANT LOAD		STATIC	in.H2O	+/-
STACK DIMENSIONS		PRESSURE CHECK	BEFORE	AFTER
H2O CONDENSED	76.9 wts ✓		YES/NO	YES/NO

South west

[illegible]

Western Research, Calgary, Alberta

## ISOKINETIC TEST DATA

COMPANY NAME	Wright Yellowknife man.	TEST DATE	Aug 29/91	PITOT FACTOR/ft	.805
PLANT LOCATION	Yellowknife	JOB NUMBER		TIME/POINT	5 min
SOURCE TESTED	Reactive drub	TEST NUMBER	Time	H2O	8.1
OPERATOR	MAT	BAROMETRIC PRESSURE	29.93 mm Hg.	SPECIFIC GRAVITY	.88
KIT USED	MM5 #2	AMBIENT TEMPERATURE	+7 C	NOZZLE I.D. in.	.243

FILTER NUMBER	625	CYCLONIC	YES/NO	ANGLE
PLANT LOAD		STATIC	20 in.H2O	+K
STACK DIMENSIONS		PRESSURE CHECK	BEFORE	AFTER -
H2O CONDENSED	75.6 lbs 17.9	<del>WATER</del>	YES/NO	YES/NO

South west

[illegible]

Research, Calgary, Alberta

	Lat	Long
#1	567.0	626.2
#2	610.6	617.9
#3	597.5	599.3
#4	<del>479.8</del>	467.0

S.1.1. 6757 6  
1 of 2

## ISOKINETIC TEST DATA

COMPANY NAME	Giant Yellowknife	TEST DATE	Aug 29/91	PITOT FACTOR/ft	805
PLANT LOCATION	Yellowknife	JCB NUMBER		TIME/POINT	5:00
SOURCE TESTED	Reactor - alk	TEST NUMBER	Two	H2O	9.1
OPERATOR	MAT	BAROMETRIC PRESSURE	29.93 mm Hg.	SPECIFIC GRAVITY	.33
KIT USED	MM5 #2	AMBIENT TEMPERATURE	+ 8 C	NOZZLE I.D. in.	.243

FILTER NUMBER	625	CYCLIC	YES/NO	ANGLE
PLANT LOAD		STATIC	in.H2O	+/-
STACK DIMENSIONS		PRESSURE CHECK	BEFORE	AFTER
H2O CONDENSED	75.6 L/s		YES/NO	YES/NO

South east

[illegible]

# ISOKINETIC TEST DATA

COMPANY NAME	Grant Yellowknife	TEST DATE	Aug 24/91	PITOT FACTOR/# 27	.805
PLANT LOCATION	Yellowknife	JCB NUMBER		TIME/POINT	5 min
SOURCE TESTED	Runwater stub	TEST NUMBER	Three	H2O	8.1
OPERATOR	MAT	BAROMETRIC PRESSURE	29.93 mm Hg.	SPECIFIC GRAVITY	.88
KIT USED	MM 5 #2	AMBIENT TEMPERATURE	+7 C	NOZZLE I.D. in.	.243

FILTER NUMBER	623	CYCLONIC	YES/NO	ANGLE
PLANT LOAD		STATIC	in.H2O	.20 +/-
STACK DIMENSIONS		PRESSURE CHECK	BEFORE	AFTER -
H2O CONDENSED	88.8 lbs		YES/NO	YES/NO

Soil East

[illegible]

Research, Calgary, Alberta

#1 553.1	643.4
#2 610.1	6130
#3 534.0	5850
#4 431.4	4353

S. 1. 4. 673.5 688.

## ISOKINETIC TEST DATA

COMPANY NAME	General	TEST DATE	Aug 24/91	PITOT FACTOR/1	.805
PLANT LOCATION	May 4th	CB NUMBER		TIME/POINT	5.00
SOURCE TESTED	Yellow Lake	TEST NUMBER	Three	H2O	31
OPERATOR	Ronnie S. L.	BAROMETRIC PRESSURE	29.93 mm Hg.	SPECIFIC GRAVITY	.83
KIT USED	MM5 #2	AMBIENT TEMPERATURE	7	NOZZLE I.D. in.	.243

FILTER NUMBER	E23	CYCLONIC	YES/NO	ANGLE
PLANT LOAD		STATIC	in.H2O	.20 +/€
STACK DIMENSIONS		PRESSURE CHECK	BEFORE	AFTER -
H2O CONDENSED	88.8 L	<del>XXXXXXXXXX</del>	YES/NO	YES/NO

[illegible]

# EMISSION TEST DATA

COMPANY NAME	CREANT MURS	TEST DATE	28/28/91	PITOT FACTOR/1	.805
PLANT LOCATION	YOUNG LIFE	JOB NUMBER		02	C02
SOURCE TESTED	ROASTER STR	TEST NUMBER	DUIC	20.5	.4
OPERATOR	MT MS	BAROMETRIC PRESSURE	29.27 in.Hg.		
KIT USED	SDG #2	AMBIENT TEMPERATURE	6 C		

SOLUTION	6% H <sub>2</sub> O <sub>2</sub>	CYCLONIC	YES/NO	ANGLE
INITIAL mls.(wt.)	500 ml	STATIC	in.H2O	+/-
FINAL mls.(wt.)	527 ml	PRESSURE CHECK	BEFORE	AFTER
WASH mls.	100 ml		YES/NO	YES/NO

SAMPLE TIME	CLOCK TIME	VOLUME CUBIC FT.	dH in.H2O	VACUUM in.Hg	meter	TEMPERATURE C	condenser	stock
0	12:38	31.215		3.0	46	6		
10	:48	32.87		3.0	48	5		
20	:58			4.0	50	5		
30	12:08	38.55		4.0	50	5		
40	:18	41.19		4.0	51	5		
50	:28	43.49		4.0	52	5		
60	:38	45.812		4.0	52	5		
		14.597		3.7	9.94	15.2		

Ts C	dH in.H2O	Ts C	dH in.H2O	Ts C	dH in.H2O	Ts C	dH in.H2O
1		1		1		1	
2		2		2		2	
3		3		3		3	
4		4		4		4	
5		5		5		5	
6		6		6		6	
7		7		7		7	
8		8		8		8	
9		9		9		9	
10		10		10		10	
11		11		11		11	
12		12		12		12	
13		13		13		13	
14		14		14		14	
PORTS							



