



Consumers
Power
Company

David J VandeWalle
Nuclear Licensing Administrator

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August 11, 1982

Dennis M Crutchfield, Chief
Operating Reactors Branch No 5
Nuclear Reactor Regulation
US Nuclear Regulatory Commission
Washington, DC 20555

DOCKET 50-155 - LICENSE DPR-6 -
BIG ROCK POINT PLANT - REACTOR
RECIRCULATION PUMPS (RCP) AND
REACTOR CLEAN-UP PUMP

On May 3, 1982, Consumers Power Company submitted a letter that incorporated into one document a request for relief from certain Inservice Inspection Requirements and specific ASME code requirements. Omitted from that letter were specific requests for relief from internal visual inspection of the Reactor Circulation Pump (RCP) casing welds and the Reactor Clean-Up Pump internal welds. A request for relief from internal visual inspection of the RCP casing welds and the Reactor Clean-Up Pump internal welds will be submitted as an addenda to our May 3, 1982 letter in the near future. This letter provides the rationale for that relief request and in addition, provides Consumers Power Company response to questions raised by representatives of Science Applications Inc. (SAI) concerning the RCP casing welds. These questions were raised as a result of the SAI review of Consumers Power Company's letter of May 3, 1982 and were discussed during a conference call between SAI, the NRC and Consumers Power Company on July 29, 1982. Also provided by this letter are detailed engineering drawings of the RCP's and the Reactor Clean-up Pumps requested by SAI.

David J VandeWalle
Nuclear Licensing Administrator

CC Administrator, Region III, USNRC
NRC Resident Inspector-Big Rock Point
R Yorg, SAI

Attachment - 16 pages

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CONSUMERS POWER COMPANY

BIG ROCK POINT PLANT

ATTACHMENT I TO LETTER ENTITLED

REACTOR CIRCULATION PUMPS AND
REACTOR CLEAN-UP PUMP

Consumers Power Company
Big Rock Point Plant

RR-A39 Pump Casing Welds

The Big Rock Point Plant has two (2) Reactor Circulation Pumps (RCP) which are welded to the 20-inch recirculation loop. These pumps function during normal reactor operation to provide forced recirculation through the core. The inspection of these pumps is considered to be impractical based on the following rationale:

1) Approximately 600 man-hours would be required and a total exposure in excess of 1000 man-rem would be experienced in performing the examination. All work would have to be performed in full face mask or under supplied air conditions. Shielding would reduce the total exposure by only 25%.

The man-hour estimate is based only on the onsite work performed by maintenance, operators and NDT personnel and does not include engineering time, pre-outage job planning or the man-hours expended by Radiation Protection personnel providing direct coverage.

2) The pump casing was fabricated from cast stainless steel (ASTM A-351, Grande CF8M). This alloy corresponds roughly to type 316 stainless steel (Ni/Cr ratio modified to facilitate casting). The thickness, material and manufacturing process lead to extraordinarily large grain sizes. Large grain cast stainless steels are considered to be non-inspectable with ultrasonics because this material is highly attenuative. The presence of delta ferrite (typically 15% or more) provides increased resistance to intergranular stress corrosion cracking (IGSCC). Delta ferrite also improves resistance to pitting corrosion. Neither Byron Jackson (pump manufacturer) or Southwest Research Institute use or advocate ultrasonic examination of primary coolant pump casing welds.

3) External access to the pump casing welds is not possible due to the base plate configuration. Furthermore, external placement of radiographic testing (RT) film is also precluded due to the base plate configuration of the pump.

4) The RCP has a double volute configuration and according to the manufacturer (Byron Jackson), lacks access for internal visual or surface examination of the pump casing.

5) The RCP design corresponds to the Type C pump illustrated in Figures NB-3441.3-2 and 3423-2 (1980 Edition, ASME B&PV Code, Section III). The "Splitter" prevents placement of RT film cassettes or an exposure device inside the pump thus precluding radiographic testing.

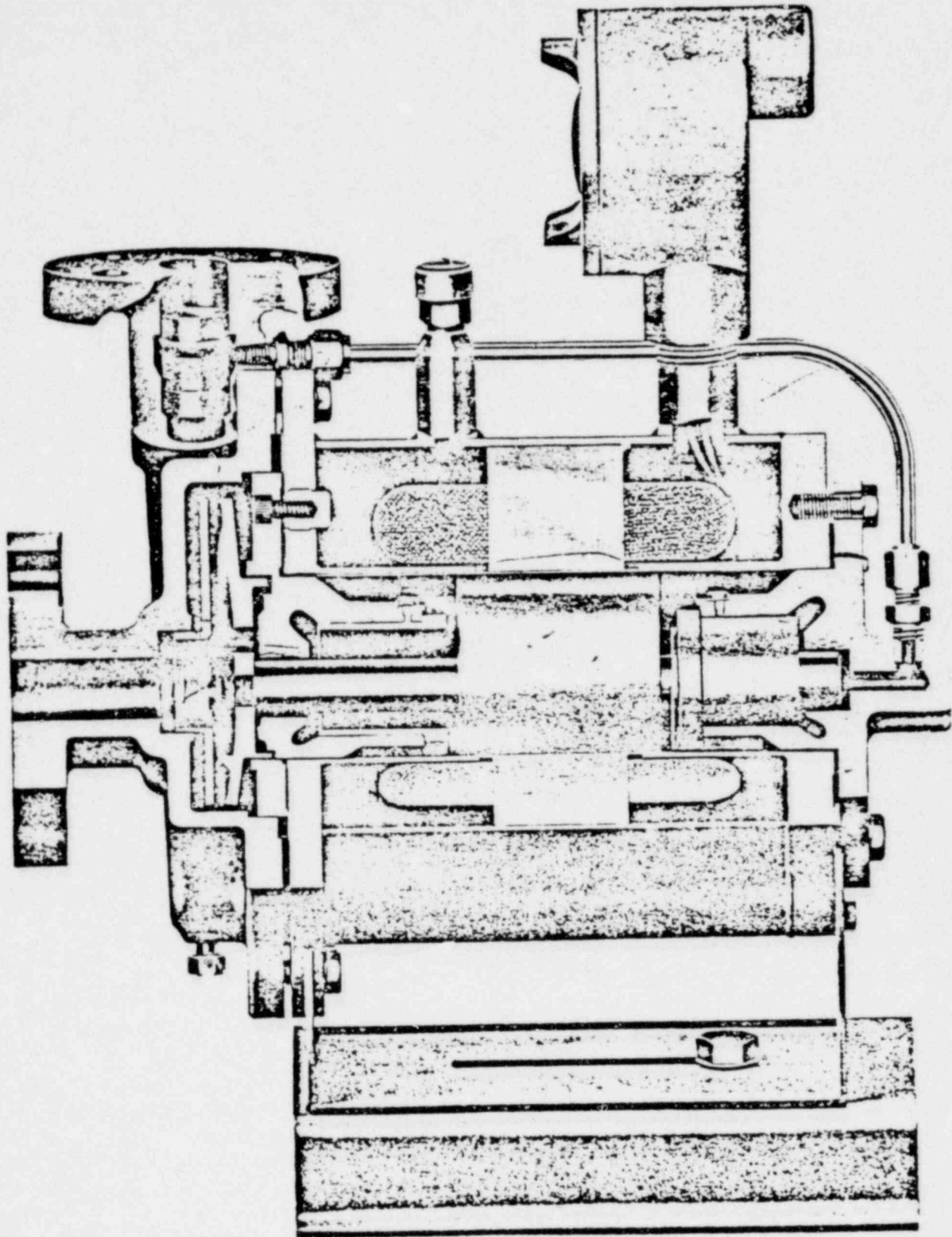
6) Notwithstanding the difficulty of ultrasonic testing, Consumers Power Company will attempt to determine the minimum wall thickness of the pump casings during the 1983 refueling outage.

