

**PP&L**

## CALCULATION COVER SHEET

CALC. NO. M-VLV-194

FILE NO. R2-1M

SUPERSEDED BY

SAFETY-RELATED  
ASME III OR XI  
OTHER QUALITY  
NON QUALITY

PROJECT SSES MOV Program

ER/CTN NO. 402288

DESIGN ACTIVITY/P&amp;MR NUMBER

PAGE 1 OF 40

TITLE/DESCRIPTION MOV Data Detail, Limit Switch Settings and Torque Switch Settings

for: HV-144F004

SYSTEMS AFFECTED

61 (RWCU)

## STATEMENT OF PROBLEM

NRC Generic Letter 89-10 required establishment of a program to provide for the testing, inspection and maintenance of safety-related motor-operated valves. This calculation provides the data details for the valve identified above which will be used to prepare the Data Detail Drawing which will support the testing, inspection and maintenance activities.

## DESIGN BASIS (EPM-QA-208 OR EPM-QA-400)

See Section 2.0 for Methodology.

This calculation serves as the design inputs for drawing # M-1196

## REFERENCES/FORMULAE

See Section 3.0 for Inputs/References.

## SUMMARY/CONCLUSIONS

See Section 6.0 for Results/Conclusions.

Rev. 1 added page 23A

Available Motor Start  
Torque = 22 Ft-lbs9110100049 911004  
PDR ADOCK 05000387  
Q PDR

## ENGINEERING TURNOVER

(ETO) BINDER AFFECTED? [ ] YES-If Yes enter: Binder # Vol.

Calc. File Pgs.

[ ] NO

REV. NO.	DATE	PREPARED BY	REVIEWED/CHECKED BY	DATE	APPROVED BY	DATE
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1	10-1-91	DH Hunt	G.W. McIntire	10-2-91	R.W. McIntire	10/3/91
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0	9-20-91	R.W. McIntire	J. P. Anderson	9-21-91	R.W. McIntire	9/21/91
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mls/frb0061(12)

FORM EPM-QA-216A REV.1

DESIGN INPUTS CHECKLIST

Title & No. M-VLV-194 Rev. 0

RWM 9-20-91  
GMP 9-21-91

A. DESIGN INPUTS

- |   | APPLICABLE                          |                                     |
|---|-------------------------------------|-------------------------------------|
|   | YES                                 | NO                                  |
| 1. APPLICABLE CODES   |                                     |                                     |
| Codes: ASME, ASTM, AISI. Standards: ANSI, IEEE, AWS, ANS Regulatory Requirements.   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| 2. PERFORMANCE REQUIREMENTS   |                                     |                                     |
| A. Input Requirements - For services such as air, water, electricity, lube oil, etc.  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| B. Output Requirements - Physical output such as: capacity, pressure, temperature, voltage, velocities of fluids, pressure drops separation and isolation both system and unit, and redundancy requirements of structures systems and components.   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| C. Operational requirements under various conditions, such as plant startup, normal plant operation, plant shutdown, plant emergency operation, special or infrequent operation and system abnormal or emergency operation. This includes the overall effect on the plant (i.e., the potential loss of generation). | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| D. Failure effects requirements of structures, systems and components, including a definition of those events and accidents which they must be designed to withstand.   | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 3. COMPATIBILITY  |                                     |                                     |
| A. Compatibility and suitability of material selection, such as chemical and physical characteristics, radiation and heat resistance protective coatings and corrosion resistance.  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| B. Operational interface requirements including definition of the functional interface involving structures, systems and components.  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 4. INSTALLATION (ITEMS MAY APPLY TO ANY DISCIPLINE)   |                                     |                                     |
| A. Transporting and Storing - Includes environmental conditions anticipated during storage, construction and operation and handling storage and shipping requirements.  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| B. Civil - Plant layout and arrangement requirements, escape from enclosures, anchor bolts, penetrations, equipment foundations.  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| C. Piping - Thermal expansion or heat restriction requirements, vibration or dynamic loading considerations, stress, shock, reaction forces and pipe supports.  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| D. Electrical - Voltage, source, grounding conduit/raceway requirements.  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| E. Instrumentation - Instrumentation and control requirements including indicating instruments, control and alarms required for operation, testing and maintenance and calibration.   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| F. Chemistry - Water chemistry considerations, including sampling provisions.   | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 5. MAINTAINABILITY  |                                     |                                     |
| A. Accessibility - Maintenance, ISI and ALARA accessibility requirements.   | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 6. TEST REQUIREMENTS - Including pre-OPS, ISI and LLRT tests.   | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 7. SAFETY - Personnel and public safety including special blocking, radiation exposures, ALARA environmental concerns, effluents and noise.   | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 8. SECURITY - Physical security plant considerations.   | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 9. DESIGN CONSIDERATIONS - Form EPM-QA-208B2 and B3.  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| 10. OTHER - _____   | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |

Rev 9-20-91  
GMP 9-21-91

DESIGN INPUTS CHECKLIST

Title & No. M-VLV-194 Rev. 0

B. DESIGN CONSIDERATIONS

<u>SUBJECT</u>	<u>APPLICABLE</u> <u>YES</u> <u>NO</u>	<u>REFERENCE</u> <u>PROCEDURE</u>	<u>NPE</u> <u>LEAD</u>	<u>ISSUED</u> <u>GUIDANCE</u>
1. Dynamic Qualification	[ ] [X]	EPM-QA-222	CIV Vernarr	
2. Environmental Qualification	[X] [ ]	EPM-QA-222	CIV Derkacs	GDG-03
2.1 Relay Qualified Life	[ ] [X]		ELC Nudge	SEA-EE-170 SEA-EE-171
3. Electrical Separation	[ ] [X]		ELC Akus	E-1012
4. II over I, Safety Impact	[ ] [X]	EPM-QA-211	CIV Rose	
5. Fire Protection	[ ] [X]	NDI-QA-15.3.1 EPM-QA-440	EP Kohn	Fire Protection Manual
6. Appendix R - 6.1 Safe Shutdown Analysis 6.2 Combustible Loading Anal.	[ ] [X] [ ] [X]		ELC Backenstoe CIV Delgado	EDS-01 CDS-03 & Dwg. C-1929
7. Flooding Protection	[ ] [X]		MCH	
8. Jet Impingement	[ ] [X]		MCH	
9. Missile Protection	[ ] [X]		CIV Reinsmith	
10. Radiation Exposure, ALARA	[ ] [X]	NDI-6.4.2	CIV Matchick	Memo AM-151 DG-G-100
11. Physical Separation	[ ] [X]		CIV Rose	Dwg. C-1804
12. HVAC Requirements	[ ] [X]		MCH Agnew	
13. Electrical Load/Voltage Study	[X] [ ]		ELC Sleva/Nudge	EDG-02 EDS-02
14. Human Factors Engineering	[ ] [X]	NDI-15.3.12	EP Patnaude	Human Factors Specifications & Guidelines Manual
15. Inservice Inspection Requirements	[ ] [X]	NDI-QA-15.3.7	EP Lindberg	ISI Manuals
16. Materials Compatibility	[ ] [X]		EP Willertz	
17. ASME Code Compliance (See Note 1)	[ ] [X]		MCH Sattar	
18. Design Assessment	[ ] [X]		SE Detamore	PLI-59437 dated 3/31/89
19. Fuel/Core Effects	[ ] [X]	NDI-QA-7.2.2	NPE Kulick	

Rum 9-20-91  
QMM 9-21-91

DESIGN INPUTS CHECKLIST

Title & No. M-VLV-194-RU. 0

B. DESIGN CONSIDERATIONS

SUBJECT	APPLICABLE		REFERENCE PROCEDURE	NPE LEAD	ISSUED GUIDANCE
	YES	NO			
20. Heavy Loads	[ ]	[X]	M-1435	MCH Kostelnick	
21. Radwaste Minimization	[ ]	[X]		MCH	NDPL85-003
22. Approved Materials	[ ]	[X]	NDI-QA-15.3.9	EP Morgan	Susq. Approved Matl's PLI-37573 of 1/10/85 PLI-45673 of 5/22/86
23. Secondary Containment, Control Structure, Ventilation Zone Boundary Penetrations	[ ]	[X]		MCH Agnew	
24. Electrical Load Tracking	[ ]	[X]		ELC Sleva/Nudge	EDS-02
25. Computer Program Change including Display Formats	[ ]	[X]	EPM-QA-401	CPU	
26. Environmental Protection	[ ]	[X]	NDI-QA-6.3.2	(Nuc. Svcs.- J. S. Fields)	
27. Station Blackout	[ ]	[X]		ELC Sleva	GDS-08

NOTE 1: For modifications to ASME III systems/components (both paperwork only and physical changes) request in the installation instructions that Plant Staff prepare the required documentation package per NDI-QA-5.3.4 and AD-QA-522.

dc/al861(11)



4. ITEM

5. DISCUSSION

RUM 9-20-91  
CPM 9-21-91

3. NO

1.

Applicable Codes: Calculation shall address requirements of NRC Generic Letter 89-10

2.

A, B, C

Performance Requirements:

Electricity input requirements are given by Limitorque Data Sheets, SEA-ME-237 and the MBS-01 Torque and Thrust calculation.

Output requirements for the actuator are given by the MBS-01 calculation.

Operational requirements when the actuator is required to function, including DP, are given in SEA-MB-237.

4 D

Installation - Electrical:

Electrical voltage, current and source requirements are given in the calculation data tables. (Table: Electrical/Motor Design Information).

4 E

Instrumentation:

Geared Limit Switch Settings and Spring Load/Torque Switch Settings are given in tables in the calculation.

RWA 9-20-91

JMP 9-21-91

Calculation Contents

1.0 Purpose/Scope

2.0 Methodology

2.1 Actuator Sizing Calculation

2.2 VOTES Diagnostic Thrust Acceptance Criteria

2.3 Limit Switch Settings

2.4 Other Items

3.0 Inputs/References

4.0 Assumptions

5.0 Calculations

5.1 Actuator Sizing Calculation

5.2 VOTES Diagnostic Thrust Acceptance Criteria

5.3 Limit Switch Settings

5.4 Other Items

6.0 Results/Conclusions

RUN 9-20-91

JLM 1-21-91

## 1.0 Purpose/Scope

The purpose of this calculation is to develop all of the information necessary to create a Motor Operated Valve Data Detail Drawing for the subject MOV. In order to meet this end the following specific activities will be performed in this calculation to complete the MOV Detail Drawing for the subject MOV:

- 1.1 Research existing design documents and records for the MOV to determine best available configuration data. This data will be used as input to the MOV Data Detail Drawing as well as to the calculations to be performed herein.
- 1.2 An actuator sizing calculation will be performed to determine the required actuator parameters (e.g. actuator size, motor size, spring pack, torque switch settings, etc.).
- 1.3 Using the results of Item 1.2, diagnostic test acceptance criteria will be established.
- 1.4 Based on the design function of the MOV, geared limit switch settings will be determined. For the purposes of this calculation, the limit switch functions to be considered will be limited to:
  - a.) Torque switch bypass (open and close direction)
  - b.) Full open limit switch
  - c.) Valve position indication
- 1.5 A review of previously approved spring pack Replacement Item Equivalency Evaluations (RIEE's or RIE's) will be performed for the particular MOV being evaluated. Changes to these RIE's will be processed as necessary based on the results of this calculation.



RWH 9-20-91  
JMM 9-21-91

## 2.0 Methodology

Existing design documents, modifications and field work authorizing documents will be reviewed to identify required inputs to the MOV Data Detail Drawing. Lists of the required inputs as well as a cross reference to the data source are provided in Section 3.0 of this calculation.