# EMISSION TEST DATA

COMPANY NAME	GREAT ALBERTA	TEST DATE	29/08/91	PITOT FACTOR/#	
PLANT LOCATION	YELLOWKNIFE	JOB NUMBER		02	CO2
SOURCE TESTED	ROASTER STK	TEST NUMBER	T-20	19.2	1.8
OPERATOR	MR. MS	BAROMETRIC PRESSURE	29.95" Hg.	19.5	1.9
KIT USED	SD2 #2	AMBIENT TEMPERATURE	6 C		

SOLUTION	H <sub>2</sub> O <sub>2</sub> (6%)	CYCLONIC	YES/NO	ANGLE
INITIAL mls.(wt.)	500 ml	STATIC	in.H2O	+/-
FINAL mls.(wt.)	522 ml	PRESSURE CHECK	BEFORE	AFTER
WASH mls.	100 ml		YES/NO	YES/NO

SAMPLE TIME	CLOCK TIME	VOLUME CUBIC FT.	dH in.H2O	VACUUM in.Hg	meter	CONDENSER	stock
0	10:42	45.838		4.0	42	6	
10	:52						
20	11:02	50.89		4.0	47	5	
30	:12	53.53		4.0	51	5	
40	:22						
50	:32	58.55		4.0	57	5	
60	:42	60.915		4.0	59	5	
		15.177		4.0	117	4.2	

Ts C	dH in.H2O	Ts C	dH in.H2O	Ts C	dH in.H2O	Ts C	dH in.H2O
1		1		1		1	
2		2		2		2	
3		3		3		3	
4		4		4		4	
5		5		5		5	
6		6		6		6	
7		7		7		7	
8		8		8		8	
9		9		9		9	
10		10		10		10	
11		11		11		11	
12		12		12		12	
13		13		13		13	
14		14		14		14	
PORTS							

# EMISSION TEST DATA

COMPANY NAME	GRANT MILES	TEST DATE	29/08/91	PITOT FACTOR/#	
PLANT LOCATION	YELLOWKNIFE	JOB NUMBER		02	CO2
SOURCE TESTED	ROSTER JTK	TEST NUMBER	THREE	19.7	1.6
OPERATOR	MT MS	BAROMETRIC PRESSURE	29.95" Hg.	19.7	1.8
NIT USED	50g #2	AMBIENT TEMPERATURE	6 C		

SOLUTION	6% H <sub>2</sub> O <sub>2</sub>	CYCLONIC	YES/NO	ANGLE
INITIAL mls.(wt.)	500 ml	STATIC		in.H2O +/-
FINAL mls.(wt.)	523 ml	PRESSURE CHECK	BEFORE	AFTER
WASH mls.	100 ml		(YES) NO	(YES) NO

48 22"

01 8 22"

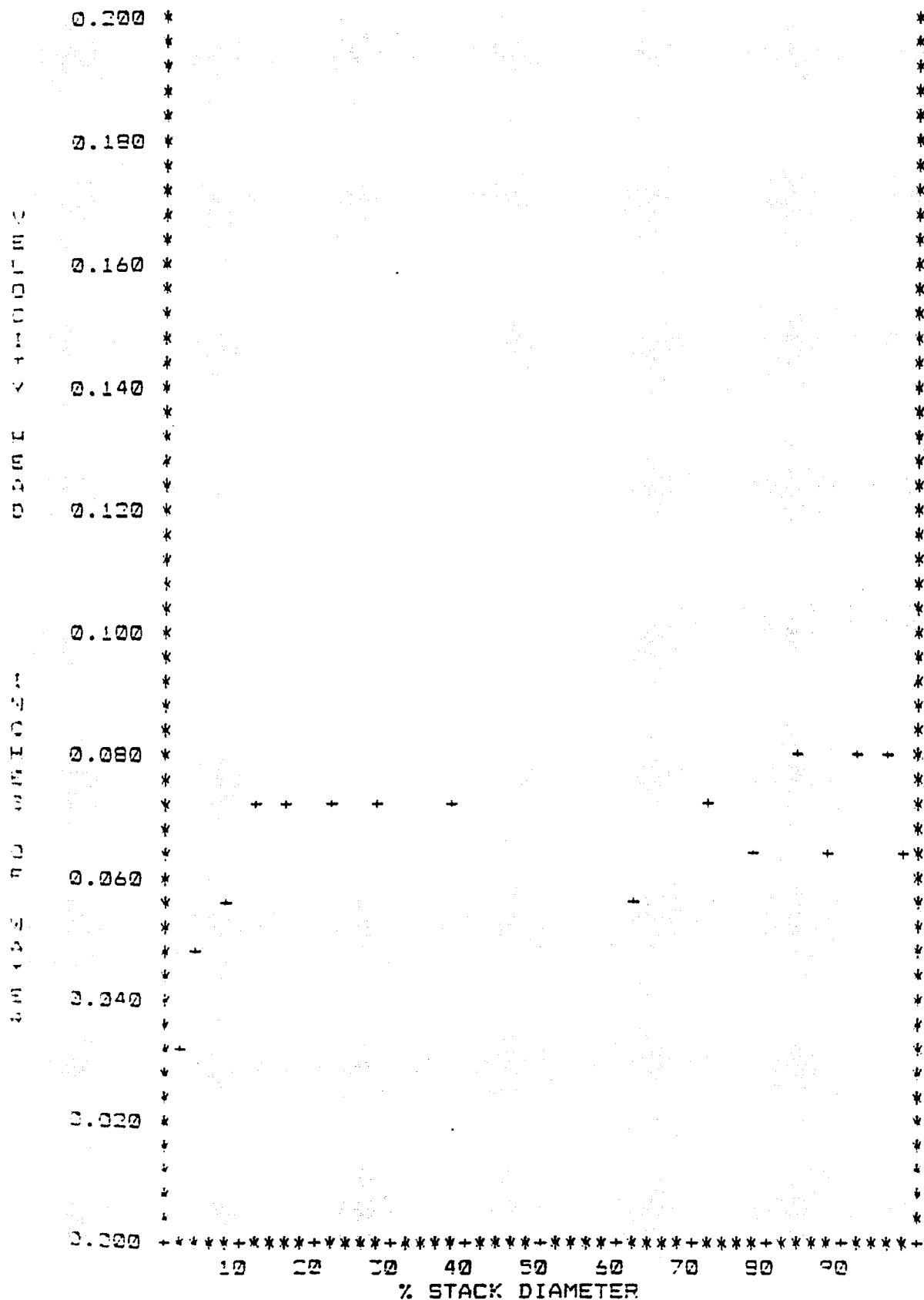
SAMPLE TIME	CLOCK TIME	VOLUME CUBIC FT.	dH in.H2O	VACUUM in.Hg	TEMPERATURES C		
					meter	condenser	stock
0	13:01	60.949	/	4.0	48	6	/
10	:11	63.25		4.0	49	5	
20	:21						
30	:31	67.95		4.0	56	5	
40	:41	70.26		4.0	58	5	
50	:51	72.66		4.0	60	5	
60	14:01	74.987		4.0	62	5	
		14.576		4.0	12	...	