7) Consumers Power Company is a member of the EPRI Owners Group for Byron Jackson pumps. We are presently investigating method (i.e. MINAC) that might be used in the examination of the RCP's at Big Rock Point.

Consumers Power Company
Big Rock Point Plant

Reactor Clean-Up Pumps

Relief from inspection of the internal welds of the two Reactor Clean-up Pumps at the Big Rock Point Plant will be requested. Both pumps are of similar design (Reference Fostoria Chempump drawings D-10570 and D-66159). Model GD is on-line with Model CH reserved as a spare. All accessible external welds will be surface examined during the 1983 refueling outage. The interior of the pump will be inspected to the extent practicable should the pump be disassembled.

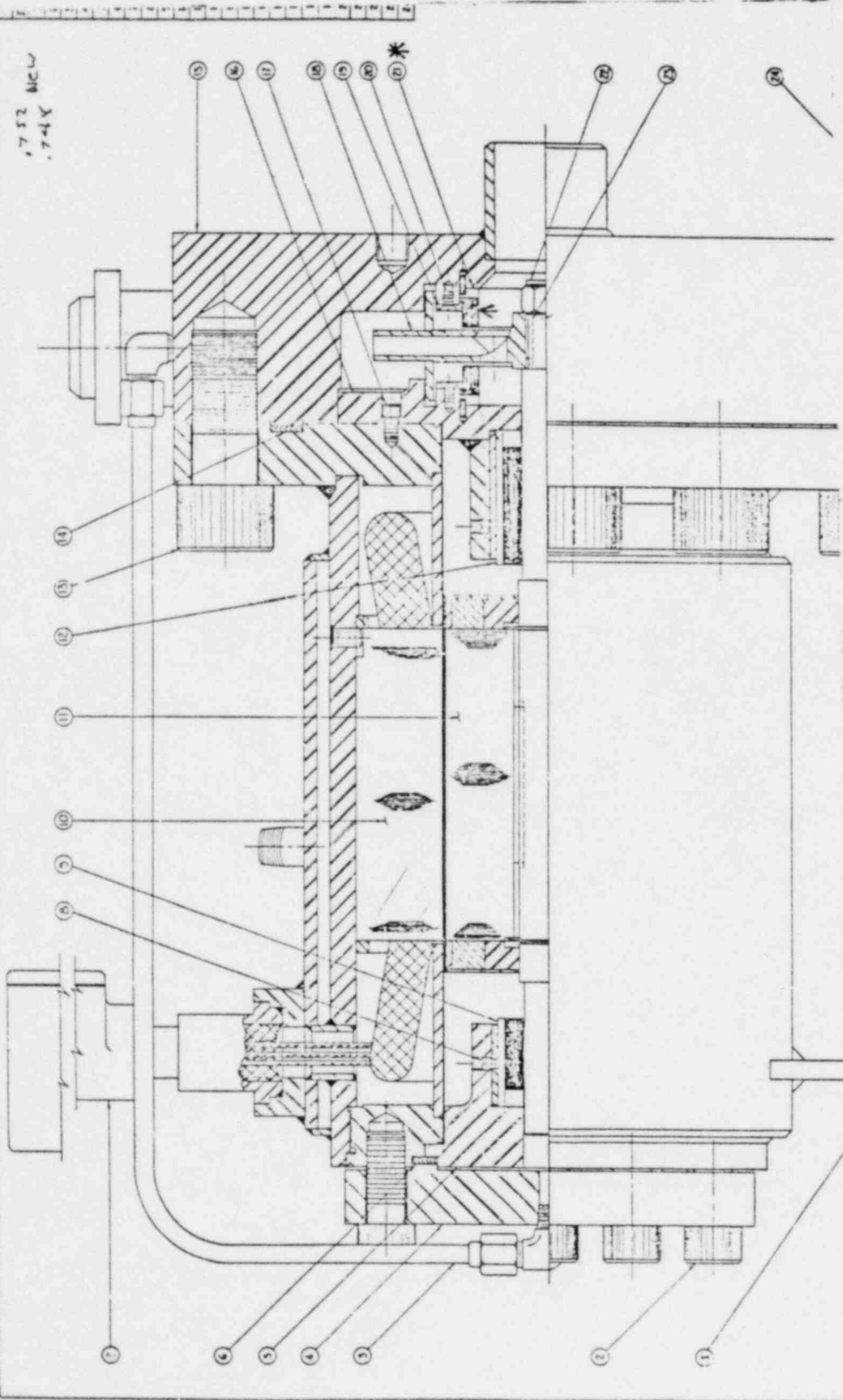


**MODELS GA, GB, GC, GD, GE, GG, GVM,
GVE, GVH, GVBS CHEMPUMPS**

Figure 1-3

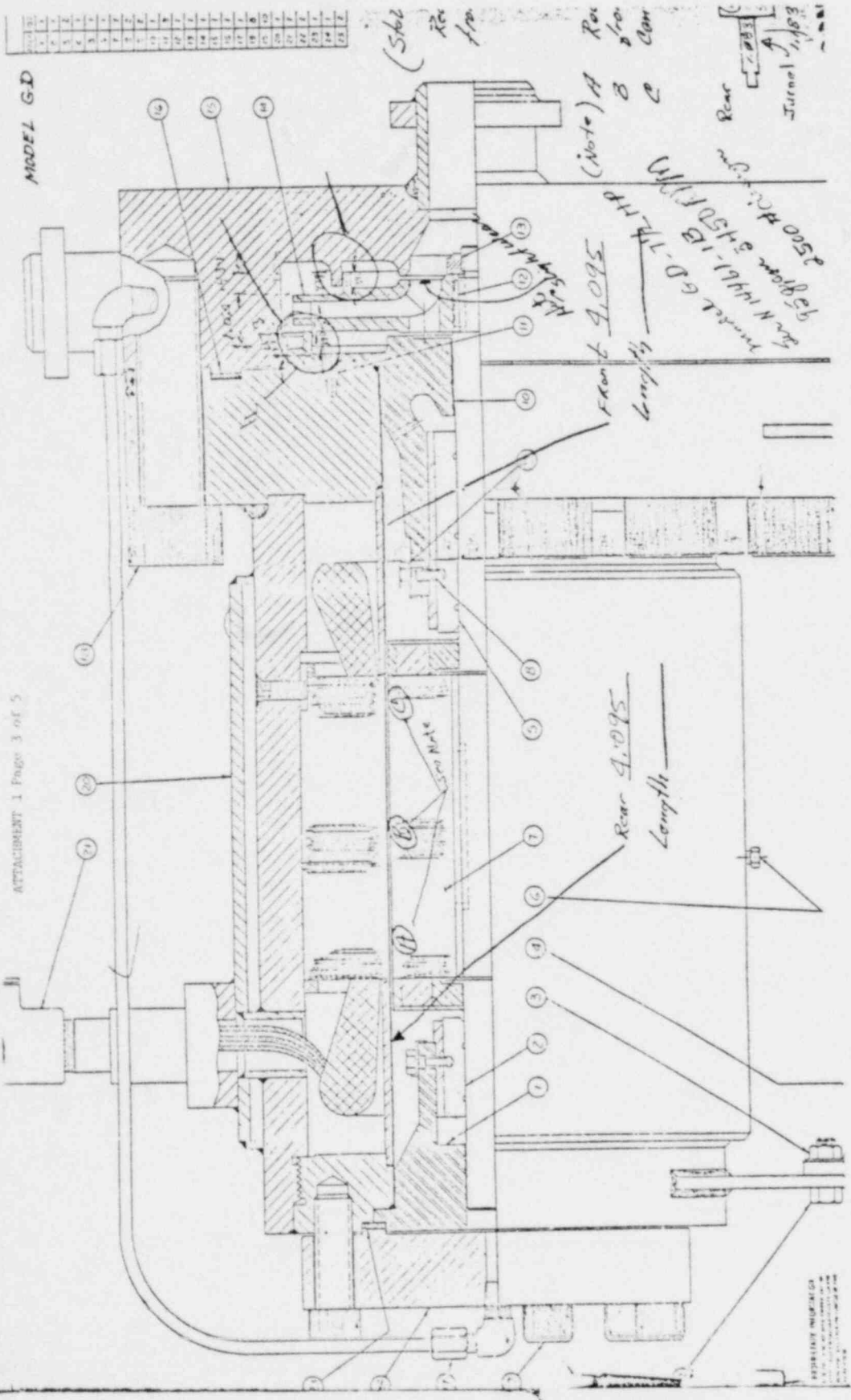
MODEL CH

1752 MCLW
.74X



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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MODEL G.D



ATTACHMENT 1 Page 3 of 5

(Note) A B C
 Rec
 for
 Con

Front 4.095
 Length

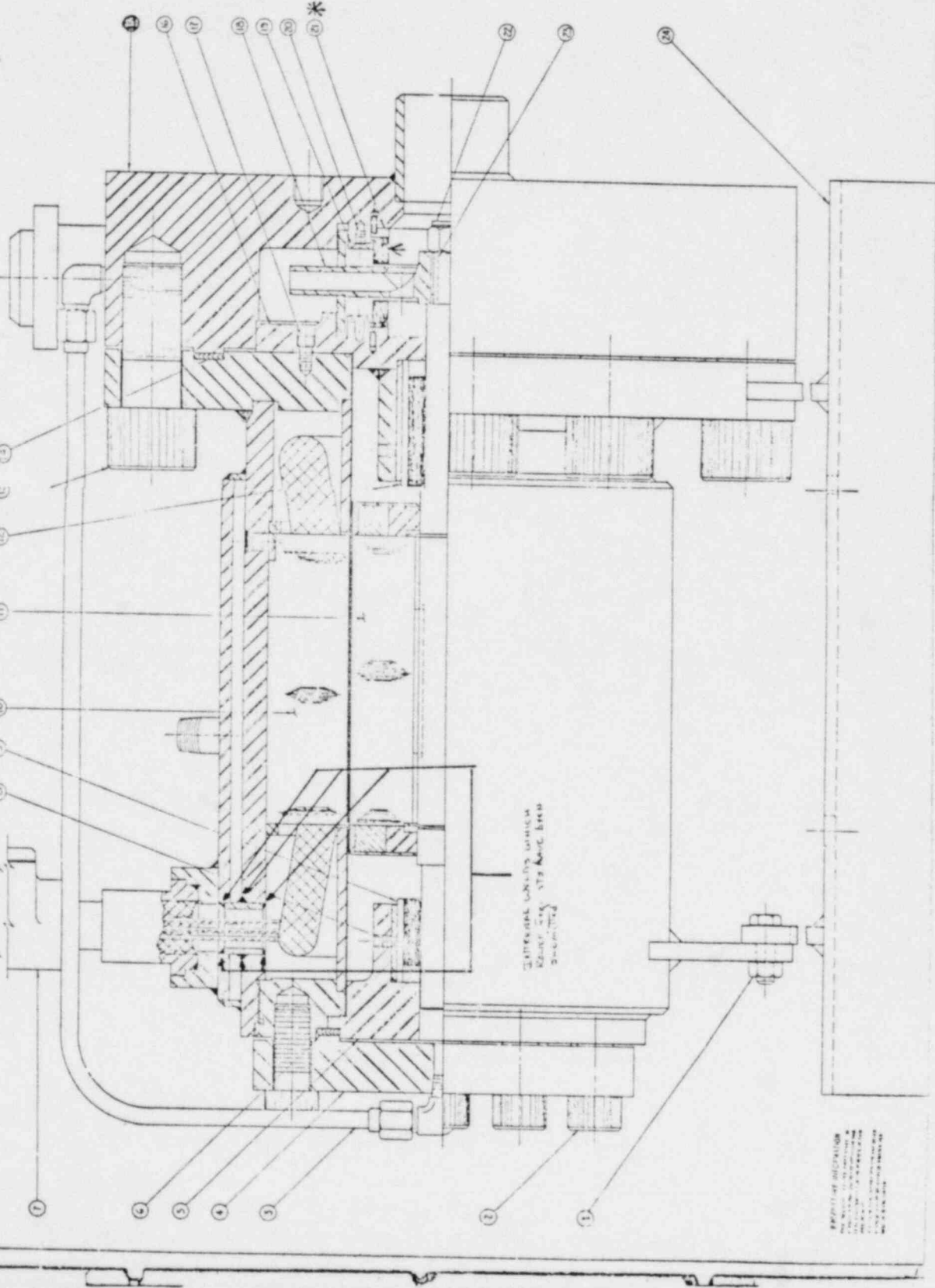
Rear 4.095
 Length

Model G.D-74-TP
 95999-3450 (M)
 2500 H.C. 0252
 1/83

Journal

STANLEY INDUSTRIAL
 1000 N. 10th St. Milwaukee, Wis. 53233

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7 4 5
BULLY



INTERNAL WORKING WHICH
REVEALS THE STATOR BORE

Frank Perdue (invt.)

