

DATE 6-19-00 ✓

PWSID 04-67-043

WELL # 646 ✓

WELL NAME Halecomb Blvd 646

BLDG. 646 ✓

CODE G

AVAILABILITY P

LOCATION Left

LATITUDE 34.72161 ✓

LONGITUDE -77.34276 ✓

WELL DIAMETER 10"

WELL DEPTH ~~215'~~ 270'

SCREEN INTERVAL 90'-100', 240'-250'
255'-265'

YIELD 425' GPM

STATIC LEVEL 22'

PUMPING LEVEL 44'

PUMP TYPE Vertical Turbine

MOTOR HP 10

INTAKE DEPTH 70'

DESIGN CAPACITY 260 GPM x

ACTUAL GPM 294 GPM

SIZE OF CONCRETE SLAB 32" x 33"

HEIGHT OF CASING 9"

10-11-13

10-11-13

11/11

11/11 11/11 11/11

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North Carolina Department of Environment, Health, and Natural Resources
 Division of Environmental Health, Public Water Supply

SOURCE INFORMATION GROUND WATER

Date Form Completed

M	M	D	D	Y	Y
0	1	2	2	9	5

PWSID
0
4
6
7
0
4
3

Owner Assigned Source Code

Well Name (If purchase, name of system)

46 Holcomb Blvd 646

Code

G=Ground
 W=Purchase/G
 Y=G w/direct influence
 Z=W w/direct influence

G

If Purchase, seller ID#

Source Begin Date

Source exempt—
SWTR?

Y
 N

Direct Influence Date

Availability

P=Permanent
 E=Emergency
 S=Seasonal
 I=Interim
 O=Other

P

Location of well within the system (If purchase, location of master meter)

Holcomb Blvd Water Plant (left)

Latitude (N)

34 43 16

Longitude (W)

077 20 35

How Determined

G=GPS
 M=Map
 S=Surveyed

0

GPS Data

Q# or
 DOP#

No. of Sats. Locked on

(If purchase, use seller's primary source lat/long)

Vulnerable (VOCs)

Y
 N

Assessment Date

ENTRY POINT INFORMATION

Use Code

C=Ground/Permanent
 D=Ground/non-permanent

C

Availability

P=Year-round
 E=Emergency
 S=Seasonal
 I=Interim
 O=Other

P

Owner Assigned Entry Point Code

200

Entry Point Name

HB670 MCB Holcomb Blvd WTP

Location:

Well Site: Owned or controlled? Y (Y,N) Control Area (100' radius)? N (Y,N) If no, explain: _____

Sources of pollution/distance: RR @ 75'

Surface water within 200'? N (Y,N) If yes, actual distance feet If yes, bact. samples collected? (Y,N)

Adequate slope? Y (Y,N) Flooding? Y (Y,N) Maintenance: OK

Well House: Free of stored materials? Y (Y,N) Properly drained? Y (Y,N) Locked? Y (Y,N)

Condition of house: OK Type of freeze protection: Elec Heat

Well: Diameter: 10" Type: Drum Packed Yield (gpm): 425 Properly sealed? Y (Y,N)

Properly vented? N (Y,N) Casing depth 50 ft. (If unknown, put 'UNK') Well depth: 266' Meter available? Y (Y,N)

Concrete slab adequate? Y (Y,N) If no, explain: well not in center of slab Size: 12x12

Size of blow-off: 4" Sample tap: Before treatment? Y (Y,N) After treatment? (Y,N)

Pumps: Capacity: GPM: 394 HP: 10 Pump intake depth: 70 Auxiliary Power? Y (Y,N)

Type pump: Vertical Turbine Height above floor (pump/casing): 9"

Storage at well site: Elev: Hydro: Ground:

If hydroautomatic, air volume control? (Y,N) Safety valves? (Y,N) Coded? (Y,N)

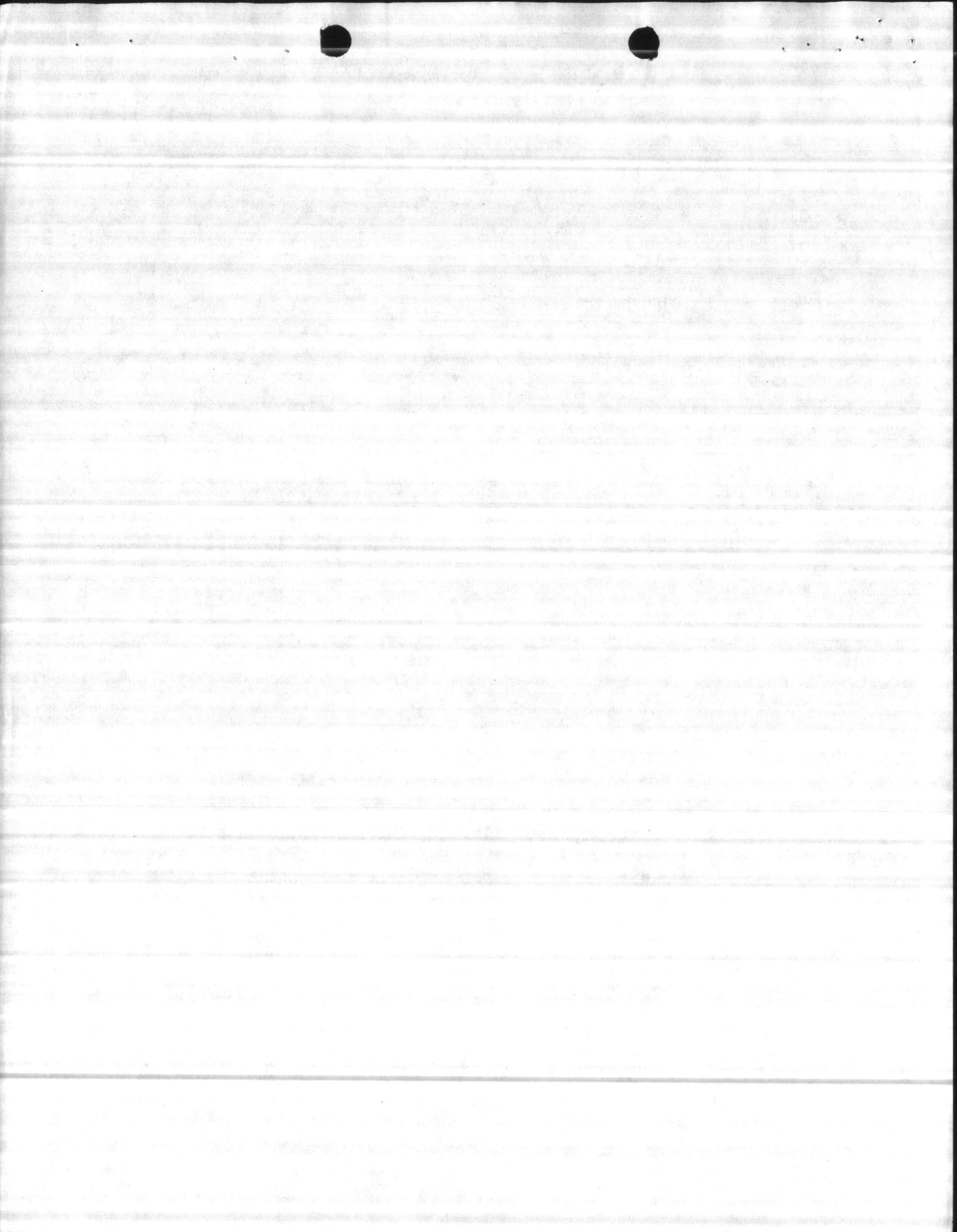
High service pumps: 1. gpm hp 2. gpm hp 3. gpm hp Auxiliary Power? (Y,N)

Is the water treated at this well? N (Y,N) If yes, complete back of form.

If other wells are treated here, which ones? If treated elsewhere, where? HB670 PLANT

If purchase, retreat? Y N If yes, complete back of form.

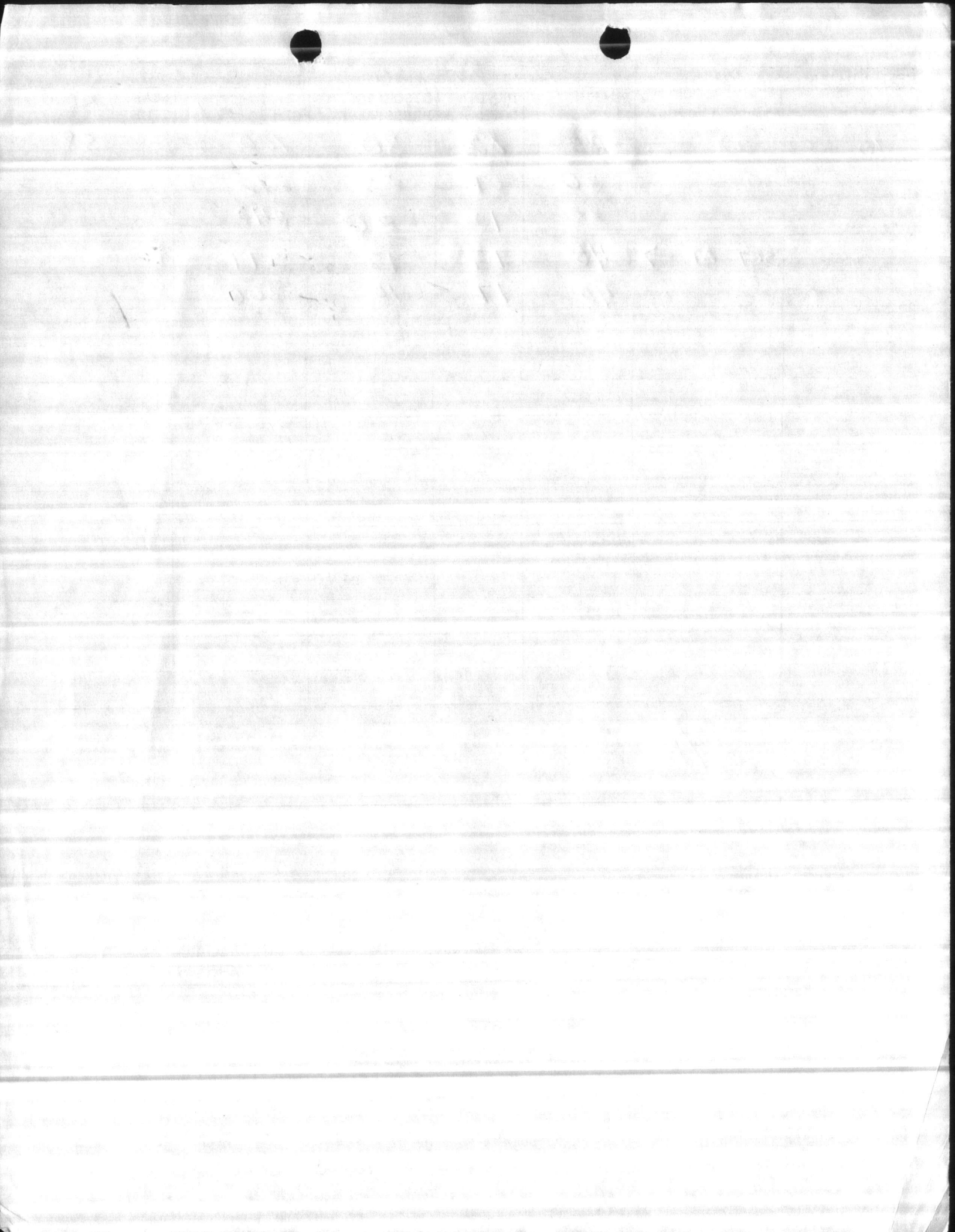
- ① Aux drive
- ② No vent
- ③ Aux drive fuel tank has no spill containment
- ④ clean up around bldg.



WELL NUMBER		BY			DATE	
1040		SALMS / THOMAS			3-13-02	
AIR LINE	STATIC LEVEL	PUMPING LEVEL	DRAIN DOWN	DISCHARGE PRESSURE	GPM	START TIME
70	23	25	02	30	100	58
		30	07	25	212	
		35	12	20	242	
	SET AT →	40	17	15	277	
		40	17	10	300	

REMARKS D/H - 35

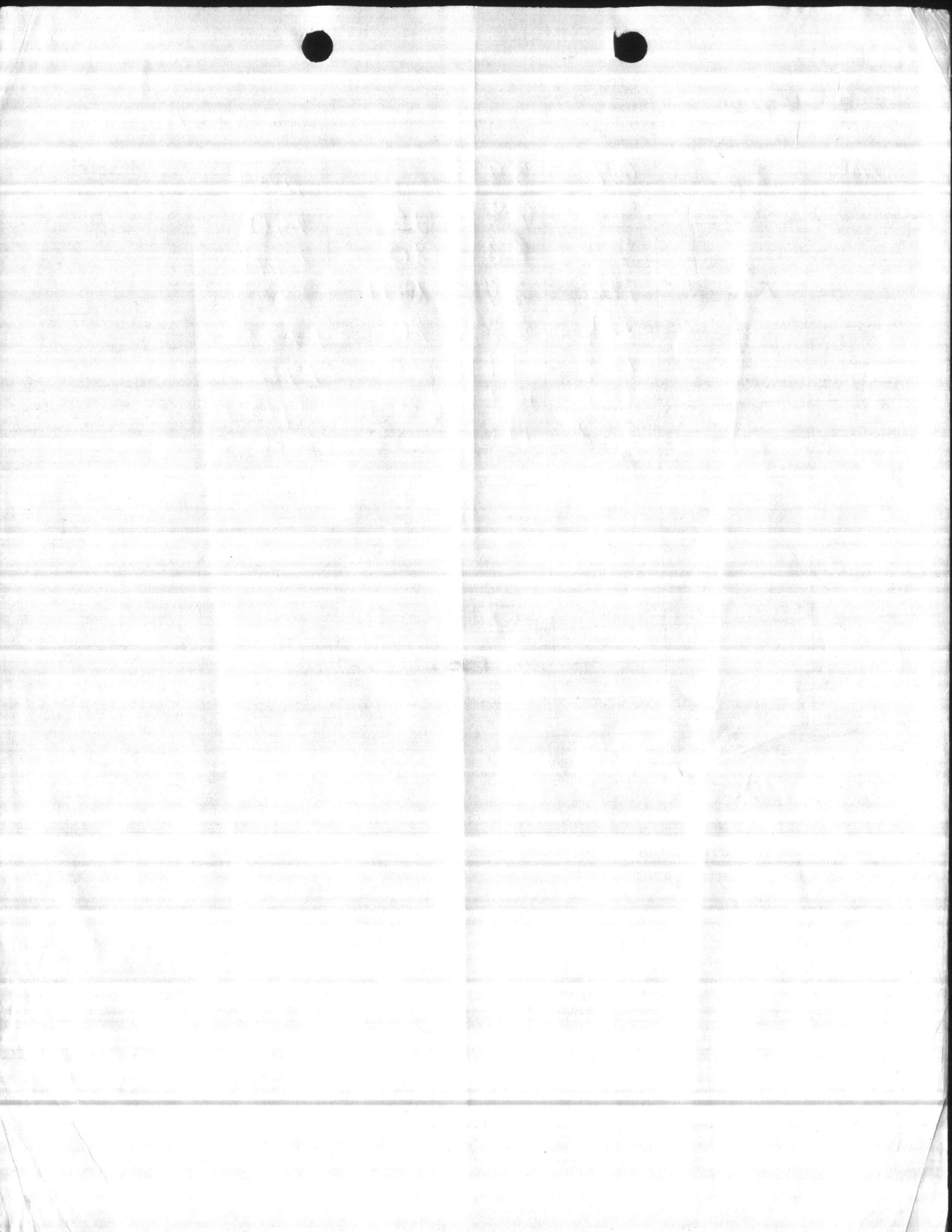
ANUFACTURER	STAGE	S.N.	TOTAL HEAD	SIZE



WELL NUMBER <i>646</i>		BY <i>Stevenson, Salas, King</i>			DATE <i>2-5-01</i>	
AIR LINE	STATIC LEVEL	PUMPING LEVEL	DRAIN DOWN	DISCHARGE PRESSURE	GPM	START TIME
<i>70</i>	<i>23</i>	<i>28</i>	<i>5</i>	<i>30</i>	<i>100</i>	<i>55</i>
<i>70</i>	<i>31</i>	<i>39</i>	<i>14</i>	<i>25</i>	<i>212</i>	
		<i>40</i>	<i>17</i>	<i>20</i>	<i>239</i>	
	<i>Left set</i>	<i>43</i>	<i>20</i>	<i>15</i>	<i>272</i>	
		<i>45</i>	<i>22</i>	<i>10</i>	<i>302</i>	

REMARKS *D/H 35 PSI*

MANUFACTURER	STAGE	S.N.	TOTAL HEAD	SIZE



C O V E R

FAX

S H E E T

To: Mr Max Frazelle
Fax #: 910-451-3350
Subject: Well 646
Date: August 17, 1995
Pages: Three, including this cover sheet.

COMMENTS:

Hello !!!!!!!!!!!!!!!

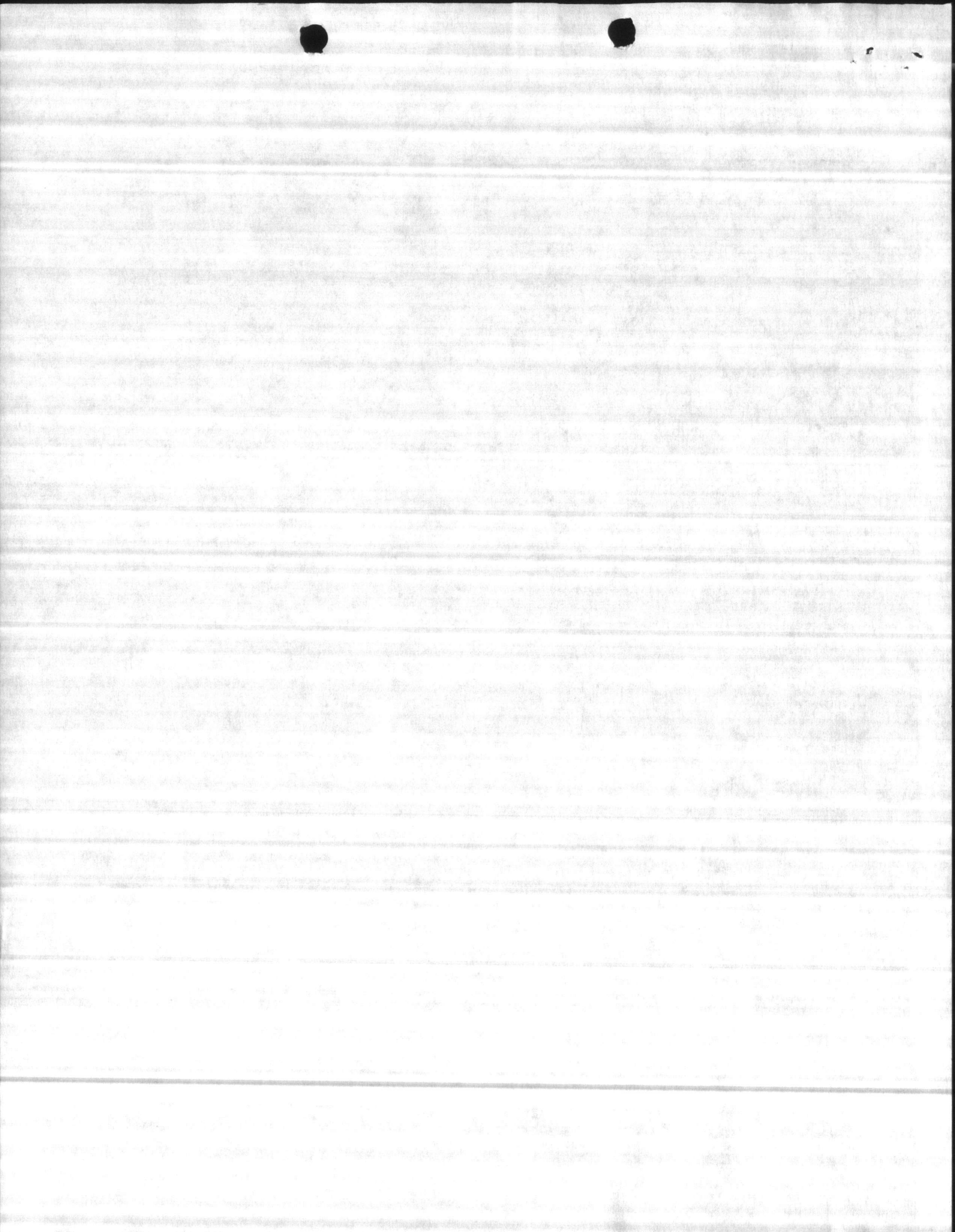
Following find quotation for the above project. Hard copy and supporting documents to follow by mail.

Thanks !!!!!!!!!!!!!!! "Pete"

From the desk of...

N. F. "Pete" Lowe
Industrial Sales
Pump & Lighting Company
205-B Hyde Park
Cary, North Carolina 27513

919-460-0051
Fax: 919-460-0051





3011
Purchasing

Pump and Lighting Company

ENGINEERED PRODUCTS DIVISION

315 9TH STREET, S.E. • P.O. BOX 2504 • HICKORY, N.C. 28601

PHONE: 704-324-9705 FAX: 704-324-4365

August 17, 1995

Mr. Max Frazelle
PSC Box 20004
Base Maintenance Div. Bin*1)
Camp LeJeune, North Carolina
28542

Dear Max:

Subject: Well 646

We are pleased to offer the following "American Made" equipment for your consideration on the above application.

Design Conditions: 260 GPM @ 75' TDH

One (1) ea. Fairbanks Morse Figure 7000, Model 8M, 3 Stage, Product Lubricated, Bowl Assembly with Impellers Trimmed to Above Conditions.

One (1) ea. 6" X 10' Suction Pipe

Two (2) ea. 6" X 5' Top-Bottom Column Pipe

Six (6) ea. 6" X 10' Intermediate Column Pipe

Two (2) ea. 1" X 6" X 5" Line shaft

Six (6) ea. 1" X 6" X 10' Intermediate Line Shaft

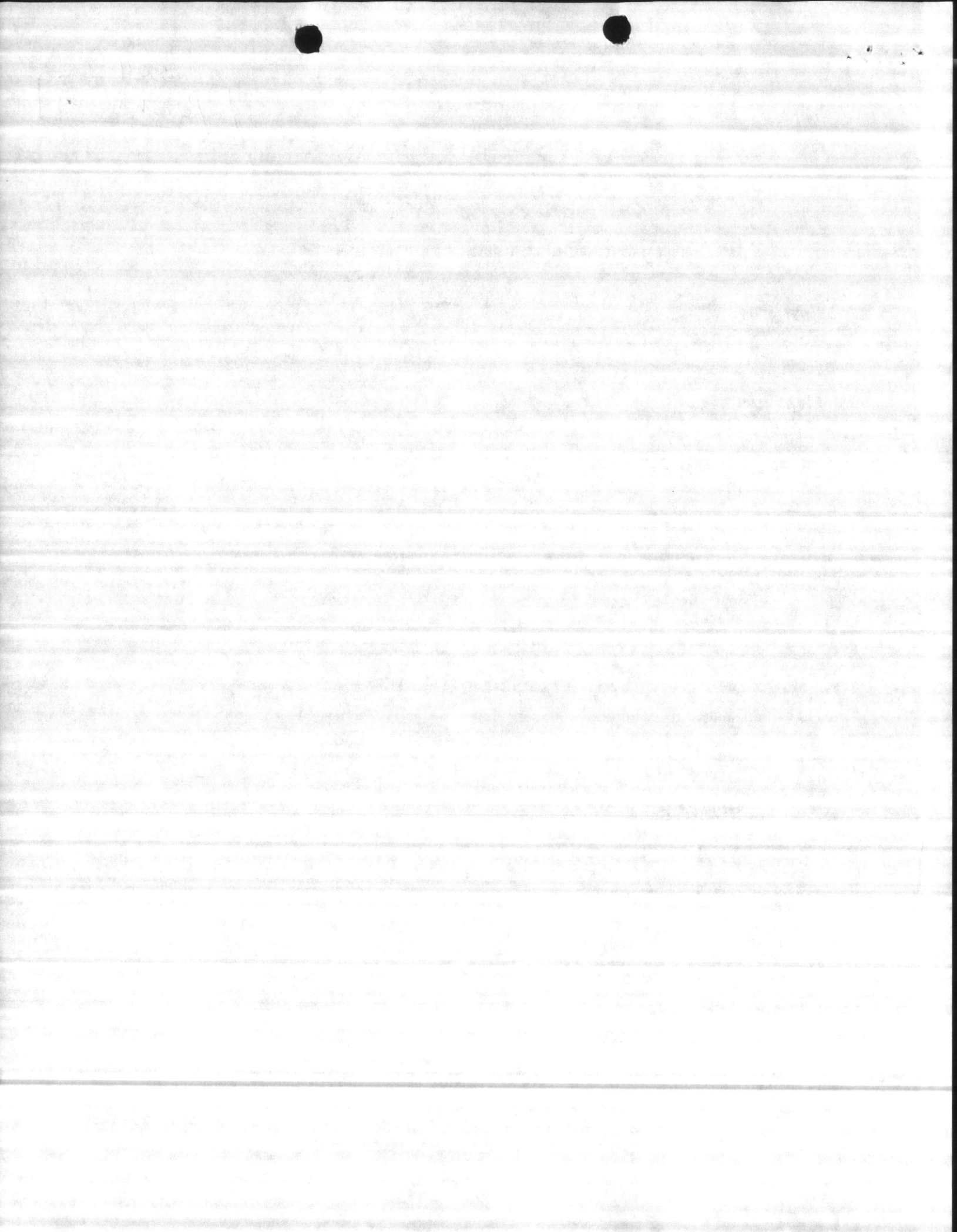
One (1) ea. 16 1/2 X 6 CT Discharge Head

One (1) ea. 1" Packing Box 175 PSI

One (1) ea. 24 X 24 Cast Iron Foundation Plate

✓ One (1) ea. Vertical Hollowshaft 10 H.P., 1770 RPM, 230/460 Volt, 3 Phase, TEFC Motor with 1" NPP Coupling

One (1) ea. 1" BX Drive Coupling, to Fit Existing Amarillo Gear Drive



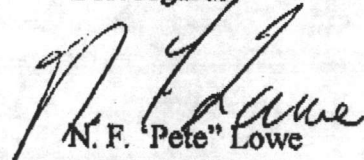
Mr. Max Frazelle
Page 2
August 17, 1995

One (1) ea. Special Two Piece Top Shaft to Accommodate the Existing Gear Drive

Your Cost \$5,545.00

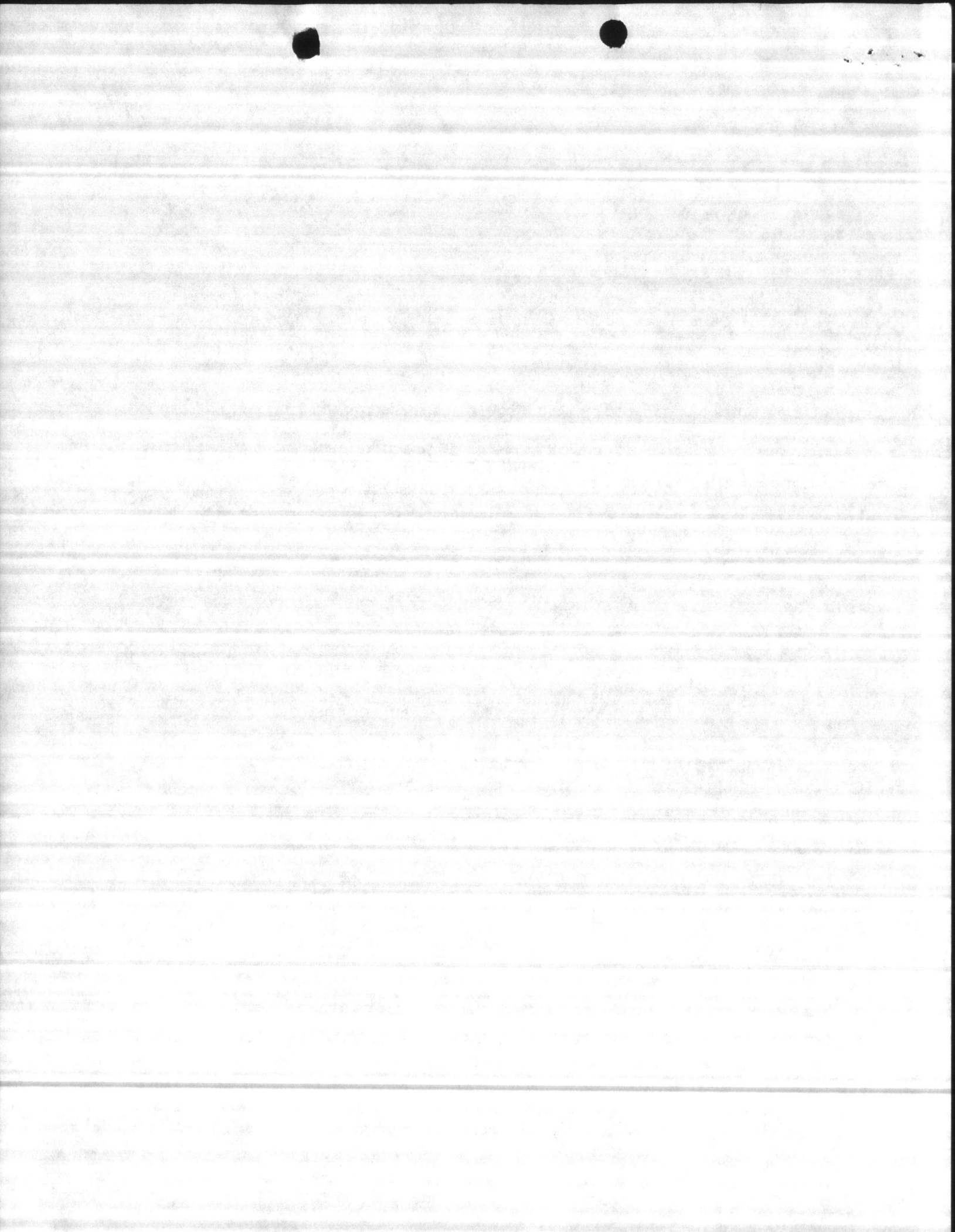
Price includes freight to your location and start up service. Price does not include any taxes, anchor bolts, gauges or other accessories not listed above. Terms are net 30 days. If any question, or I may be of further service to you, please call me.