Ts C	dH in.H2O	Ts C	dH in.H2O	Ts C	dH in.H2O	Ts C	dH in.H2O
1		1		1		1	
2		2		2		2	
3		3		3		3	
4		4		4		4	
5		5		5		5	
6		6		6		6	
7		7		7		7	
8		8		8		8	
9		9		9		9	
10		10		10		10	
11		11		11		11	
12		12		12		12	
13		13		13		13	
14		14		14		14	
PORTS							

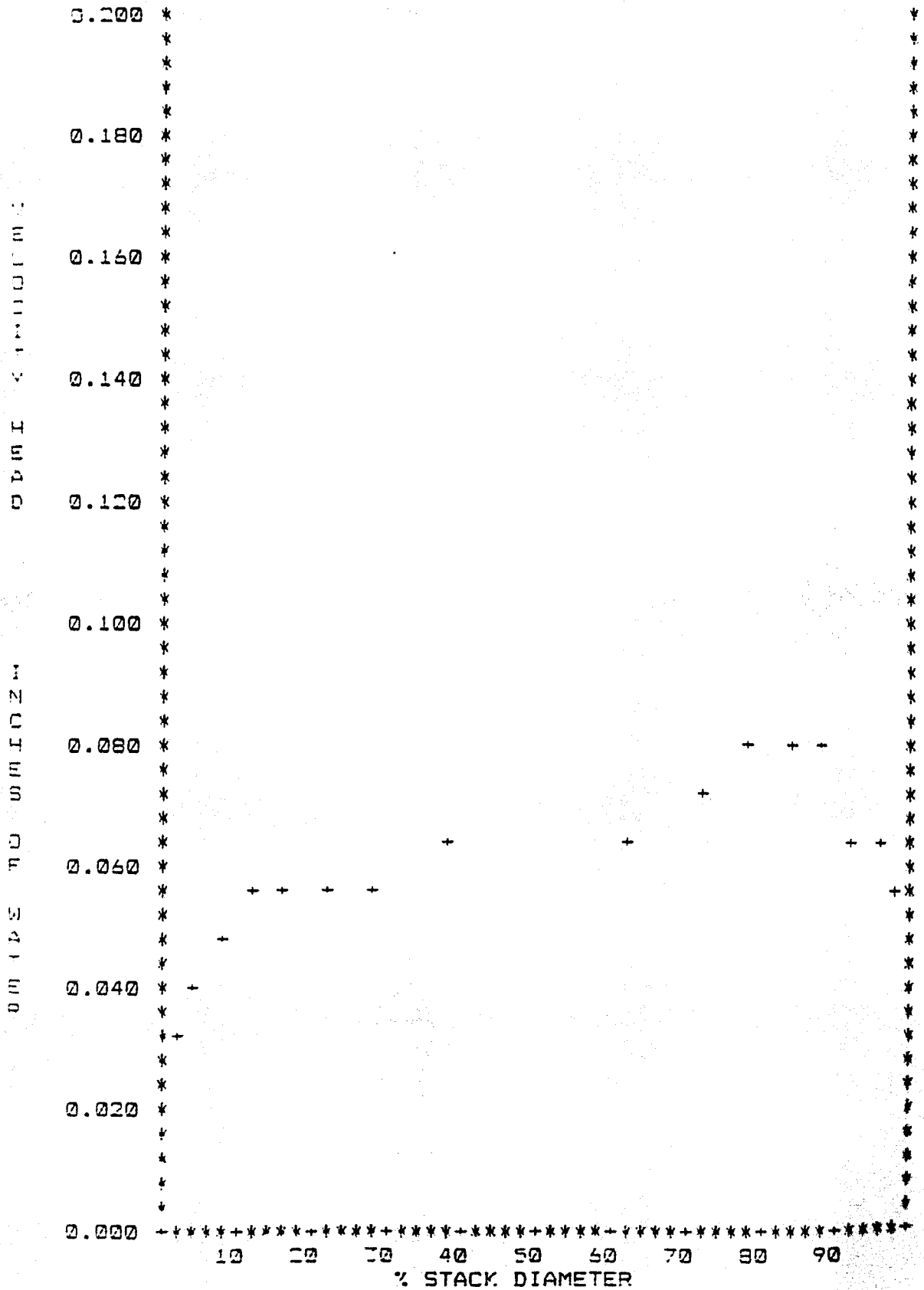
## APPENDIX C

### Velocity Profiles

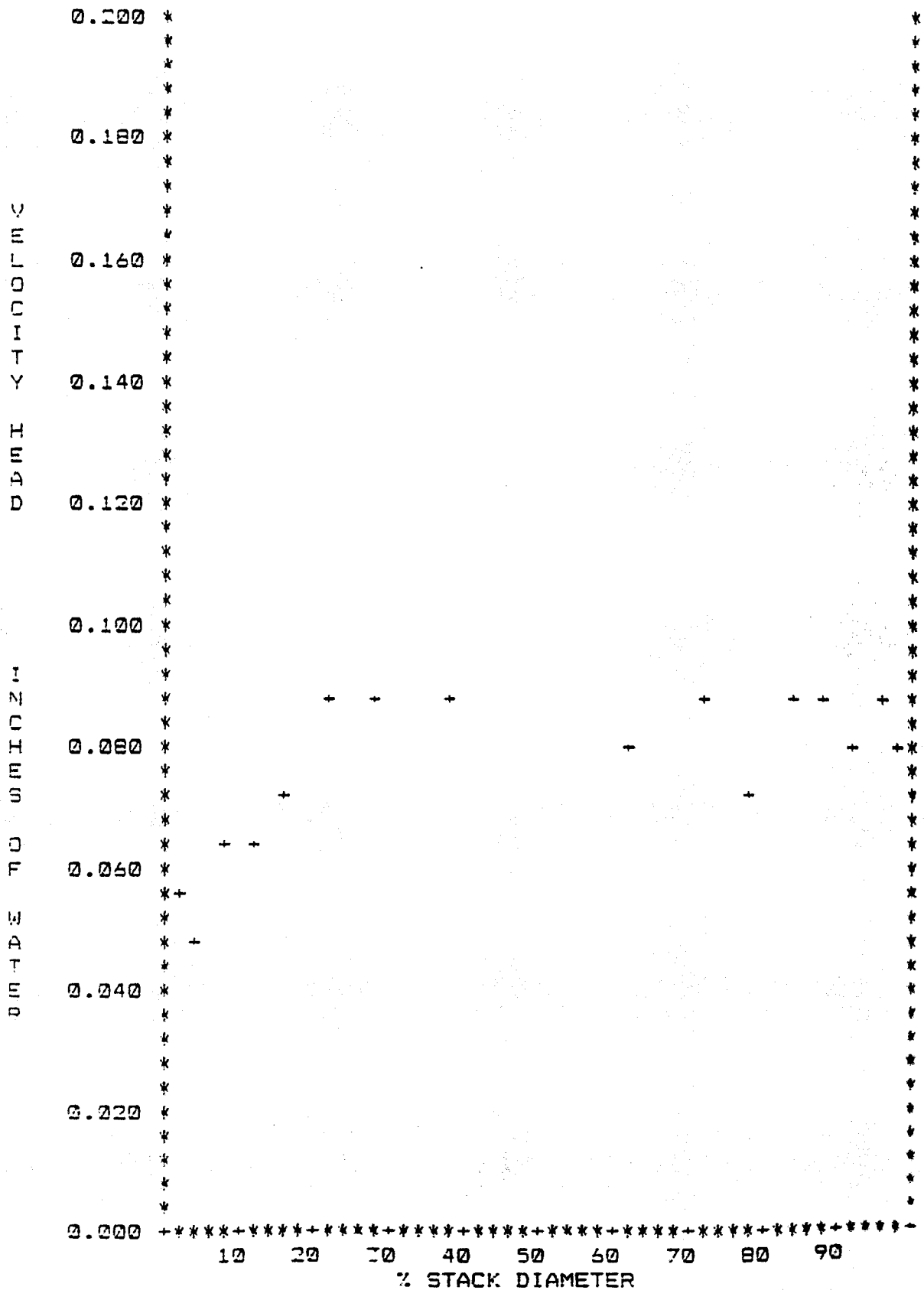
TEST ONE  
VELOCITY PROFILE 1  
ROASTER STACK



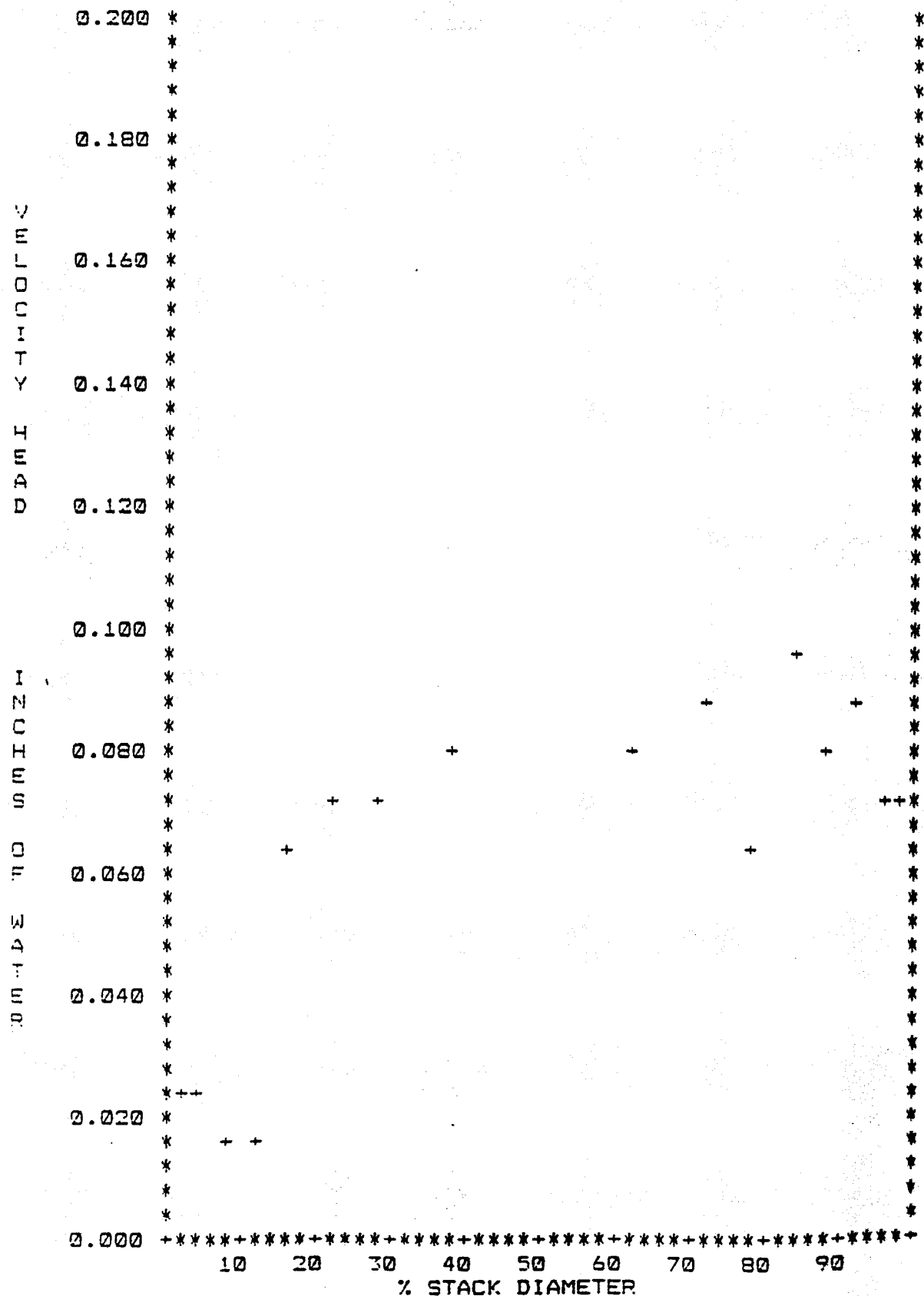
TEST ONE  
VELOCITY PROFILE 2  
ROASTER STACK