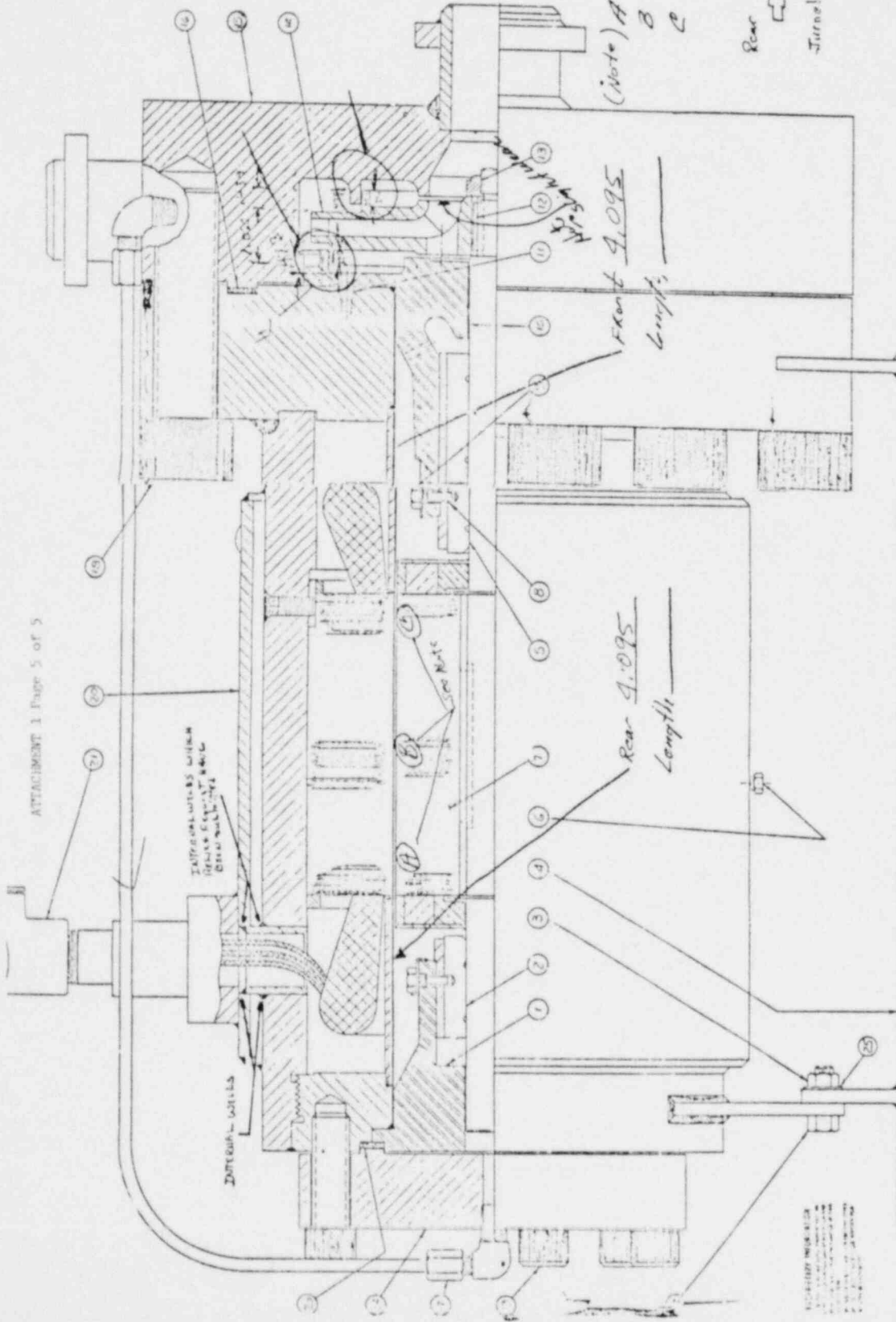
Serial No 10771-1A
EM-2 1-1-425

MODEL CH

ITEM NO	DESCRIPTION	QTY	UNIT
1	REAR SHAFT DRIVE	1	ASSEMBLY
2	REAR SHAFT DRIVE	1	ASSEMBLY
3	REAR SHAFT DRIVE	1	ASSEMBLY
4	REAR COVER PLATE	1	C 10345
5	REAR BEARING ASSEMBLY	1	C 10345
6	REAR BEARING ASSEMBLY	1	C 10345
7	REAR BEARING ASSEMBLY	1	C 10345
8	REAR BEARING ASSEMBLY	1	C 10345
9	REAR BEARING ASSEMBLY	1	C 10345
10	REAR BEARING ASSEMBLY	1	C 10345
11	REAR BEARING ASSEMBLY	1	C 10345
12	REAR BEARING ASSEMBLY	1	C 10345
13	REAR BEARING ASSEMBLY	1	C 10345
14	REAR BEARING ASSEMBLY	1	C 10345
15	REAR BEARING ASSEMBLY	1	C 10345
16	REAR BEARING ASSEMBLY	1	C 10345
17	REAR BEARING ASSEMBLY	1	C 10345
18	REAR BEARING ASSEMBLY	1	C 10345
19	REAR BEARING ASSEMBLY	1	C 10345
20	REAR BEARING ASSEMBLY	1	C 10345
21	REAR BEARING ASSEMBLY	1	C 10345
22	REAR BEARING ASSEMBLY	1	C 10345
23	REAR BEARING ASSEMBLY	1	C 10345
24	REAR BEARING ASSEMBLY	1	C 10345

ELECTRICAL	
1	REAR SHAFT DRIVE
2	REAR SHAFT DRIVE
3	REAR SHAFT DRIVE
4	REAR COVER PLATE
5	REAR BEARING ASSEMBLY
6	REAR BEARING ASSEMBLY
7	REAR BEARING ASSEMBLY
8	REAR BEARING ASSEMBLY
9	REAR BEARING ASSEMBLY
10	REAR BEARING ASSEMBLY
11	REAR BEARING ASSEMBLY
12	REAR BEARING ASSEMBLY
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22	REAR BEARING ASSEMBLY
23	REAR BEARING ASSEMBLY
24	REAR BEARING ASSEMBLY

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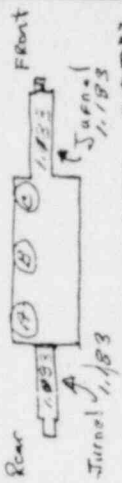


ITEM NO.	DESCRIPTION	QTY	UNIT
1	ROTOR SHAFT	1	PC
2	ROTOR RING	1	PC
3	ROTOR ARMATURE	1	PC
4	ROTOR ARMATURE PIN	1	PC
5	ROTOR ARMATURE PIN WASHER	1	PC
6	ROTOR ARMATURE PIN NUT	1	PC
7	ROTOR ARMATURE PIN WASHER	1	PC
8	ROTOR ARMATURE PIN NUT	1	PC
9	ROTOR ARMATURE PIN WASHER	1	PC
10	ROTOR ARMATURE PIN NUT	1	PC
11	ROTOR ARMATURE PIN WASHER	1	PC
12	ROTOR ARMATURE PIN NUT	1	PC
13	ROTOR ARMATURE PIN WASHER	1	PC
14	ROTOR ARMATURE PIN NUT	1	PC
15	ROTOR ARMATURE PIN WASHER	1	PC
16	ROTOR ARMATURE PIN NUT	1	PC
17	ROTOR ARMATURE PIN WASHER	1	PC
18	ROTOR ARMATURE PIN NUT	1	PC
19	ROTOR ARMATURE PIN WASHER	1	PC
20	ROTOR ARMATURE PIN NUT	1	PC
21	ROTOR ARMATURE PIN WASHER	1	PC
22	ROTOR ARMATURE PIN NUT	1	PC
23	ROTOR ARMATURE PIN WASHER	1	PC
24	ROTOR ARMATURE PIN NUT	1	PC
25	ROTOR ARMATURE PIN WASHER	1	PC

