

Arif, Syed

From: Brunk, Ron [rbrunk@cfifl.com]
Sent: Monday, June 29, 2009 3:46 PM
To: Arif, Syed
Cc: Nipper, Martin; Charlot, Randy; May, Bob
Subject: CF B-SAP Construction Permit 0570005-021-AC
Attachments: 90-SK-86_B-SAP Upgrade 6-29-09.xlsx

Syed,

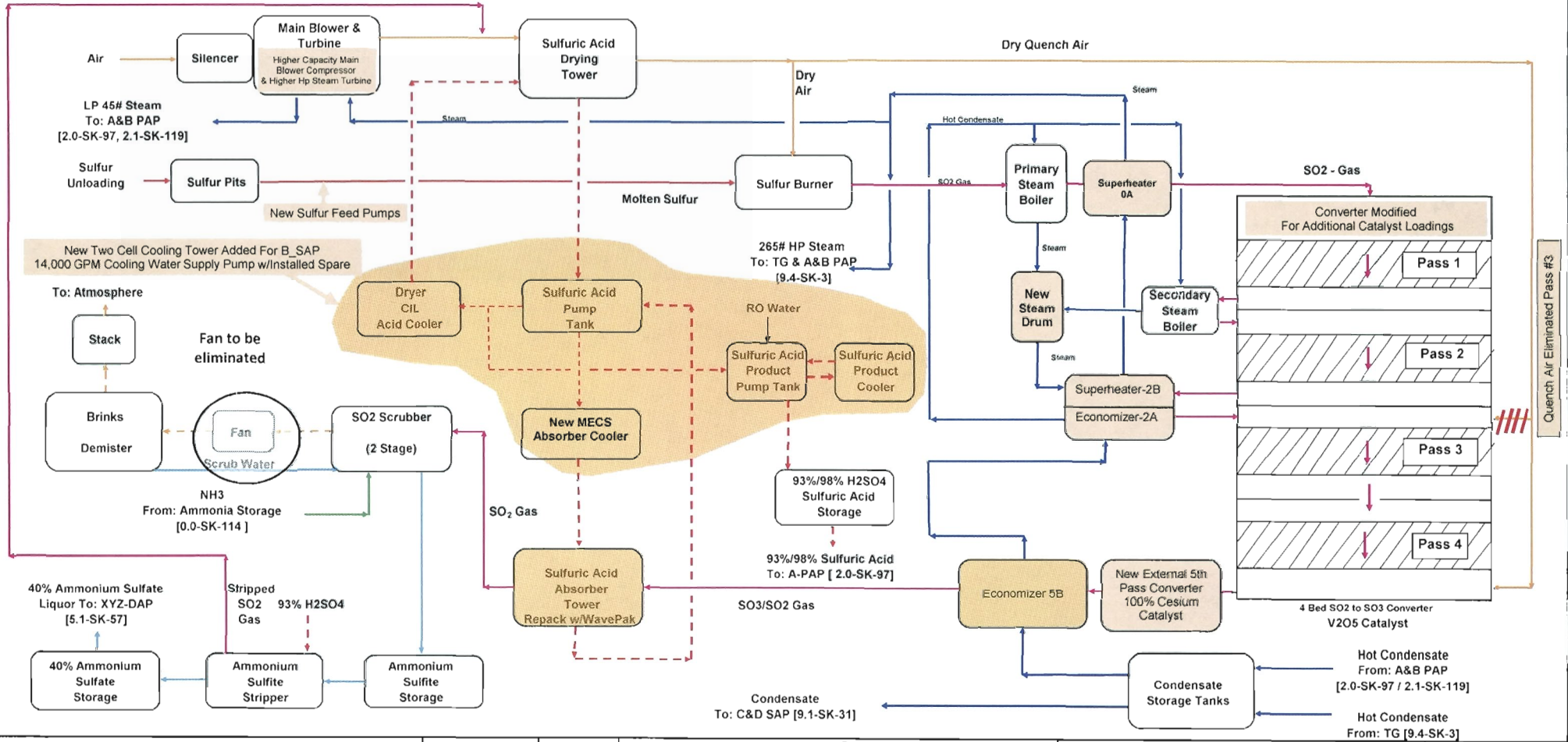
As per our phone conversation this afternoon, attached is a drawing showing the B-SAP process that is being modified under the subject permit. The new blower installed as part of the upgrade of B-SAP has sufficient capacity to operate the plant without the boosting effect of the Brink's fan. Elimination of the Brink's fan would reduce the extra maintenance required for maintaining the Brinks Fan and associated components (i.e. steam turbine, fan and housing, turbine relief device, etc).