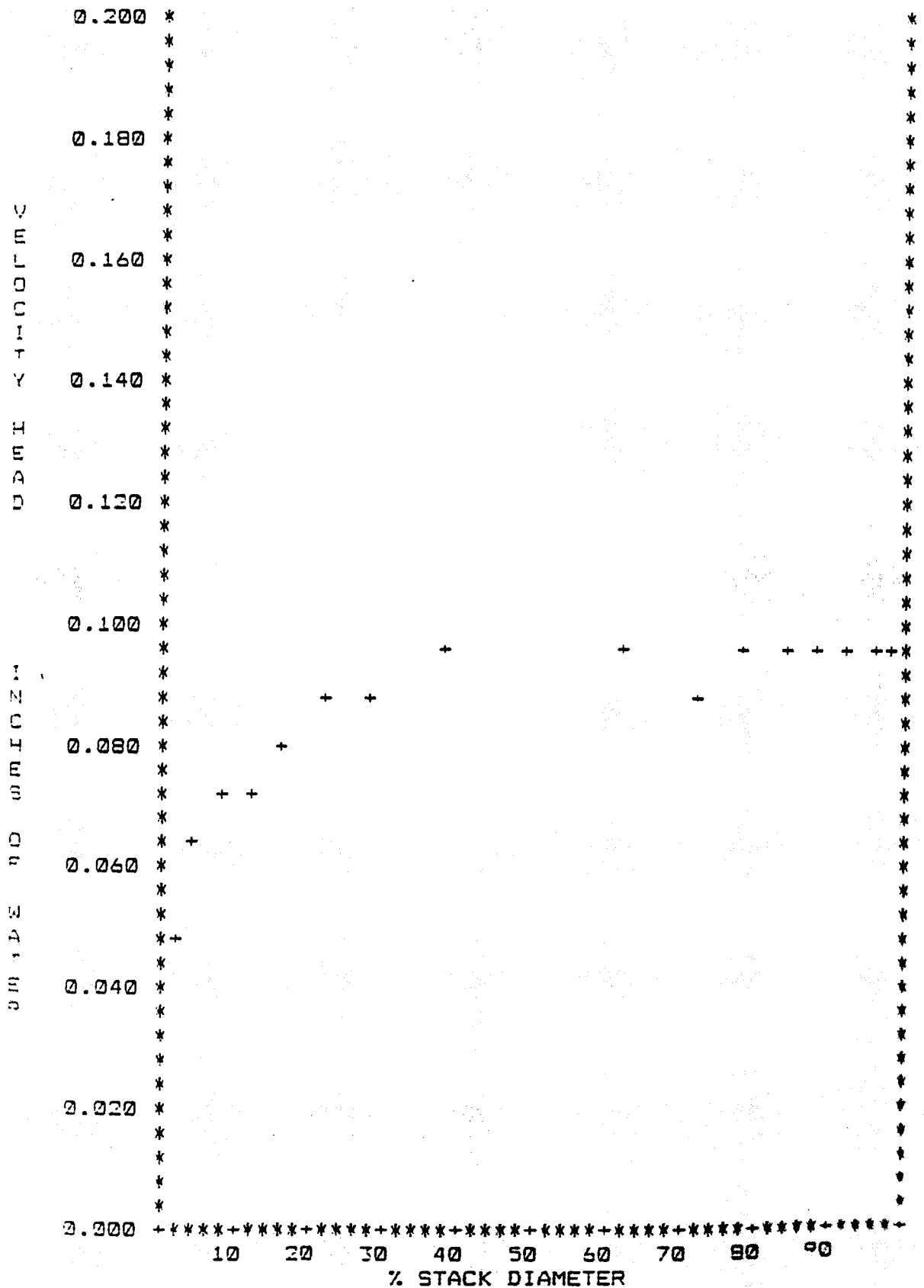
TEST TWO  
VELOCITY PROFILE 1  
ROASTER STACK