Best regards,


N. F. "Pete" Lowe
Industrial Sales

NFL

cc: Ed White
Cindy Benfield
File



646
org.



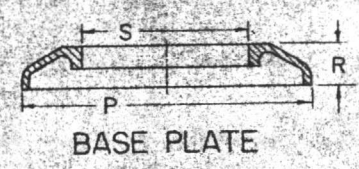
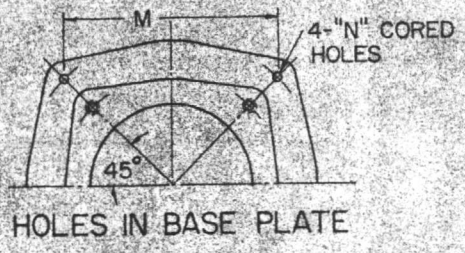
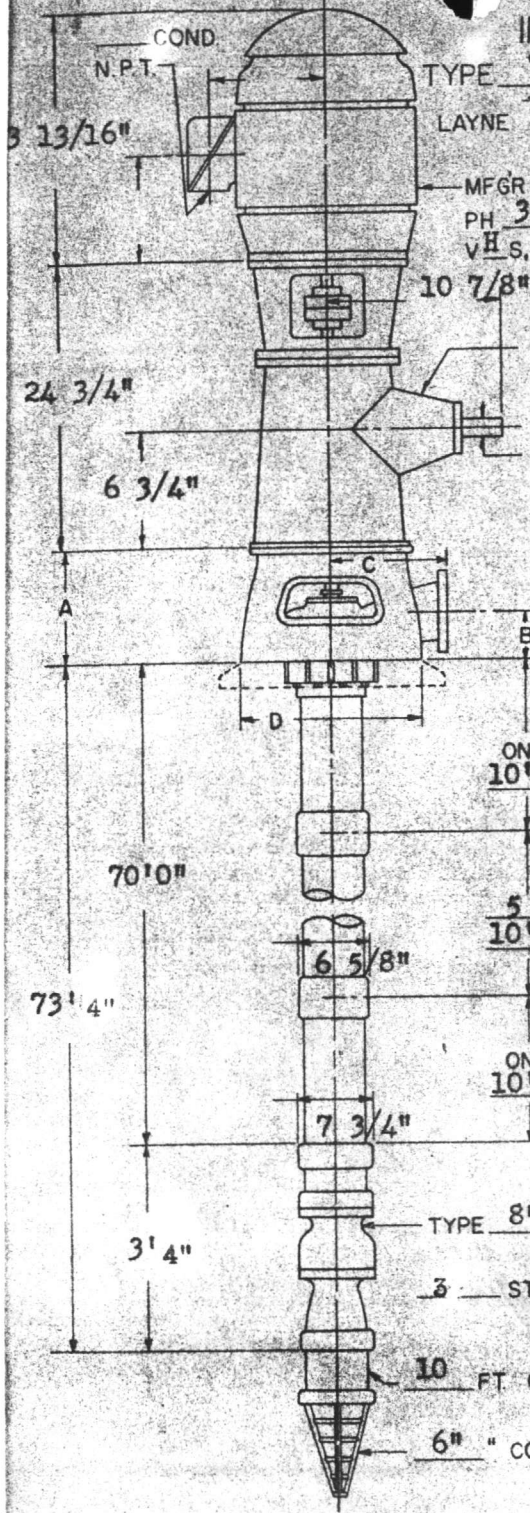
INSTALLATION PLAN

TYPE TF413 DISCHARGE HEAD
LAYNE & BOWLER INC. MEMPHIS, TENN.

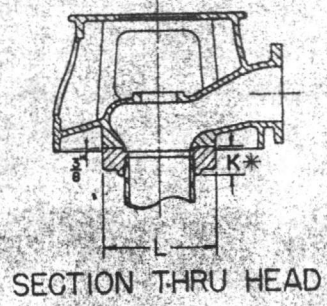
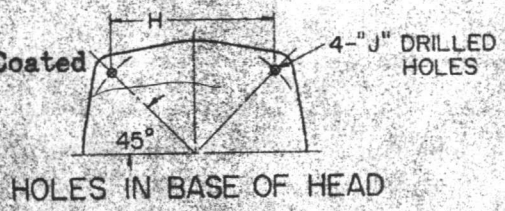
MFG'R G. E. HP 10 RPM 1750
PH 3 CY 60 VOLTS 230/460
VHS, FRAME 215TP10

MFG'R Amarillo MODEL C20
RATIO 1:1

USE THESE DIMENSIONS ONLY
WHEN CERTIFIED BY FACTORY



COLUMN 5\"/>



* FOR COLUMN SETTINGS OF 200' OR GREATER, "K"=11"

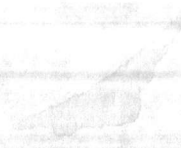
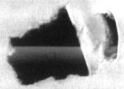
CUSTOMER: Camp LeJeune, N. C.
LOCATION: _____
FOR APPROVAL: _____
CERTIFIED: John Sewell

YOUR NO: N-160-71
OUR NO: 71D-5D17
PUMP NO: 70692
DATE: Oct. 15, 1971

G.P.M. 260
T.D.H. 75
R.P.M. 1750
B.H.P. _____

HEAD	A	B	C	D	E	F	G	H	J	K*	L	M	N	P	R	S
F413	13	6	11	18	9	8-3/4	7 1/2	14 1/8	11 1/8	2 13/16	10	16 15/16	7 7/8	21	2	17
F613	14	6	11	18	11	8-7/8	9 1/2	14 1/8	11 1/8	2 7/8	11	16 15/16	7 7/8	21	2	17
F418	13	6	14 1/4	23	9	8-3/4	7 1/2	17 5/16	13 1/16	2 13/16	10	20 1/16	7 7/8	26 1/2	2 3/4	21 3/4
F618	15	6	14 1/4	23	11	8-7/8	9 1/2	17 5/16	13 1/16	2 7/8	12 1/2	20 1/16	7 7/8	26 1/2	2 3/4	21 3/4
F818	18	7 3/8	14 1/4	23	13 1/2	8-7/8	11 3/4	17 5/16	13 1/16	3 1/16	13 3/4	20 1/16	7 7/8	26 1/2	2 3/4	21 3/4
F1018	18	8 1/8	14 1/4	23	16	12-1/4	14 1/4	17 5/16	13 1/16	3 1/16	16	20 1/16	7 7/8	26 1/2	2 3/4	21 3/4
F1218	20	9 5/8	16 1/4	26	19	12-1	17	19 5/8	13 1/16	3 1/16	19	23 1/16	7 7/8	32	3 1/4	24

HEAD	A	B	C	D	E	F	G	H	J	K*	L	M	N	P	R	S
TF625	15	8 1/8	18 1/4	31	11	8-7/8	9 1/2	23 1/16	13 1/16	2 7/8	12 1/2	29	1	38	3 3/4	29
TF825	20	8 1/8	18 1/4	31	13 1/2	8-7/8	11 3/4	23 1/16	13 1/16	3 1/16	13 3/4	29	1	38	3 3/4	29
TF1025	20	8 1/8	18 1/4	31	16	12-1	14 1/4	23 1/16	13 1/16	3 1/16	16	29	1	38	3 3/4	29
TF1225	21	9 5/8	18 1/4	31	19	12-1	17	23 1/16	13 1/16	3 1/16	19	29	1	38	3 3/4	29
TF1225I	21	9 5/8	18 1/4	31	19	12-1	17	23 1/16	13 1/16	4 7/16	21	29	1	38	3 3/4	29
TF1425	21	10 5/8	18 1/4	31	21	12-1 1/8	18 3/4	23 1/16	13 1/16	4 7/16	21	29	1	38	3 3/4	29
TF1227	24 1/2	9 3/4	21	36	19	12-1	17	27 5/8	13 1/16	3 1/16	19	33 3/8	1	43	4 1/2	33 7/8



SINGER

LAYNE & BOWLER DIVISION
MEMPHIS, TENNESSEE U.S.A.



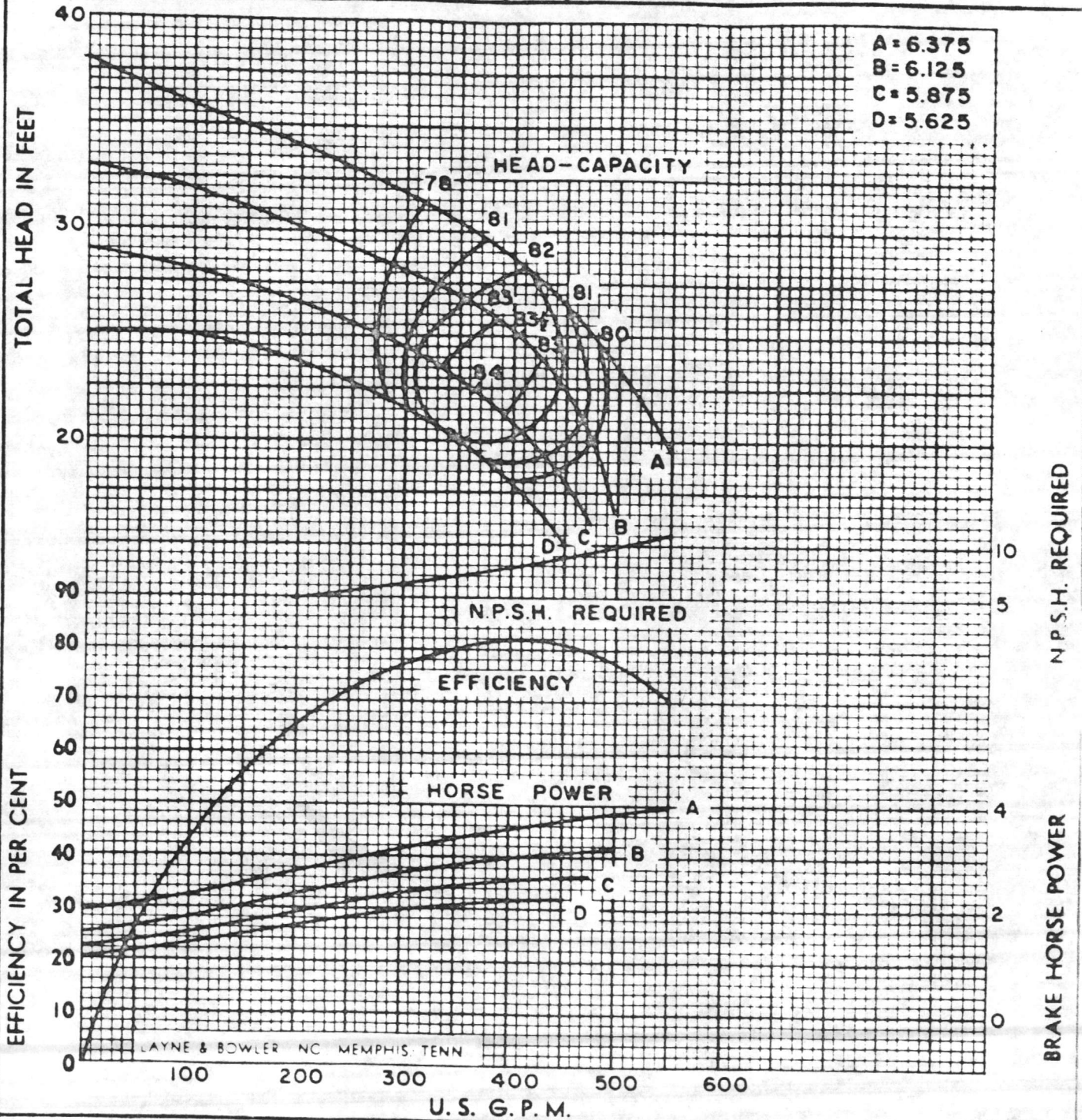
No. Stages	BN. Change	MATERIAL	BN. Change
1	-2	IMP.-C.I.	-1
2	-1	IMP.-C.I. ENM	0
3	-1	IMP.-NI-R	-1
4	0	BOWL-BRZ	-1
5	0	BOWL-C.I. ENM	0
6	0	BOWL-NI-R.	-1

8" BHC

1750 R. P. M.

SINGLE STAGE LAB HEAD AND HORSE POWER WITH STANDARD CAST IRON BOWLS AND BRONZE IMPELLER

EFFICIENCY SHOWN FOR 4 OR MORE STAGES. HORSE POWER SHOWN FOR ONE STAGE BASED ON 4 STAGE EFFICIENCY. CORRECTIONS SHOULD BE MADE FOR STAGES AND MATERIAL.



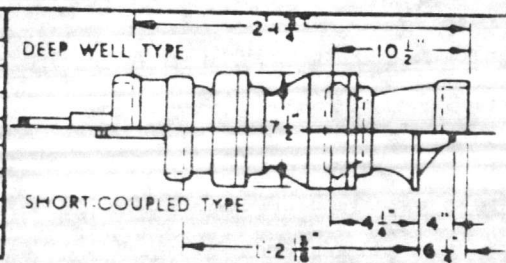
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B=6.125
C=5.875
D=5.625

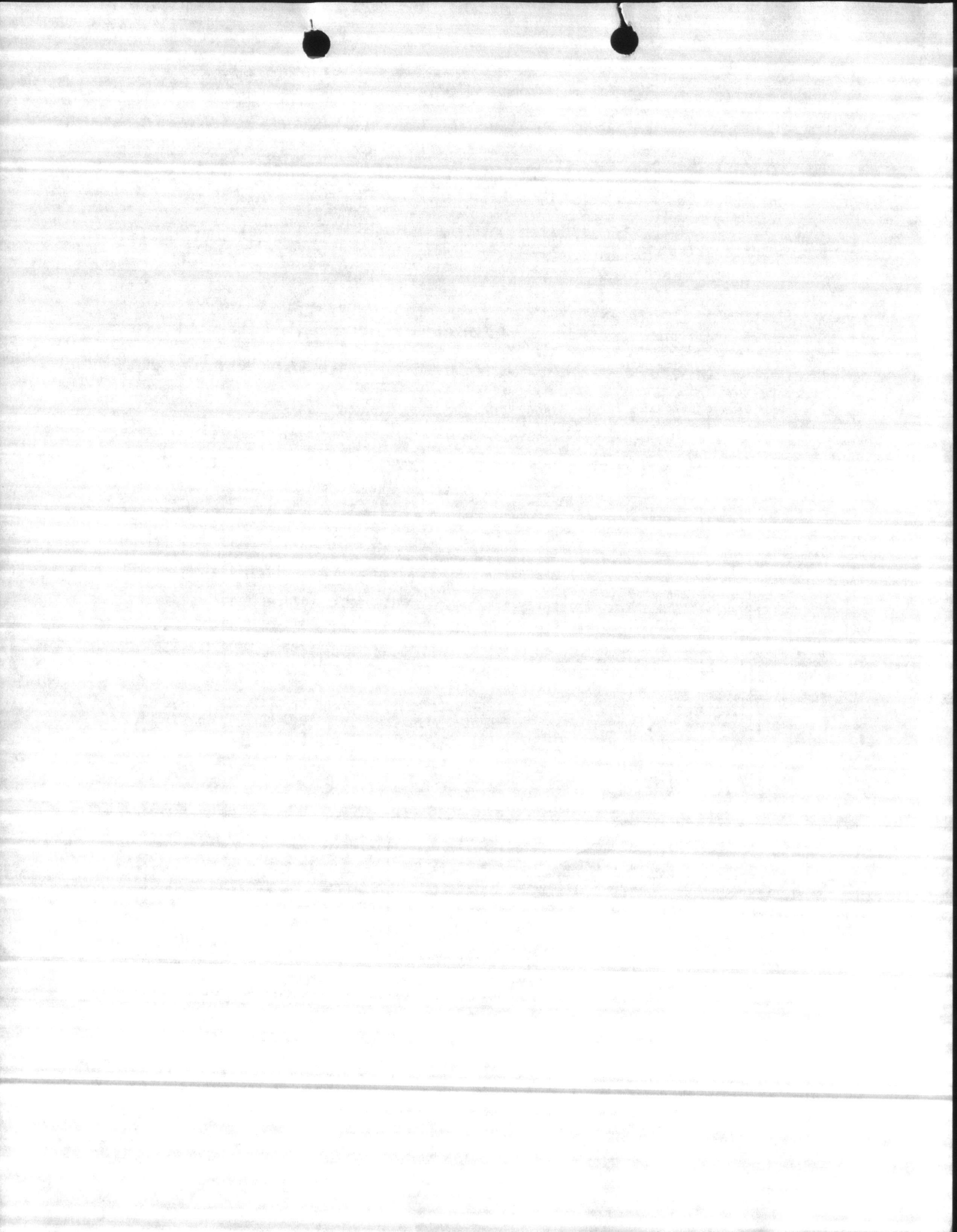
N.P.S.H. REQUIRED
BRAKE HORSE POWER

LAYNE & BOWLER NC MEMPHIS TENN

U.S. G.P.M.

EYE AREA - SQ. IN.	= 11	IMPELLER WT.-LBS.	= 6.8
THRUST CONSTANT	= 4.3	ONE STAGE WT.-LBS.	= 150
WR. PER IMPELLER	= .25 L.B.-FT. ²	ADD'L STAGE WT.-LBS.	= 40
MAX. SPHERE SIZE	= .812	IMPELLER NUMBER	= 4B17
MAX. NO. STD. STAGES	= 20	DISCH. SIZES	= 6", 5"
MAX. OPERATING P.S.I.	= 700	SUCTION SIZE	= 6"
STD. LATERAL	= .312	BOWL CONN. SCREWED, COLLET	
STD. SHAFT DIA.	= 1.187		
MAX. SHAFT DIA.	= 1.50	ADD. 6" PER ADDITIONAL STAGE.	



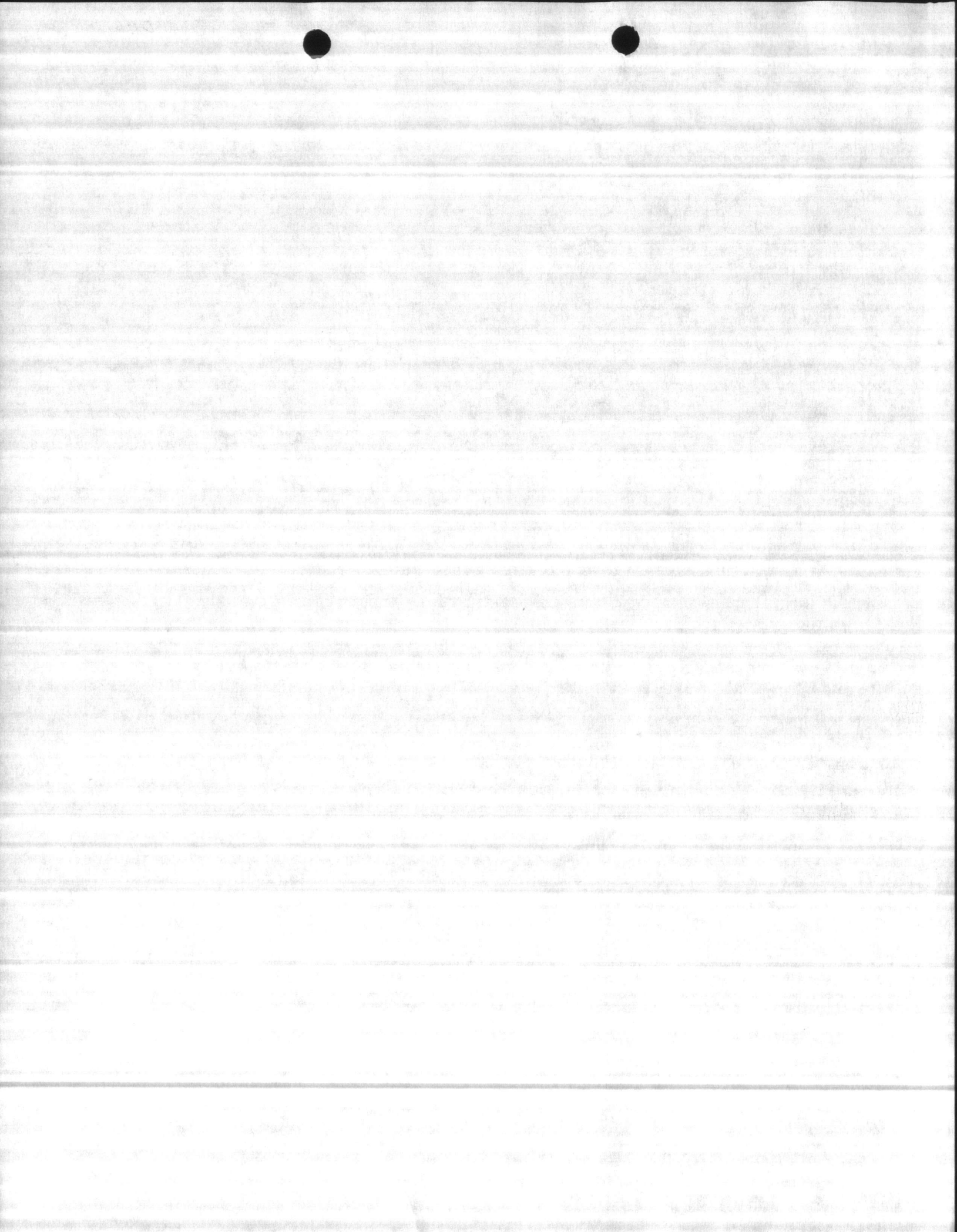


Well # 8

Discharge head per section 11A, par. 11A.3.1	----	30
Pumping level @ 260 gpm	----	45
Total head	----	75

Pump

8" BHC 3 stage 10 hp A curve



1	10	100	1000	10000	100000
2	20	200	2000	20000	200000
3	30	300	3000	30000	300000
4	40	400	4000	40000	400000
5	50	500	5000	50000	500000
6	60	600	6000	60000	600000
7	70	700	7000	70000	700000
8	80	800	8000	80000	800000
9	90	900	9000	90000	900000
10	100	1000	10000	100000	1000000



Handwritten notes and scribbles at the bottom right of the page, including some numbers and illegible text.

Well # 8

Discharge head per section 11A, par. 11A.3.1 ----- 30

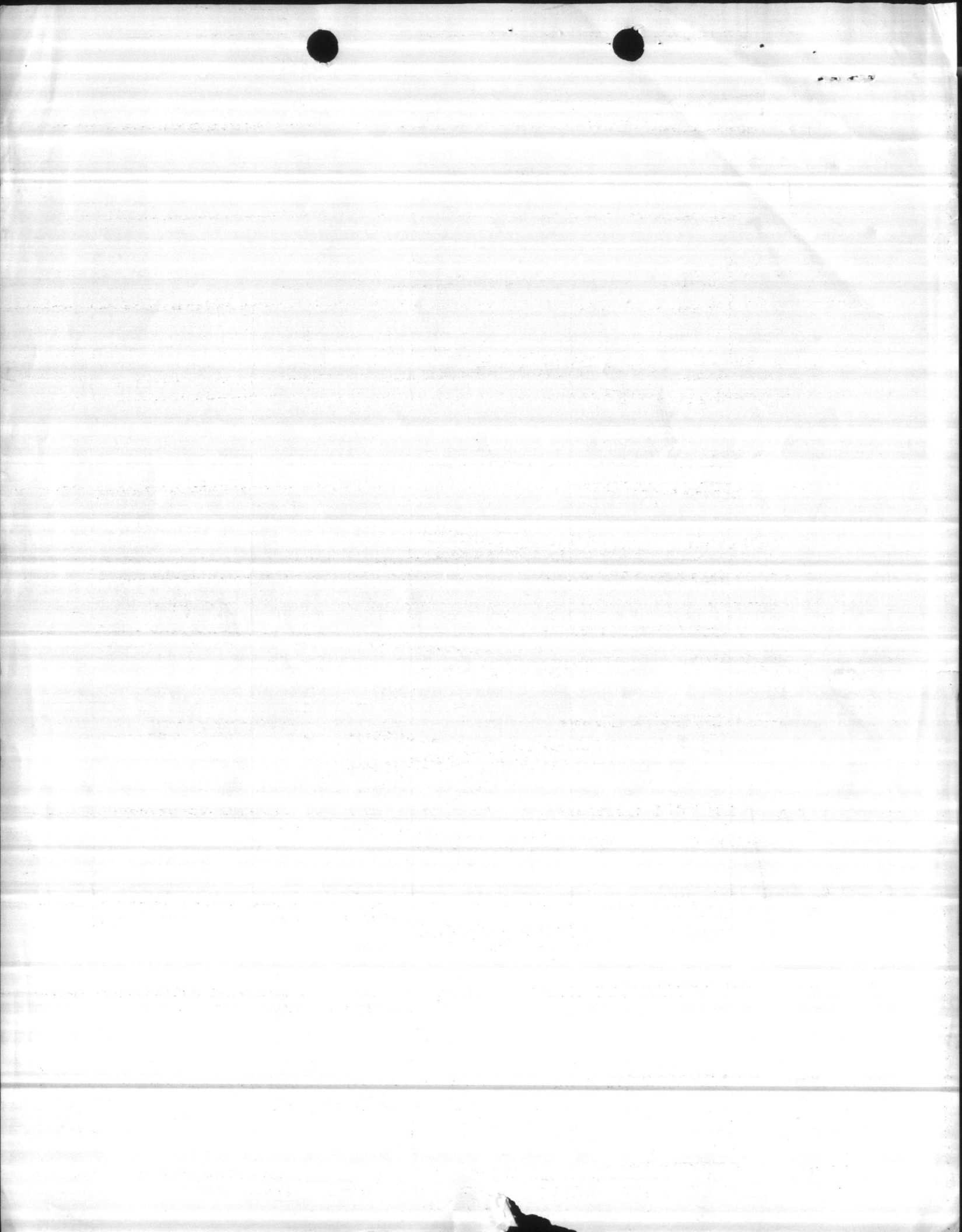
Pumping level @ 260 gpm ----- 45

Total head ----- 75

Pump

8" BHC 3 stage 10 hp A curve

26 HP
72.5 / AMP
AT 208 V8255



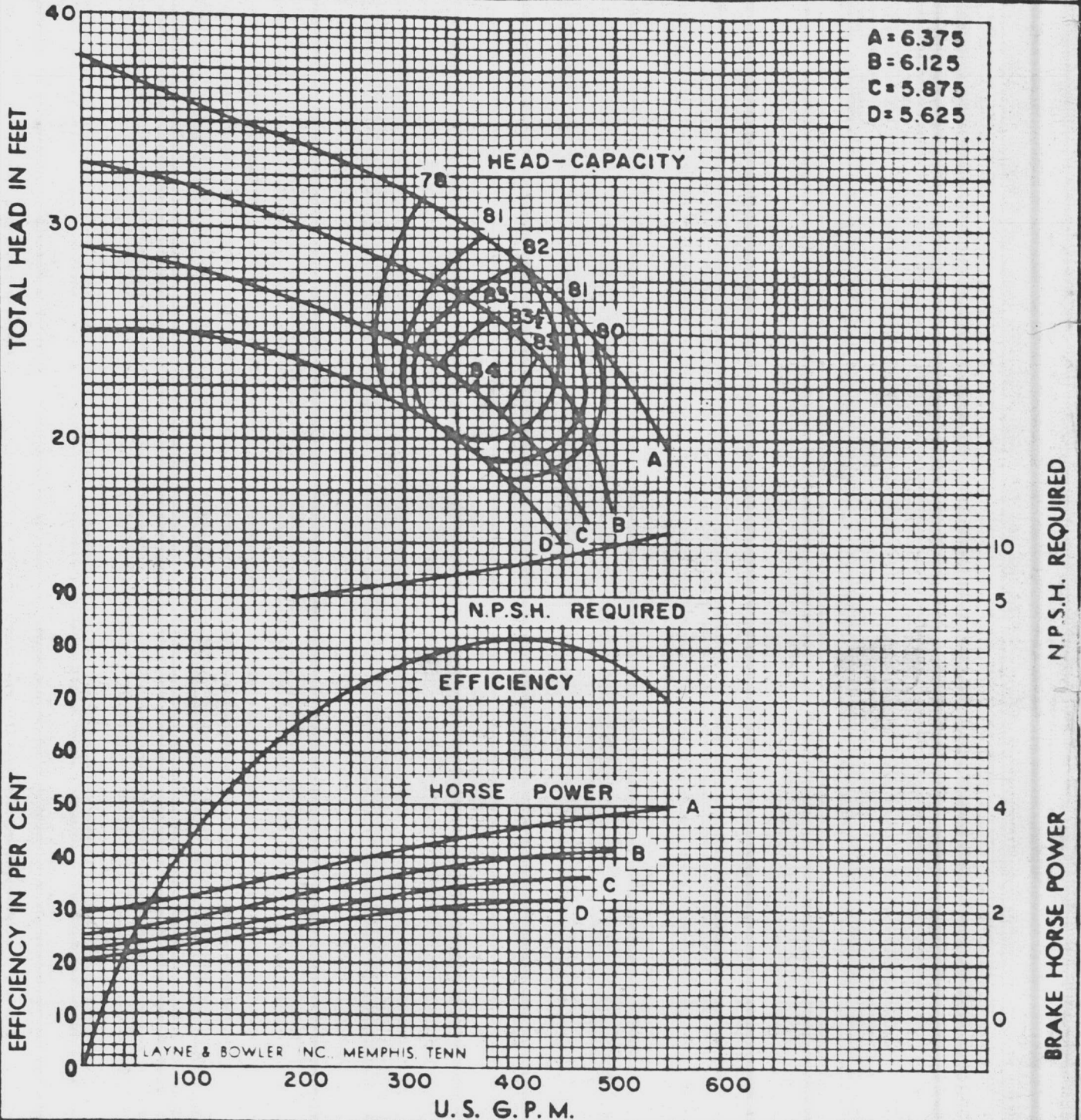
SINGER

LAYNE & BOWLER DIVISION
MEMPHIS, TENNESSEE U.S.A.