We would like your opinion as the whether the elimination of the Brink's fan is a natural outgrowth of the already permitted construction project.

Ron Brunk
CF Plant City

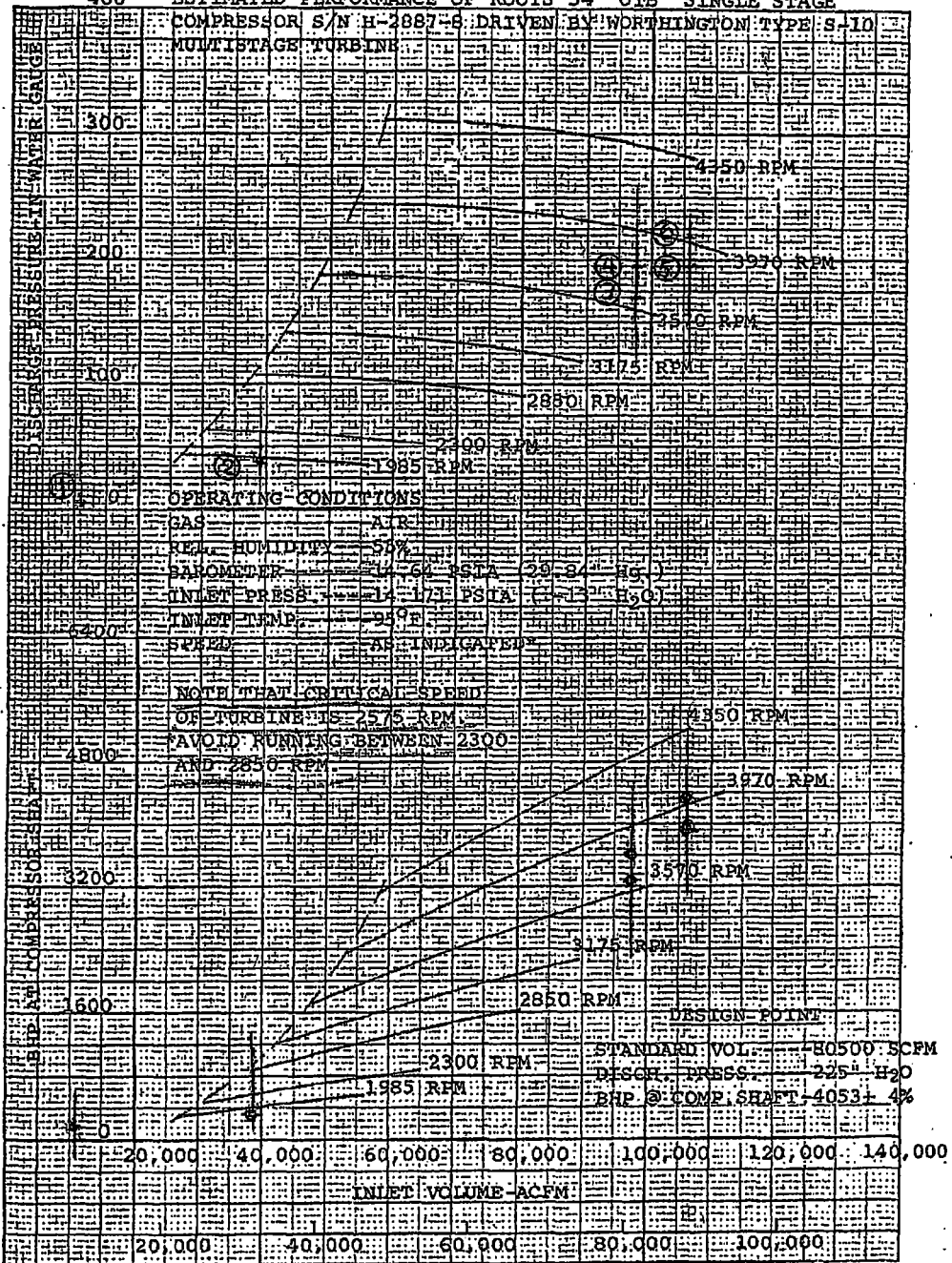
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Increased Sulfuric Acid Production B-SAP - Proposed Modifications