(Stator) Sold Core
 Rear Ramp 4.095
 Front Ramp 4.095

Rotor Core
 Rear 4.050
 Front 4.054
 Center 4.126

Rotor shaft



CONTROLLED COPY
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MODEL 6-D

CHEMURD P. VILLIOT,
 ASTORIA CORPORATION

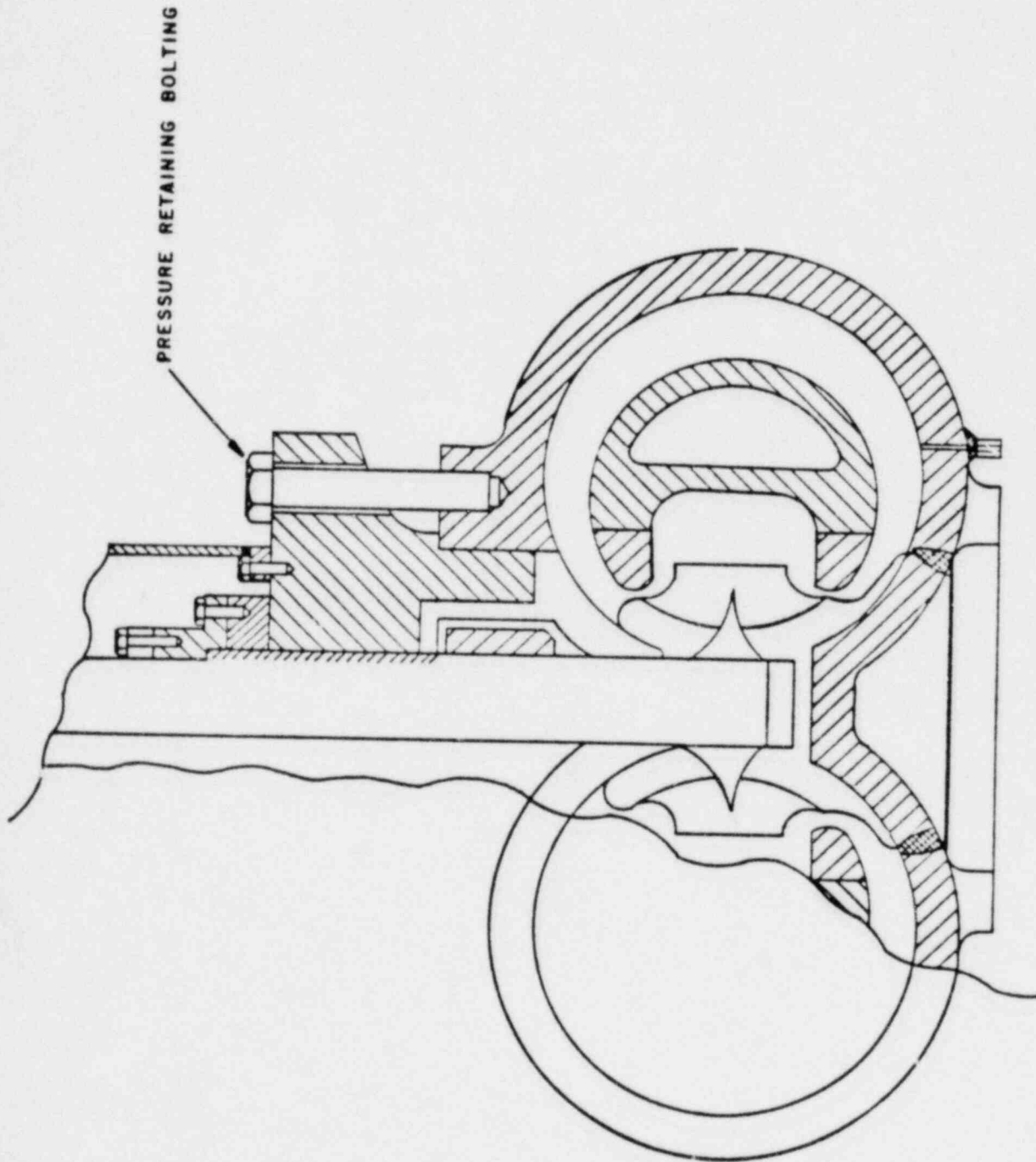
CROSS SECTION

MODEL 6-D 7/8 HP
 2520" DESIGN

D 66753

GD-7 1/2-152H-255
 Ser No 14461-1B
 95 GPM - 3450 RPM

MAIN RECIRCULATION PUMPS
Nos. 1 & 2
(SEE FIGURE A-66 AND A-67)
REF. DRWG. BYRON JACKSON
IF-4614



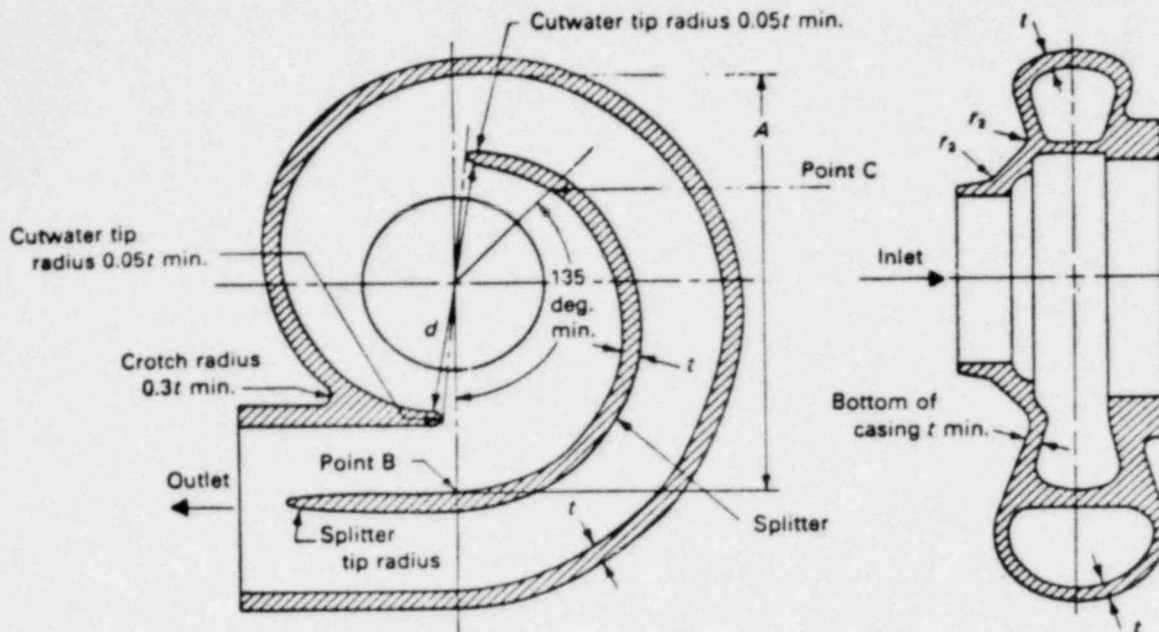


FIG. NB-3441.3-2 TYPE C PUMP

configuration of a Type F pump casing is a shell with a dished head attached at one end and a bolting flange at the other. The inlet enters through the dished head, and the outlet may be either tangent to the side or normal to the center line of the casing. Variations of these inlet and outlet locations are permitted.