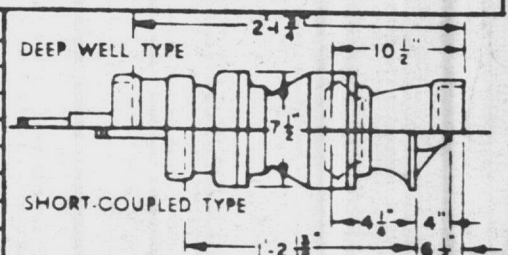


No. Stages	BN. Change	MATERIAL	BN. Change
1	-2	IMP.-C.I.	-1
2	-1	IMP.-C.I. ENM	0
3	-1	IMP.-NI-RI	-1
4	0	BOWL-BRZ	-1
5	0	BOWL-C.I. ENM	0
6	0	BOWL-NI-R.	-1

8" BHC **1750 R.P.M.**
 SINGLE STAGE LAB HEAD AND HORSE POWER WITH STANDARD CAST IRON BOWLS AND BRONZE IMPELLER
 EFFICIENCY SHOWN FOR 5 OR MORE STAGES. HORSE POWER SHOWN FOR ONE STAGE BASED ON 5 STAGE EFFICIENCY. CORRECTIONS SHOULD BE MADE FOR STAGES AND MATERIAL.



EYE AREA - SQ. IN.	= 11	IMPELLER WT.-LBS.	= 6.8
THRUST CONSTANT	= 43	ONE STAGE WT.-LBS.	= 150
WR. PER IMPELLER	= .25 L.B.-FT. ²	ADD'L STAGE WT.-LBS.	= 40
MAX. SPHERE SIZE	= .812	IMPELLER NUMBER	= 4817
MAX. NO. STD. STAGES	= 20	DISCH. SIZES	= 6, 5"
MAX. OPERATING P.S.I.	= 700	SUCTION SIZE	= 6"
STD. LATERAL	= 312	BOWL CONN. SCREWED, COLLET	
STD. SHAFT DIA.	= 1.107		
MAX. SHAFT DIA.	= 1.50	ADD. <u>6</u> " PER ADDITIONAL STAGE.	



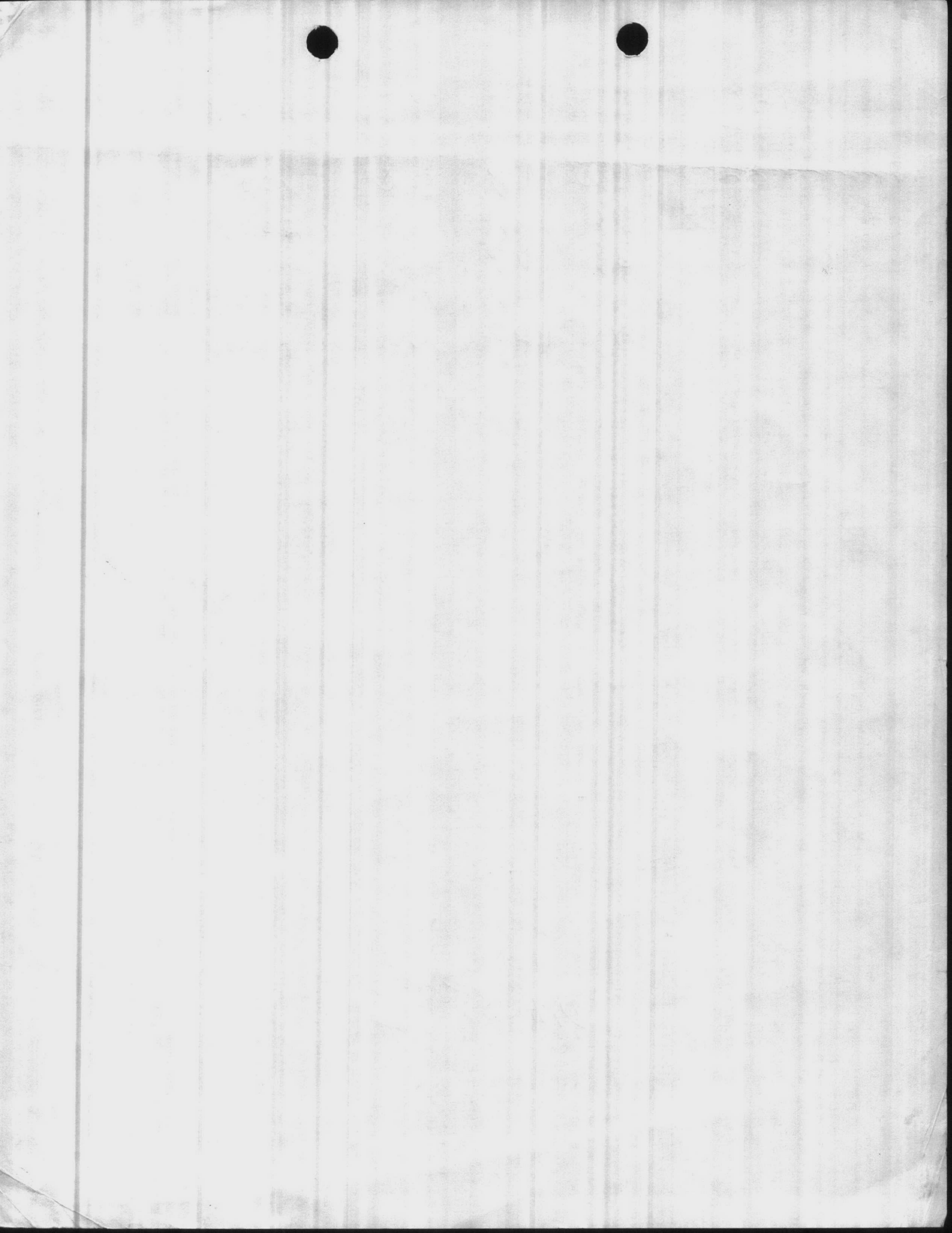


WELL NUMBER <i>646</i>		BY <i>Stevenson & Petersen</i>			DATE <i>5-8-97</i>	
AIR LINE	STATIC LEVEL	PUMPING LEVEL	DRAIN DOWN	DISCHARGE PRESSURE	GPM	START TIME
<i>70</i>	<i>22</i>	<i>30</i>	<i>8</i>	<i>30</i>	<i>100</i>	<i>20</i>
		<i>36</i>	<i>14</i>	<i>25</i>	<i>203</i>	<i>30</i>
		<i>39</i>	<i>17</i>	<i>20</i>	<i>239</i>	<i>40</i>
		<i>41</i>	<i>19</i>	<i>15</i>	<i>265</i>	<i>50</i>
		<i>44</i>	<i>22</i>	<i>10</i>	<i>294</i>	<i>60</i>

REMARKS

D/H 35 PST

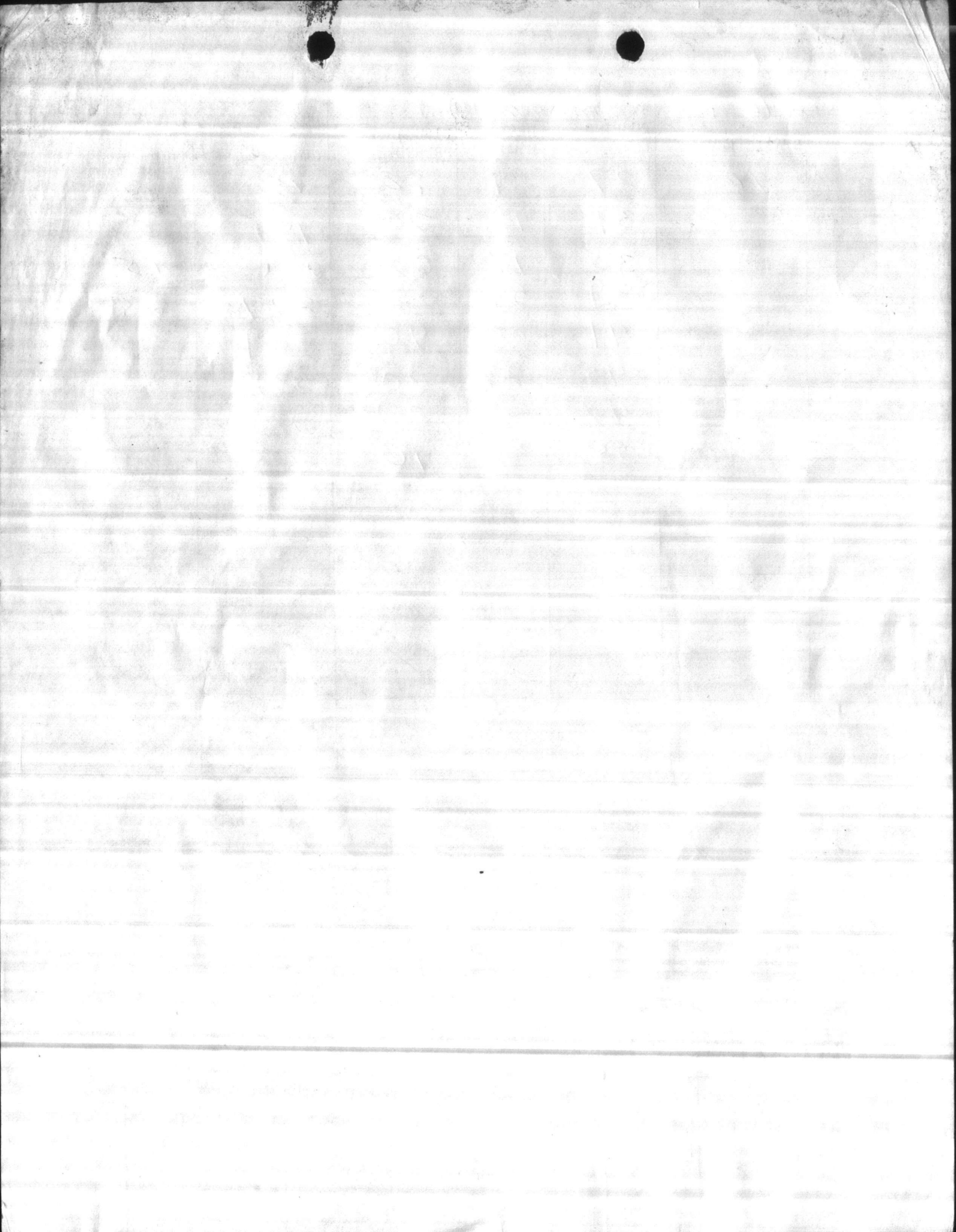
MANUFACTURER	STAGE	S.N.	TOTAL HEAD	SIZE



WELL NUMBER 646		BY THOMAS STEVENSON			DATE 8-23-93	
AIR LINE	STATIC LEVEL	PUMPING LEVEL	DRAIN DOWN	DISCHARGE PRESSURE	GPM	START TIME
70	18	27	9	80	137	55
		31	13	70	199	05
		35	17	60	236	15
		39	21	50	277	25
		41	23	40	309	35
		45	27	30	334	45
		47	29	20	373	55
	left set	50	32	10	425	05

REMARKS
 installed new pump set @ 70' with
 5" column & 1" shaft, 10' tail net
 with strainer
 Dead head @ 100 PSI

MANUFACTURER	STAGE	S.N.	TOTAL HEAD	SIZE
mid south	7	SN-15266V		8MC=7

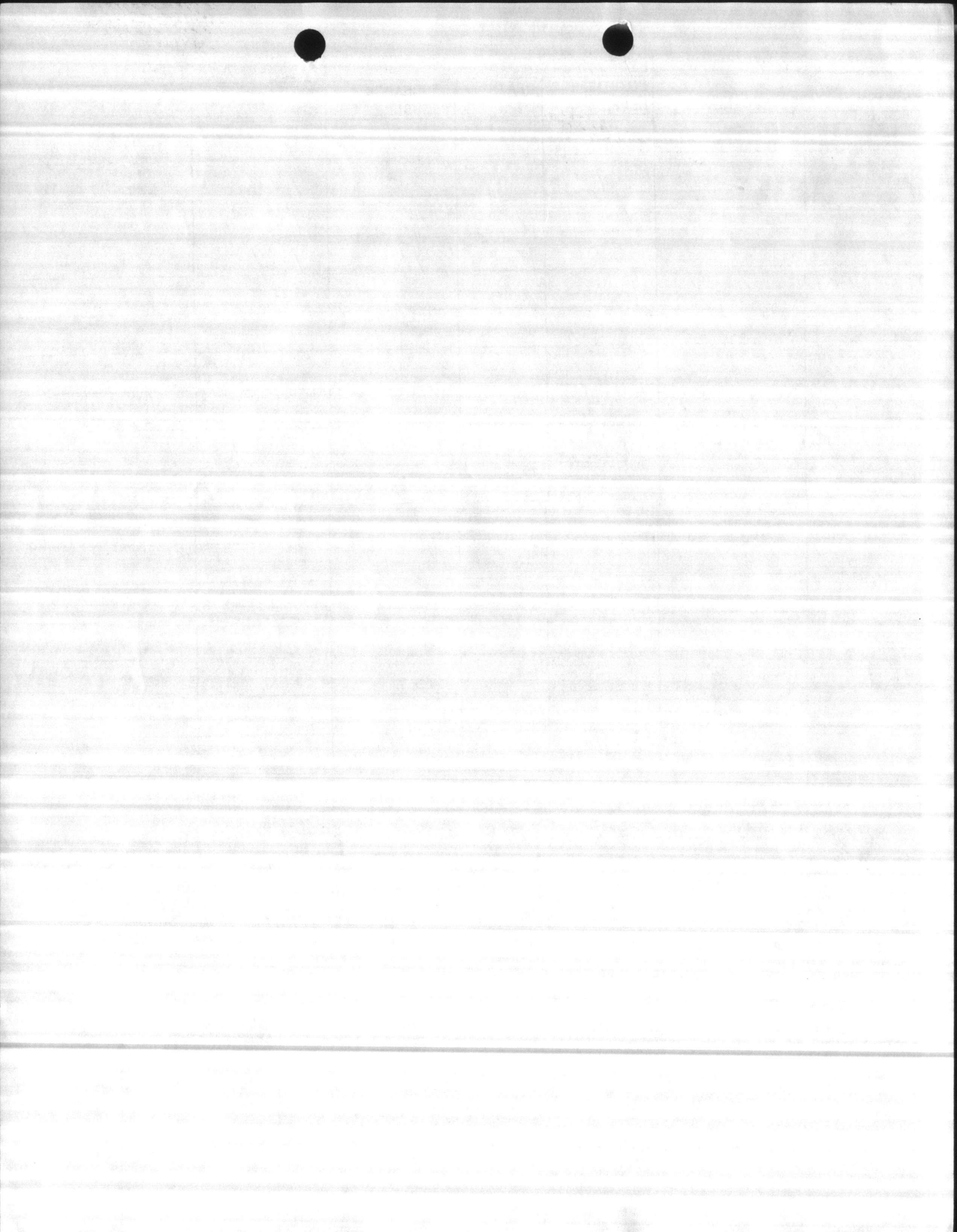


WELL NUMBER 646		BY THOMAS			DATE 7-21-90	
AIR LINE	STATIC LEVEL	PUMPING LEVEL	DRAIN DOWN	DISCHARGE PRESSURE	GPM	START TIME
70	23	30	7	24	108	20
		31	8	20	115	30
		33	10	15	140	40
Left set →		34	11	11	154	50
		35	12	5	175	60

REMARKS Dead head 35 PSI

Left set @ 11 PSI

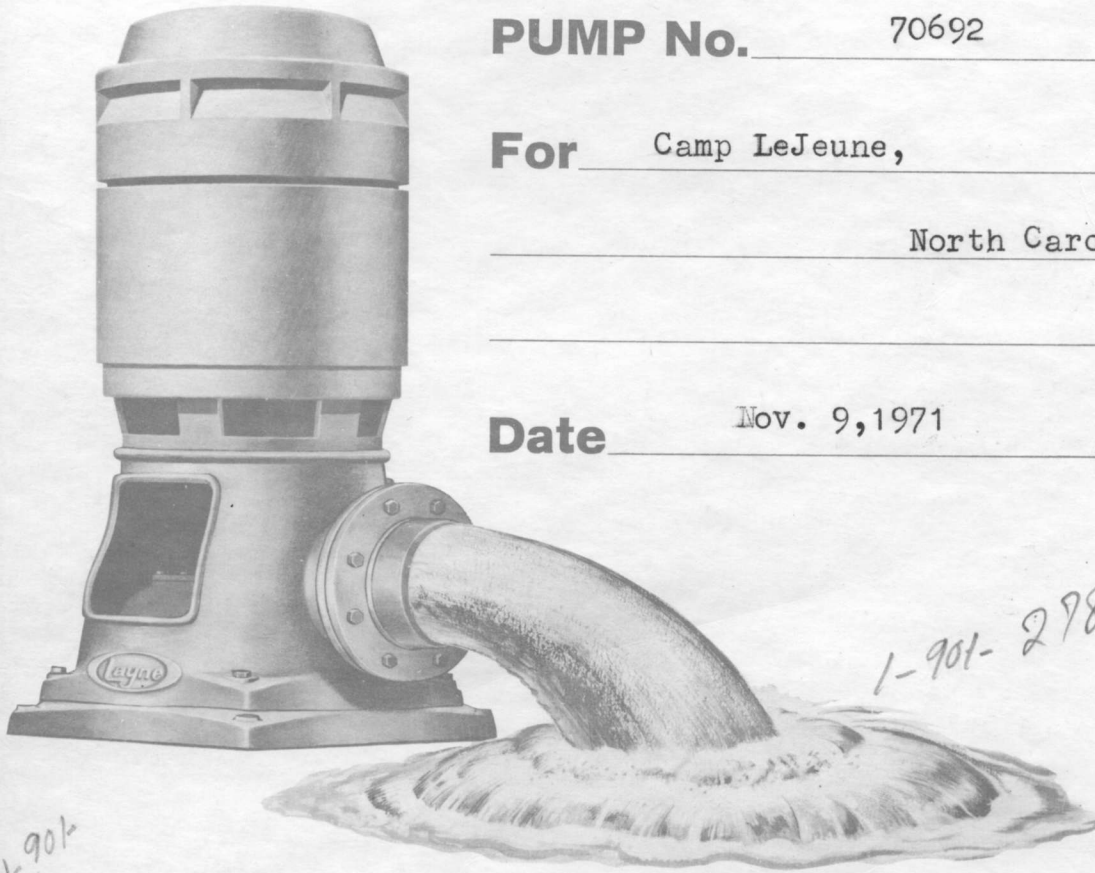
MANUFACTURER	STAGE	S.N.	TOTAL HEAD	SIZE



HB WELL # 8



PUMP RECORD



PUMP No. 70692

For Camp LeJeune,

North Carolina

Date Nov. 9, 1971

1-901-298-3800

L901

Layne Atlantic Co.

Norfolk,

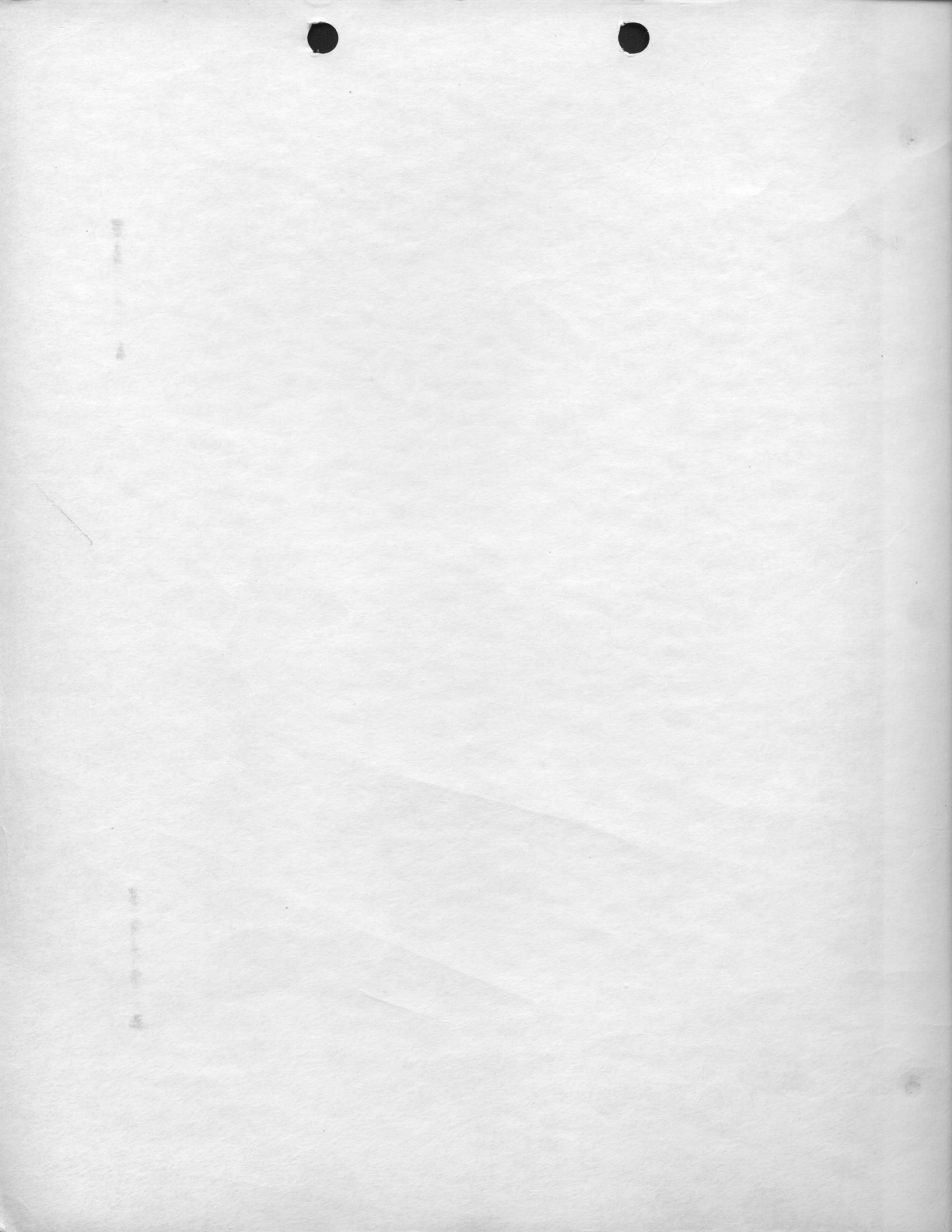
Virginia

Manufactured By:

SINGER

LAYNE & BOWLER DIVISION

MEMPHIS, TENNESSEE U.S.A.



INSTALLATION PLAN



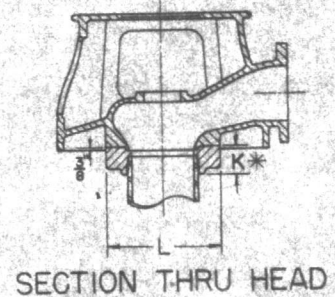
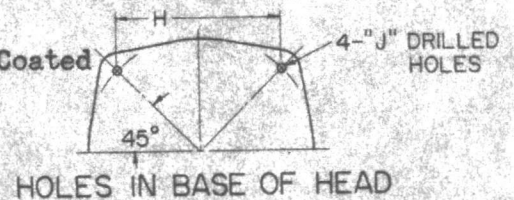
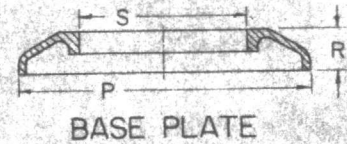
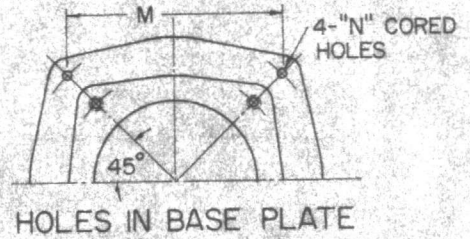
TYPE TF413 DISCHARGE HEAD

LAYNE & BOWLER INC. MEMPHIS, TENN.