Legend		By	Date	CF Industries, Inc. Plant City Phosphate Complex P.O. Drawer L Plant City, Florida 33564 Phone: (813) 782-1591 Fax: (813) 788-9126	Title	DWR. NO
	Sulfuric Acid	Randy Charlot	6/29/09		B Sulfuric Acid Plant Upgrade Process Block Flow Diagram	9.0-SK-86 (B-SAP)
	Steam/Condensate					
	Process Gas SO ₂ /SO ₃					
	Air					
	Other					
	Sulfur					
	Ammonia					
	Scrub Liquor					
	Air + trace SO ₂					

400 ESTIMATED PERFORMANCE OF ROOTS 54" OIB SINGLE STAGE



20 X 20 TO THE INCH 48 1242
 MADE IN U.S.A.
 KEUFFEL & ESSER CO.

A.S.H.
6/15/73

STANDARD VOLUME-SCFM (29.92" Hg., 32°F., DRY)

GB-4595
Rev. #1

Equipment No. CM-38090
 Work Order No. 38090
 Old Equipment No. 9092-019B; 9060-141
 Engineering No. 902-21B

Description Main Blower
 Location SAP "B"
 Drawings 9.0-C-74, 9.0-M-166, 173, 186, 187, 9.0-S-89, 9.0-SK-24

- W. O. File
- Equip. File
- Engr. File
- Maint. File
- Field Verify

- Conveyor
- Gear Box
- Motor
- Heat Exchanger
- Turbine
- Pump
- Vessel
- Miscellaneous

CONVEYOR
 Manu. _____
 Width _____
 C. to C. _____
 Capacity _____
 Other _____

HEAT EXCHANGER
 Manu. _____
 Model _____
 S/N _____
 Surface Area _____
 Tube Side Flow _____
 Temp In _____ Out _____

PUMP
 Manu. _____
 Model _____
 Impeller _____ RPM _____
 Other _____

GEAR BOX
 Manu. _____
 Model _____
 Gear Reduction _____
 Other _____

Shell Side Flow _____
 Temp In _____ Out _____
 Material Shell _____
 Tube _____
 Other _____

VESSEL
 Manu. _____
 Model _____
 Capacity _____
 Size _____
 Other _____

MOTOR
 H.P. _____ RPM _____
 Service Factor _____
 Frame _____
 Other _____

TURBINE
 Manu. Elliot
 Model 2EPG-3
 S/N C-3711-2
 H.P. 1960 RPM 3700
 Other _____

MISC. Blower
 Manu. Elliot
 Model 80 P
 S/N C-8135-1
 Other _____

DATE July 29, 1983
 BY J. L. Neff

**FINAL JOB SUMMARY
P-LINE COMPRESSOR**

S.O.	USER C. F. Industries	GENERAL ORDER NO. AT74-2037	UNIT S.O. C-8135-2R
E S.O. - BASE S.O.	ADDRESS Plant City, Florida	CONT. ENG. R. P. Lapina	FRAME 80P
S.I. R.F. 3711-2R	PURCHASER Same	MASTER S.O.	SHIP. DATE 2/27/75
	APPLICATION Air		