(b) The design of Type F pumps shall be in accordance with this Subarticle.

NB-3442 Special Pump Types — Type J Pumps

(a) Type J pumps are those that cannot logically be classified with any of the preceding types.

(b) Any design method which has been demonstrated to be satisfactory for the specified Design Conditions may be used.

NB-3500 VALVE DESIGN

NB-3510 ACCEPTABILITY¹³

NB-3511 General Requirements¹⁴

The requirements for design acceptability for valves shall be those given in this Subarticle. In all cases,

¹³These requirements for the acceptability of a valve design are not intended to assure the functional adequacy of the valve.

pressure-temperature rating shall be as given in NB-3530 and, except for NB-3512.2(d) and in local regions (NB-3221.2), the wall thickness of the valve body shall not be less than that given by NB-3541. The requirements for prevention of nonductile failure [NB-3211(d)] may be considered to have been met under all service loadings at temperatures equal to or higher than the lowest service temperatures, if all materials meet the requirements of NB-2332 and if all other applicable requirements of this Subsection are met.

NB-3512 Acceptability of Large Valves

Valve designs having an inlet piping connection larger than 4 in. nominal pipe size are acceptable when they satisfy either the standard design rules or one of the alternative design rules.

NB-3512.1 Standard Design Rules. The design shall be such that requirements of this Subarticle are met. The requirements of NB-3530 through NB-3550 apply

¹⁴CAUTIONARY NOTE: Certain types of double seated valves have the capability of trapping liquid in the body or bonnet cavity in the closed position. If such a cavity accumulates liquid and is in the closed position at a time when adjacent system piping is increasing in temperature, a substantial and uncontrolled increase in pressure in the body or bonnet cavity may result. Where such a condition is possible, it is the responsibility of the Owner or the Owner's designee to provide, or require to be provided, protection against harmful overpressure in such valves.

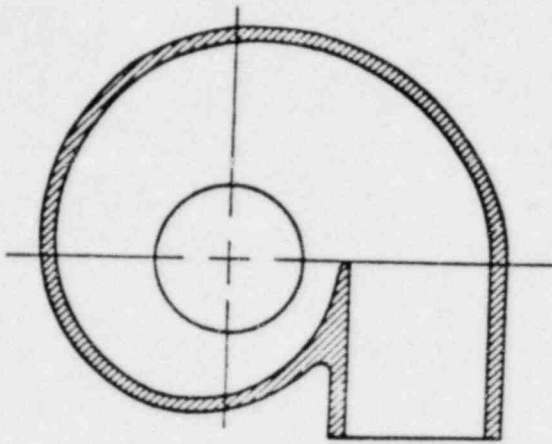


FIG. NB-3423-1
TYPICAL SINGLE VOLUTE CASING

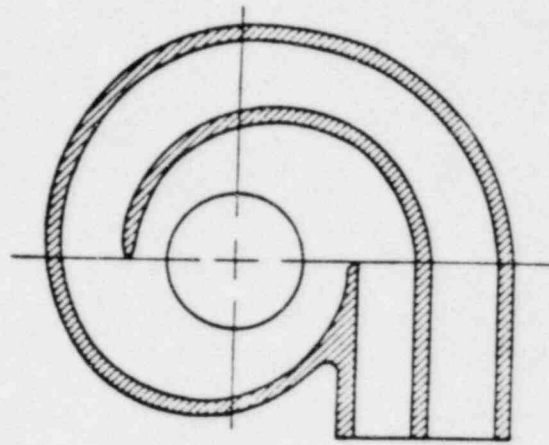


FIG. NB-3423-2
TYPICAL DOUBLE VOLUTE CASING

(b) Partial penetration welds are permitted for piping connections 2 in. nominal pipe size and less when the requirements of NB-3337.3 and NB-3352.4(d) are met.

NB-3432 Cutwater Tip Stresses

(a) It is recognized that localized high stresses may occur at the cutwater tips of volute casings (Fig. NB-3441.3-2). Adequacy of the design in this area shall be demonstrated either by an investigation through experimental stress analysis in accordance with Appendix II or by detailing satisfactory service performance of other pumps under similar operating conditions.

(b) Where experimental stress analysis is used, stress intensity at this point shall meet the requirements of NB-3222.

Pump Casing Inlets

NB-3433.2 Radially Oriented Inlets and Outlets. Reinforcement of radially oriented inlets and outlets in accordance with the rules of NB-3331 through NB-3336 is required.

NB-3433.3 Tangential Inlets and Outlets. Except as modified in NB-3433.4, any design which has been demonstrated to be satisfactory for the specified Design Loadings may be used.

NB-3433.4 Minimum Inlet and Outlet Wall Thicknesses. The wall thickness of the inlet or outlet shall not be less than the minimum wall thickness of the casing for a distance l as shown in Fig. NB-3433.4-1. The wall thickness beyond the distance l may be reduced to the minimum wall thickness of the connected piping. The change in wall thickness shall be gradual and have a maximum slope as indicated in Fig. NB-4250-1. The distance l in Fig. NB-3433.4-1 is the limit of reinforcement. The value of l , in., shall be determined from the relationship:

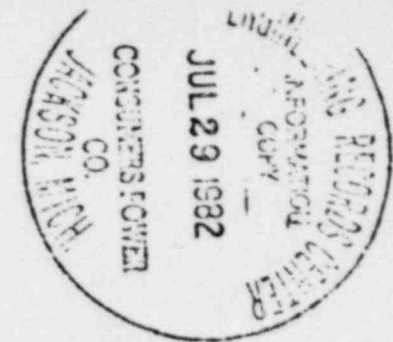
$$l = 0.5 \sqrt{r_m t_m}$$

radius, in.

rad.
one-h.
reinforce

ness, in., taken
section y-y

MATERIALS OF CONSTRUCTION



CUSTOMER
BJ Job No.
Customer

General Electric Company, San Jose
374456-7
205-28810 - Equipment No. NG01

Reference Drawing

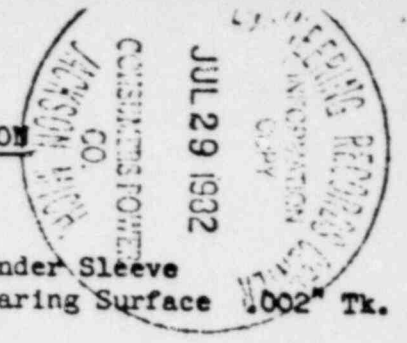
1F-4614-2 & 2F-914
1F-5774-1 (Mech. Seal Cartridge Assembly) *Recirc Pump - ERP*