2.1 Actuator Sizing Calculations: These will be performed using the software version of Mechanical Design Standard (MDS) Number 01 (Input a. ). The following methods will be used to compliment the techniques used in the software package:

- a.) The active valve stroke length is a required program input which allows the program to calculate a design valve stroke time. The active stroke length will be calculated based on the following expression:

$$\begin{array}{l} \text{ACTIVE} \\ \text{STROKE} \\ \text{LENGTH} \end{array} = Z * \text{FSL}$$

Where:

Z = The setpoint of the full open limit switch in percent open (typically 97%)

FSL = Full Valve Stroke Length from the closed position to the fully open (backseated) position. If FSL is not specifically known it can be calculated using the following expression:

$$\text{FSL} = \frac{\text{HWT} * \text{SL}}{\text{HGR}}$$

Where:

HWT = The number of handwheel turns required for the valve to travel from fully closed to fully

open.

Run 9-20-91  
JMM 9-21-91

SL = The valve stem lead.

HGR = The overall handwheel  
gear ratio.

- b.) Program overrides will be used to allow the calculation to reflect the current configuration of the MOV.
- c.) Once an expected motor run torque is calculated, a typical motor curve will be consulted to determine an estimated midstroke loaded motor speed (RPM). The calculation will be rerun using this value as an override, the result being a more representative design stroke time.
- d.) For gate valves the calculation will be run using a valve factor of .3.
- e.) The calculation will be run with various acceptable spring packs to allow for flexibility in future replacement. Only spring packs approved on spring pack equivalencies will be included on the MOV Data Detail Drawing.

2.2 VOTES Diagnostic Thrust Acceptance Criteria: Once the actuator sizing has been completed diagnostic test thrust acceptance criteria will be established using the following methodology:

- a.) The Minimum Allowable Thrust will be established as 115% of the design calculated required thrust. This allows for at least 10% error in the diagnostic test results and 5% variation in torque switch repeatability.
- b.) The Maximum Allowable Running Thrust will be established as the Stuffing Box Friction load used in the actuator sizing calculations.
- c.) The Maximum Allowable Thrust will be established as the thrust corresponding to the minimum of the following:



*Run* 9-20-91  
*Am* 9-21-91

- 1.) Actuator thrust rating,
  - 2.) 120% of the equivalent thrust at maximum allowable actuator output torque,
  - 3.) Maximum allowed valve thrust (if available).
- d.) The acceptance criteria at each torque switch setting will be specified as the expected thrust +/- 20% .
- e.) In all cases items a.) and c.) shall take precedence over item d.).

2.3 Limit Switch Settings: This section of the calculation will determine the appropriate geared limit switch settings for valve control and position indication. The limit switch settings will be established per the requirements of MDS-03 (Input b.). The switch settings will be specified in percentages of physical stem travel from either full open or full closed.

#### 2.4 Other Items

RWM 9-20-91  
JMM 9-24-91

### 3.0 Inputs/References

3.1 The principle design inputs for this calculation are:

- a.) MDS-01 "Design Standard for the Sizing of Limitorque Actuators Including Thrust Calculation, Actuator Sizing, Spring Pack Selection and Torque Switch Setting Determination." Revision 1.
- b.) MDS-03 "Design Standard for Determining and Setting Valve Motor Actuator Limit Switches." Revision 0.

3.2 Information required for entry on the MOV Data Detail Drawing and as input to this calculation is provided on pages 12 through 15 of this calculation. Reference Numbers are provided for each of the entries. A listing of all references is provided on Page (Note: Copies of references not readily available are provided as attachment to this calculation).

Rev 9-20-91  
JMP 9-21-91

## General Valve Design

	Data Value	Reference No.
Valve Manufacturer	ANCHOR DARLING	1
Vendor Drawing Number	93-13668	1
Valve Serial Number		
Valve Quality Class	Q	9
Valve ASME Section III Edition and Class	1971 THRU W'72 CL.1	1
Valve Location (Inside/Outside Containment)	OUTSIDE	9
Valve Type	GATE	1
Valve Pressure Class	600	1.
Valve Size (Inches)	6	3
Valve Seat Area (Inches Squared)	25.43	8
Stem Information:		
Stem Diameter (Inches):		
At Stuffing Box Location	1.5	2
At Threaded Portion	1.5	2
Thread Pitch/Lead	.333   .333	2
Stem Material	A276-410T	1
Original Design Stroke Time (Seconds)	28	3

## General Valve Design (Cont.)

Rev 9-20-91  
9-24-91  
Reference No.

Rev. 0

Data Value

## Process Parameters:

Flow Medium

WATER

11

Design/Maximum Pressure (PSIG)

1250/1375

7

Design/Maximum Temperature (F)

565/565

7

Design/Maximum Flow (GPM or LB/HR)

436/436

11

Throttled Flow (GPM or LB/HR)

Max. Operating Differential Press. (PSID):

Opening Direction

N/A

Closing Direction

1053

11

## Additional Physical Parameters:

Valve Max. Thrust Capability (LBS)

End Connections/Rating

BW-SCH. 80

1

Body Material

SA105-II

1

Disc Trim Material

STELLITE

1

Body Seat Trim Material

STELLITE

1

Guide Rib Facing (Gate Valves Only)

SA105-II

1

Drain/Bypass Required (Y/N)

Y N

1, 3

# Actuator Design

Calc # M-VLV-194 R.O.  
Page 14 of 40

Data Value

Reference No.

## General:

Actuator Quality Class

Q

9

Rev 9-20-91  
AM-9-21-91

Safety Function (Open/Close)

C

11

Actuator Manufacturer

LIMITORQUE

1

## Main Unit ( e.g. SMB):

Actuator Order Number

381264-E

5

Actuator Serial Number

213610

5,4

Actuator Size

SMB-00-15

4

## Gearing Information:

Motor Pinion Number of Teeth

31

5

Worm Gear Number of Teeth

34

4

Worm to Worm Gear Ratio

45:1

5

Overall Actuator Ratio

49.35:1

4,5

Lost Motion Drive Sleeve (Y/N)

## Auxiliary Worm/Bevel Gear Unit:

Unit Order Number

N/A

Unit Serial Number

N/A

Unit Type/Size

N/A

Unit Gear Ratio

N/A

Rev

Overall Handwheel Ratio

4.38:1

6

Handwheel Orientation (Top or Side Mount)