DESIGN CONDITIONS	GUAR.	ALTER.
	Air	
FM	72000	
FLOW, LBS/MIN.	5013	
AR WEIGHT	28.53	
ET	1.0	
CHARGE	1.0	
ET	1.4	
CHARGE	1.4	
VE HUMIDITY %	80	
ER PSIA XXXXXXX	14.7	
I TEMP. °F	90	
I PRESS. PSIA (Ø FLANGE)	14.4	
DISCHARGE TEMPERATURE °F	162	
DISCH. PRESS. PSIA (Ø FLANGE)	20.12	
ADIABATIC HEAD, FT	10500	
OWER (± 4%) (RPM)	2120	
	3680	

MATERIALS	COMMERCIAL DESIGNATION	ELLIOTT SPEC #
CASING	Cast	Iron
SHAFT	AISI	4140
HUB <input type="checkbox"/> CAST <input checked="" type="checkbox"/> FORGED	AISI	4340
COVER	-	-
BLADES <input type="checkbox"/> MILLED <input checked="" type="checkbox"/> CAST <input checked="" type="checkbox"/> FORGED	ASIM A-148 GR105-85	196D
SHAFT SLEEVES	-	-
INLET CONNECTION	Fabricated Steel	
IMPELLER EYE SEAL	-	-
SEAL HOUSING #	Original	
BACKPLATE <input type="checkbox"/> PLATE <input checked="" type="checkbox"/> CAST	Steel	
BEARING HOUSING #4	Original	
SHAFT SEALS	Carbon Ring	
IMPELLERS <input checked="" type="checkbox"/> INDUCER <input type="checkbox"/> CLOSED <input checked="" type="checkbox"/> OPEN	DESIGNATION (NUMBER) 811	
BLADE DIAMETER 45.5"	SHAFT DIAMETER	

ROTA. FACING INLET <input checked="" type="checkbox"/> CW <input type="checkbox"/> CCW
MAX. CONT. SPEED 3680 RPM
MAX. DISCH. PRESS. 21.7 PSIA
MAX. DISCH. TEMP. 250 °F
WEIGHT OF COMPR. ONLY _____ LB.
TESTING
HYDRO _____ PSIG
GAS TEST _____ PSIG
ROTOR OVERSPEED _____ RPM
IMPELLER OVERSPEED 6370 RPM
ASME PERFORMANCE <input type="checkbox"/> YES <input type="checkbox"/> NO

ISO-CARBON <input type="checkbox"/>	BUFFER CONN. <input type="checkbox"/>	NO <input type="checkbox"/> YES <input type="checkbox"/>	LABYRINTH <input type="checkbox"/>	NO. PORTS <input type="checkbox"/>
<input checked="" type="checkbox"/> 3-CARBON RING - <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	(Indicate Buffer Ports)			
<input type="checkbox"/> 6-CARBON RING - <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>				
<input type="checkbox"/> 8-CARBON RING - <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>				

MAIN SHAFT END 3 "NOM. DIAM.
<input type="checkbox"/> STRAIGHT
<input type="checkbox"/> TAPERED

NGS DISTANCE BETWEEN BEARINGS _____ INCHES
IAL - DRIVE END 3 3/4 "DIA. X 2 " LENGTH <input type="checkbox"/> LINER <input type="checkbox"/> DAM <input type="checkbox"/> TILT-SHOE
IAL - IMPELLER END 4 1/2 "DIA. X 2 1/2 " LENGTH <input type="checkbox"/> LINER <input type="checkbox"/> DAM <input type="checkbox"/> TILT-SHOE
ST TYPE LOADED SIDE JJ-7 IN ² <input type="checkbox"/> SELF-EQUAL. <input type="checkbox"/>
UNLOADED SIDE _____ IN ² <input type="checkbox"/> SELF-EQUAL. <input type="checkbox"/>
ST LOAD - LOADED SIDE: MAX. _____ PSI; MIN. _____ PSI

CRITICAL SPEED (RPM)
1ST 5350
2ND _____
BOOK <input checked="" type="checkbox"/>
COMPUTER <input type="checkbox"/>
TEST <input type="checkbox"/>