TEST TWO  
VELOCITY PROFILE 2  
ROASTER STACK

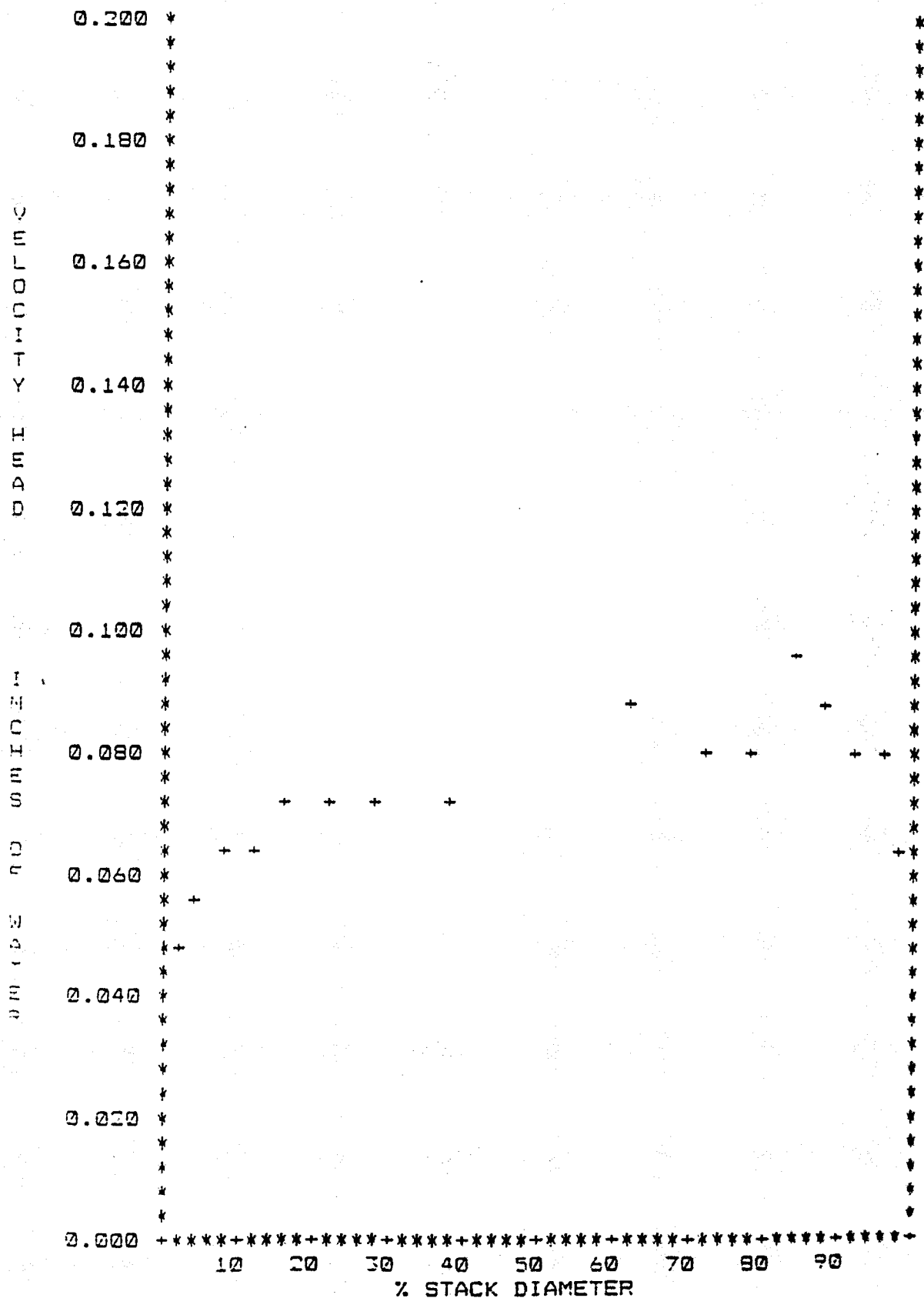


TEST THREE  
VELOCITY PROFILE 1  
ROASTER STACK





TEST THREE  
VELOCITY PROFILE 2  
ROASTER STACK



**APPENDIX D**

**POINT BY POINT ISOKINETICS**

**CALIBRATION DATA SHEETS**

FILE: 5280  
 DATE: 91/08/28  
 UNIT: ROASTER STACK

TEST 1

GAS SPEED AND SAMPLING  
 ISOKINETICITY CALCULATIONS

POINT #	VELOCITY PRES. IN.H2O	ORIFICE PRES. IN.H2O	VOLUME M3	STACK TEMP. C	METER-TEMP IN C	OUT C	STACK VEL M/S	PERCENT ISOKIN.
1.01	0.040	0.060	0.0260	80.0	9.0	9.0	3.70	106.91
1.02	0.060	0.100	0.0337	80.0	10.0	10.0	4.53	112.51
1.03	0.070	0.130	0.0325	89.0	11.0	10.0	4.96	101.76
1.04	0.090	0.160	0.0396	93.0	11.0	10.0	5.65	109.86
1.05	0.090	0.160	0.0368	93.0	11.0	10.0	5.65	102.01
1.06	0.090	0.160	0.0405	93.0	11.0	10.0	5.65	112.21
1.07	0.090	0.160	0.0388	95.0	11.0	11.0	5.67	107.61
1.08	0.090	0.160	0.0396	94.0	12.0	11.0	5.66	109.62
1.09	0.070	0.120	0.0331	94.0	13.0	12.0	4.99	103.51
1.10	0.090	0.170	0.0402	94.0	13.0	12.0	5.66	110.80
1.11	0.080	0.140	0.0357	94.0	14.0	13.0	5.33	103.91
1.12	0.100	0.190	0.0425	94.0	15.0	13.0	5.96	110.45
1.13	0.080	0.150	0.0368	94.0	15.0	13.0	5.33	107.02
1.14	0.100	0.190	0.0416	92.0	13.0	12.0	5.95	108.51
1.15	0.100	0.190	0.0399	93.0	12.0	12.0	5.96	104.41
1.16	0.080	0.140	0.0374	93.0	12.0	12.0	5.33	109.28
2.01	0.040	0.060	0.0260	80.0	11.0	11.0	3.70	106.16
2.02	0.050	0.080	0.0294	80.0	13.0	13.0	4.14	106.59
2.03	0.060	0.110	0.0325	79.0	13.0	12.0	4.52	107.63
2.04	0.070	0.130	0.0354	88.0	13.0	12.0	4.95	109.68
2.05	0.070	0.130	0.0345	92.0	14.0	13.0	4.98	107.27
2.06	0.070	0.130	0.0351	93.0	14.0	14.0	4.98	108.98
2.07	0.070	0.120	0.0342	93.0	14.0	13.0	4.98	106.53
2.08	0.080	0.150	0.0368	94.0	15.0	13.0	5.33	107.02
2.09	0.080	0.150	0.0382	94.0	15.0	13.0	5.33	111.14
2.10	0.090	0.170	0.0382	94.0	15.0	14.0	5.66	104.60
2.11	0.100	0.190	0.0402	93.0	15.0	13.0	5.96	104.42
2.12	0.100	0.190	0.0425	93.0	16.0	14.0	5.96	109.92
2.13	0.100	0.190	0.0425	93.0	15.0	14.0	5.96	110.11
2.14	0.080	0.150	0.0357	94.0	16.0	14.0	5.33	103.37
2.15	0.080	0.150	0.0374	94.0	16.0	15.0	5.33	108.11
2.16	0.070	0.130	0.0359	94.0	16.0	15.0	4.99	111.19
AVG.		0.144		91.0	13.3	12.3	5.25	107.60
TOTAL			1.1691					
MAX							5.96	112.51
MIN							3.70	101.76