SIDE

1

Handwheel Efficiency

95 %

6



# Electrical/Motor Design Information

Calc # M-VLV-199  
Page 15 of 40

	Data Value	Reference No.
Motor Class (1E/Non1E)	1E	12 R. 0
Power Supply Type (AC/DC)	DC	4, 5 Rev 9-20-1 9-21-1
Power Source	1P274042	11
Voltage Supply/Phase/Frequency	250/1/NA	5
Motor Manufacturer		
Motor Serial Number		
Design Motor Speed (RPM)	1900	4, 5
Motor Start/Run Torque (ft-lbs)	15   3	4, 5
Motor Horsepower	1.10	4
Service Factor	1	5
Motor Type/Frame Size	/D456F	5
Motor Frame Design/Enclosure Type		
Winding Type (DC Motors)		
Motor Duty Rating (min.)	5	5
Insulation Class	RA	5
Temp. Rise/Ambient Temp. ( C)	60	5
Full Load/Locked Rotor Current (Amps) or KVA Code (LRIC) at Supply Voltage (See Note 3)	4.0   25	5
DC Motor Field Current (Amps)		
Limit Switch Comp/Motor Spaceheaters (Y/N)		

Rev 9-20-91  
JMP 9-21-91

3.0 REFERENCES:

1. Anchor Darling Valve Drawing, 93-13668 Rev. H, FF110100 Sht 4801 Rev. 9.
2. Anchor Darling Letter, dated 2/20/90  
(copy attached)
3. Valve Specification Data Sheet P10 Sh 9 , Rev 4  
(copy attached)
4. Work Authorization S00647  
(copy attached)
5. Motor Operator Information Sheet for 381264-E, Serial Nos. 213610-11  
(copy attached)
6. SEL-11, Limitorque Standard Handwheel Ratios  
(copy attached)
7. SEIS Pipeline Index, dated 8-9-88.
8. Anchor Darling Design Report (FF110101 Sht 901)  
(copy of referenced page attached)
9. P&ID M-144 Rev. 29
10. not used.
11. SEA-ME-238 Design Basis Development Priority 2 Motor Operated Valves, (9/19/91)  
Rev 0  
(copy of data sheet attached)
12. Electrical Schematic Dwg. E-165, Sh 7, Rev 19
13. not used.
14. Anchor Darling Telecopy dated 3/28/91  
(copy attached)
15. E-AAA-619 Rev 3 (Page 44 of 100)

RWR 9-20-91  
JMP 9-21-91

#### 4.0 Assumptions

1. For the purposes of this calculation, attempts have been made to verify design information against actual as-installed information as documented in Plant Work Authorizations. Where actual as-installed information is unavailable the original design information will be used. Upon completion of field as-built verification, any discrepancies will be reconciled and this calculation shall be revised as appropriate.
2. Stuffing box friction values will be consistent with the empirical values listed in MDS-01 unless otherwise noted herein.
3. Unless noted otherwise, the stem factor used herein will be based on a coefficient of friction of 0.15 (Reference (4)). This is consistent with the original design seismic analysis. The SSES MOV preventative maintenance and trending program will ensure the valve stems/stem nuts are maintained in a manner which supports this assumption.
4. The minimum voltage available will be assumed to be 80% unless noted otherwise. If the electrical voltage drop calculations show this to be unconservative a lower value will be used. If the use of 80% initially produces unacceptable results the electrical voltage drop calcs will be consulted in an attempt to remove some of the conservatism.
5. Gate valve sizing calculations will be run using a valve factor of .3.
6. During the initial preparation of this calculation, the valve maximum thrust capability may not yet be available. In these cases, the maximum thrust/torque shall be based on the following:

##### Maximum Torque

The maximum allowed torque shall be the lesser of the maximum torque calculated by the MDS01 software or the torque corresponding to the original design maximum torque switch setting.

##### Maximum Thrust

The maximum allowed thrust shall be the lesser of the actuator thrust rating or 120% of the equivalent thrust at the maximum allowable actuator output torque.

## 5.0 Calculations

### 5.1 Actuator Sizing Calculation

The results of the actuator sizing calculations are provided as follows:

<u>Run #</u>	<u>Conditions</u>	<u>Calc. Pages</u>
ORIGINAL 1.	SPRING PACK: 60-600-0022-1 valve factor: 0.3	Pages.
FIXED BY COMPUTER 2. ± CURRENT × PLACEMENT	SPRING PACK: 60-600-0049-1 BM: 0301-112 valve factor: 0.3	pages
4.		

### 5.2 VOTES Diagnostic Thrust Acceptance Criteria

The calculation of the thrust acceptance criteria was performed per the method outlined in 2.2.

### 5.3 Limit Switch Settings

PP&L REVISION 1.90226 DATED 08-14-90 - TODAY IS 09-19-1991 14:47:00

VALVE Info (Input) (TABLE # 1) - FILE: 144F004A

Page 1 of 2

Calculated by:

Checked by:

Valve MANUFACTURER:	ANCHOR DARLING
Valve TYPE (GATE or GLOBE):	GATE
Valve SIZE:	6
Valve TAG Number:	HV-144F004
Valve VENDOR DRAWING number:	93-13668
Valve PP&L Drawing number:	
Valve LOCATION:	OUTSIDE
Valve SYSTEM:	RWCU
Valve LINE (ie. PIPE LINE I.D.):	
Valve MAXIMUM Design THRUST:	0

VALVE Data (Input) (TABLE # 2) - FILE: 144F004A

ANCHOR DARLING GATE Tag: HV-144F004

Valve STEM DIAMETER (Inches):	1.5
Valve STEM PITCH:	.333
Valve STEM LEAD (Inches):	.333
Valve SEAT AREA (Sq-Inches):	25.43
Valve STEM AREA (Default = 0 Sq-Inches):	1.76715
Req'd STEM SPEED (0 or 3-6=Globe or 12-14=Gate):	0
Valve STROKE LENGTH (Inches):	0
Req'd STROKE TIME (Seconds):	0 ( 0 Min.)
Valve INLET PRESSURE (PSIG):	1053
Valve PRESSURE DROP (PSIG):	1053
Valve Factor (.2 or .3=Gate 1.1=Globe):	.3
Valve STUFFING BOX FRICTION (Default = 0 Lbs):	1500
Valve STEM/NUT Coeff. FRICTION (0 .15 or .2):	.15
Manual ACTUATOR RATIO Selected:	49.35 : 1
Manual ACTUATOR Selected:	6
Manual SPRING PAC CURVE Selected:	23