NOZZLES	SIZE & RATING	POSITION
INLET	42" 25#ASA	<input checked="" type="checkbox"/> AXIAL
DISCHARGE	36" 25#ASA	1

ROTOR WR² _____ LB. FT²

DRIVER	MFG. & TYPE	RATED HP	RATED RPM	MAX. HP	MAX. RPM	POWER CONDITIONS
URBINE	ECO 2EPG3	2120	3680	2120	3680	
OTOR						
EAR						RATIO :

LLANEIOUS SPECIAL REQUIREMENTS AND COMMENTS

Rebuild required

- New rotor assembly**
- New nameplate**

NAMEPLATE DATA

INLET CAPACITY	72000	CFM	SERIAL NO.	C-8135-1R
INLET TEMPERATURE	90	F	MODEL NUMBER	80P
RATED INLET PRESSURE	14.4	PSIA	BAROMETER	30.0
		IN. H ₂ O G	RATED MOL. WEIGHT	28.53
RATED DISCHARGE PRESSURE	20.12	PSIA	$K = \frac{P}{C_v}$	1.4
		IN. H ₂ O G	MAX. DISCH. PRESS.	21.7
RATED POWER INPUT	2120	HP	MAX. DISCH. TEMP.	250
RATED SPEED (100%)	3680	RPM		
MAX. CONTINUOUS SPEED	3680	RPM		
FIRST CRITICAL SPEED	5350	RPM		

NOTE: IF CRITICAL SPEED IS NOT INSERTED, THE SHOP IS TO DETERMINE IT DURING THE RUNNING TEST AND STAMP.

C-8135-1R, -2K



INSTRUCTION BOOK INFORMATION

DATA AND CLEARANCES

*S.O. C-8135/C-3711
 **S.O. C-8135R/C-3711R ←
COMPRESSOR

Kind of Gas..... Air	Design Speed.....	3500* 3680**RPM
Molecular Weight..... 28.65	Max. Cont. Speed.....	3700 RPM
Specific Gravity..... .988	First Critical Speed.....	5350 RPM
Barometer..... 14.7 psia	Tripping Speed.....	3885 RPM
Inlet Pressure..... 14.55 psia	Approx. Wt. - Comp.....	26,000 lbs.
Inlet Temperature..... 90 °F.	Approx. Wt., -Top Half Only..	8250 lbs.
Inlet Capacity. 72,000***, 64,000*CFM	Approx. Wt., Rotor Only.....	1060 lbs.
Discharge Pressure. 20.12***, 19.55*psia	Rotor Serial No.....	C-8135/C-3711*
Approx. Design Dis. Temp. 162**152*°F.	Carbon Packing Clearance....	.005-.007
Max. Allowable Press..... 21.7 psia	Oil Guard Clearance.....	.016-.020
Max. Allowable Temp..... 250 °F.	Thrust Brg. Clearance.....	.010-.012
Number of Stages..... One	Journal Brg. Clearance.....	.007-.0095
Horsepower..... 1660*, 2120**	Impeller Clearance.....	See Figure 3

TURBINE

Horsepower.....	1960* 2120**
Rated Speed.....	3700* 3680**RPM
Turbine Speed Range.....	3700 to 1300 RPM
Critical Speed.....	7150 RPM
Overspeed Trip Setting.....	3885 RPM
Steam Pressure.....	265* 255**psig
Steam Temperature.....	450 °F.
Exhaust Pressure.....	38* 35** psig
Extraction Pressure.....	Uncontrolled psig
Nominal Nozzle to Shroud Clearance - Stages 1 to 4 Incl.....	1/16
Steam End Pkg. Clearance - Carbon.....	.005-.008
Exhaust End Pkg. Clearance - Carbon.....	.005-.008
Diaphragm Packing Clearance - Carbon.....	.005-.008
Bearing Clearance - Steam End.....	.007-.009.6
Bearing Clearance - Exhaust End.....	.007-.009.6
Thrust Bearing Total Axial Float.....	.010-.016
Approx. Wt., Turbine.....	6000 lbs.
Approx. Wt., Top Half Only.....	1400 lbs.
Approx. Wt., Rotor Only.....	1040 lbs.