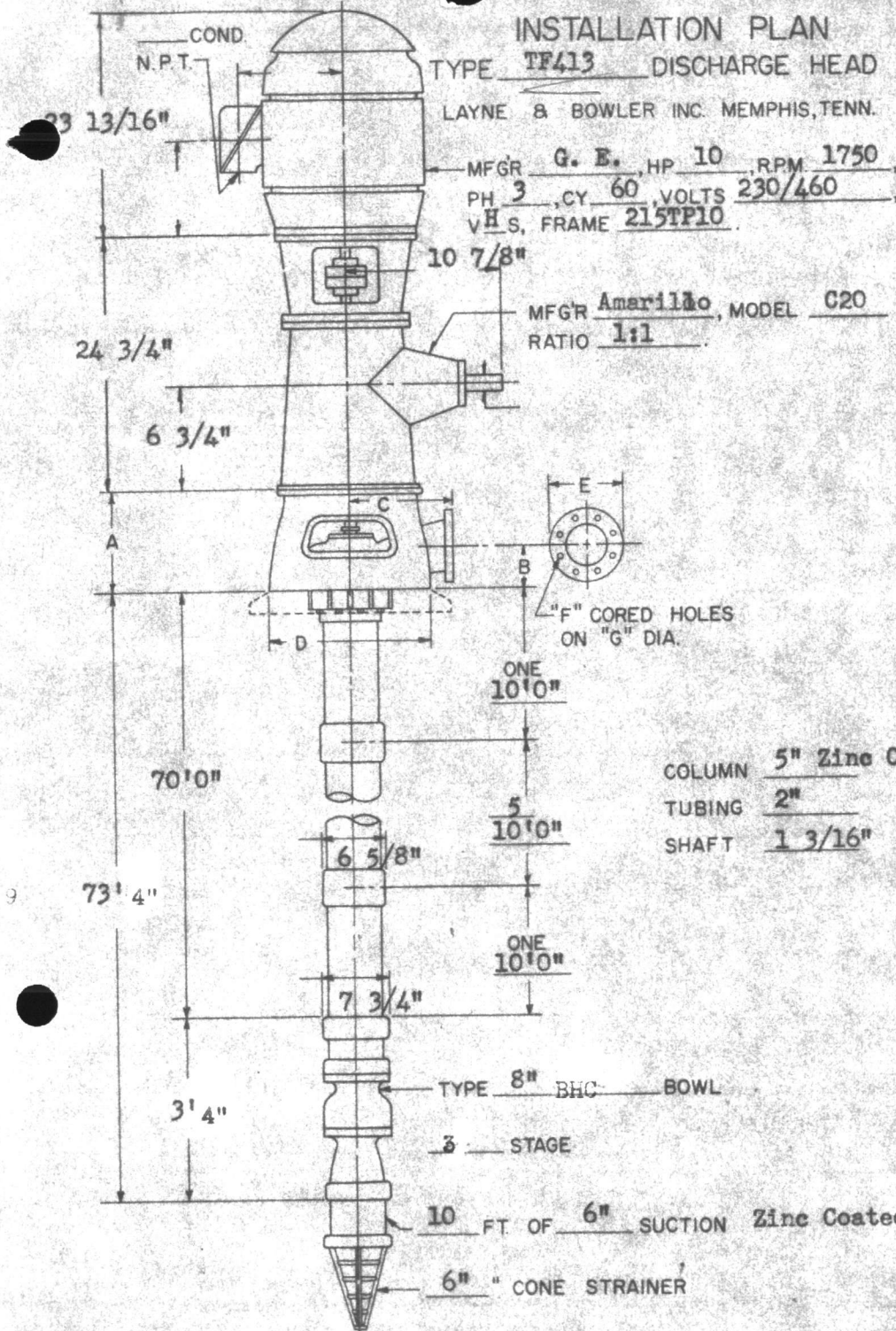
MFG'R G. E., HP 10, RPM 1750
 PH 3, CY 60, VOLTS 230/460
 V.H.S. FRAME 215TP10

MFG'R Amarillo, MODEL C20
 RATIO 1:1

USE THESE DIMENSIONS ONLY WHEN CERTIFIED BY FACTORY



COLUMN 5\"/>
 TUBING 2\"/>
 SHAFT 1 3/16\"/>

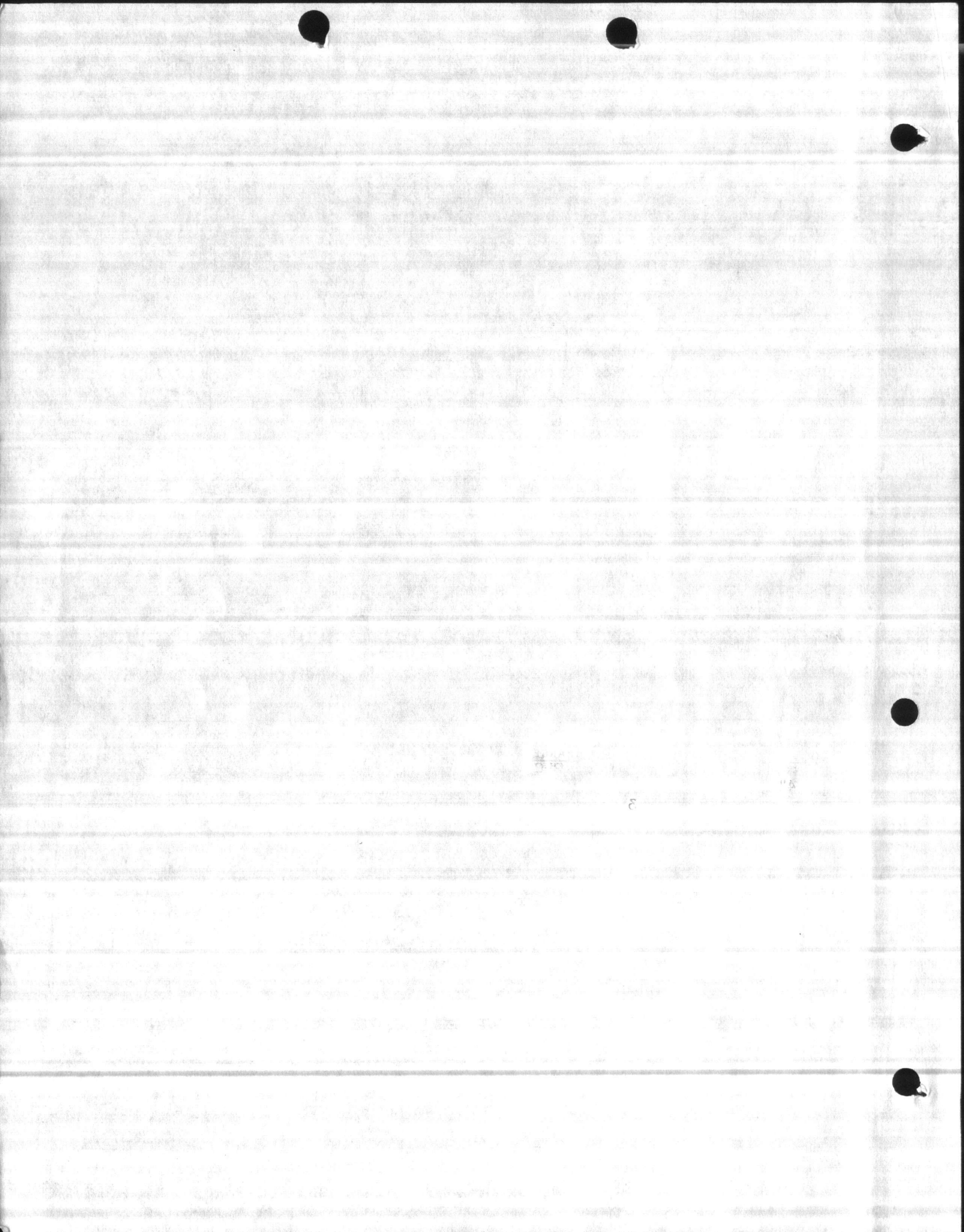


* FOR COLUMN SETTINGS OF 200' OR GREATER, "K"=11"

CUSTOMER: <u>Camp LeJeune, N. C.</u>	YOUR NO. <u>N-160-71</u>	G.P.M. <u>260</u>
LOCATION: _____	OUR NO. <u>71D-5017</u>	T.D.H. <u>75</u>
FOR APPROVAL _____	PUMP NO. <u>70692</u>	R.P.M. <u>1750</u>
CERTIFIED: <u>John Sewell</u>	DATE: <u>Oct. 15, 1971</u>	B.H.P. _____

HEAD	A	B	C	D	E	F	G	H	J	K*	L	M	N	P	R	S
TF413	13	6	11	18	9	8-3/4	7 1/2	14 1/8	11 1/8	2 13/16	10	16 15/16	7 7/8	21	2	17
TF613	14	6	11	18	11	8-7/8	9 1/2	14 1/8	11 1/8	2 7/8	11	16 15/16	7 7/8	21	2	17
TF418	13	6	14 1/2	23	9	8-3/4	7 1/2	17 5/8	13 1/8	2 13/16	10	20 1/2	7 7/8	26 1/2	2 3/4	21 3/4
TF618	15	6	14 1/2	23	11	8-7/8	9 1/2	17 5/8	13 1/8	2 7/8	12 1/2	20 1/2	7 7/8	26 1/2	2 3/4	21 3/4
TF818	18	7 3/4	14 1/2	23	13 1/2	8-7/8	11 1/2	17 5/8	13 1/8	3 1/8	13 3/4	20 1/2	7 7/8	26 1/2	2 3/4	21 3/4
TF1018	18	8 1/2	14 1/2	23	16	12-1	14 1/2	17 5/8	13 1/8	3 1/8	16	20 1/2	7 7/8	26 1/2	2 3/4	21 3/4
TF1218	20	9 5/8	16 1/2	26	19	12-1	17	19 5/8	13 1/8	3 1/8	19	23 1/2	7 7/8	32	3 1/4	24

HEAD	A	B	C	D	E	F	G	H	J	K*	L	M	N	P	R	S
TF625	15	8 1/2	18 1/2	31	11	8-7/8	9 1/2	23 11/16	13 1/8	2 7/8	12 1/2	29	1	38	3 1/2	29
TF825	20	8 1/2	18 1/2	31	13 1/2	8-7/8	11 1/2	23 11/16	13 1/8	3 1/8	13 3/4	29	1	38	3 1/2	29
TF1025	20	8 1/2	18 1/2	31	16	12-1	14 1/2	23 11/16	13 1/8	3 1/8	16	29	1	38	3 1/2	29
TF1225	21	9 5/8	18 1/2	31	19	12-1	17	23 11/16	13 1/8	3 1/8	19	29	1	38	3 1/2	29
TF1225I	21	9 5/8	18 1/2	31	19	12-1	17	23 11/16	13 1/8	4 7/16	21	29	1	38	3 1/2	29
TF1425	21	10 5/8	18 1/2	31	21	12-1	18 1/2	23 11/16	13 1/8	4 7/16	21	29	1	38	3 1/2	29
TF1227	24 1/2	9 1/2	21	36	19	12-1	17	27 1/8	13 1/8	3 1/8	19	33 3/4	1	43	4 1/2	33 1/2



**VERTICAL CENTRIFUGAL PUMP--INSTALLATION OF PUMP HEADS WITH STYLE 60 STUFFING BOX
HOLLOW SHAFT--MOTOR DRIVEN** **BUTT-JOINT TOP COLUMN FLANGE**

DISASSEMBLE AND CLEAN Before installation, the pump head should be disassembled and all parts thoroughly cleaned with kerosene. Remove the stuffing box from the discharge ell.

MOUNT DISCHARGE ELL With the style 60 packing box a butt-joint, top-column flange is used. Therefore, no adjustment is necessary. Clean the face of the top flange and the bottom flange of the discharge ell and coat with Layncote. Note condition of top of the projecting tubing and remove with a file any burrs or sharp edges that might cut the O ring when it is installed. Bolt discharge ell and column together.

PACKING BOX Clean the tension bearing and stuffing box thoroughly before continuing with installation. Insert the stuffing box first, having the "O" ring in place (a light coat of oil should be given the "O" ring). The tension bearing can now be installed, the threaded portion being coated with Layncote. Slip bearing over shaft and screw into tubing until the bearing flange butts the stuffing box. (This should be a hand tight snug fit). The bearing is now ready to take the tension.

TENSION The amount of tension should be based on 1/8" tube travel per 100 ft. of setting, this is put in terms of No. of turns of the tension bearing in the table below:

SIZE TUBING	NUMBER THREADS	NUMBER OF TURNS PER 100 FEET OF SETTING
1 1/4"	16	2
1 1/2"	12	1 1/2
2"	10	1 1/4
2 1/2", 3" & 3 1/2"	8 OLD STD.	1
2 1/2", 3" & 3 1/2"	10 NEW STD.	1 1/4
4" & UP	10	1 1/4

ALIGNMENT The pump shaft MUST now be in the exact center of the pump head and exactly perpendicular to the machined surface of the discharge ell. This can be checked with a straight edge, square, and pair of calipers. The discharge ell can be shafted slightly on the concrete foundation or tilted with shims until the shaft is properly aligned.

MOTOR MOUNT Lower the hollow shaft motor over the drive shaft, taking care not to disturb the alignment. To insure proper operation of the pump it is necessary that the motor be centered exactly, so great care should be taken in this operation. Bolt motor to discharge ell or motor stand with cap screws.

When a hollow shaft motor is used the drive shaft is keyed to a removable motor coupling. Screw on and tighten the drive shaft nut, lifting the shaft until the impellers are drawn against the top of the pump bowl. In this position the shaft cannot be rotated. The nut should then be loosened 1/4 to 1/2 turn or until the shaft turns freely. A gib key is then inserted to prevent the drive shaft nut from working loose.

GROUT BASE AND CONNECT DISCHARGE Grout the discharge ell in position, being careful not to disturb the alignment of the pump head. In case the discharge nipple is to be connected to a water main, a Dresser Coupling should be used. The main should be placed as nearly as possible in line with the discharge nipple. The Dresser Coupling prevents throwing any strain on the pump head if the discharge nipple and main are not exactly in line.

LUBRICATING SYSTEM Connect the hand oil pump, drip feed lubricator or automatic solenoid lubricator to the oil connection in the tension bushing. When first connected allow about one cup full oil to enter the tubing. Then adjust the drip cup or automatic lubricator to allow the following quantity of oil to enter the tubing:

For setting up to 50 feet - 5 drops per minute
 For setting up to 100 feet - 10 drops per minute
 For setting up to 150 feet - 15 drops per minute
 For setting up to 200 feet - 20 drops per minute
 For setting up to 250 feet - 25 drops per minute
 For setting up to 300 feet - 30 drops per minute

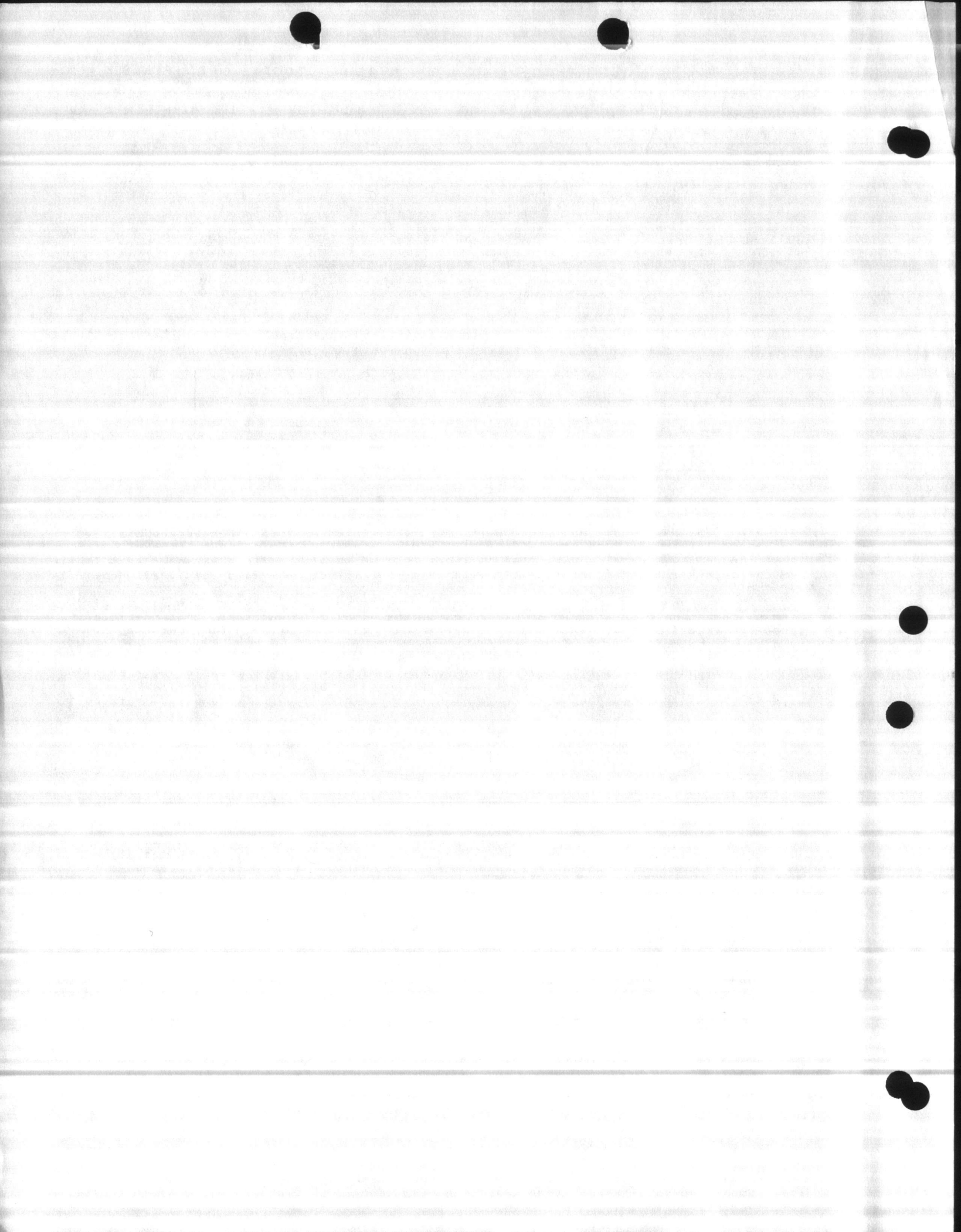
When using a force feed oil pump inject about one cup full of oil for each 24 hours of operation.

The oil should be of a good grade of mineral oil free from grit or foreign matter, with a viscosity rating of approximately S.A.E. 10 and having a relatively low cold pour point.

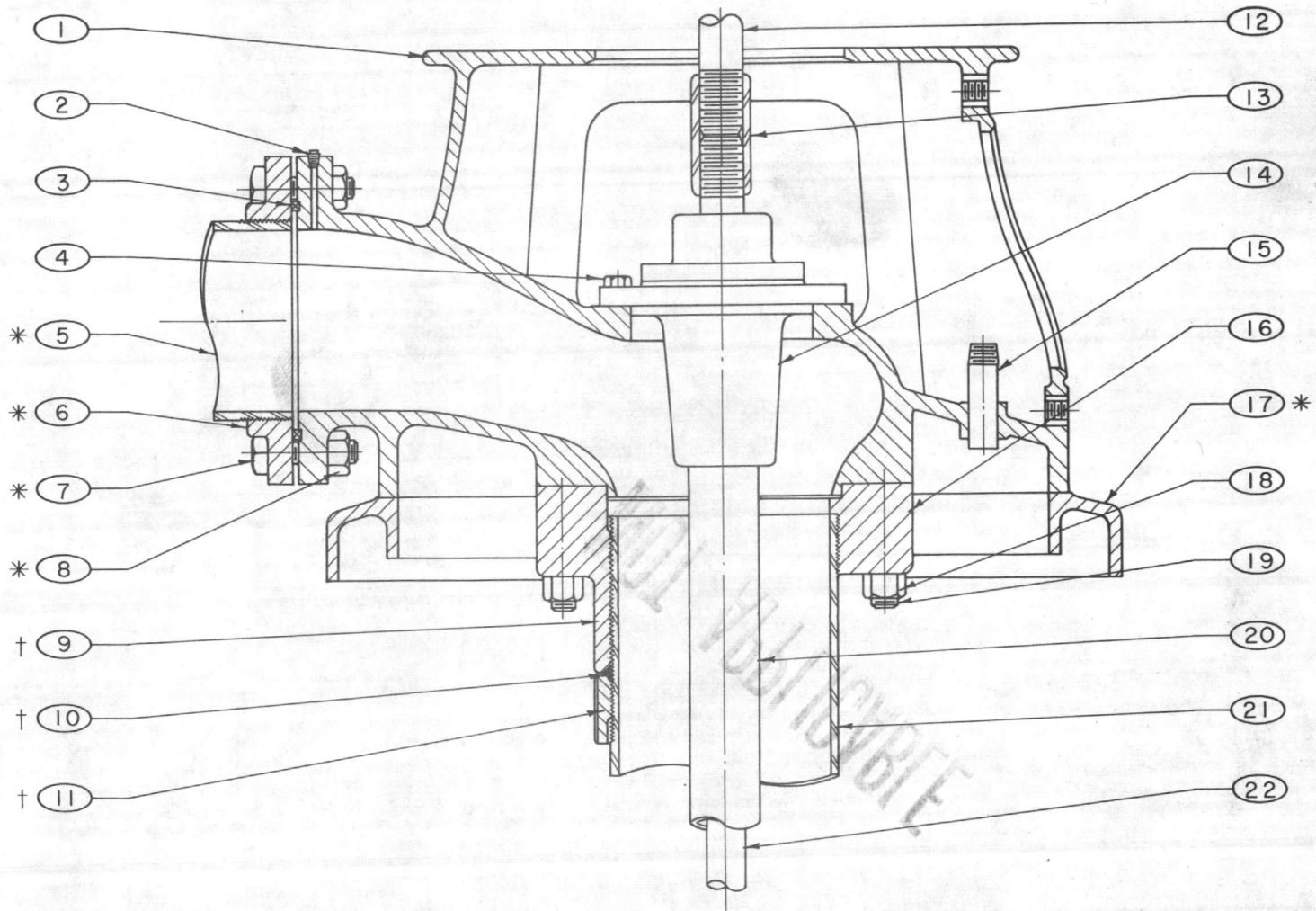
STARTING PUMP CHECK DIRECTION OF MOTOR ROTATION very carefully before applying power. The pump must operate in a left hand or counter clock-wise direction.

Open pet cock located adjacent to packing box to release air from discharge column, and close as soon as water discharges from pet cock.

After the pump has been in operation a few hours, shut down and check the adjustment of the pump runners. The pump shaft may have been screwed up tighter by the power applied and thereby shortened.



TYPE TF DISCHARGE HEAD
ENCLOSED LINE SHAFT



* NOT FURNISHED UNLESS SPECIFIED BY CUSTOMER

† USED FOR SETTINGS GREATER THAN 200 FT.

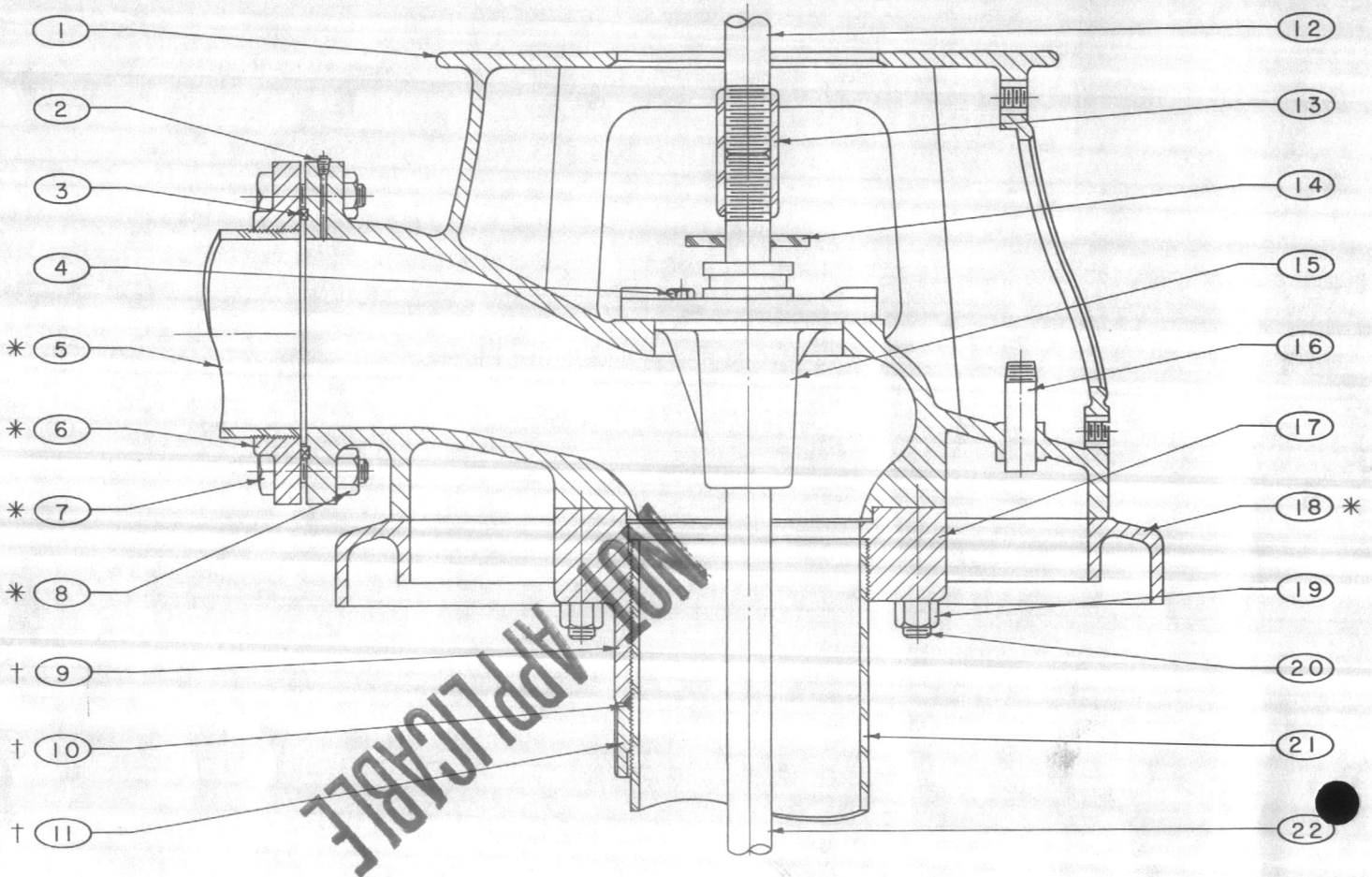
ITEM NO.	DESCRIPTION
1	DISCHARGE HEAD
2	PIPE PLUG, PRESSURE GAUGE
3	PACKING, COMPANION FLANGE
4	CAPSCREW (STUFFING BOX)
5	DISCHARGE PIPE
6	COMPANION FLANGE
7	MACHINE BOLT, COMPANION FLG.
8	HEX NUT, COMPANION FLANGE
9	ADJ. TOP COLUMN FLANGE
10	PACKING
11	PACKING RING

ITEM NO.	DESCRIPTION
12	MOTOR DRIVE SHAFT
13	HEAD COUPLING
14	STUFFING BOX (ASSEMBLY)
15	PIPE NIPPLE (AUXILIARY OPN'G)
16	TOP COLUMN FLANGE
17	BASE PLATE
18	HEX NUT
19	STUD
20	TUBING
21	TOP COLUMN PIPE
22	LINE SHAFT, TOP PIECE

IN ORDERING REPLACEMENT PARTS, SPECIFY PART DESCRIPTION & PUMP SERIAL NO.

REVISED 10-1-67
SUPERSEDES ORIGINAL PRICE BOOK ISSUE

TYPE TF DISCHARGE HEAD
OPEN LINE SHAFT



* NOT FURNISHED UNLESS SPECIFIED BY CUSTOMER

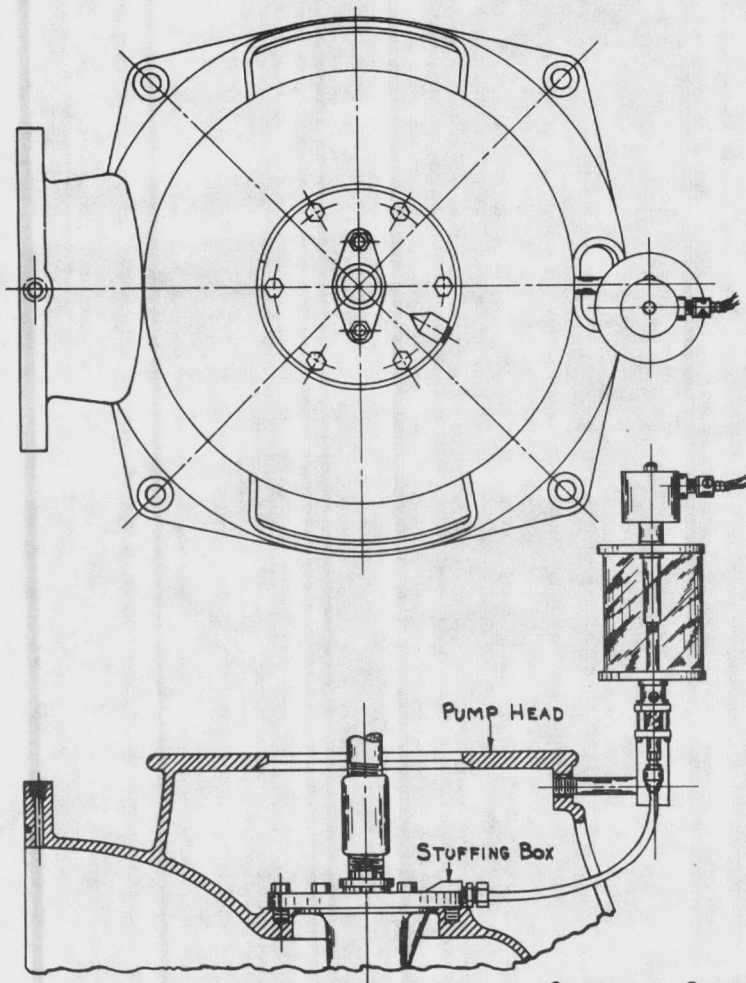
† USED FOR SETTINGS GREATER THAN 200 FT.

ITEM NO.	DESCRIPTION
1	DISCHARGE HEAD
2	PIPE PLUG, PRESSURE GAUGE
3	PACKING, COMPANION FLANGE
4	CAPSCREW (STUFFING BOX)
5	DISCHARGE PIPE
6	COMPANION FLANGE
7	MACHINE BOLT, COMPANION FLG.
8	HEX NUT, COMPANION FLANGE
9	ADJ. TOP COLUMN FLANGE
10	PACKING
11	PACKING RING

ITEM NO.	DESCRIPTION
12	MOTOR DRIVE SHAFT
13	HEAD COUPLING
14	WATER SLINGER
15	STUFFING BOX (ASSEMBLY)
16	PIPE NIPPLE (AUXILIARY OPN'G)
17	TOP COLUMN FLANGE
18	BASE PLATE
19	HEX NUT
20	STUD
21	TOP COLUMN PIPE
22	LINE SHAFT, TOP PIECE

IN ORDERING REPLACEMENT PARTS, SPECIFY PART DESCRIPTION & PUMP SERIAL NO.