MOTOR Data (Input) (TABLE # 3) - FILE: 144F004A

ANCHOR DARLING GATE Tag: HV-144F004

Motor TYPE (AC or DC):	DC
Motor RPM (900 1800 or 3600):	1800
Motor REDUCED VOLTAGE Percent (Default=0.8):	.8
High TEMPerature application (Y or N):	N
COMPOund motor GEAR application (Y or N):	N
AIR MoToRs (Y or N):	N
MODULTRONIC MoToRs (Y or N):	N
HILO Applications (Y or N):	N
Non-Rising Stem - OPERator thrust (Y or N):	N
Non-Rising Stem - ValVe thrust (Y or N):	N
Manual MOTOR Selected:	6

M-VLV-194 Rev. 0  
Page 20 of 40

Rev 9-20-91  
JMS 9-21-91

PP&L REVISION 1.90226 DATED 08-14-90 - TODAY IS 09-19-1991 14:47:00

Calculation RESULTS (TABLE # 4 ) - FILE: 144F004A

Page 2 of 2

Calculated by:

Checked by:

ANCHOR DARLING GATE Tag: HV-144F004

Valve STEM FACTOR: 0.0132  
STUFFING BOX FRICTION: 1500 Lbs  
THRUST: 11394.15 Lbs  
STEM TORQUE: 150.2606 Ft-Lbs  
STEM SPEED: 12.82067 Inches/Min.  
UNIT RPM: 38.50051 RPM  
Design STROKE TIME: 0 Seconds  
OVERALL ACTUATOR RATIO: 49.35

\* SMB-00 ACTUATOR selected having a 43.6 - 109 Ratio RANGE (IACT= 6 )  
\* SMB-00 43.6 - 109 UNIT Efficiencies: PULLOUT= 40 RUN= 50 STALL= 50  
\* \* USER Selected ACTUATOR  
\* \* USER Selected ACTUATOR Ratio

used 1800 Rpm 'DC' Motor OPERATING at 1900 Rpm

APPLICATION FACTOR: .9  
Calc. MOTOR START TORQUE: 8.45776 Ft-Lbs  
MIDSTROKE RUN THRUST: 3360.809 Lbs  
Calc. MOTOR RUN TORQUE: 1.79618 Ft-Lbs (5 X RUN= 8.9809 )

\* 15 Ft-Lbs SMB-00 MOTOR with 65 Maximum Ratio Selected (IMTR= 6 )  
\* \* USER Selected MOTOR

Revised MOTOR START TORQUE: 10.5722 Ft-Lbs  
STALL TORQUE: 407.1375 Ft-Lbs  
STALL THRUST: 30872.93 Lbs (2.5 X Rated= 35000 )

\* \* USER Selected Motor SIZE  
\* \* USER Selected OPERATING Rpm of 1900

\* SPRING PAC Curve: SMB-00 OBSOL Selected (ISPG= 23 )

\* \* USER Selected SPRING PAC Curve  
SPRING PAC No: 60-600-0022-1  
BILL of Materials No: NONE

\* Calc. SPRING PAC SETTING: 1.730234

\* Set SPRING PAC to: 1.75

Max. SPRING PAC SETTING: 2

Normal TORQUE: 152 Ft-Lbs  
Max. TORQUE: 174 Ft-Lbs

MOTOR SIZE Checks: 15 Ft-Lbs vs 8.45776 Ft-Lbs Calc. Start TORQUE  
15 Ft-Lbs vs 10.5722 Ft-Lbs Revised Start TORQUE  
15 Ft-Lbs vs 8.9809 Ft-Lbs 5 X RUN TORQUE

MOTOR STALL Check: 30872.93 Lbs vs 35000 Lbs 2.5 X Actuator THRUST

TORQUE SWITCH Checks: 174 Ft-lbs vs 250 Ft-Lbs Actuator RATING  
13194 Lbs vs 14000 Lbs Max. Actuator THRUST  
174 Ft-Lbs vs 407 Ft-Lbs Stall TORQUE  
2 SETTING vs 3.315 Max. SPRING PAC Setting

\* CAUTION - Check MDS-01 if this application operates at 340 DEG.F

M-VLV-194 R. 0  
Page 21 of 40

RAM 9-20-91  
JMP 9-21-91

PP&L REVISION 1.90226 DATED 08-14-90 - TODAY IS 09-19-1991 14:41:27

VALVE Info (Input) (TABLE # 1) - FILE:

Page 1 of 2

Calculated by:

Checked by:

Valve MANUFACTURER:	ANCHOR DARLING
Valve TYPE (GATE or GLOBE):	GATE
Valve SIZE:	6
Valve TAG Number:	HV-144F004
Valve VENDOR DRAWING number:	93-13668
Valve PP&L Drawing number:	
Valve LOCATION:	OUTSIDE
Valve SYSTEM:	RWCU
Valve LINE (ie. PIPE LINE I.D.):	
Valve MAXIMUM Design THRUST:	0

VALVE Data (Input) (TABLE # 2) - FILE:

ANCHOR DARLING GATE Tag: HV-144F004

Valve STEM DIAMETER (Inches):	1.5
Valve STEM PITCH:	.333
Valve STEM LEAD (Inches):	.333
Valve SEAT AREA (Sq-Inches):	25.43
Valve STEM AREA (Default = 0 Sq-Inches):	1.76715
Req'd STEM SPEED (0 or 3-6=Globe or 12-14=Gate):	0
Valve STROKE LENGTH (Inches):	0
Req'd STROKE TIME (Seconds):	0 ( 0 Min.)
Valve INLET PRESSURE (PSIG):	1053
Valve PRESSURE DROP (PSIG):	1053
Valve Factor (.2 or .3=Gate 1.1=Globe):	.3
Valve STUFFING BOX FRICTION (Default = 0 Lbs):	1500
Valve STEM/NUT Coeff. FRICTION (0 .15 or .2):	.15
Manual ACTUATOR RATIO Selected:	49.35 : 1
Manual ACTUATOR Selected:	6