Turbine Hand Valve Settings

<u>Hand Valve</u>	<u>Position</u>	<u>Horsepower</u>	<u>Speed</u>	<u>Steam Conditions</u>
			**3680 **255	**35
1 & 2	Open	*1960 **2120	*3700 RPM	*265psig-450°F*38psig
1	Open	1660	3500 RPM	265psig-450°F-38psig
		<u>3000#/Hr.Uncontrolled Extr@ 84psig</u>		
1 & 2	Closed	1370	3200 RPM	265psig-450°F-38psig
		<u>3000#/Hr.Uncontrolled Extraction</u>		

*ORIGINAL
 **REBUILD

**C-8135R/C-3711R

This applies M/N

Equipment No. CM-38097
 Work Order No. 38097
 Old Equipment No. 9092-027B
 Engineering No. 902-29B

Description Brinks Fan
 Location "B" Sulfuric Acid Plant
 Drawings 9.0-F-9, 9.0-M-115-117,
9.0-M-190, 198, 199;
9.0-P-83, 87, 91, 92;
9.0-S-20,
Philadelphia Dwg. 03101-0598-3

X W.O. File
X Equip. File
X Eng. File
X Maint. File
X Field Verify

 Conveyor
 X Gear Box
 Motor
 Heat Exchanger

 X Turbine
 Pump
 Vessel
 X Miscellaneous

CONVEYOR

Manu.
 Width
 C. to C.
 Capacity
 Other

HEAT EXCHANGER

Manu.
 Model
 S/N
 Surface Area
 Tube Side Flow
 Temp. In Temp. Out
 Shell Side Flow
 Temp. In Temp. Out
 Material Shell
 Tube
 Other

PUMP

Manu.
 Model
 Impeller RPM
 Other

GEAR BOX

Manu. Philadelphia
 Model 85 HPS-1
 Gear Reduction 2.551 to 1
 Other Output (1,780 RPM)

VESSEL

Manu.
 Model
 Capacity
 Size
 Other

MOTOR

H.P. RPM
 Service Factor
 Frame
 Other

TURBINE

Worthington
 Manu. Turbodyne
 Model 503-T
 S/N 37245, 37246, or 37247
 H.P. 550 RPM 4150
 Other

MISCELLANEOUS - FAN

Manu. Robinson
 Model Order No. 58932
 S/N
 Other Impeller 51½

By: K. M. Broussard
 Date: Novemeber 14, 1985

ROBINSON INDUSTRIES, INC.

Date October 17, 1980

~~To: Pete Berger~~ Office

Subject C F Industries

Robinson Factory Order #59325
50 1/2" x 8 5/8" Forward Curve Wheel

Pete,

Attached are copies of performance curve #SC-50FRA-0022 and -0023 for the subject fan. As shown by curve #0023, a fan was originally designed to run up to 1750 RPM.

For a performance of 70,546 CFM, 25" SP at .069 #/FT³ density requires the fan to operate approximately at 1470 RPM and will require 385 BHP. This is shown on the attached curve #0022.

Gary
Gary Miller

GM/wlg

Attachment

Fan Performance Curves
#SC-50FRA-0022
#SC-50FRA-0023

*A & B - SAP
BRINKS FANS*

ROBINSON

INDUSTRIES, INC.