<u>PART NO.</u>	<u>NAME</u>	<u>MATERIAL SPECIFICATION</u>
1	Pump Case Assembly	
1-1	Pump Case	ASME SA-351 Gr. CF8M
1-2	Case Wear Ring	ASTM A-336 CL. F8M
1-3	Soc. Hd. Cap Screw - Wear Ring	ASTM A-276, Type 304 Flash Chrome Plate Threads Only
2	Cover Assembly	
2-1	Pump Cover	ASME SA-351, Gr. CF8M
2-2	Gasket - Flexitallic	Type 304 S.S. & Asbestos
2-3	Cap Screw - Cover to Case	ASTM A-193 Gr. B7
2-4	Washer - Cover to Case	ASTM A-107 Gr. 1018
2-5	Suction Cover	ASME SA-351 Gr. CF8M No. 4 Colmonoy Overlay at Brg. Seat Viton "A"
2-6	Gasket "O" Ring	ASTM D-735-55T CL. SB-820 BE ₁ E ₃
2-7	Gasket "O" Ring	ASTM A-276 Type 304
2-8	Soc. Hd. Cap Screw	Flash Chrome Plate Threads Only
2-9	Cover Wear Ring	ASTM A-336 CL. F8M
2-10	Soc. Hd. Cap Screw - Wear Ring	ASTM A-276 Type 304 Flash Chrome Plate Threads Only
3	Impeller	
3-1	Impeller	ASME SA-351 Gr. CF8 Flash Chrome Plate Bore Hard Chrome Plate Wearing Surfaces .002" Tk.
3-2	Impeller Nut	ASTM A-336 CL. F8M
3-3	Lock Screw - Impeller Nut	ASTM A-276 Type 304

ATTACHMENT 4 Page 1 of 4

Rev. 6

19 MAY 1982
1F-2842
Sheet 1 of 5



<u>PART NO.</u>	<u>NAME</u>	<u>MATERIAL SPECIFICATION</u>
4	Shaft Assembly	
4-1	Shaft	ASTM A-276 Type 316 Flash Chrome Plate Under Sleeve Hard Chrome Plate Wearing Surface .002" Tk.
4-2	Key - Impeller	ASTM A-276 Type 304
4-3	Key - Shaft Sleeve	ASTM A-276 Type 304
4-4	Key - 1st Seal	ASTM A-276 Type 304
4-5	Key - 2nd Seal	ASTM A-276 Type 304
4-7	Key - Coupling	ASTM A-276 Type 304
5	Bearing Assembly	
5-1	Bearing Housing	ASTM A-336 CL. F8M No. 4 Colmonoy Overlay at Bearing Seat
5-2	Lock Pin	ASTM A-276 Type 304
5-3	Carbon Bearing	Graphitar 14
5-4	R Retaining Spacer	ASTM A-240 Type 304
5-5	Retaining Ring	AISI Type 302
5-6	Shaft Sleeve	ASTM A-336 CL. F8M No. 5 Colmonoy Overlay on O.D.
5-7	Coolant Recirc. Impeller	ASTM A-336 CL. F8M Hard Chrome Plate Wearing Surface .002" Tk.
5-8	Lock Screw - Recirc. Impeller	ASTM A-276 Type 304
6	Coupling Assembly	
6-1	Coupling - Pump Half	ASTM A-182 Gr. F6 H.T. R/C 25-28
6-2	Coupling - Driver Half	ASTM A-182 Gr. F6 H.T. R/C 25-28
6-3	Coupling Spacer	ASTM A-182 Gr. F6 H.T. R/C 25-28
6-4	Thrust Disc	ASTM A-276 Type 410 H.T. R/C 25-28
6-5	Lock Nut - Pump Half	ASTM A-276 Type 410 R/C 26-34
6-8	Split Ring - Driver Half	ASTM A-276 Type 410 H.T. R/C 25-28
6-9	Spacer Ring - Driver Half	ASTM A-276 Type 410 H.T. R/C 25-28
6-10	Fitted Stud Bolts with Nuts & Washers	ASTM A-193 Gr. B7 Commercial
6-11	Thrust Ring	ASTM A-276 Type 410 H.T. R/C 25-28

ATTACHMENT 4 Page 2 of 4

Rev. 6 19 May 1957
IT-2342
Sheet 2 of 4

PART NO.NAMEMATERIAL SPECIFICATION

7

7-1
7-2
7-3

Driver Mount

Driver Mount
Cap Screws - Driver Mount to Pump
Lockwasher - Driver Mount to PumpFabricated L. Carbon Steel
Commercial
Commercial

8

8-2
8-4
8-S-3
8-S-4
8-S-5
8-S-13
8-S-14
8-S-15-1
8-S-15-2
8-S-16
8-S-17
8-S-44
8-S-60
8-S-124

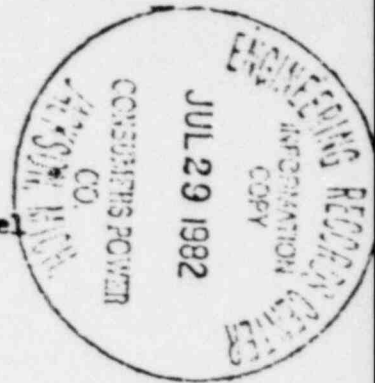
1st Seal Assembly

Gasket "O" Ring
Retaining Ring - Stationary Face
Pin-Assembly Spring Holder
U-Cup
Lock Pin
Seat Gasket
Stationary Face
Rotating Face Body
Rotating Face Ring
Coil Spring
Spring Holder
Back-Up Ring
U-Cup Follower
Lock RingASTM D-735-55T CL. SB-720 - BE₁ E₃
AISI Type 302
304 S.S.
ASTM D-735-55T CL. SB 720 - BE₁ E₃
ASTM A-276 Type 304
ASTM D-735-55T CL. SB-720 - BE₁ E₃
Carbon A - Morganite Manuf.
ASTM A-276 - Type 304
Tungsten Carbide
Inconel X
ASTM A-362 GR. CF8
17-4 PH - Cond. H 1100 - 4 Hrs. at Temp.
ASTM A-362 GR. CF8
ASTM A-276 Type 304

9

9-S-3
9-S-4
9-S-5
9-S-13
9-S-14
9-S-15-1
9-S-15-2
9-S-16
9-S-17
9-S-44
9-S-54
9-S-60
9-S-124

2nd Seal Assembly

Pin-Assembly Spring Holder
U-Cup
Lock Pin
Seat Gasket
Stationary Face
Rotating Face Body
Rotating Face Ring
Coil Spring
Spring Holder
Back-Up Ring
Split Ring
U-Cup Follower
Lock Ring304 SS.
ASTM D-735-55T CL. SB-720 - BE₁ E₃
ASTM A-276 Type 304
ASTM D-735-55T CL. SB-720 - BE₁ E₃
Carbon A - Morganite Manuf.
ASTM A-276 Type 304
Tungsten Carbide
Inconel X
ASTM A-362 GR. CF8
17-4 PH - Cond. H 1100 - 4 Hrs at Temp.
ASTM A-276 Type 304
ASTM A-362 GR. CF8
ASTM A-276 Type 304

ATTACHMENT 4 Page 3 of 4

Rev. 6

19 May 1957
IT-2842
Sheet 3 of 4

PART NO.