REVISED-10-1-67
SUPERSEDES ORIGINAL PRICE BOOK ISSUE



VOLT. _____ CYCLE _____

TAPPED FOR $\frac{1}{8}$ "
CONDUIT WITH ADAPTER
FOR $\frac{3}{8}$ " FLEXIBLE TUBING

SOLENOID

LUBRICATOR

BRACKET

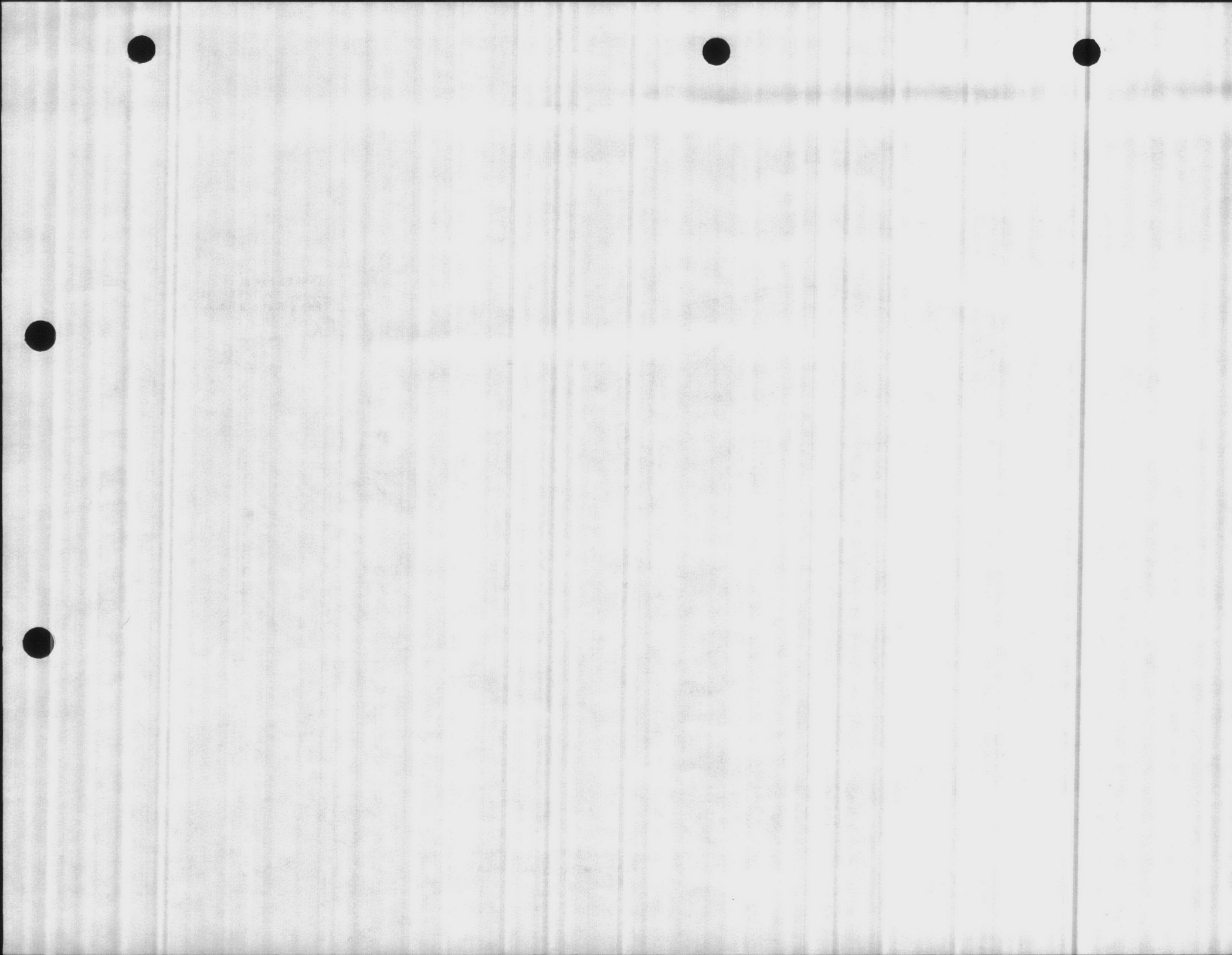
SIGHT FEED

SOLENOID - OPERATED SIGHT FEED LUBRICATOR
FOR AUTOMATIC OPERATION

LMA99

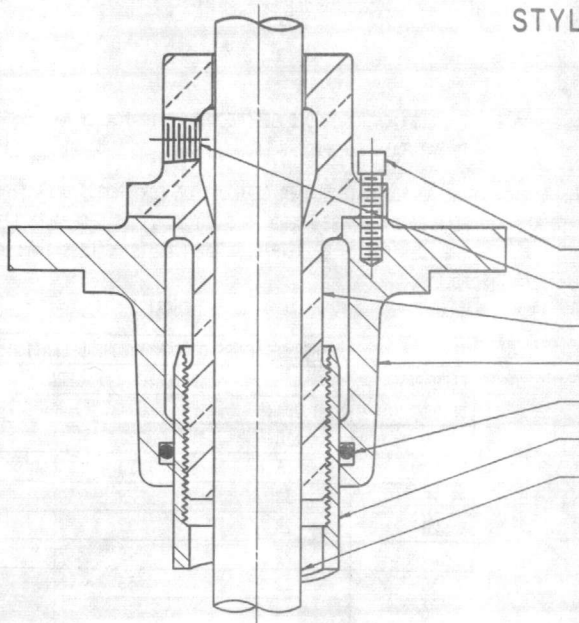
PRINTED IN U.S.A.







STUFFING BOX ASSEMBLY OIL LUBRICATION STYLE 60



PART NAME	MATERIAL	
	STANDARD	SPECIAL
LOCK SCREW	STEEL	
OIL INLET		
TENSION BEARING	BRONZE	
TENSION BOX	CAST IRON	
O-RING	BUNA-N	
TUBING	C.S.-SCH. 80 PIPE	
LINE SHAFT	C-1045 CAR. STL.	

IN ORDERING REPLACEMENT PARTS, SPECIFY
PARTS DESCRIPTION AND PUMP SERIAL NO.

INSTALLATION AND OPERATING INSTRUCTIONS

1. REMOVE THE LOCK SCREW AND THE O-RING AND THOROUGHLY CLEAN THE TENSION BOX INCLUDING THE O-RING GROOVE. REMOVE ANY NICKS OR BURRS FROM THE UPPER AND LOWER MOUNTING FACES AND MALE REGISTER WITH A FINE FLAT FILE. RE-INSTALL AND LIGHTLY OIL THE EXPOSED SURFACE OF THE O-RING.
2. CLEAN THE SURFACE OF THE HEAD THAT RECEIVES THE TENSION BOX AND REMOVE ANY NICKS OR BURRS WITH A FINE FLAT FILE.
3. CAREFULLY INSTALL THE TENSION BOX. ALIGN THE MOUNTING HOLES WITH THE TAPS IN THE HEAD AND SEAT THE BOX TO THE HEAD. INSTALL AND EVENLY TIGHTEN THE MOUNTING CAPSCREWS.
4. CLEAN THE TENSION BEARING THOROUGHLY AND REMOVE ANY NICKS OR BURRS FROM THE MOUNTING FACE AND REGISTER WITH A FINE FLAT FILE. REMOVE ANY NICKS OR BURRS FROM THE THREADS WITH A THREE CORNERED FILE.
5. OIL THE THREADS AND THE BORE AND CAREFULLY PLACE THE TENSION BEARING OVER THE SHAFT AND THREAD (RIGHT HAND) INTO THE TUBING. CONTINUE THREADING UNTIL THE LOWER FLANGE FACE FIRMLY CONTACTS THE TENSION BOX FACE.
6. FOR THE PROPER AMOUNT OF TUBE TENSION, REFER TO INSTRUCTIONS PBI 100 PAGE 1 OR 2. FOR SETTINGS LESS THAN 100 FEET, TIGHTEN TO THE NEAREST LOCKING POSITION.

CHART 1 BELOW GIVES THE AMOUNT OF PULL-UP FOR EACH COMPLETE TURN, OF THE TENSION BEARING.

CHART 1

SIZE TUBING	1 1/4"	1 1/2"	2"	2 1/2"	3"	3 1/2"	4" & UP
NO. THD'S/IN	16	12	10	10	8	8	10
"A"	.063"	.083"	.100"	.100"	.125"	.125"	.100"

"A" = AMOUNT OF PULL-UP FOR EACH COMPLETE TURN OF THE TENSION BEARING. THE TOTAL NUMBER OF TURNS REQUIRED CAN BE CALCULATED BY DIVIDING THE FIGURE ABOVE INTO THE TENSION FIGURE FROM PBI 100.

EXAMPLE: 500 FEET OF 10" (.279" WALL) x 1 11/16" x 2 1/2": FROM PBI 100, THE PROPER TENSION OR PULL-UP IS FOUND TO BE 0.529" AND FROM CHART 1, THE PULL-UP PER COMPLETE TURN IS 0.100" FOR 2 1/2" 10 THD. TUBING.

$$\text{TOTAL NO. OF TURNS} = \frac{0.529}{0.100} = 5.29 \text{ OR APPROXIMATELY } 5 \frac{1}{4}$$

IF AFTER ADJUSTING THE TENSION BEARING THE PROPER NUMBER OF TURNS, NO SLOT ALIGNS WITH THE LOCK SCREW TAP IN THE BOX, IT IS RECOMMENDED THAT THE BEARING BE BACKED OFF TO THE NEAREST ALIGNMENT POSITION IE IT TAKES MORE THAN AN EIGHTH TURN FORWARD TO ACHIEVE ALIGNMENT.

7. INSTALL AND TIGHTEN THE LOCK SCREW.
8. CONNECT THE LUBRICATOR TO THE OIL CONNECTION IN THE TENSION BEARING. FILL THE LUBRICATOR WITH A GOOD GRADE MINERAL OIL HAVING A VISCOSITY RATING OF APPROXIMATELY S.A.E. 10 AND HAVING A RELATIVELY LOW COLD POUR POINT.

CONTINUED ON PAGE 2



STYLE 60 INSTALLATION AND OPERATING INSTRUCTIONS

(CONTINUED)

IMPORTANT:

PRIOR TO INITIAL START-UP AND AFTER A SHUT DOWN OF 150 HOURS OR LONGER, THE LUBRICATOR SHOULD BE ADJUSTED FOR THE RECOMMENDED NUMBER OF DROPS PER MINUTE AS OUTLINED IN CHART 2 AND ALLOWED TO OPERATE AT THIS RATE FOR 20 MINUTES FOR EACH 100 FEET OF SETTING.

FOR NORMAL OPERATION, THE LUBRICATOR SHOULD BE ADJUSTED IN ACCORDANCE WITH CHART 2.

- 9. THE LUBRICATOR SHOULD BE CHECKED PERIODICALLY AND RESET IF REQUIRED TO MAINTAIN THE PROPER FLOW.

THE APPROXIMATE NUMBER OF HOURS OF CONTINUOUS OPERATION AT VARIOUS FLOW RATES CAN BE FOUND IN CHART 3, IT IS GENERALLY RECOMMENDED THAT THE LUBRICATION BE RE-FILLED WHEN IT IS NO LESS THAN ONE QUARTER FULL.

CHART 2

SHAFT SIZE	"A" LUBRICATOR SETTING IN DROPS PER MIN.	"B" DROPS PER MIN. PER EACH 100 FT. SETTING
7/8 - 1 3/16	5	2
1 1/2 - 1 11/16	7	3
1 15/16 - 2 7/16	10	4
2 11/16	12	5

$$\text{TOTAL DROPS/MIN.} = \text{"A"} + \frac{(\text{SETTING} \times \text{"B"})}{100}$$

EXAMPLE: 500 FEET OF 1 11/16" x 2 1/2"

$$\text{TOTAL DROPS/MIN.} = 7 \times \frac{(500 \times 3)}{100} = 7 + (5 \times 3) = 7 + 15 = \underline{22}$$

CHART 3

FLOW RATE DROPS/MIN.	NUMBER OF HOURS OF CONTINUOUS OPERATION		
	LUBRICATOR CAPACITY		
	1 QUART	2 QUART	3 QUART
5	110	220	440
10	55	110	220
15	38	75	150
20	28	55	110
25	22	45	90
30	19	38	75
40	14	28	55
50	11	22	45

SINGER

LAYNE & BOWLER DIVISION
MEMPHIS, TENNESSEE U.S.A.



TUBE TENSION ADJUSTMENT CHART

COLUMN SIZE	SHAFT AND TUBING SIZE	TUBE TENSION IN INCHES									
		SETTING IN FEET									
		100	200	300	400	500	600	700	800	900	1000
3" MC* (.187)	1 1/4 x 7/8	0.025	0.103	0.233	0.415	0.649					
	1 1/2 x 1	0.028	0.115	0.261	0.465	0.726					
4" * (.237) SCH. 40S	1 1/4 x 7/8	0.020	0.083	0.186	0.333	0.520	0.750	1.021	1.334	1.688	2.084
	1 1/2 x 1	0.022	0.090	0.202	0.361	0.564	0.813	1.107	1.447	1.831	2.260
	2 x 1 3/16	0.025	0.103	0.233	0.416	0.650	0.936	1.275	1.666	2.108	2.603
5" * (.258) SCH. 40S	1 1/4 x 7/8	0.018	0.075	0.171	0.305	0.476	0.686	0.934	1.220	1.544	1.906
	1 1/2 x 1	0.020	0.081	0.182	0.325	0.508	0.733	0.998	1.303	1.650	2.036
	2 x 1 3/16	0.022	0.091	0.205	0.366	0.571	0.824	1.121	1.465	1.854	2.289
6" * (.280) SCH. 40S	1 1/4 x 7/8	0.017	0.071	0.160	0.286	0.447	0.644	0.878	1.146	1.451	1.791
	1 1/2 x 1	0.018	0.075	0.169	0.302	0.472	0.681	0.927	1.211	1.532	1.892
	2 x 1 3/16	0.020	0.083	0.187	0.333	0.521	0.751	1.022	1.335	1.690	2.086
	2 1/2 x 1 1/2	0.024	0.098	0.220	0.393	0.613	0.884	1.204	1.572	1.990	2.457
	2 1/2 x 1 11/16	0.025	0.102	0.231	0.412	0.643	0.927	1.263	1.649	2.088	2.577
	3 x 1 15/16	0.029	0.119	0.269	0.480	0.750	1.080	1.471	1.922	2.432	3.003
7" * (.300)	1 1/2 x 1	0.017	0.071	0.161	0.287	0.449	0.647	0.881	1.151	1.457	1.798
	2 x 1 3/16	0.019	0.077	0.175	0.313	0.488	0.704	0.958	1.252	1.584	1.956
	2 1/2 x 1 1/2	0.022	0.089	0.202	0.360	0.563	0.811	1.105	1.443	1.827	2.255
	2 1/2 x 1 11/16	0.023	0.093	0.211	0.376	0.587	0.846	1.153	1.506	1.906	2.353
	3 x 1 15/16	0.026	0.107	0.242	0.431	0.673	0.970	1.321	1.726	2.184	2.696
	3 1/2 x 2 3/16	0.030	0.121	0.272	0.485	0.757	1.092	1.486	1.941	2.457	3.034
8" * (.277) SCH. 30	3 1/2 x 2 7/16	0.031	0.127	0.287	0.512	0.800	1.153	1.570	2.050	2.595	3.204
	2 x 1 3/16	0.019	0.076	0.173	0.308	0.481	0.694	0.945	1.234	1.562	1.928
	2 1/2 x 1 1/2	0.022	0.088	0.198	0.354	0.552	0.796	1.084	1.416	1.793	2.213
	2 1/2 x 1 11/16	0.022	0.091	0.206	0.368	0.575	0.829	1.129	1.475	1.867	2.306
	3 x 1 15/16	0.026	0.105	0.236	0.421	0.657	0.947	1.290	1.684	2.132	2.632
	3 1/2 x 2 3/16	0.029	0.117	0.265	0.472	0.737	1.062	1.447	1.890	2.392	2.953
8" * (.322) SCH. 40S	3 1/2 x 2 7/16	0.031	0.124	0.279	0.498	0.778	1.121	1.526	1.993	2.522	3.114
	2 x 1 3/16	0.018	0.074	0.166	0.297	0.464	0.668	0.910	1.189	1.505	1.858
	2 1/2 x 1 1/2	0.020	0.083	0.188	0.336	0.525	0.757	1.031	1.347	1.704	2.104
	2 1/2 x 1 11/16	0.021	0.087	0.196	0.349	0.545	0.786	1.070	1.398	1.769	2.184
	3 x 1 15/16	0.024	0.098	0.221	0.394	0.616	0.887	1.208	1.579	1.998	2.467
	3 1/2 x 2 3/16	0.027	0.109	0.246	0.439	0.685	0.987	1.344	1.756	2.223	2.744
9" * (.312)	3 1/2 x 2 7/16	0.028	0.115	0.259	0.461	0.720	1.038	1.413	1.846	2.336	2.884
	2 x 1 3/16	0.018	0.072	0.163	0.291	0.455	0.655	0.892	1.166	1.476	1.822
	2 1/2 x 1 1/2	0.020	0.081	0.183	0.327	0.511	0.737	1.003	1.311	1.659	2.048
	2 1/2 x 1 11/16	0.021	0.084	0.190	0.339	0.530	0.763	1.040	1.358	1.719	2.122
	3 x 1 15/16	0.023	0.095	0.213	0.381	0.595	0.857	1.167	1.524	1.929	2.382
	3 1/2 x 2 3/16	0.026	0.105	0.236	0.422	0.658	0.949	1.292	1.688	2.136	2.637
10" * (.279)	3 1/2 x 2 7/16	0.027	0.110	0.248	0.442	0.690	0.995	1.355	1.770	2.240	2.766
	2 x 1 3/16	0.018	0.072	0.163	0.291	0.454	0.655	0.891	1.164	1.474	1.819
	2 1/2 x 1 1/2	0.020	0.081	0.183	0.327	0.510	0.736	1.002	1.309	1.656	2.045
	2 1/2 x 1 11/16	0.021	0.084	0.190	0.338	0.529	0.762	1.038	1.355	1.716	2.118
	3 x 1 15/16	0.023	0.094	0.213	0.380	0.593	0.855	1.164	1.521	1.925	2.377
	3 1/2 x 2 3/16	0.026	0.104	0.236	0.420	0.657	0.946	1.289	1.683	2.131	2.630
10" * (.307) SCH. 30	3 1/2 x 2 7/16	0.027	0.110	0.247	0.441	0.689	0.992	1.351	1.765	2.234	2.758
	4 x 2 11/16	0.030	0.122	0.276	0.492	0.769	1.108	1.509	1.971	2.494	3.079
	2 x 1 3/16	0.017	0.071	0.159	0.285	0.445	0.641	0.873	1.141	1.444	1.783
	2 1/2 x 1 1/2	0.019	0.079	0.178	0.318	0.496	0.715	0.974	1.272	1.610	1.988
	2 1/2 x 1 11/16	0.020	0.081	0.184	0.328	0.513	0.739	1.007	1.315	1.664	2.055
	3 x 1 15/16	0.022	0.091	0.205	0.366	0.572	0.824	1.122	1.466	1.855	2.290
SCH. 30	3 1/2 x 2 3/16	0.025	0.100	0.226	0.403	0.629	0.907	1.235	1.614	2.042	2.521
	3 1/2 x 2 7/16	0.026	0.105	0.236	0.422	0.659	0.949	1.292	1.688	2.137	2.638
	4 x 2 11/16	0.029	0.116	0.263	0.469	0.732	1.055	1.436	1.876	2.374	2.931

NOTE: ALL PIPE MARKED * IS SINGER-LAYNE & BOWLER DIV. STANDARD



TUBE TENSION ADJUSTMENT CHART

COLUMN SIZE	SHAFT AND TUBING SIZE	TUBE TENSION IN INCHES									
		SETTING IN FEET									
		100	200	300	400	500	600	700	800	900	1000
10" (.365) 40S	2 x 1 3/16	0.017	0.068	0.154	0.276	0.430	0.620	0.845	1.104	1.397	1.725
	2 1/2 x 1 1/2	0.018	0.075	0.170	0.303	0.474	0.683	0.930	1.215	1.538	1.899
	2 1/2 x 1 11/16	0.019	0.077	0.175	0.312	0.488	0.703	0.958	1.251	1.583	1.955
	3 x 1 15/16	0.021	0.085	0.193	0.344	0.538	0.775	1.055	1.378	1.745	2.154
	3 1/2 x 2 3/16	0.023	0.093	0.210	0.376	0.586	0.845	1.151	1.504	1.903	2.349
	3 1/2 x 2 7/16	0.024	0.097	0.219	0.391	0.611	0.881	1.199	1.567	1.983	2.448
	4 x 2 11/16	0.026	0.107	0.242	0.431	0.673	0.970	1.321	1.725	2.183	2.695
12" * (.330) SCH. 30	2 1/2 x 1 1/2	0.018	0.074	0.166	0.297	0.464	0.670	0.912	1.191	1.508	1.861
	2 1/2 x 1 11/16	0.019	0.076	0.171	0.306	0.477	0.688	0.937	1.225	1.550	1.913
	3 x 1 15/16	0.020	0.083	0.188	0.335	0.524	0.755	1.028	1.342	1.699	2.098
	3 1/2 x 2 3/16	0.022	0.090	0.204	0.364	0.569	0.820	1.116	1.458	1.846	2.278
	3 1/2 x 2 7/16	0.023	0.094	0.212	0.379	0.592	0.853	1.161	1.517	1.919	2.370
	4 x 2 11/16	0.025	0.103	0.233	0.415	0.649	0.935	1.273	1.663	2.105	2.599
12" * (.375) "S"	2 1/2 x 1 1/2	0.018	0.072	0.162	0.289	0.451	0.650	0.886	1.157	1.464	1.808
	2 1/2 x 1 11/16	0.018	0.073	0.166	0.296	0.463	0.667	0.908	1.187	1.502	1.854
	3 x 1 15/16	0.020	0.080	0.181	0.322	0.503	0.726	0.988	1.291	1.634	2.017
	3 1/2 x 2 3/16	0.021	0.086	0.195	0.348	0.543	0.783	1.066	1.393	1.763	2.177
	3 1/2 x 2 7/16	0.022	0.090	0.202	0.361	0.563	0.812	1.106	1.444	1.828	2.257
	4 x 2 11/16	0.024	0.098	0.220	0.393	0.614	0.885	1.205	1.574	1.992	2.459
14" * (.375) SCH. 30S	2 1/2 x 1 1/2	0.017	0.070	0.158	0.283	0.442	0.637	0.868	1.133	1.435	1.771
	2 1/2 x 1 11/16	0.018	0.072	0.162	0.290	0.452	0.652	0.888	1.160	1.468	1.813
	3 x 1 15/16	0.019	0.078	0.175	0.313	0.489	0.705	0.961	1.255	1.588	1.961
	3 1/2 x 2 3/16	0.021	0.084	0.189	0.337	0.526	0.758	1.032	1.348	1.706	2.106
	3 1/2 x 2 7/16	0.021	0.086	0.195	0.348	0.544	0.784	1.067	1.394	1.765	2.179
16" * (.375) SCH. 30S	4 x 2 11/16	0.023	0.094	0.212	0.378	0.590	0.850	1.157	1.512	1.914	2.362
	3 x 1 15/16	0.018	0.075	0.169	0.302	0.472					
	3 1/2 x 2 3/16	0.020	0.080	0.180	0.322	0.503					
	3 1/2 x 2 7/16	0.020	0.082	0.186	0.332	0.519					
	4 x 2 11/16	0.022	0.089	0.201	0.358	0.559					

NOTE: ALL PIPE MARKED * IS SINGER-LAYNE & BOWLER DIV. STANDARD.



VERTICAL CENTRIFUGAL PUMP

Installation of Pump Bowls and Column

Butt Joint Column

Enclosed Line Shaft

Derrick Installation of a Layne Pump requires a derrick 30 to 40 feet in height and a hand winch or power hoist of sufficient size to handle the total weight.

Foundation The concrete foundation for the pump base should be built in accordance with foundation plans furnished by the factory. Where a separate pump base plate is used it should be set in position in the concrete foundation before the pump bowls and column are installed but not grouted into position until the installation is completed.

Dimensions of Well Check the inside diameter of the well and the outside diameter of the pump bowls and column flanges or couplings to be sure that the pump and column will go in the well with ample clearance. The well casing must be straight and without obstructions that might bend the line shaft. Measure the static level of the water in the well to determine if the pump has been furnished with the proper depth of setting. The pump bowls should be submerged when the pump is operating and we do not recommend or guarantee satisfactory operation with a suction lift.

Check Material Check all parts of the pump against the packing list to find out whether all parts have been received. If any parts are missing claim should be made at once to the railroad company.

Clean All Joints All threads and flanged couplings of the discharge pipe and protective tubing should be carefully cleaned and at the time of installation coated with L A Y N C O T E. Care should be taken that there be absolutely no sand or grit between flanges or couplings when making up the joints.

Suction If a basket suction is used it should be lowered into the well first and held by pipe clamps. The suction pipe is picked up and screwed into the coupling at top of basket suction. The basket suction and suction pipe are then lowered into the well until about 18 inches of suction pipe extend above the well casing. The suction pipe is clamped in this position with pipe clamps. When the suction pipe has only threads at the top end care should be taken to place the clamps under the small lug welded on the pipe.

Pump Bowls The pump bowls should be carefully inspected before placing in the well. Rotate impeller shaft several times by hand to be sure that it does not bind at any point. The impeller shaft should have about 1/4-inch or more end play. DO NOT STRAIN SHAFT IN ANY WAY THAT MIGHT BEND IT AND DO NOT LIFT PUMP BOWLS BY THE SHAFT. The pump bowls can best be handled by a pair of pipe clamps. The bowls should be lifted into position and screwed or bolted to the suction pipe. The clamps on the suction pipe are then removed and the bowls and suction pipe lowered into the well until the top of the discharge nozzle is about 18 inches above the well casing or top of foundation. The bowls are then supported at this point by pipe clamps.

Discharge Column Pipe Check the enclosed chart to determine the correct spacing of the spiders in the discharge column. If the discharge pipe screws into the pump bowl be sure to have the coupling at the top end of the first section either with the spider or without the spider as shown on the chart. If the lower section of discharge pipe has a special flange to connect to the pump bowls be sure to arrange the pipe with this flange at the lower end.

Protective Tubing and Shaft The shaft and protective tubing are shipped assembled in 20-ft. or 10-ft. lengths and packed with sufficient lubricant to prevent rusting. A 20-ft. length or 10-ft. length of shaft and tubing is required for each 20-ft. or 10-ft. length of pipe. Remove the protecting cap only from the top end of the tubing, which is the end fitted with the bronze shaft bearing and tubing coupling. Slide the assembled tubing and shafting into the discharge column pipe, making sure that the bronze bearing end of the assembly will be on top.

Installing Discharge Column Pull the tubing about six inches below the lower end of the discharge pipe and tie them together in this position with a piece of rope by taking several half hitches around the pipe and then the tubing.

Raise the assembled section of pipe, tubing and shafting until it is hanging vertically in the derrick with the lower end of the tubing about one inch above a board placed on the foundation. Remove the lower plug from the tubing to release the shaft. Raise the discharge pipe about six inches and take several half hitches around the shaft. This method avoids straining the shaft as the column is swung under the derrick. Swing the discharge pipe into position over the pump bowls and screw the shaft into the shaft coupling until it butts against the impeller shaft.

THE THREADS AND THE ENDS OF THE SHAFTING AND THE SHAFT COUPLINGS MUST BE PERFECTLY CLEAN.

Lower the discharge pipe and tubing and screw the tubing onto the main bearing box about 3 or 4 threads. Then coat the threads on the bronze box with L A Y N C O T E and screw the tubing on the box until it butts. The discharge pipe is then bolted or screwed to the pump bowls.

Remove the clamps from the pump bowls and lower the pump bowls with the section of discharge column until the column extends about 18 inches above the well casing or foundation. Clamp the discharge column in this position.

Remove the bronze shaft bearing and tubing coupling and pour about one pint of oil into the tubing. The oil used should be a good grade of mineral oil free from grit and foreign matter, with a viscosity rating approximately SAE 10 and having a relatively low cold pour point.

When the next section of discharge column is in position in the derrick replace the bronze bearing, screwing it into the tubing about 3 or 4 threads. After the spider and spider bushing or aligning ring have been installed (as described below) and the shaft connection is made, lower the discharge pipe and tubing and screw the tubing onto the bronze bearing about 3 or 4 threads. Then coat the threads of the bearing with L A Y N C O T E and screw the tubing on the bearing until the ends butt tightly together. IT IS VERY IMPORTANT THAT EVERY TUBING JOINT BE TIGHT AND to form a seal the ends of the tubing must be smooth and square. While handling and installing the tubing use care to keep from scoring or damaging the ends in any way.

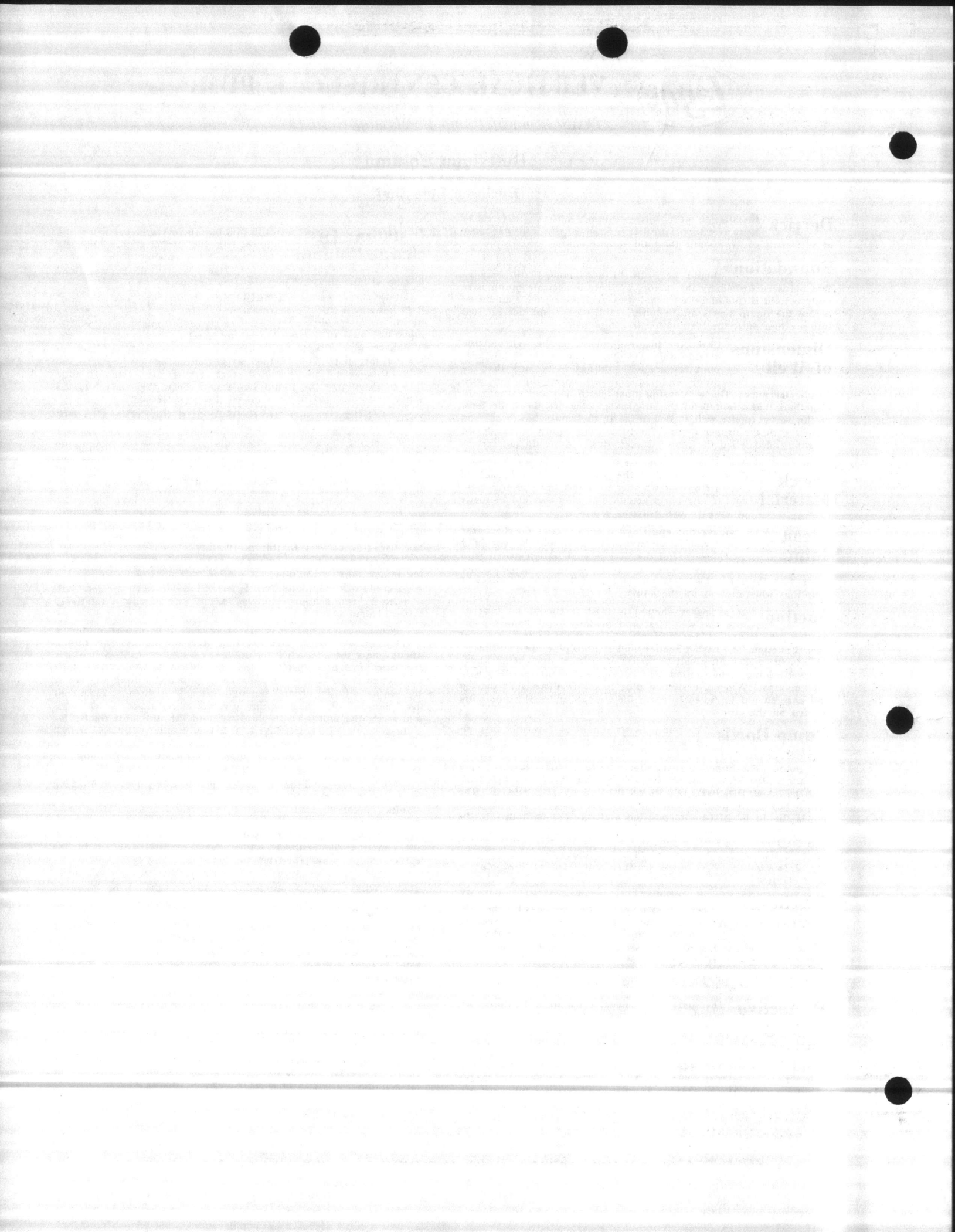
When flanged column is used, slip a bronze spider or aligning ring over the top of the tubing and fit it into the recess in the flange. (Refer to spider spacing chart to determine whether a flange or aligning ring should be used at the joint in question). When screw coupled column is used the spider is cast integral with the coupling. The rubber spider bushings are installed in the spiders before shipment from the factory.