INDUSTRIAL FANS • BLOWERS • EXHAUSTERS • SINCE 1892

P. O. BOX 100

ZELIENOPLE, PENNA. 16063

PHONE 412/452-6121

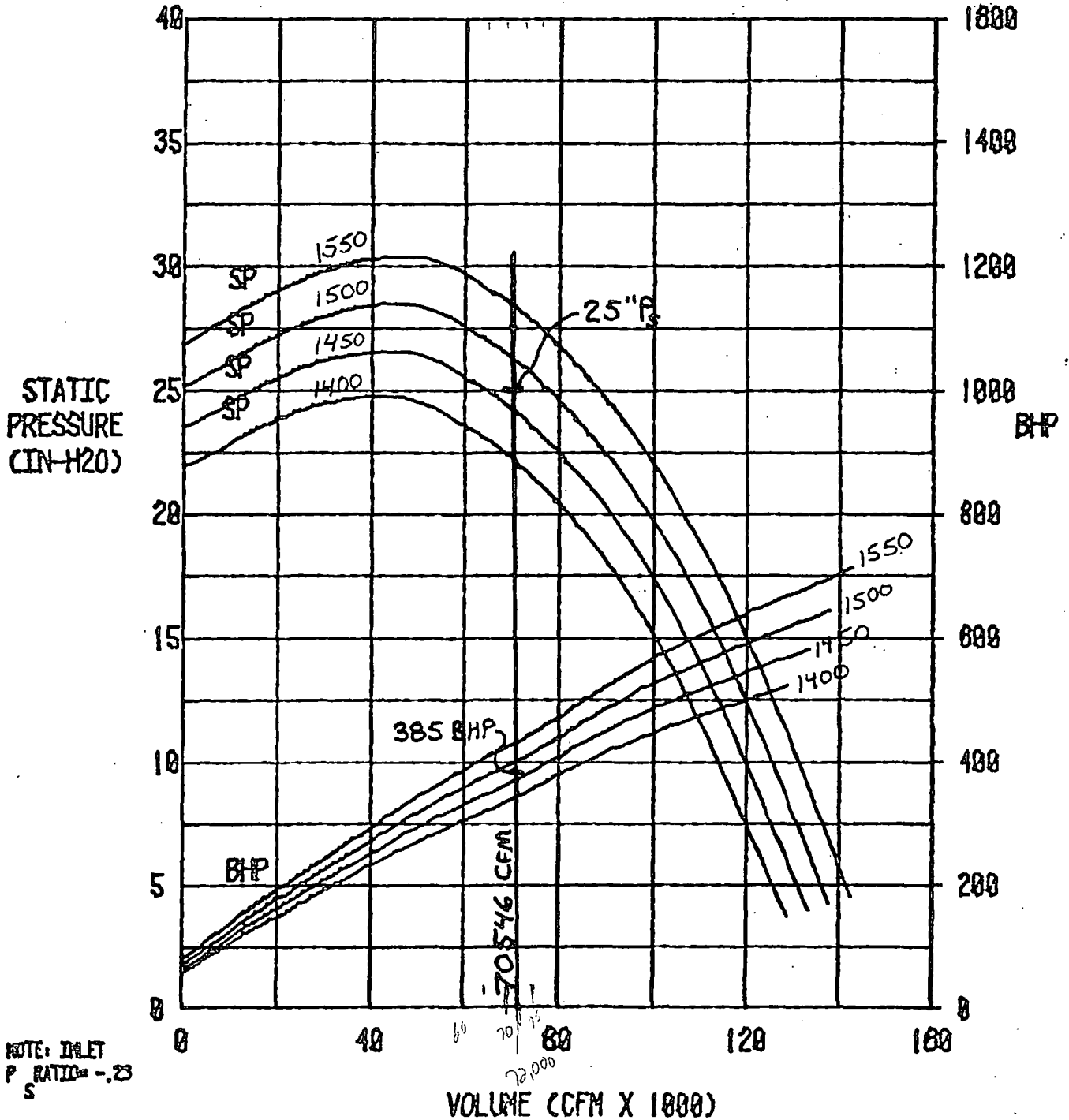
TELEX 866-311

SC-50FRA-0022

ROBINSON INDUSTRIES INC.
 FAN: 50.5 X 8.025 FRA-SWSI
 FOR: C.F. INDUSTRIES

SPEED: AS NOTED BELOW
 TEMP: 90 DEG F
 DENSITY: .069 #/FT³

DATE: 09-AUG-79
 QUOTE #: NONE
 RII FOR: 59325



NOTE: INLET
 P RATIO = -.23
 S