NAME

MATERIAL SPECIFICATION

10

Seal Cartridge Assembly

10-1	Shaft Sleeve Seal	ASTM A-362 GR. CF8
10-2	Gasket "O" Ring	ASTM D-735-55T CL. SB - 720 - RE ₁ E ₃
10-3	Back-Up Ring - Shaft Sleeve	ASTM A-362 GR. CF8
10-4	Soc.Hd.Cap Screw - Press. Reducing Cell	ASTM A-193 GR. B6
10-5	Seal Flange	ASTM A-182 GR. F. 316
10-6	Gasket "O" Ring - Seal Flange	ASTM D-735-55T CL. SB-720 - RE ₁ E ₃
10-7	Cap Screw - Seal Flange	ASTM A-193 GR. B6
10-8	Washer - Seal Flange	ASTM A-325 Hardened
10-9	Gasket "O" Ring - Press. Reducing Cell	ASTM D-735-55T CL. SB-720 - RE ₁ E ₃
10-10	Pressure Reducing Cell	ASTM A-362 GR.CF8 & ASTM A-276 Type 30
10-11	Adjusting Cap	ASTM A-362 GR. CA-15
10-12	Soc.Hd. Cap Screw - Adjusting Cap	ASTM A-193 GR. B6
10-13	Lockwasher - Adj. Cap	Commercial
10-14	Sleeve Lock Plate	ASTM A-240 Type 304

Item 1

Heat Exchanger (One Inch)
Case and Cover
Coil
Gasket (Case to Cover)

Cast Iron (ASTM A48 CL. 40)
ASTM A-213 Type 304 SMLS
Rubber - Lactal G340

Item 2

Heat Exchanger (3/4 Inch)
Case & Cover
Coil
Gasket (Case to Cover)

Cast Iron (ASTM A48 CL. 40)
ASTM A-213 Type 304 SMLS
Rubber - Lactal G340

Items A, B & C

Pressure Reducing Device
Inlet & Outlet Tube
Body
Body Cap

ASTM A-276 Type 316 SMLS
ASTM A-376 Type 316 SMLS
ASTM A-276 Type 316
(Flash Chrome Plated Threads)
PB-D-80 Buna N. Rubber
17-4 PH Cond. H 1100 - 4 Hrs at Temp.
ASTM A-376 Type 316 SMLS - Sch. 80

"O" Ring
Adjusting Bolt
Seal to Pressure Reducing Device Piping

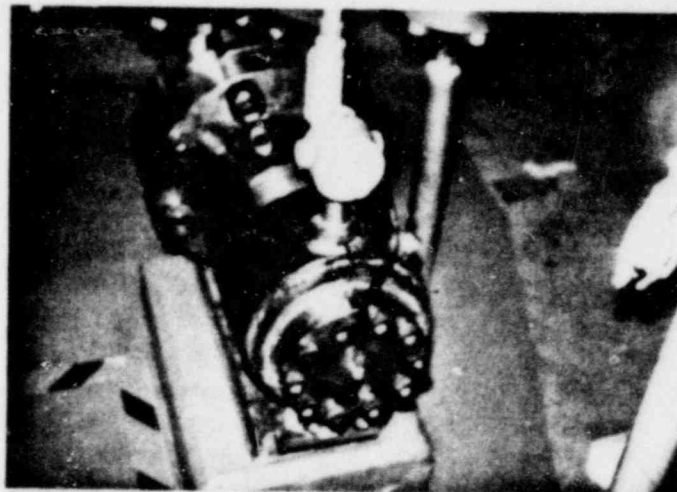


Rev. 6

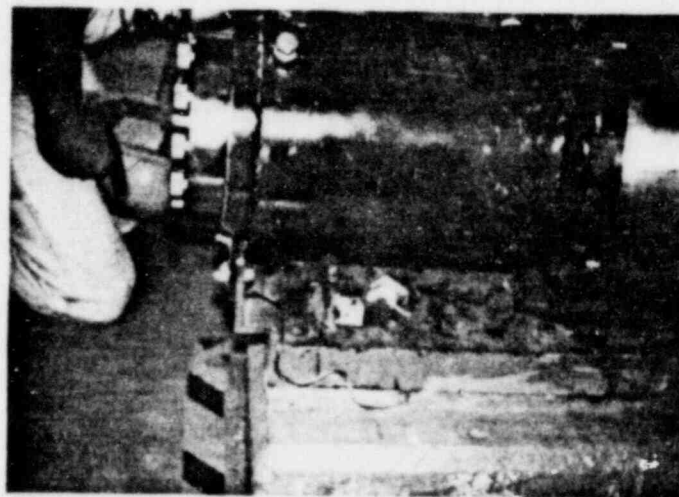
19 May 1967

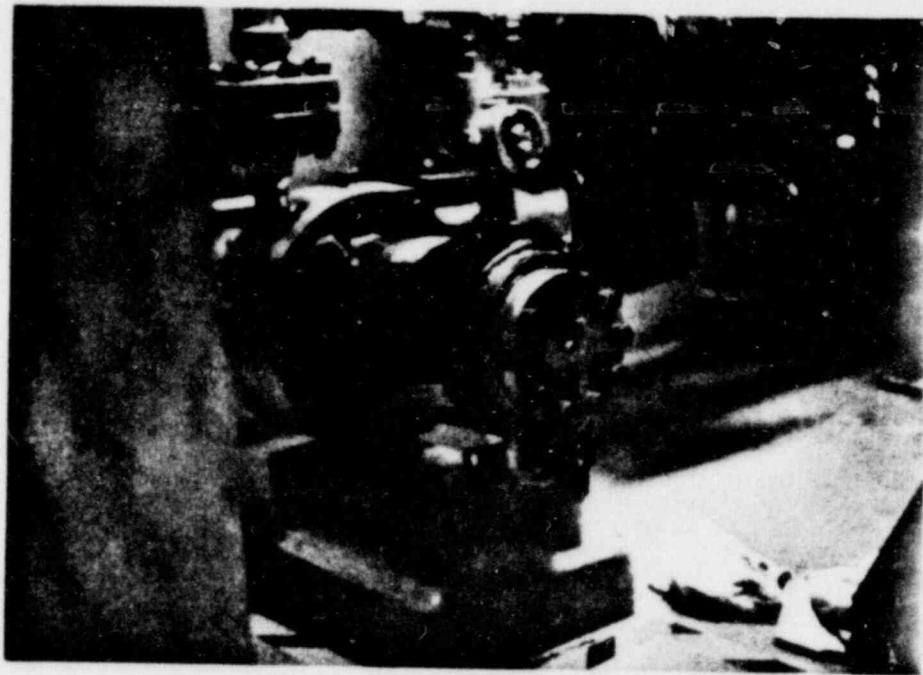
1T-2842

Sheet 4 of 4



REACTOR CLEAN-UP PUMP
BIG ROCK POINT NUCLEAR PLANT





REACTOR CLEAN-UP PUMP
BIG ROCK POINT NUCLEAR PLANT