Each section of discharge column is installed as described above. When screw couplings are used care should be taken in starting the pipe in the coupling. The pipe should start by hand and screw by hand to within 5 or 6 threads of butting. If the thread appears tighter than this check carefully for a damaged thread as the pipe should not be forced into the coupling. The last 5 or 6 threads should be made up with a chain tong, making sure that the joint is tight with the pipe butting against the shoulder in the coupling or against the end of the pipe in the coupling as the case might be.

When the line shaft connects to the motor drive shaft below the tension assembly, the motor drive shaft should be attached to the line shaft in the top section of tubing before the top length of discharge column is installed.

The top length of discharge pipe will usually have a special flange or special threads to connect to the bottom of the discharge cell and the top length of shaft will be of special length.

In case the discharge column does not check out within reasonable limits notify the factory to furnish the correct lengths.

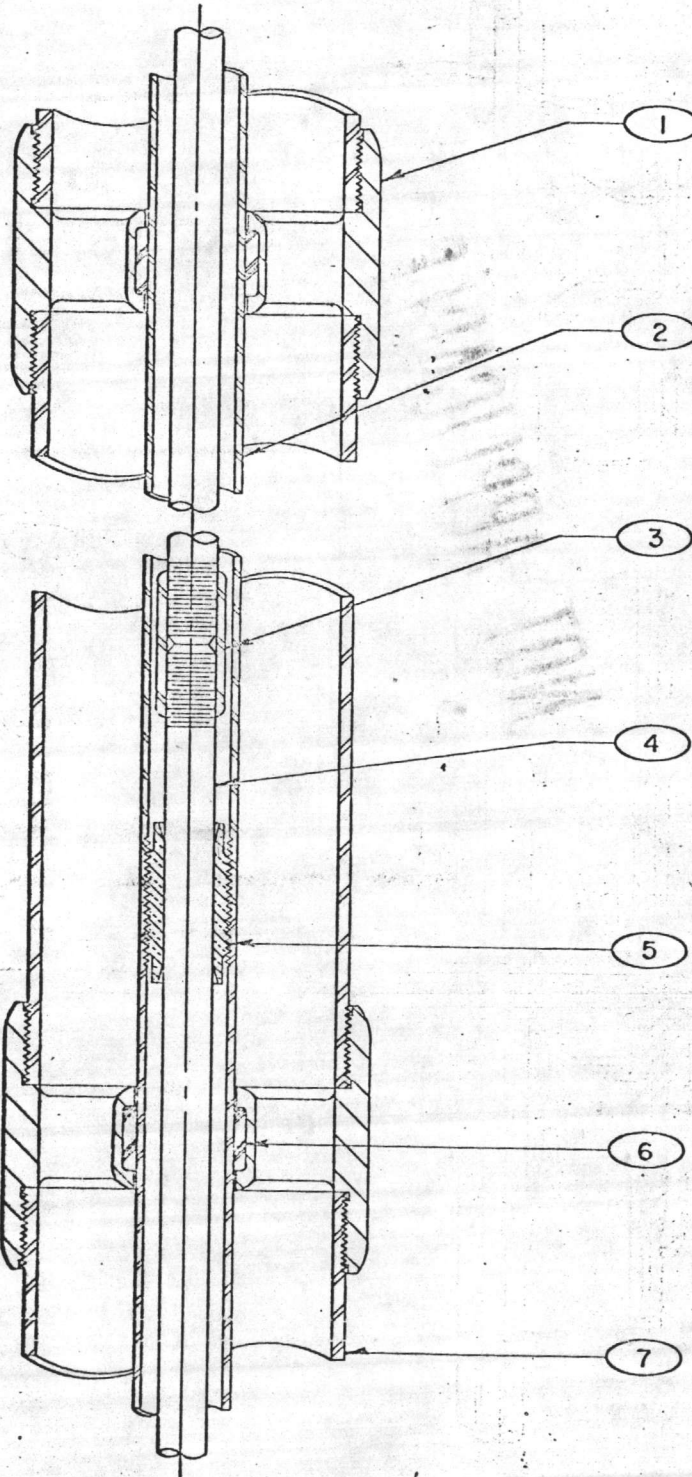


SINGER

LAYNE & DOWLER DIVISION
MEMPHIS, TENNESSEE U.S.A.



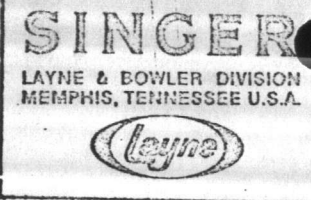
DISCHARGE COLUMN ASSEMBLY SCREWED TYPE - ENCLOSED LINE SHAFT



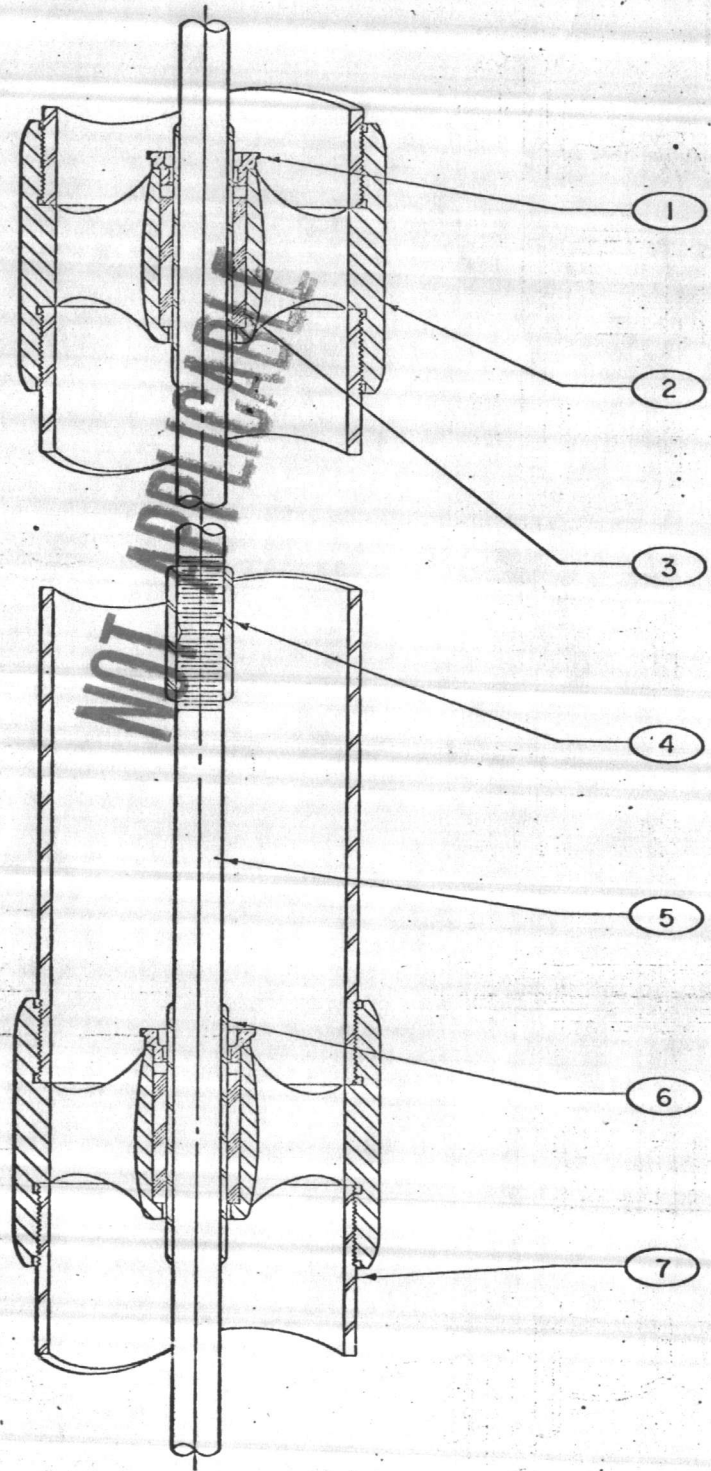
ITEM NO.	DESCRIPTION
1	COMBINATION COUPLING
2	SHAFT TUBING
3	SHAFT COUPLING
4	LINE SHAFT

ITEM NO.	DESCRIPTION
5	SHAFT BOX
6	RUBBER BEARING
7	COLUMN PIPE

IN ORDERING REPLACEMENT PARTS, SPECIFY PART DESCRIPTION & PUMP SERIAL NO.



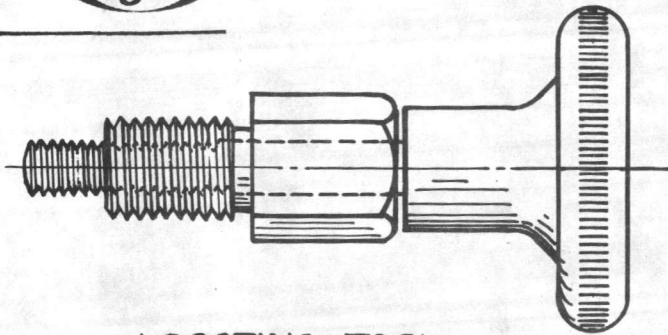
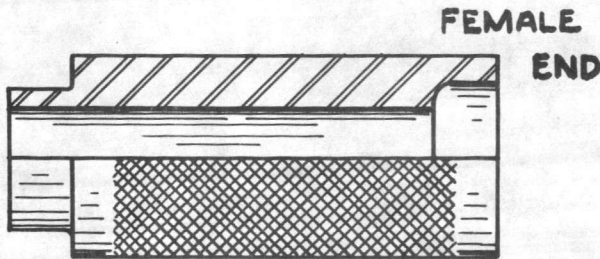
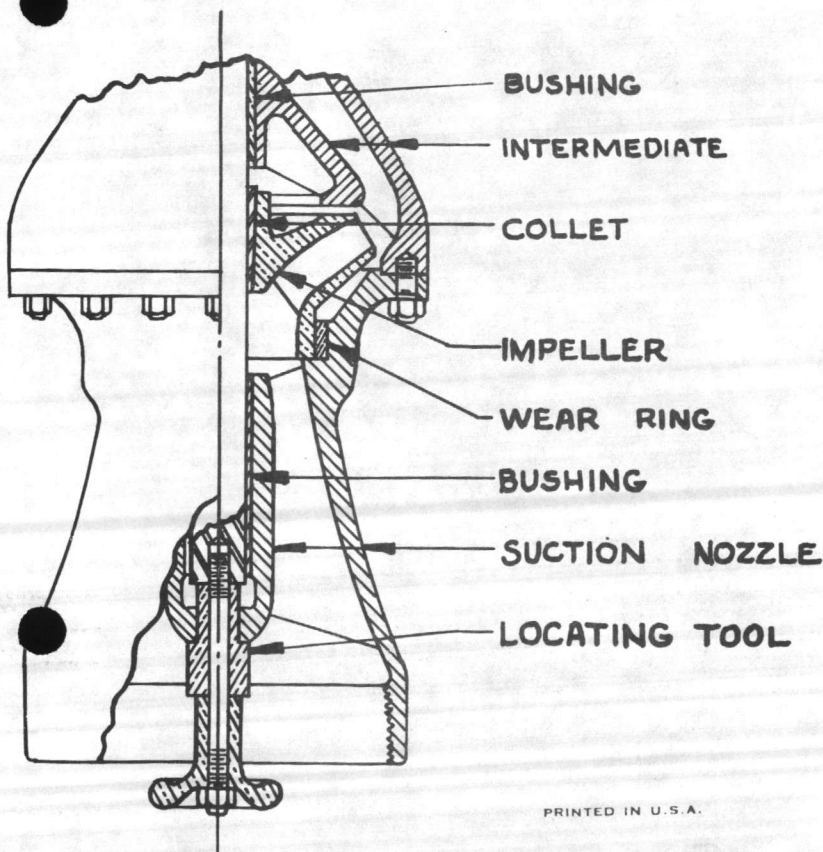
DISCHARGE COLUMN ASSEMBLY
SCREWED COUPLED - OPEN LINE SHAFT



ITEM NO.	DESCRIPTION
1	LOCK RING
2	COMBINATION COUPLING
3	RUBBER BEARING
4	SHAFT COUPLING

ITEM NO.	DESCRIPTION
5	LINE SHAFT
6	MONEL SLEEVE
7	COLUMN PIPE

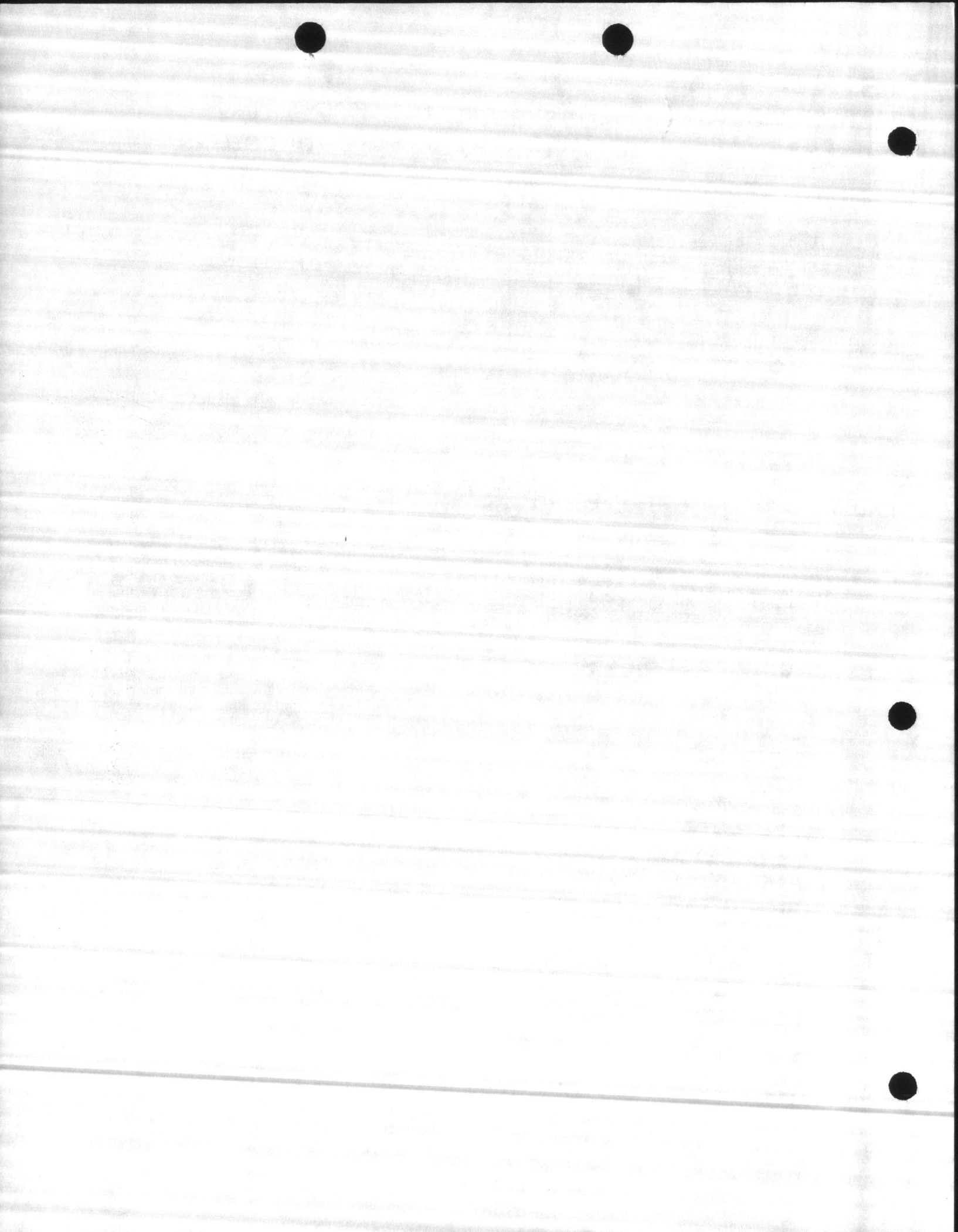
IN ORDERING REPLACEMENT PARTS, SPECIFY PART DESCRIPTION & PUMP SERIAL NO.

SINGERLAYNE & BOWLER DIVISION
MEMPHIS, TENNESSEE U.S.A.**INSTRUCTIONS FOR ASSEMBLY
AND DISMANTLING PUMP BOWLS WITH COLLETS****LOCATING TOOL****MALE
END****COLLET DRIVER****TO ASSEMBLE BOWL**

1. Remove cap screw from the bottom of the suction nozzle.
2. Screw locating tool into bottom end of suction nozzle hub.
3. Insert impeller shaft into suction nozzle bearing and turn handwheel of locating tool until impeller shaft is pulled down tight against the shoulder of the tool.
4. Place the impeller over the shaft. Slip the collet over the shaft with the small end first. (A screw driver can be used to spread collet for ease in slipping over shaft). Hold the impeller firmly into the wear ring recess and drive the collet into place with the male end of the collet driver.
5. Remove collet driver and assemble first intermediate stage. Place the next impeller over the shaft and continue to assemble as explained above.
6. When the bowl is completely assembled remove locating tool and replace cap screw in suction nozzle.

TO DISMANTLE BOWL

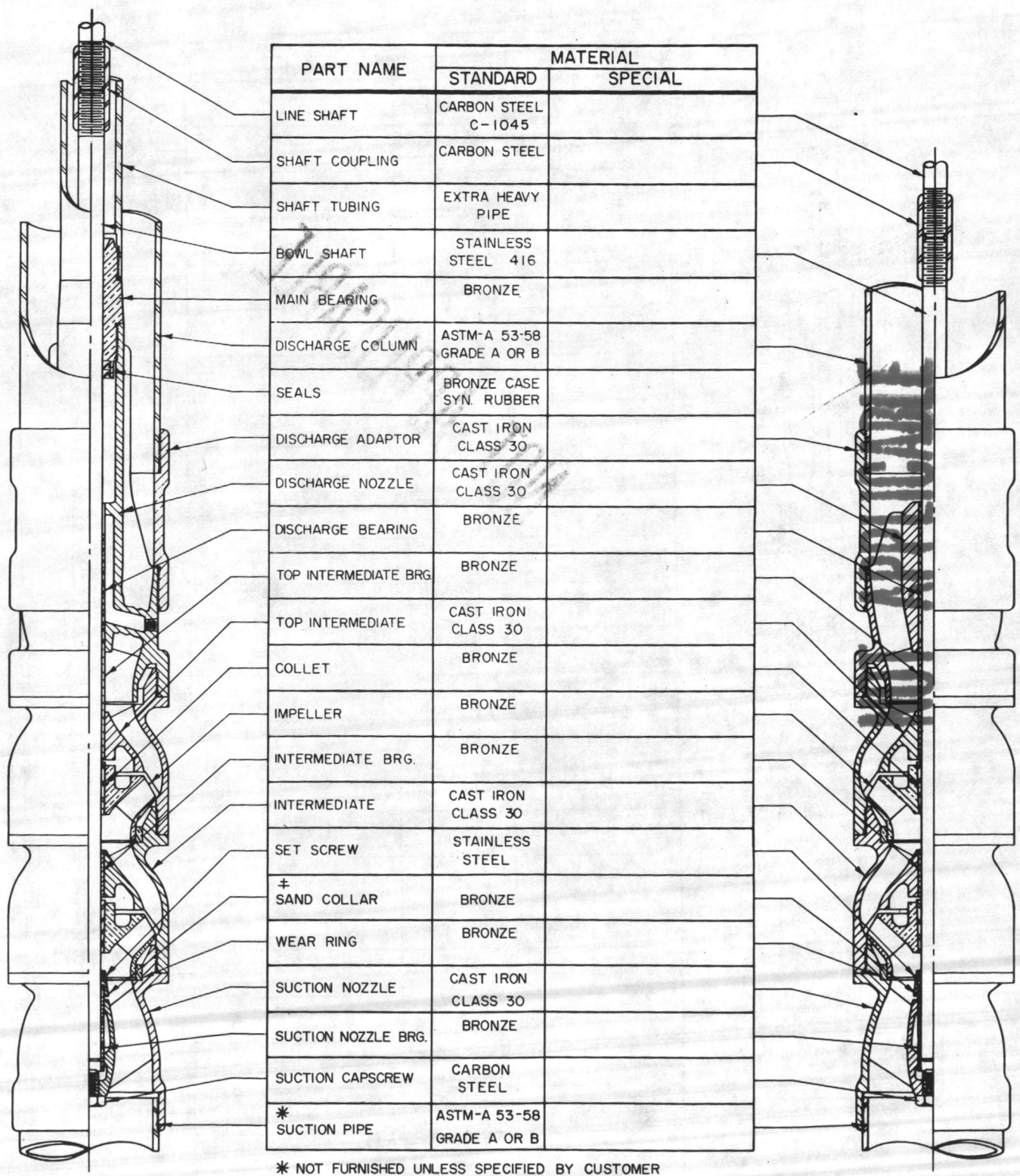
1. Remove discharge nozzle. Place collet driver over shaft with the female end first and while holding the impeller out of the wear ring recess, drive the impeller off of the collet. Remove the collet and impeller.
2. Remove the intermediate shell and drive the impeller off of the next collet. Continue to dismantle in like manner.





VERTICAL TURBINE PUMP DEEP WELL

8" B, DR, PR, RK, T, UR - 10" RK, T, U - 12" T, UR



PART NAME	MATERIAL	
	STANDARD	SPECIAL
LINE SHAFT	CARBON STEEL C-1045	
SHAFT COUPLING	CARBON STEEL	
SHAFT TUBING	EXTRA HEAVY PIPE	
BOWL SHAFT	STAINLESS STEEL 416	
MAIN BEARING	BRONZE	
DISCHARGE COLUMN	ASTM-A 53-58 GRADE A OR B	
SEALS	BRONZE CASE SYN. RUBBER	
DISCHARGE ADAPTOR	CAST IRON CLASS 30	
DISCHARGE NOZZLE	CAST IRON CLASS 30	
DISCHARGE BEARING	BRONZE	
TOP INTERMEDIATE BRG	BRONZE	
TOP INTERMEDIATE	CAST IRON CLASS 30	
COLLET	BRONZE	
IMPELLER	BRONZE	
INTERMEDIATE BRG.	BRONZE	
INTERMEDIATE	CAST IRON CLASS 30	
SET SCREW	STAINLESS STEEL	
‡ SAND COLLAR	BRONZE	
WEAR RING	BRONZE	
SUCTION NOZZLE	CAST IRON CLASS 30	
SUCTION NOZZLE BRG.	BRONZE	
SUCTION CAPSCREW	CARBON STEEL	
* SUCTION PIPE	ASTM-A 53-58 GRADE A OR B	

* NOT FURNISHED UNLESS SPECIFIED BY CUSTOMER
‡ HARD RUBBER USED ON 8" BOWLS

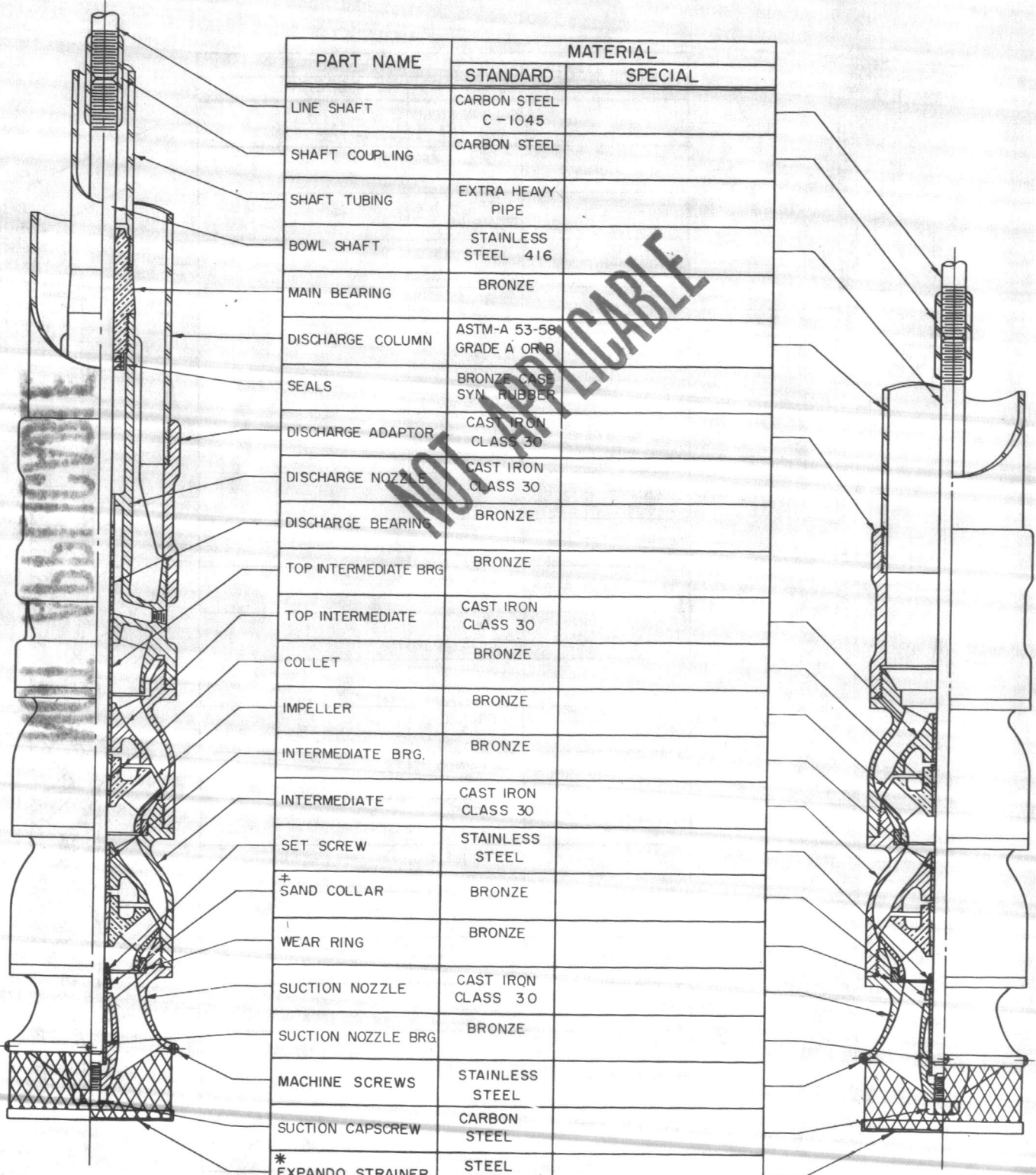
ENCLOSED LINE SHAFT

OPEN LINE SHAFT

VERTICAL TURBINE PUMP SHORT COUPLED



8" B, DR, PR, RK, T, UR-10" RK, T, U-12" T, UR

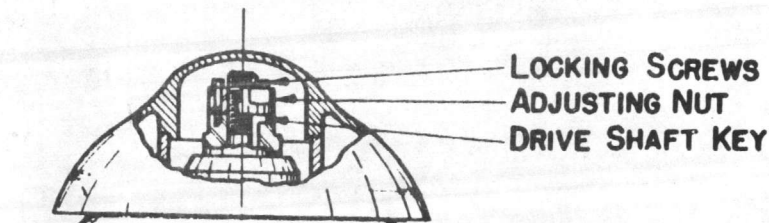


PART NAME	MATERIAL	
	STANDARD	SPECIAL
LINE SHAFT	CARBON STEEL C-1045	
SHAFT COUPLING	CARBON STEEL	
SHAFT TUBING	EXTRA HEAVY PIPE	
BOWL SHAFT	STAINLESS STEEL 416	
MAIN BEARING	BRONZE	
DISCHARGE COLUMN	ASTM-A 53-58 GRADE A OR B	
SEALS	BRONZE CASE SYN RUBBER	
DISCHARGE ADAPTOR	CAST IRON CLASS 30	
DISCHARGE NOZZLE	CAST IRON CLASS 30	
DISCHARGE BEARING	BRONZE	
TOP INTERMEDIATE BRG	BRONZE	
TOP INTERMEDIATE	CAST IRON CLASS 30	
COLLET	BRONZE	
IMPELLER	BRONZE	
INTERMEDIATE BRG.	BRONZE	
INTERMEDIATE	CAST IRON CLASS 30	
SET SCREW	STAINLESS STEEL	
± SAND COLLAR	BRONZE	
WEAR RING	BRONZE	
SUCTION NOZZLE	CAST IRON CLASS 30	
SUCTION NOZZLE BRG	BRONZE	
MACHINE SCREWS	STAINLESS STEEL	
SUCTION CAPSCREW	CARBON STEEL	
* EXPANDO STRAINER	STEEL CADMIUM PLTD	