EASTERN RESEARCH. CALGARY. ALBERTA

FILE: 5280  
 DATE: 91/08/29  
 UNIT: ROASTER STACK

TEST 2

GAS SPEED AND SAMPLING  
 ISOKINETICITY CALCULATIONS

POINT #	VELOCITY PRES. IN.H2O	ORIFICE PRES. IN.H2O	VOLUME M3	STACK TEMP. C	METER-TEMP IN C	METER-TEMP OUT C	STACK VEL M/S	PERCENT ISOKIN.
1.01	0.030	0.040	0.0221	75.0	10.0	11.0	3.14	104.39
1.02	0.030	0.040	0.0226	82.0	11.0	11.0	3.17	107.95
1.03	0.020	0.020	0.0184	76.0	11.0	11.0	2.57	106.51
1.04	0.020	0.020	0.0184	89.0	12.0	11.0	2.61	108.28
1.05	0.080	0.140	0.0342	94.0	13.0	12.0	5.26	101.12
1.06	0.090	0.155	0.0382	94.0	13.0	12.0	5.58	106.37
1.07	0.090	0.155	0.0374	94.0	14.0	12.0	5.58	103.82
1.08	0.100	0.175	0.0410	95.0	14.0	13.0	5.89	108.16
1.09	0.100	0.175	0.0396	94.0	14.0	13.0	5.88	104.28
1.10	0.110	0.197	0.0416	94.0	14.0	13.0	6.17	104.40
1.11	0.080	0.136	0.0371	94.0	15.0	13.0	5.26	108.91
1.12	0.120	0.220	0.0433	94.0	15.0	14.0	6.45	103.68
1.13	0.100	0.180	0.0399	94.0	15.0	14.0	5.88	104.66
1.14	0.110	0.200	0.0419	95.0	16.0	14.0	6.18	104.71
1.15	0.090	0.160	0.0388	94.0	16.0	15.0	5.58	106.82
1.16	0.090	0.160	0.0385	94.0	16.0	14.0	5.58	106.23
2.01	0.070	0.120	0.0340	75.0	11.0	10.0	4.79	105.14
2.02	0.060	0.100	0.0314	74.0	12.0	11.0	4.43	104.52
2.03	0.080	0.140	0.0354	87.0	10.0	10.0	5.21	104.38
2.04	0.080	0.130	0.0382	92.0	11.0	10.0	5.25	113.31
2.05	0.090	0.150	0.0359	93.0	11.0	11.0	5.57	100.46
2.06	0.110	0.190	0.0430	94.0	11.0	11.0	6.17	108.90
2.07	0.110	0.190	0.0402	92.0	9.0	9.0	6.15	102.18
2.08	0.110	0.190	0.0425	94.0	11.0	11.0	6.17	107.47
2.09	0.100	0.170	0.0399	91.0	8.0	8.0	5.86	106.65
2.10	0.110	0.190	0.0399	93.0	10.0	9.0	6.16	101.42
2.11	0.090	0.150	0.0379	92.0	8.0	9.0	5.57	106.79
2.12	0.110	0.190	0.0416	93.0	10.0	10.0	6.16	105.55
2.13	0.110	0.190	0.0419	93.0	9.0	9.0	6.16	106.64
2.14	0.100	0.170	0.0399	92.0	9.0	8.0	5.87	106.60
2.15	0.110	0.190	0.0399	93.0	9.0	9.0	6.16	101.60
2.16	0.100	0.170	0.0405	92.0	10.0	9.0	5.87	107.73
AVG.		0.150		90.4	11.8	11.2	5.39	105.61
TOTAL			1.1750					
MAX							6.45	113.31
MIN							2.57	100.46

WESTERN RESEARCH. CALGARY. ALBERTA

FILE: 5280  
 DATE: 91/08/29  
 UNIT: ROASTER STACK

TEST 3

GAS SPEED AND SAMPLING  
 ISOKINETICITY CALCULATIONS

POINT #	VELOCITY PRES. IN.H2O	ORIFICE PRES. IN.H2O	VOLUME M3	STACK TEMP. C	METER-TEMP IN C	METER-TEMP OUT C	STACK VEL M/S	PERCENT ISOKIN.
1.01	0.060	0.095	0.0300	80.0	7.0	7.0	4.48	102.82
1.02	0.080	0.130	0.0362	73.0	7.0	7.0	5.12	106.46
1.03	0.090	0.160	0.0385	83.0	7.0	7.0	5.51	108.17
1.04	0.090	0.150	0.0382	90.0	8.0	7.0	5.56	108.23
1.05	0.100	0.170	0.0374	92.0	8.0	7.0	5.88	100.67
1.06	0.110	0.190	0.0427	93.0	8.0	7.0	6.17	109.95
1.07	0.110	0.190	0.0410	93.0	8.0	7.0	6.17	105.58
1.08	0.120	0.210	0.0430	93.0	8.0	7.0	6.45	105.97
1.09	0.120	0.210	0.0436	94.0	8.0	7.0	6.45	107.51
1.10	0.110	0.190	0.0410	93.0	7.0	7.0	6.17	105.77
1.11	0.120	0.210	0.0425	94.0	8.0	7.0	6.45	104.72
1.12	0.120	0.210	0.0430	93.0	8.0	8.0	6.45	105.79
1.13	0.120	0.210	0.0425	93.0	7.0	7.0	6.45	104.76
1.14	0.120	0.210	0.0439	93.0	7.0	7.0	6.45	108.25
1.15	0.120	0.210	0.0419	93.0	8.0	8.0	6.45	103.00
1.16	0.120	0.210	0.0441	93.0	7.0	7.0	6.45	109.95
2.01	0.060	0.100	0.0328	75.0	8.0	8.0	4.44	111.32
2.02	0.070	0.120	0.0314	76.0	9.0	8.0	4.81	99.59
2.03	0.080	0.140	0.0371	79.0	11.0	10.0	5.16	108.54
2.04	0.080	0.140	0.0351	86.0	12.0	10.0	5.21	103.57
2.05	0.090	0.160	0.0399	93.0	11.0	12.0	5.58	111.91
2.06	0.090	0.150	0.0374	93.0	13.0	11.0	5.58	104.59
2.07	0.090	0.150	0.0371	94.0	14.0	12.0	5.59	103.57
2.08	0.090	0.155	0.0374	95.0	14.0	12.0	5.60	104.50
2.09	0.110	0.195	0.0422	94.0	14.0	13.0	6.18	106.37
2.10	0.100	0.180	0.0399	94.0	15.0	13.0	5.89	105.39
2.11	0.100	0.180	0.0405	94.0	15.0	13.0	5.89	106.88
2.12	0.120	0.220	0.0441	94.0	15.0	14.0	6.45	106.26
2.13	0.110	0.200	0.0408	94.0	15.0	14.0	6.18	102.44
2.14	0.100	0.180	0.0430	94.0	16.0	14.0	5.89	113.22
2.15	0.100	0.180	0.0392	94.0	16.0	14.0	5.89	100.55
2.16	0.080	0.140	0.0365	94.0	16.0	14.0	5.27	107.47
AVG.		0.173		90.2	10.5	9.6	5.82	105.99
TOTAL			1.2627					
MAX							6.45	113.22
MIN							4.44	99.59