MOTOR Data (Input) (TABLE # 3) - FILE:

ANCHOR DARLING GATE Tag: HV-144F004

Motor TYPE (AC or DC):	DC
Motor RPM (900 1800 or 3600):	1800
Motor REDUCED VOLTAGE Percent (Default=0.8):	.8
High TEMPerature application (Y or N):	N
COMPOund motor GEAR application (Y or N):	N
AIR MoToRs (Y or N):	N
MODULTRONIC MoToRs (Y or N):	N
HILO Applications (Y or N):	N
Non-Rising Stem - OPERator thrust (Y or N):	N
Non-Rising Stem - VALVe thrust (Y or N):	N
Manual MOTOR Selected:	6

Rev 9-20-91  
JMM 9-21-91

PP&L REVISION 1.90226 DATED 08-14-90 - TODAY IS 09-19-1991 14:41:27

Calculation RESULTS (TABLE # 4 ) - FILE:

Page 2 of 2

Calculated by:

Checked by:

ANCHOR DARLING GATE Tag: HV-144F004

Valve STEM FACTOR: 0.0132  
STUFFING BOX FRICTION: 1500 Lbs  
THRUST: 11394.15 Lbs  
STEM TORQUE: 150.2606 Ft-Lbs  
STEM SPEED: 12.82067 Inches/Min.  
UNIT RPM: 38.50051 RPM  
Design STROKE TIME: 0 Seconds  
OVERALL ACTUATOR RATIO: 49.35

\* SMB-00 ACTUATOR selected having a 43.6 - 109 Ratio RANGE (IACT= 6 )  
\* SMB-00 43.6 - 109 UNIT Efficiencies: PULLOUT= 40 RUN= 50 STALL= 50  
\* \* USER Selected ACTUATOR  
\* \* USER Selected ACTUATOR Ratio

used 1800 Rpm 'DC' Motor OPERATING at 1900 Rpm

APPLICATION FACTOR: .9  
Calc. MOTOR START TORQUE: 8.45776 Ft-Lbs  
MIDSTROKE RUN THRUST: 3360.809 Lbs  
Calc. MOTOR RUN TORQUE: 1.79618 Ft-Lbs (5 X RUN= 8.9809 )

\* 15 Ft-Lbs SMB-00 MOTOR with 65 Maximum Ratio Selected (IMTR= 6 )  
\* \* USER Selected MOTOR

Revised MOTOR START TORQUE: 10.5722 Ft-Lbs  
STALL TORQUE: 407.1375 Ft-Lbs  
STALL THRUST: 30872.93 Lbs (2.5 X Rated= 35000 )

\* \* USER Selected Motor SIZE  
\* \* USER Selected OPERATING Rpm of 1900

\* SPRING PAC Curve: SMB-00 MEDUM Selected (ISPG= 7 )  
SPRING PAC No: 60-600-0049-1  
BILL of Materials No: 0301-112

\* Calc. SPRING PAC SETTING: 2.070642  
\* Set SPRING PAC to: 2.25 Normal TORQUE: 156 Ft-Lbs  
Max. SPRING PAC SETTING: 2.75 Max. TORQUE: 175 Ft-Lbs

MOTOR SIZE Checks: 15 Ft-Lbs vs 8.45776 Ft-Lbs Calc. Start TORQUE  
15 Ft-Lbs vs 10.5722 Ft-Lbs Revised Start TORQUE  
15 Ft-Lbs vs 8.9809 Ft-Lbs 5 X RUN TORQUE

MOTOR STALL Check: 30872.93 Lbs vs 35000 Lbs 2.5 X Actuator THRUST

TORQUE SWITCH Checks: 175 Ft-lbs vs 250 Ft-Lbs Actuator RATING  
13270 Lbs vs 14000 Lbs Max. Actuator THRUST  
175 Ft-Lbs vs 407 Ft-Lbs Stall TORQUE  
2.75 SETTING vs 3 Max. SPRING PAC Setting

\* CAUTION - Check MDS-01 if this application operates at 340 DEG.F





Dept. \_\_\_\_\_

PENNSYLVANIA POWER & LIGHT COMPANY  
CALCULATION SHEET

ER No. R.O.

Date 9-20 19 91

M-VLV-194

Designed by R.W. / J.M.

PROJECT MOV Data Detail,

Sht. No. 23 of 40

Approved by \_\_\_\_\_

Limit Switch Settings, and  
Torque Switch Settings for HV-

**PULLOUT TORQUE CALCULATION: (100% Voltage)**

Pullout Torque (ft-lbs) = Motor Start Torque x Overall Actuator Ratio x  
Pullout Efficiency x Application Factor

Pullout Torque (ft-lbs) = <sup>\*\*</sup> 15 x 49.35 x 0.40 x 0.9

Pullout Torque (ft-lbs) = 266.5 ft-lbs

Equivalent Thrust (lbs) =  $266.5 / 0.132 = 20189$  (lbs.)

**TORQUE SWITCH SETTING CHECK (cont'd):**

Torque (ft-lbs) at Max  
Torque Switch Setting

vs.

Voltage Pullout  
Torque (ft-lbs)

S.P.  
( 0022 ) 174  
( 0049 ) 175

vs.

266

USE 175<sup>th</sup> AS LIMITING MAX ALLOWABLE  
TORQUE BECAUSE 236<sup>th</sup> NOTED ON  
REF.#5 (ORIG. DESIGN) EXCEEDS  
ACTUATOR THRUST RATING.