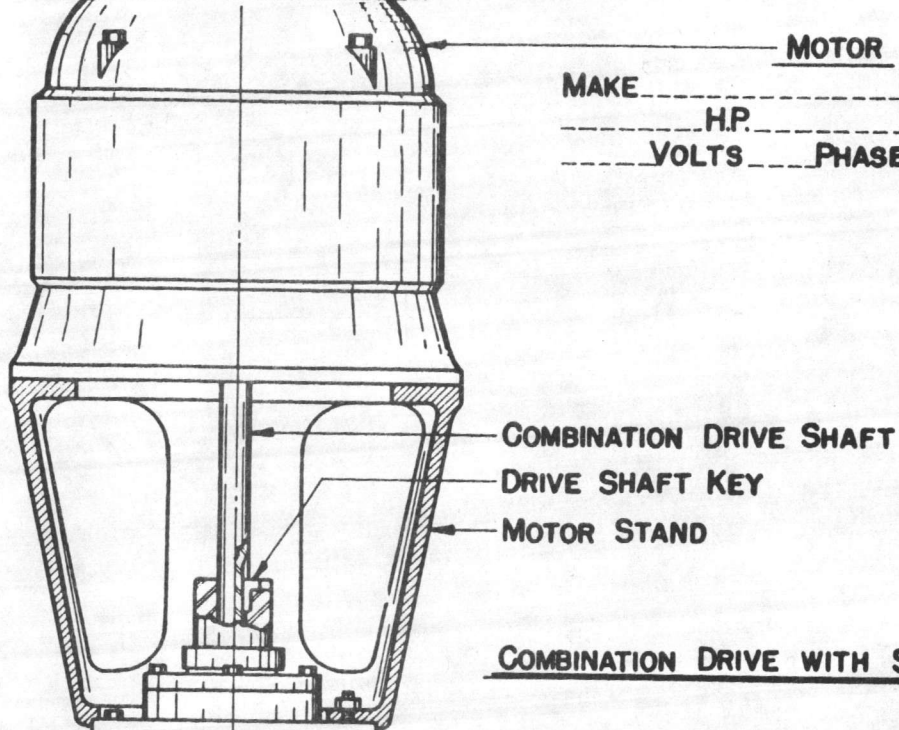
ENCLOSED LINE SHAFT

OPEN LINE SHAFT

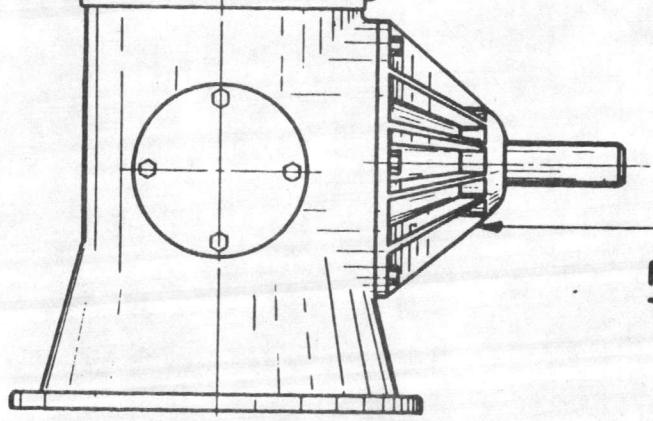
* NOT FURNISHED UNLESS SPECIFIED BY CUSTOMER
± HARD RUBBER USED ON 8" BOWLS



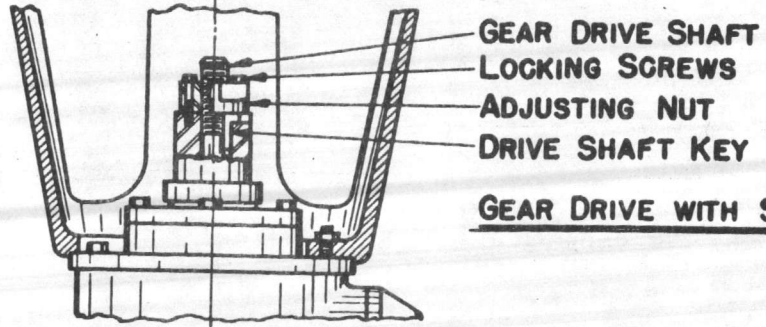
MOTOR
MAKE _____ FRAME NO. _____
HP. _____ R.P.M. _____
VOLTS _____ PHASE _____ CYCLES _____



COMBINATION DRIVE WITH SOLID SHAFT

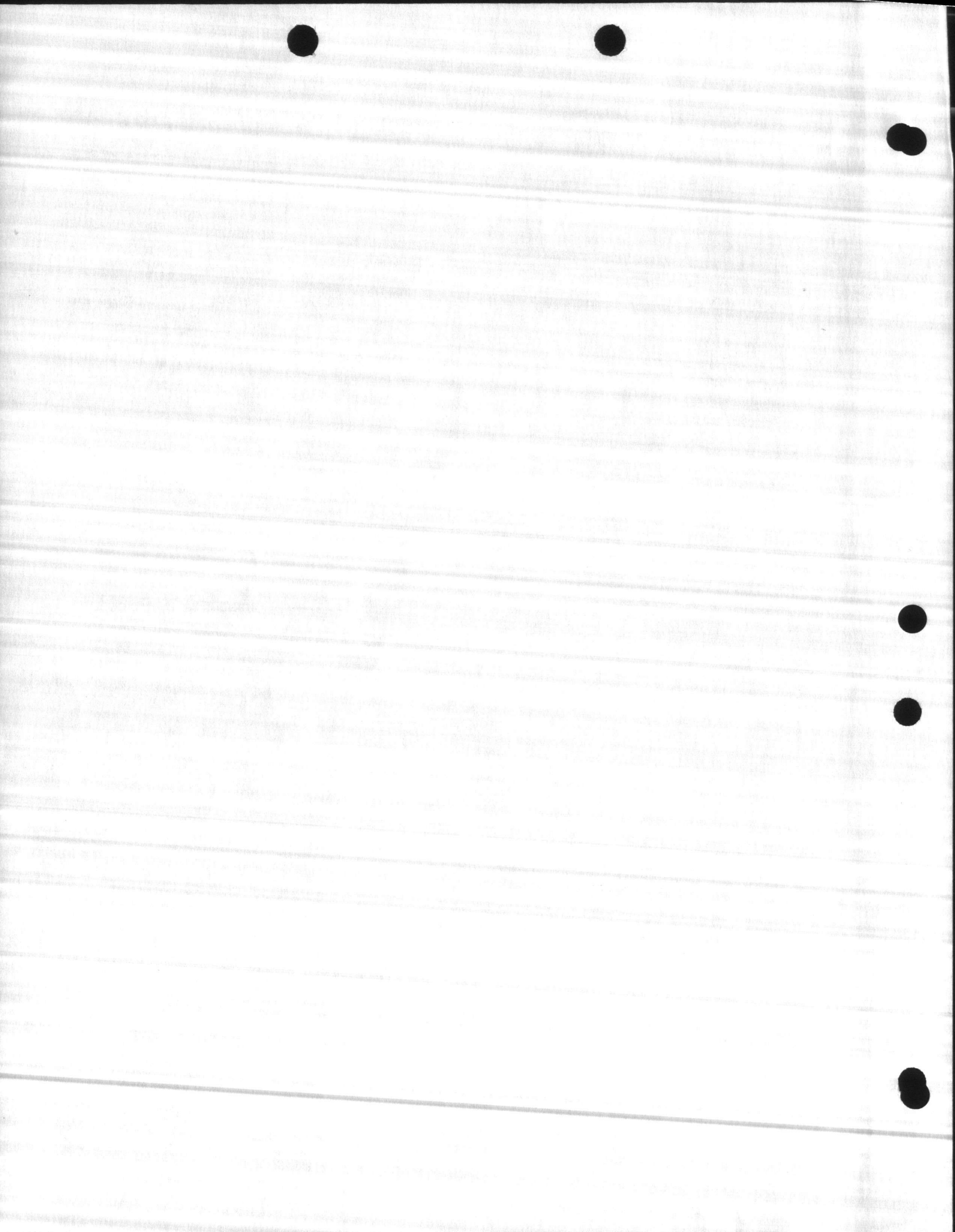


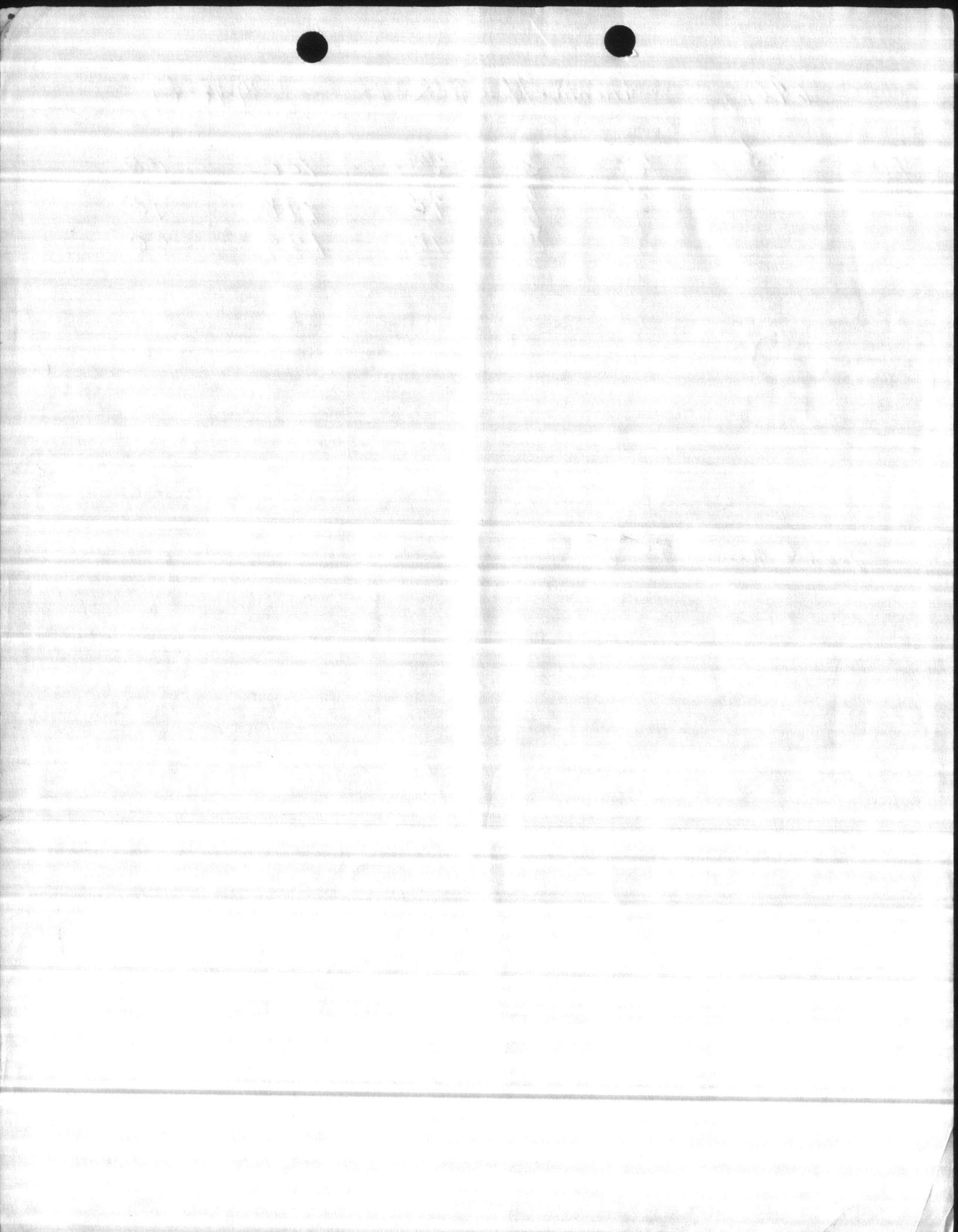
MAKE _____
TYPE _____ FRAME NO. _____

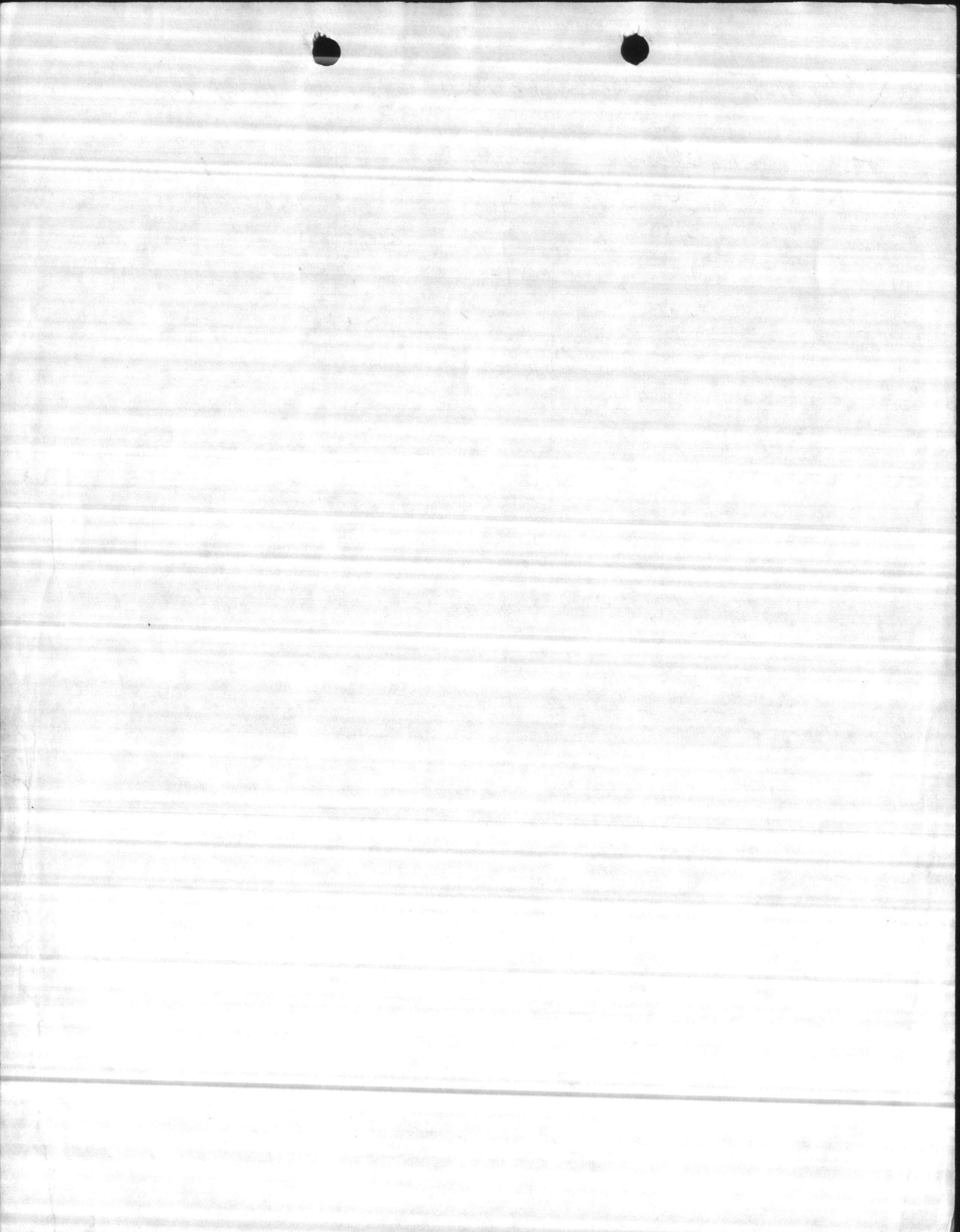


GEAR DRIVE WITH SEPARATE SHAFT

**COMBINATION GEAR DRIVE AND HOLLOW SHAFT MOTOR
USING SOLID COMBINATION SHAFT & SEPARATE GEAR SHAFT**







U.S. DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
OFFICE OF WATER DATA COORDINATION
INVENTORY OF HYDROLOGIC DATA STATIONS
QUALITY OF WATER

APPROVED.
Budget Bureau No. 42-R1485
Approval Expires June 30, 1976

1. AGENCY CODE MC		2. TYPE Q	3. LATITUDE 34° 43' 17" N			4. LONGITUDE 77° 20' 34" W		
6. AGENCY STATION NO. HP-646		7. STATION NAME HP-670-646						
8. DRAINAGE BASIN CODE No. Letter 06 N		9. STATE CODE 32	10. COUNTY CODE 133	11. COUNTY NAME Onslow				
12. PERIOD OF RECORD Began Discontinued 1972		Y <input type="checkbox"/> Continuous <input type="checkbox"/> Interruption Exceeds 1 Year			13.		14.	
15. SITE								
<input type="checkbox"/> 101 Stream		<input type="checkbox"/> 104 Reservoir			<input checked="" type="checkbox"/> 107 Well			
<input type="checkbox"/> 102 Canal		<input type="checkbox"/> 105 Estuarine zone			<input type="checkbox"/> 108 Drain			
<input type="checkbox"/> 103 Lake		<input type="checkbox"/> 106 Spring			<input type="checkbox"/> 109 Other			
16. TYPES OF DATA AVAILABLE AND FREQUENCY OF MEASUREMENT (Enter appropriate number (1-8) beside each parameter to indicate frequency of measurement. For parameters telemetered, enter "T".)								
1 Continuous 2 Seasonal		3 Daily 4 Weekly		5 Monthly 6 Quarterly		7 Annual 8 Other Periodic		
<i>Physical</i>		<i>Chemical</i>			<i>Biologic</i>			
311 Temperature		331 Dissolved solids			361 Coliforms			
312 Specific conductance		332 <u>8</u> Chloride			362 Other micro-organisms (Benthic organism, phytoplankton, etc.)			
313 Turbidity		333 Nutrients (nitrogen)			363 Other			
314 Color		334 Nutrients (phosphorus)						
315 Odor		335 Common ions						
316 p _i (field)		336 <u>8</u> Hardness			<i>Sediment</i>			
317 <u>8</u> p _i (lab)		337 Radiochemical			371 Concentration (suspended)			
318 Eh		338 Dissolved oxygen			372 Particle size (suspended)			
319 Suspended solids		339 Other gases			373 Particle size (bed load material)			
320 Other		340 Minor elements			374 Other			
		341 Pesticides (insecticides, herbicides, etc.)						
		342 Detergents - MBS						
		343 Biochemical oxygen demand						
		344 Carbon (total, dissolved, etc.)						
17. SUPPLEMENTARY DATA AVAILABLE FOR STATION								
<input type="checkbox"/> 421 Surface water station		<input type="checkbox"/> 423 Water stage or level		<input type="checkbox"/> 425 Time of travel				
<input type="checkbox"/> 422 Ground water station		<input checked="" type="checkbox"/> 424 Water discharge		<input type="checkbox"/> 426 Drainage area				
18. STORAGE OF DATA								
<input type="checkbox"/> 501 Published		<input type="checkbox"/> 503 Data on punchcard			<input type="checkbox"/> 505 Other			
<input checked="" type="checkbox"/> 502 Not published		<input type="checkbox"/> 504 Data on magnetic tape, disc, data cell, etc.						
19. INQUIRIES ABOUT DATA SHOULD BE SENT TO:								
Office <u>Base Maintenance Department, Utilities Division</u>								
Street No. <u>Marine Corps Base</u>								
City, State, Zip <u>Camp Lejeune, North Carolina 28542</u>						City Code 0735		
20. DATA ARE AVAILABLE TO PUBLIC ON REQUEST <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No								
21. OFFICE COMPLETING FORM BASE MAINTENANCE DEPARTMENT								
22. COMPILER'S NAME BOB WILSON						23. DATE 12 Month 19 <u>76</u> year		

10-11-0

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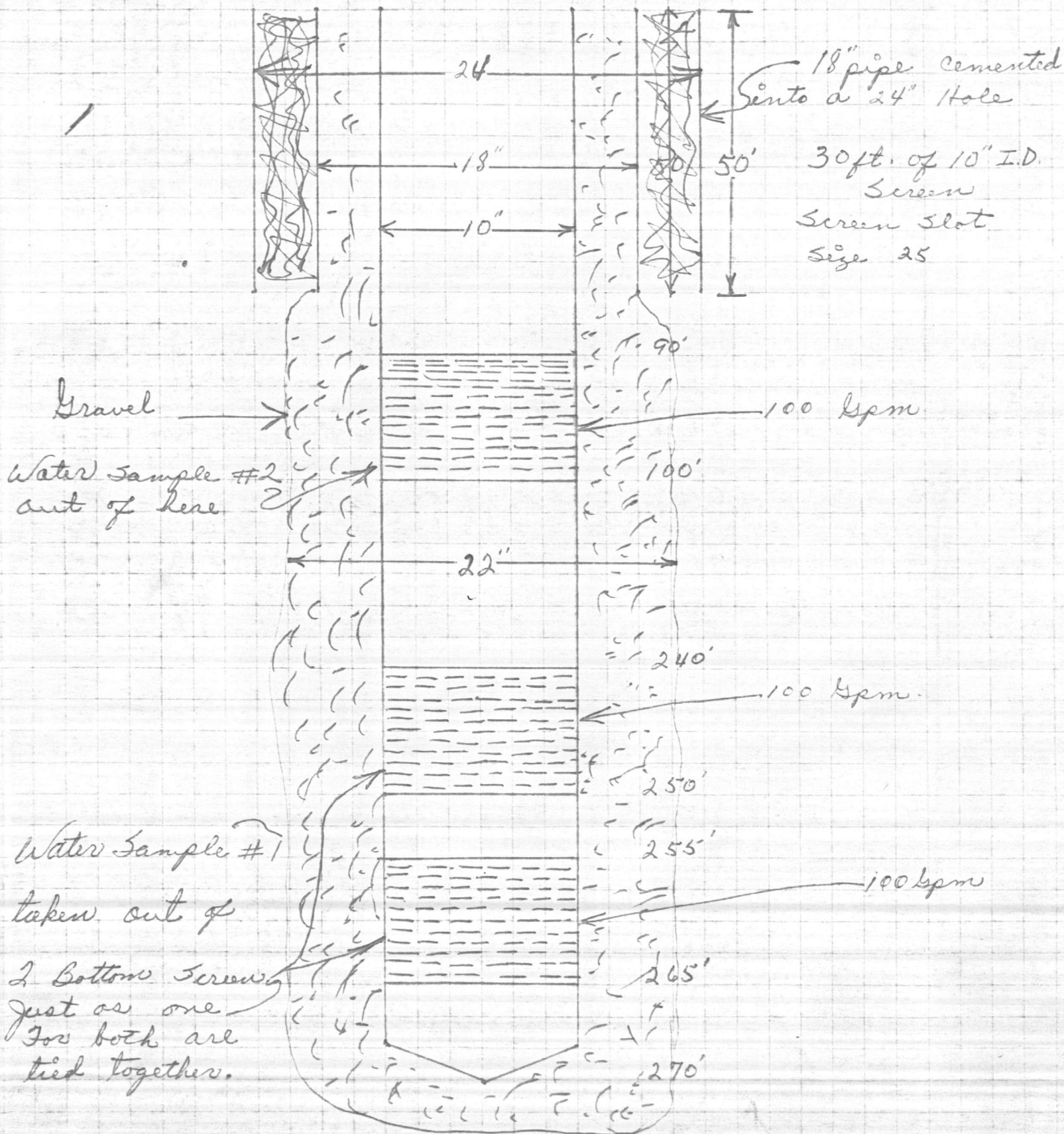
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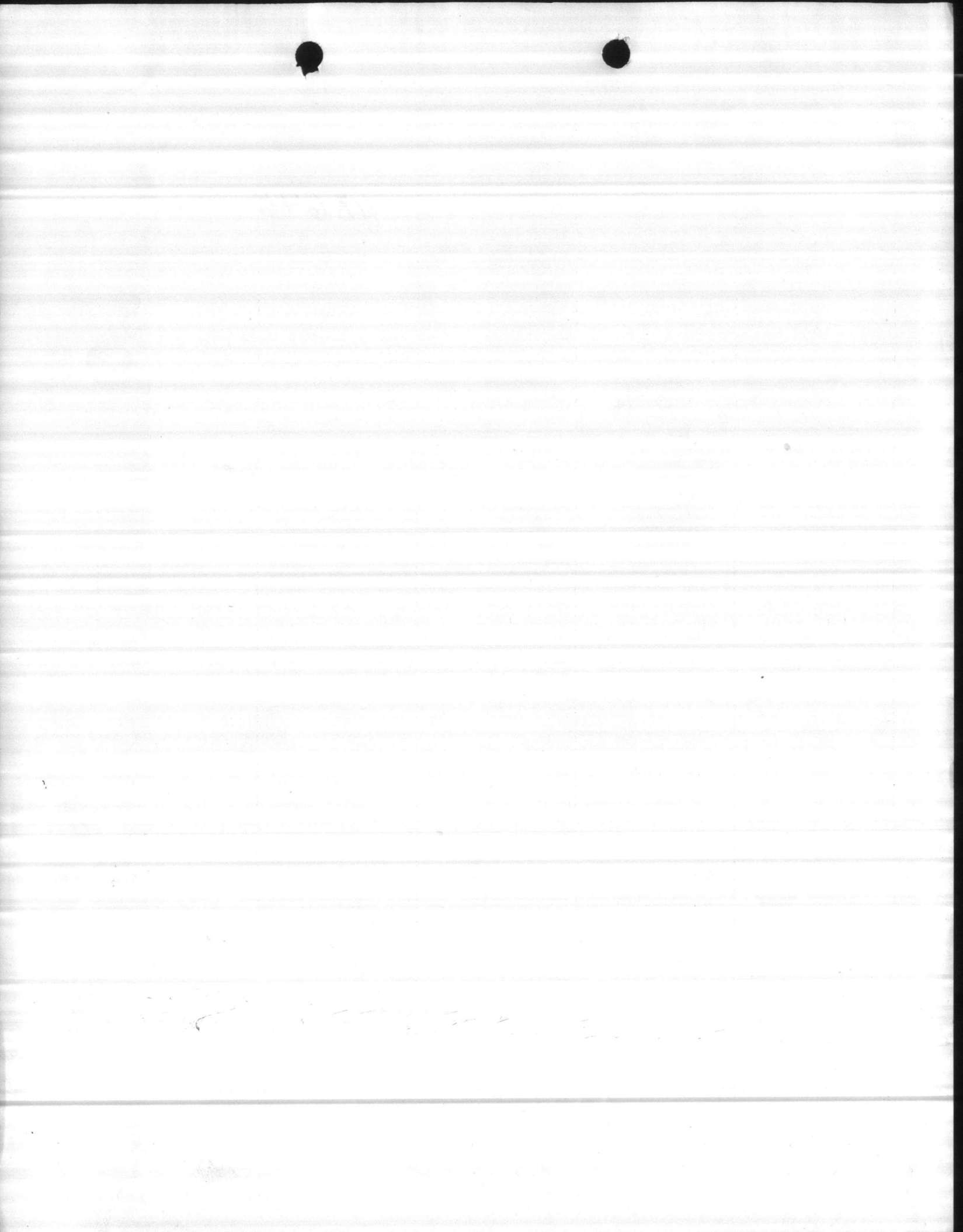
10-11-0

Corbin Construction Co Jun 11, 1971

Camp Lejeune, D.C. Job # 40936

Singers Layne Atlantic Co Sketch of Proposed Well # 8





WATER ANALYSIS LABORATORY
802 Hamlet Highway
Bennettsville, South Carolina
29512

2

(803) 479-4639

Date: June 11, 1971

696

Report To: Layne Atlantic Co.
Norfolk, Va.