WESTERN RESEARCH, CALGARY, ALBERTA

M3200612

## ORIFICE CALIBRATION DATA

by M. SEBBELOV

91/06/26

Barometric Pres. = 26.27  
 Multiplier Factor = 178.02  
 Meter Factor = 0.9975  
 Alberta Environment K = 0.67

DH = 2.02

ORIFICE dH	VOLUME ft. <sup>3</sup>	Tm C	TIME min.	CFM	SQRT dH	CALC. (dH) <sup>1.5</sup>	CALC. dH
0.1	1.0	19.00	5.0442	0.1977	0.3162	0.33	0.1
0.1	1.0	19.00	5.0395	0.1979	0.3162	0.33	0.1
0.1	1.0	19.50	5.0453	0.1977	0.3162	0.33	0.1
0.1	1.0	19.50	5.0463	0.1977	0.3162	0.33	0.1
0.5	1.0	20.00	2.3635	0.4220	0.7071	0.73	0.5
0.5	1.0	20.00	2.3625	0.4222	0.7071	0.73	0.5
0.5	1.0	20.00	2.3593	0.4228	0.7071	0.73	0.5
0.5	1.0	20.00	2.3610	0.4225	0.7071	0.73	0.5
0.9	1.0	20.50	1.7808	0.5601	0.9487	0.97	0.9
0.9	1.0	20.50	1.7782	0.5609	0.9487	0.97	0.9
0.9	1.0	20.50	1.7745	0.5621	0.9487	0.98	1.0
0.9	1.0	20.50	1.7755	0.5618	0.9487	0.98	1.0
2.0	1.0	21.00	1.1980	0.8326	1.4142	1.46	2.1
2.0	1.0	21.00	1.1963	0.8338	1.4142	1.46	2.1
2.0	1.0	21.50	1.1985	0.8323	1.4142	1.46	2.1
2.0	1.0	21.50	1.1958	0.8341	1.4142	1.46	2.1
5.0	1.0	23.50	0.7907	1.2615	2.2361	2.22	4.9
5.0	1.0	23.50	0.7892	1.2639	2.2361	2.22	4.9
5.0	1.0	23.50	0.7907	1.2615	2.2361	2.22	4.9
5.0	1.0	23.50	0.7885	1.2650	2.2361	2.23	5.0

Western Research Factor  
 Regression Output:

Alberta Environment Factor  
 Regression Output:

Constant	-0.02381	Constant	0.012575
Std Err of Y Est	0.015848	Std Err of Y Est	0.000555
Squared	0.999481	R Squared	0.999998
No. of Observations	20	No. of Observations	20
Degrees of Freedom	18	Degrees of Freedom	18

Coefficient(s)	1.777994	X Coefficient(s)	0.67368
Std Err of Coef.	0.009549	Std Err of Coef.	0.000225

## GAS METER CALIBRATION DATA

by M. SEBBELOV

91/06/26

	VOLUME	Tm F	dP(inHg)	Vp(inHg)
TEST METER	5.000	63.5	0.007	0.5904
GAS METER	4.738	65.3	1.000	NA
LIBRATION FACTOR			=====>	0.9975

METER CALIBRATION DATA  
SO2 #2

Barometric Pres. = 26.10

by D. Morgan

VOLUME Tm F dP(inHg) Vp(inHg) 90/02/15

TEST METER 5.000 65.3 0.007 0.6288

RY GAS METER 4.690 62.0 1.000 NA

CALIBRATION FACTOR =====> 0.9960

Barometric Pres. = 26.34

by D. Morgan

VOLUME Tm F dP(inHg) Vp(inHg) 90/02/15

TEST METER 5.000 64.6 0.007 0.6136

RY GAS METER 4.676 64.0 1.000 NA

CALIBRATION FACTOR =====> 1.0053

Barometric Pres. = 26.15

by F. CHAMPIO

VOLUME Tm F dP(inHg) Vp(inHg) 91/03/11

TEST METER 5.000 66.2 0.007 0.6487

RY GAS METER 4.650 62.0 1.000 NA

CALIBRATION FACTOR =====> 1.0022

Barometric Pres. = 26.34

by J. Swallow

# PITOT TUBE/PITOT CALIBRATION DATA SHEET

WESTERN RESEARCH  
PITOT DESIGNATION WR #27  
EFFECTIVE LENGTH  
91/04/29

VEL. M/S	dP std.	dP test	Pf	DEV.
9.144	0.190	0.291	0.800	0.0055
9.144	0.193	0.294	0.802	0.0033
9.144	0.193	0.293	0.803	0.0019
15.240	0.544	0.825	0.804	0.0015
15.240	0.546	0.824	0.806	0.0004
15.240	0.545	0.824	0.805	0.0003
21.336	1.041	1.558	0.809	0.0038
21.336	1.041	1.558	0.809	0.0038
21.336	1.042	1.557	0.810	0.0045
Average			0.805	0.0025 0.0033 (s)

WESTERN RESEARCH, CALGARY, ALBERTA