\*\* Per E-AAA-619 Available Motor Start  
Torque = 22 ft-lbs

Dept. \_\_\_\_\_

PENNSYLVANIA POWER & LIGHT COMPANY  
CALCULATION SHEET

ER No. \_\_\_\_\_

Date 10-1 19 91

PROJECT \_\_\_\_\_

M-VLV-194 Rev 1

Designed by DWH/RWH

Sht. No. 23 A of 40

Approved by \_\_\_\_\_

HV 144F004

RWH 10-2-91

Check for Limiting Valve Factor in closing direction:

$$LVF = \frac{RVT_{stall} - F - (A_{sr} \times P)}{A_{se} \times \Delta P}$$

[MDS-01 Rev 2]  
Eqn. 23

Where:  $F = 1500$   
 $A_{sr} = 1.77$   
 $A_{se} = 25.43$   
 $P = 1053$   
 $\Delta P = 1053$

$OAR = 49.35$   
Unit Stall Eff. = .5  
 $FS = .0132$

Reduced Voltage = (DC)

Actual motor start torque = 22 at reduced voltage (Ref 15)

$$\begin{aligned} \text{Reduced Voltage Stall Torque} &= \text{Reduced Voltage Motor Start Torque} \times OAR \times \text{Unit Stall Eff.} \\ &= 22 \times 49.35 \times .5 \times 9 \\ &= 488 \end{aligned}$$

$$\text{Reduced Voltage Stall Thrust} = \frac{RV_{stall} \text{ Torque}}{FS} = \frac{488}{.0132} = 36969$$

Thus:

$$\begin{aligned} LVF &= \frac{36969 - 1500 - (1.77 \times 1053)}{25.43 \times 1053} \\ &= 1.25 \end{aligned}$$

# Geared Limit Switch Settings

Calc # M-VLV-194 Rev. 0  
Page 24 of 40

Rev 9-20-91  
JMM 9-21-91

Data Value

Reference  
No.

Electrical Schematic & Connection Diagram No.

E-165 SH. 7  
Rev. 19

E-379-11 SH. D  
Rev. 3

Full Stroke Length & Number of Handwheel Turns

Limit Switch  
Number

Function

Setpoint  
(See Note 4)

Equivalent No. of  
Handwheel Turns

ZS-1

ZS-2

ZS-3

ZS-4

ZS-5

ZS-6

ZS-7

ZS-8

ZS-9

ZS-10

ZS-11

ZS-12

ZS-13

ZS-14

ZS-15

ZS-16

CLOSE LIGHT

3 % C

OPEN LS

97 % C

OPEN LIGHT

3 % C

CTS BYPASS

97 % C

# Spring Pack/Torque Switch Settings

Rev 9.20.91  
9-21-91  
Reference  
No.

Data Value

Minimum Required Torque (ft-lbs)

151

Maximum Allowable Torque (ft-lbs)

175

Max torque  
switch setting

Original Design

Replacement 1

Replacement 2

Spring Pack Number

60-600-0022-1

60-600-0049-1

Limiter B/M  
Number

NONE

0301-112

Lowest Allowed Torque  
Switch Setting

1.75

2.25

Corresponding Expected  
Actuator Output Torque  
(ft-lbs)

152

156

Highest Allowed Torque  
Switch Setting

2

2.75

Corresponding Expected  
Actuator Output Torque  
(ft-lbs)

174

175

RIE Number

91.0154

Rev 9-20-91  
GMP 9-21-91

# VOTES Thrust Acceptance Criteria

Data Value

Minimum Thrust Required (lbs)

11394.15 x 1.15

Reference  
No.

Maximum Total Thrust Allowable (lbs)

ACTUATOR THRUST  
RATING LIMITING

Maximum Allowable Running Thrust (lbs)



Torque  
Switch  
Setting

## Acceptable Thrust Range at Torque Switch Trip (lbs)

Original Design  
Spring Pack  
Installed

Replacement 1  
Spring Pack  
Installed

Replacement 2  
Spring Pack  
Installed

1.0



1.25



1.5



1.75 152

11515  
13110 - 13818

2.0 174

13182  
13110 - 14000

2.25

156

11818  
13110 - 14000

2.50

166

12576  
13110 - 14000

2.75

175

13258  
13110 - 14000

3.0



3.25



3.50



3.75



4.0

Rum 9-20-91  
QMP 9-21-91

## 6.0 Results/Conclusions

- 6.1 All available MOV Data Detail Drawing input has been researched and documented herein. Where it was determined that information was unavailable from existing records, the field has been left blank. This information will be determined during the as-built walkdown.
- 6.2 The results of the actuator sizing calculations, VOTES diagnostic acceptance criteria calculations and limit switch setting determination are provided within the body of the calculation.
- 6.3 The following anomalies have been identified through the performance of this calculation:

- 1.) TORQUE SWITCH SETTINGS DETERMINED HERE DIFFER FROM ORIGINAL DESIGN. ON THE ORIGINAL LIMITORQUE DATA SHEET THE MAX T.S. SETTING WOULD RESULT IN EXCEEDING THE ACTUATOR THRUST RATINGS.

# Anchor/Darling

Valve Company

701 FIRST STREET  
P.O. BOX 3428  
WILLIAMSPORT, PA 17701-0428  
(717) 327-4800  
TELEX: 759953

Ref #2

M-VLV-194 Rev U

Page 28 of 40

Rev 9-20-91  
JMP 9-21-91

February 20, 1990

PENNSYLVANIA POWER & LIGHT COMPANY  
Two North Ninth Street  
Allentown, PA 18101

Attn: Mr. Ken Anderson, Engineering

SUBJECT: VALVE DATA

Dear Ken,

The valve data you requested at our recent meeting is enclosed.

Please advise if you need further information.

Yours sincerely,

ANCHOR/DARLING VALVE COMPANY

*R. W. Dommers*

R. W. Dommers  
Director - Marketing & Sales

/cll

cc: J. J. Chappell  
R. J. Stout

encl.