Date Analyzed: 6/11/71
Sample Number: Camp Lejeune
Well #8, 80'-100'

Analysis Results--Parts Per Million

Determination

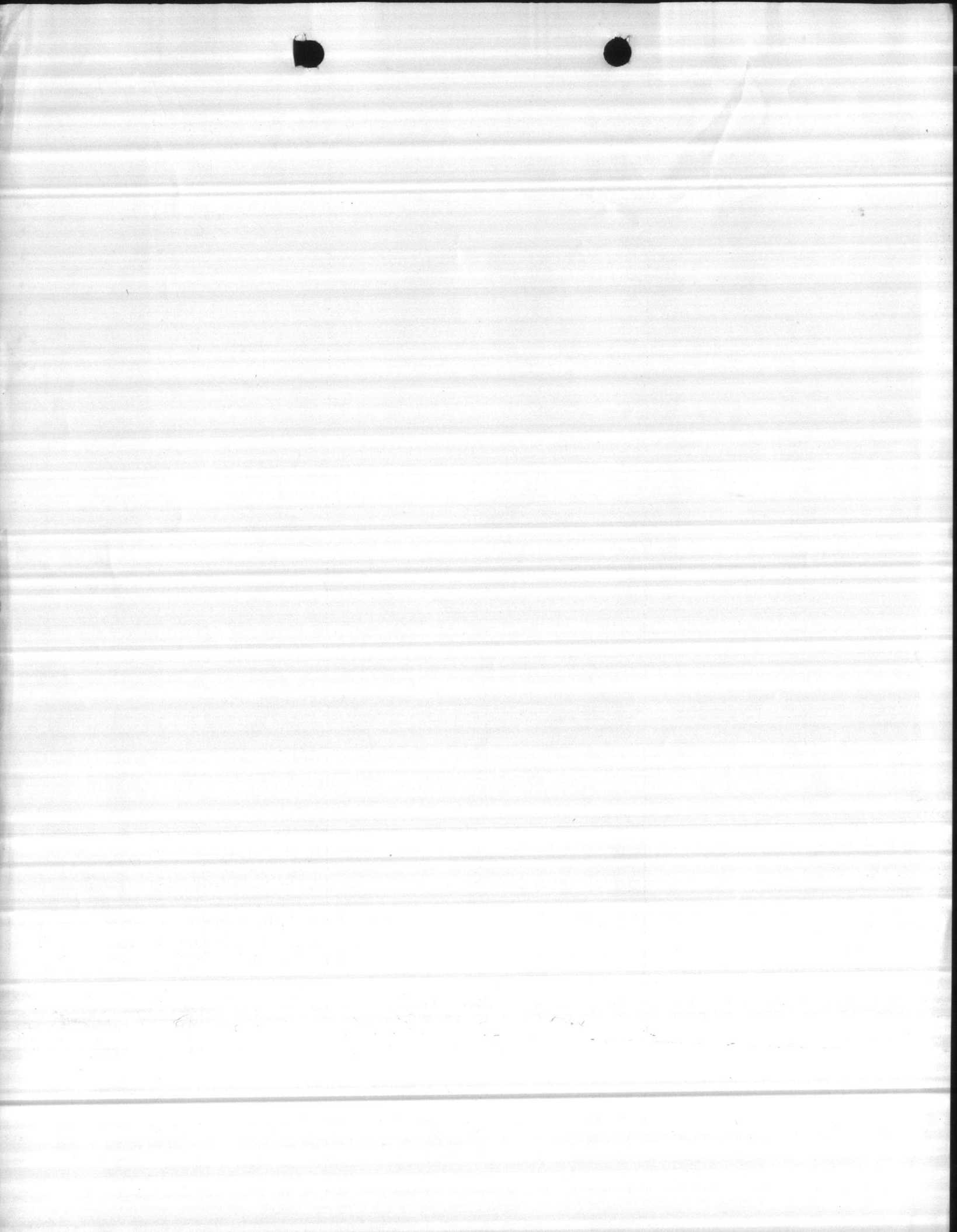
pH 7.3
Iron (Fe) 0.1
Nitrate (NO₃) 0.2
Fluoride (F) 0.3
Manganese (Mn) 0
Total Hardness (CaCO₃) 196
Chlorides (Cl) 6
Sulfate (SO₄) 6.2
Phosphate (PO₄) 0.4
Magnesium (Mg) 4.8
Calcium (Ca) 70
Carbonate (CO₃) 0
Bicarbonate (HCO₃) 195
Hydroxide (OH) 0

Determination

Carbon Dioxide (CO₂) 16
Total Acidity (CaCO₃) 38
Calcium Hardness (CaCO₃) 176
Magnesium Hardness (CaCO₃) 20
Carbonate Hardness (CaCO₃) 196
Noncarbonate Hardness (CaCO₃) 0
Alkalinity (Phenolphthalein) (CaCO₃) 0
Carbonate Alkalinity (CaCO₃) 0
Bicarbonate Alkalinity (CaCO₃) 160
Total Alkalinity (CaCO₃) 160
Total Dissolved Solids 221
Specific Conductance
(micromhos at 25°) 340
Appearance When Analyzed Clear
Odor When Analyzed Not Objectionable

Signed: W. P. Johnson
W. P. Johnson, Laboratory Director

Remarks: _____

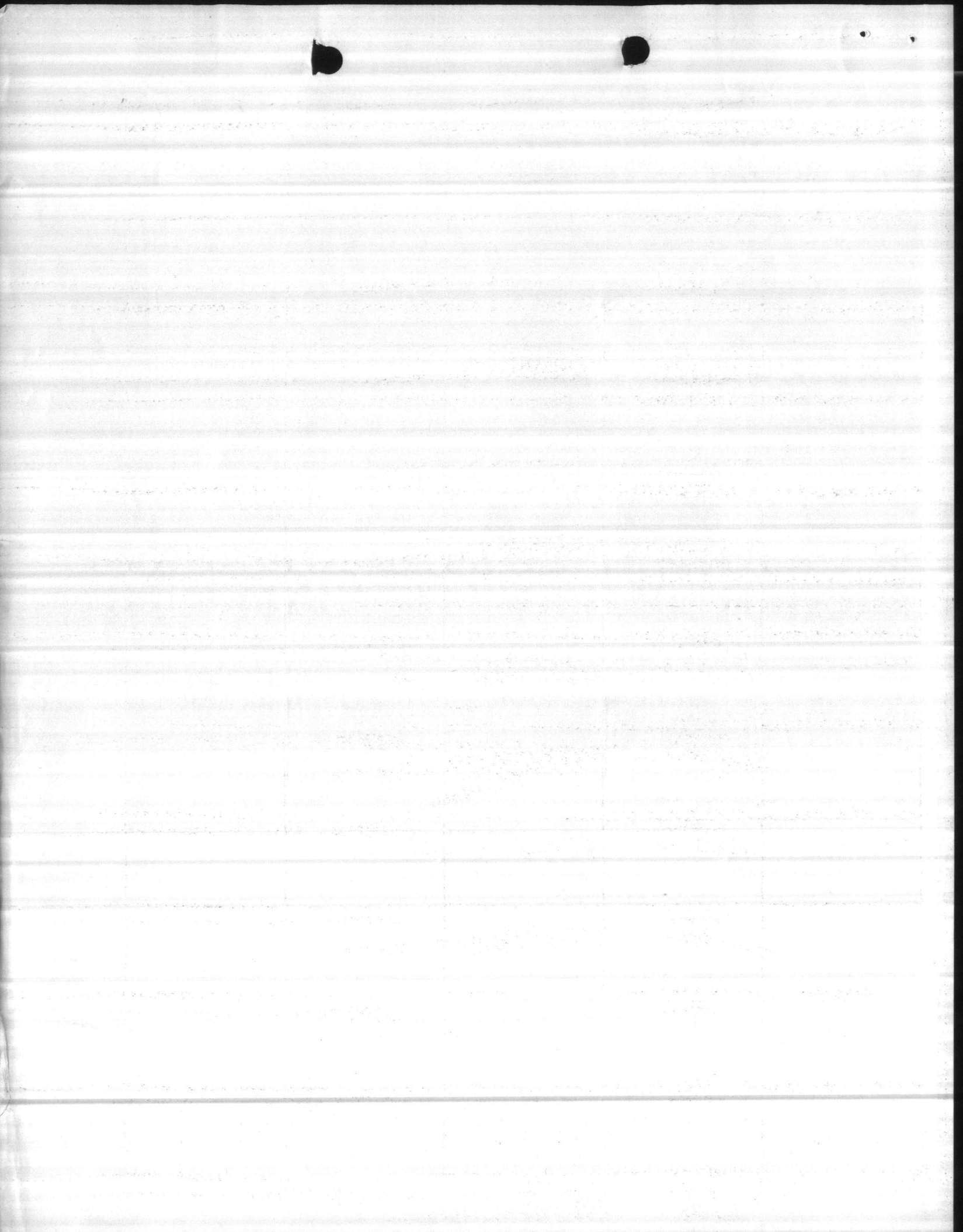


8/18/78
23' ST

CORBIN CONSTRUCTION COMPANY
Camp LeJeune, North Carolina
Pumping Test Well No. 8
June 23, 1971

Static Level 23 Ft.

TIME	GPM	PUMPING LEVEL	TIME	GPM	PUMPING LEVEL
9:00	160	23'	6:45	323	52' 9"
9:15	160	34' 1"	7:45	323	53' 1"
9:30	160	34' 6"	8:45	323	53' 1"
9:45	160	34' 9"	9:45	323	53' 1"
10:00	160	34' 10"	10:45	323	53' 1"
10:30	160	35' 1"	11:45	323	53' 1"
11:00	160	35' 4"	12:45 PM	323	53' 1"
12:00	160	35' 5"	1:45	323	52' 1"
12:15	200	38' 3"	2:45	323	51' 8"
12:30	200	38' 5"	3:45	323	51' 8"
12:45	200	38' 6"	4:45	323	51' 8"
1:15	200	38' 7"	5:45	323	51' 8"
1:45	200	39' 0"	6:45	323	51' 8"
2:15	200	39' 2"	7:45	323	51' 8"
2:45	200	39' 3"	8:45	323	51' 8"
3:00	250	43' 2"	9:45	323	51' 8"
3:15	250	43' 2"	10:45	323	51' 8"
3:30	250	43' 4"	11:45	323	51' 8"
4:00	250	43' 4"	12:45AM	323	51' 8" 6/25/71
4:30	250	43' 6"	1:45	323	51' 8"
5:00	250	43' 6"	2:00	363	57' 2"
5:30	250	43' 8"	2:15	363	57' 4"
5:45	302	48' 6"	2:30	363	57' 5"
6:00	302	48' 8"	3:00	363	57' 6"
6:15	302	49' 1"	3:30	363	57' 7"
6:45	302	49' 2"	4:00	363	57' 7"
7:15	302	49' 3"	4:30	363	57' 8"
7:45	302	49' 4"	4:45	413	62' 11"
8:15	302	49' 5"	5:00	413	63' 1"
8:30	329	51' 7"	5:15	413	63' 4"
8:45	329	51' 8"	5:45	413	63' 5"
9:00	329	51' 9"	6:15	413	63' 7"
9:30	329	51' 10"	6:45	413	63' 7"
10:00	329	52' 1"	7:15	413	63' 8"
10:30	323	52' 2"	7:30	463	67' 10"
11:00	323	52' 3"	7:45	463	68' 2"
11:15	323	52' 4"	8:00	463	68' 3"
11:30	323	52' 4"	8:30	463	68' 5"
11:45	323	52' 4"	9:00	463	68' 6"
12:15AM	323	52' 4" 6/24/71	9:30	463	68' 7"
12:45	323	52' 4"	10:00	463	68' 8"
1:15	323	52' 4"	10:15	513	72' 9"
1:45	323	52' 4"	10:30	513	72' 10"
2:45	323	52' 4"	10:45	513	73' 0"
3:45	323	52' 4"	11:15	513	73' 3"
4:45	323	52' 9"	11:45	513	73' 6"
5:45	323	52' 9"	12:15PM	513	73' 8"
			12:45	513	73' 8"



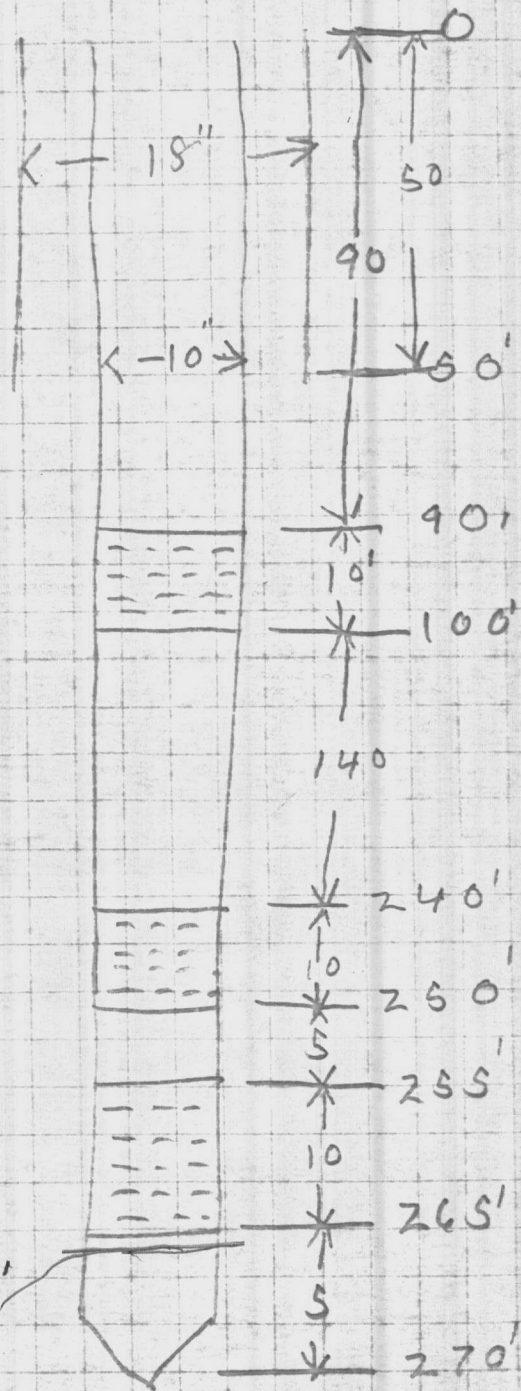
6-2-71
Corbin Construction Co.

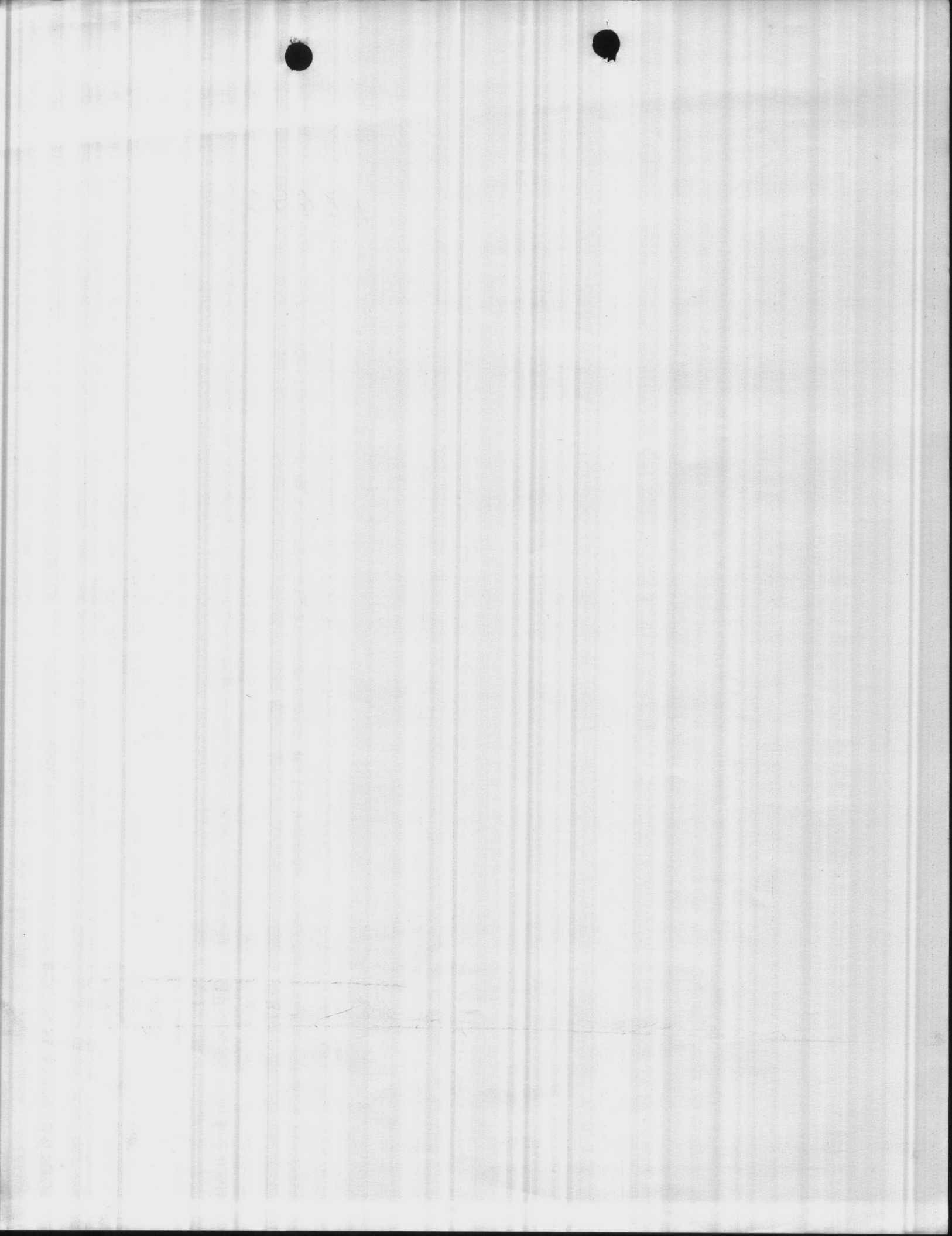
Camp Lejeune, N.C. Jt. 40936

Test Well #8 Formation Log

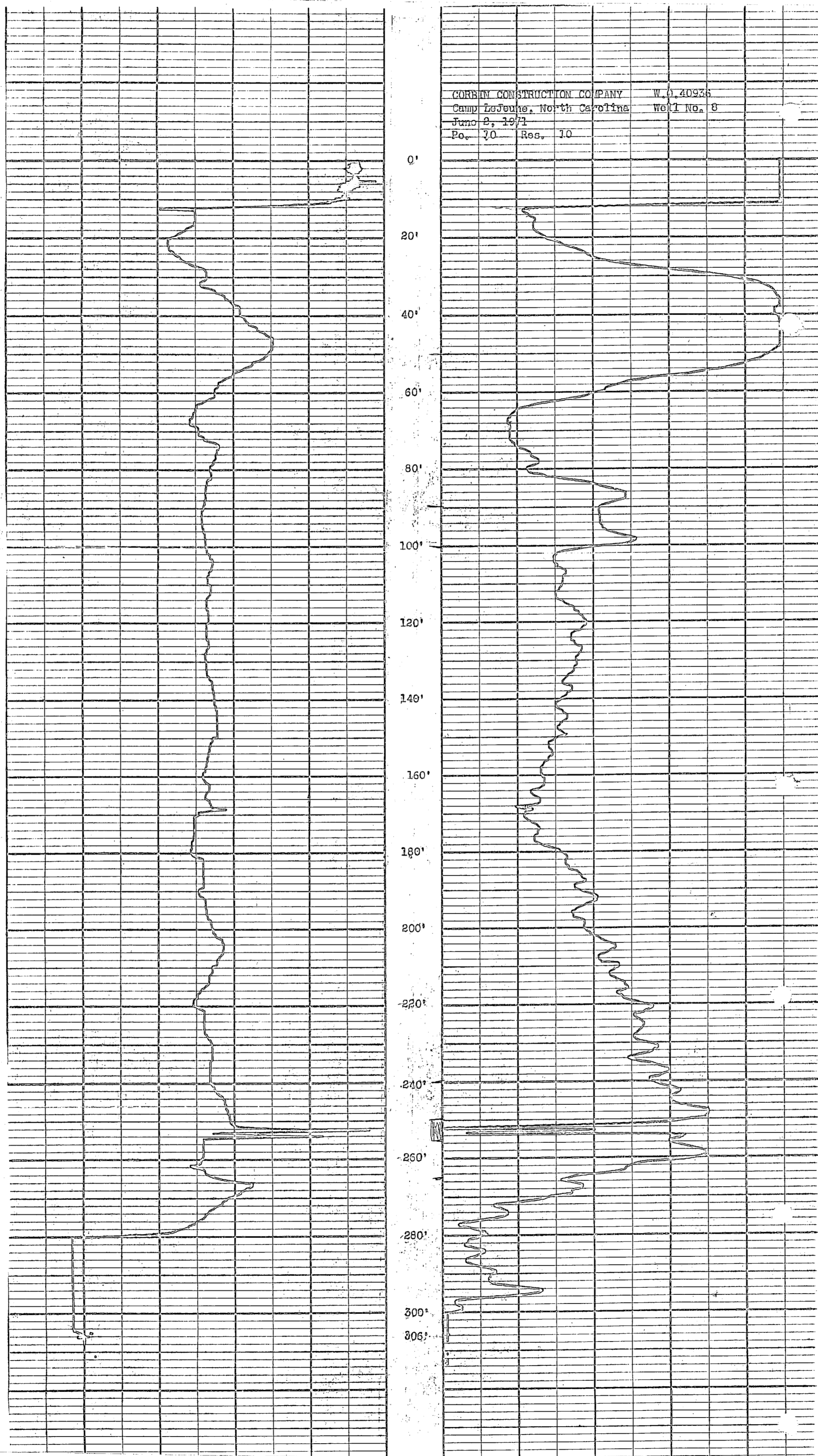
HB 646

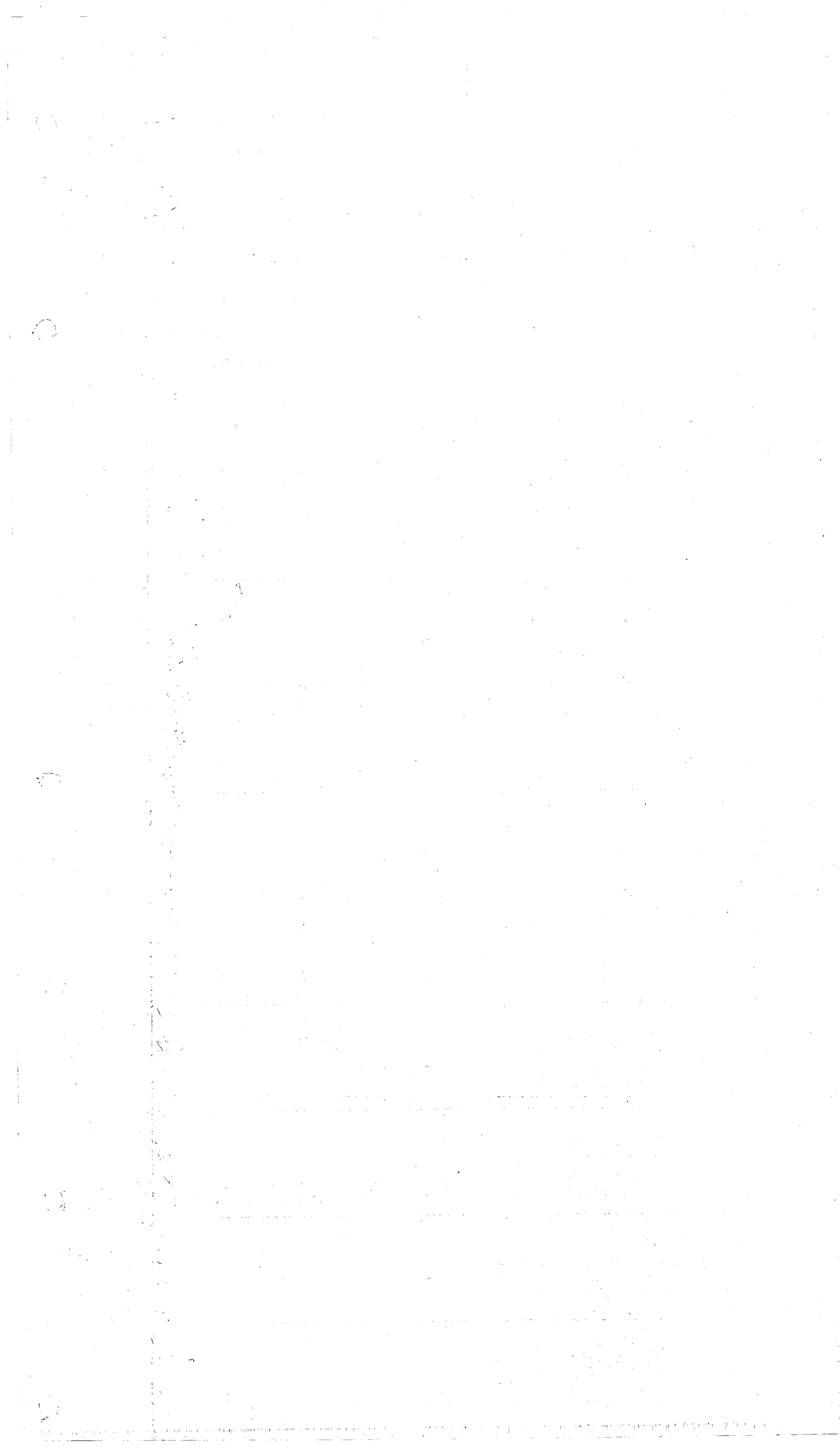
0-10'	Sandy clay
10-21'	coarse sand
21-39'	Gravel + Clay
38-43'	Gravel + Sand
43-50'	Sand Coarse
50-64'	sand + gravel
64-84'	Sand
84-105'	lime stone
105-125'	lime stone + Sand
125-146'	limestone + Sand
146-166'	limestone + Sand
166-187'	Sand
187-207'	limestone and sand
207-228'	limestone + sand
228-248'	limestone + sand
248-268'	lime stone + Sand
268-288'	pepper sand
288-310'	pepper Sand Strips of Rock + Clay





CORBIN CONSTRUCTION COMPANY W. O. 40938
Camp Lejeune, North Carolina Well No. 8
June 2, 1971
Pg. 70 Rec. 10



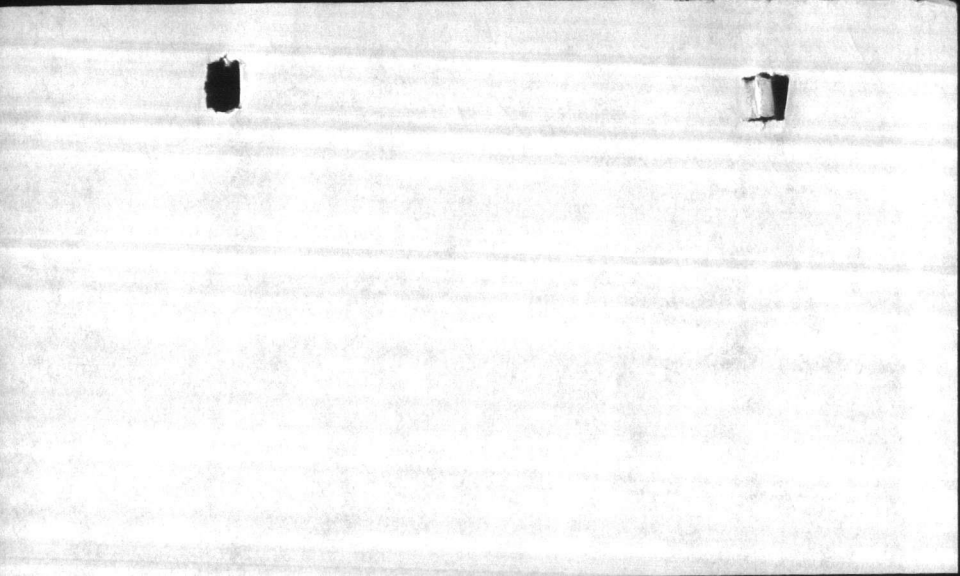


PUMP PULLED CLEANED +
REPAIRED 8/21/78

Static 23'

Depth 266'

Pump was clogged with
iron



nections. Provide a slide type shutoff gate and flexible connection with rubberized fabric at the inlet to each feeder.

IIB.4 Lime solution pumps shall be positive displacement plunger type suitable for pumping lime solution. Each pump shall have a capacity of 400 gallons per hour at a discharge pressure of 50 psig. Pumps shall be complete with totally enclosed horizontal electric motors, gear reducers, plunger pumps with provisions for adjustment in motion, and cast iron frame. Pump casing shall be cast iron with stainless steel plungers. Suction and discharge check valves shall have reversible seats. Pump components shall be self aligning.

IIB.5 Softeners shall be cold lime water softening units utilizing catalytic precipitation. The units shall have a capacity of 700 gpm each. Units shall be constructed of structural steel shapes and plates and shall include support legs and braces for adequate support. Unit shall be complete with proper internal baffles, weirs, overflow, etc., to provide proper level control. Provide four sample taps with piping to 4 feet above grade with ball valves for sampling bed at various levels. Provide catalyst hopper with water piping to deliver catalyst to the top of the unit. Submit complete shop drawings of unit and all accessories. Provide complete catalyst charge for each unit. Analysis of the raw water is expected to be approximately as shown in the following table.

	<u>Raw Water</u>	<u>Softener Effluent</u>
Calcium	180	35
Magnesium	8	8
Sodium and potassium	25	25
Bicarbonate	182	2
Carbonate	0	35
Chloride	25	25
Total hardness	188	43
Alkalinity (M.O.)	182	37
Alkalinity (PH)	0	17
Carbon dioxide	13	0
Iron	0.6	0.1
pH	7.2	10.2

IIB.6 Filters. Provide two gravity type, rapid sand filters. Each filter shall have a capacity of 1 million gallons per day at a filter rate of 2 gpm per square foot of filter area. Each filter shall be complete with all necessary equipment including underdrain system, sand and gravel filter media, wash troughs, cast iron wall and floor thimbles, access manholes, hydraulically operated valves, surface wash system, and operating tables.

Submitted Note

1. Electricity log.

2. Reconnaissance + Data.

1. Appropriate depth

2. Details of construction

4. Screen opening

5. Estimation of quantity of water from each

water bearing strata + from the complete well

H.B. 646 WELL #8