P.L. 8-5664-5 P.E.-12.930

M-VLV-194 R.O.  
Page 29 of 40  
REFERENCE #2

A/DY EB109-4

Drawing	Inside Dia. at seat	Nom. Dia. for seating	Stem Dia	Pitch	Lead
W3522332	2 3/4"	3"	1"	1/6	1/6
93-13748	5 3/8	5 11/16	1 1/2	1/3	1/3
93-13655	3 5/8	3 5/8	1 1/4 *	1/4	1/4
93-13668	5 3/8	5 11/16	1 1/2	1/3	1/3
93-13718	19	19 3/8	3 3/4	1/2	1/2
93-13811	8 3/3	8 11/16	2	1/3	1
94-13956	5 1/8	5 7/16	1 5/8	1/3	1/3
W8422159	3 5/8	3 5/8	1 1/4	1/4	1/4

\* Stem dia. at packing area = 1 1/2"

Km 10/18/90

# ANCHOR DARLING VALVES

PRIORITY 2

A/DV FB109-10

M-VLV-194 Rv.0

Page 30 of 40

REFERENCE #2

	<u>Stem Dia. at Threads</u>
93-13718	3 3/4
93-13748	1 1/2
93-13668	1 1/2 <del>1</del>
93-13956	1 5/8
93-13655	1 1/4
93-13663	1 1/4
93-13810	1 1/4
93-13805	1 7/8
93-13811	2

RMA 31791

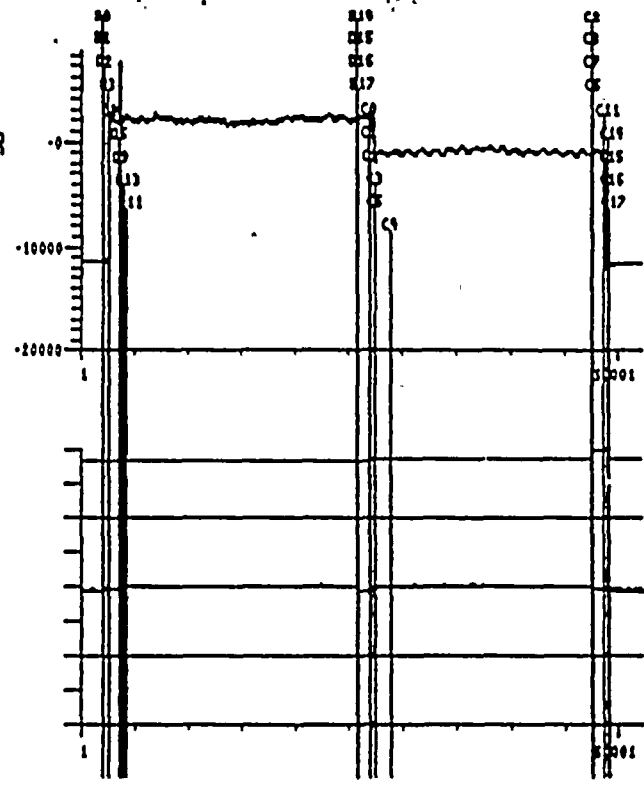
VALVE NO.	10"EBA-CT-MD-FDD3	6"EBA-PT-MD-FDD1	6"EBA-CT-MD-FDD4
SERVICE	MAIN STEAM	REACTOR	REACTOR
TYPE	GATE	RECIRCULATION	RECIRCULATION
LINE OR EQUIPMENT REF.	DBA-102	DBA-101	DBA-101
Motor Type	D.C.	A.C.	D.C.
SIZE	10"	6"	6"
COMMODITY	STEAM	DEMINERALIZED WATER	DEMINERALIZED WATER
DESIGN/MAX. PRESS. (PSIG)	1230 / 1350	1250 / 1375	1250 / 1375
DESIGN/MAX. TEMP. (°F)	565 / 565	565 / 565	565 / 565
FLOW Normal/Max.	184.5X10 <sup>3</sup> gal / SAME	352 GPM / 358 GPM	352 GPM / 358 GPM
VALVE RATING	600 # ASME	600 # ASME	600 # ASME
TYPE ENDS/RATING	P.W. / SCH. 80	P.W. / SCH. 80	P.W. / SCH. 80
BODY MATERIAL	SEE APPENDIX 3	SEE APPENDIX 3	SEE APPENDIX 3
TRIM MATERIAL	SEE A/DV DWG		
SEAT FACINGS	STELLITE	STELLITE	STELLITE
PACKING	CRANE 187-I	CRANE 187-I	CRANE 187-I
TYPE BONNET	PRESSURE SEAL	PRESSURE SEAL	PRESSURE SEAL
TYPE OF SEATS	SEE APPENDIX 3	SEE APPENDIX 3	SEE APPENDIX 3
TYPE OF DISC	FLEXIBLE (NET SPLIT)	FLEXIBLE (NET SPLIT)	FLEXIBLE (NET SPLIT)
BYPASS SIZE & TYPE			
HANDWHEEL FULL-BREAKAWAY LBS	100	70	70
Act. Op. DIFF. PRESS. (MAX.)	A 1172 PSID	1000 PSID	1000 PSID
PORT DIAMETER (seat)	8.88	5.38	5.38
PRESS. DROP (PSI)	0.047 / 0.040	0.016 / 0.017	0.016 / 0.017
VELOCITY (FPS) (seat)	43 / 38	6.9 / 7.0	6.9 / 7.0
VALVE WEIGHT LBS incl. oper.	1530	570	565
MOTOR OPER (TYPE/SIZE/SPD)	SMB 1-40/1900	SMB 00-10/3600	SMB 00-15/1900
OPER. SPEED FT/MIN/MP	1.1 / 2.9	1 / 1.3	1 / 1.1
TIME TO OPEN	A 50 SECS.	~28 SEC	~28 SEC
TIME TO CLOSE	A 50 SECS.	~28 SEC	~28 SEC
FULL LOAD CURRENT (440V, 3Φ, 60C)	11.1	2.3	4
STALLED MOTOR CURRENT	85.4	11.9	25
MOTOR OPERATOR WEIGHT	430	210	215
COST - EACH VALVE			
BYPASS			
FURN & INSTALL LIMIT SWS.			
TESTS - MAGNAFLUX			
TESTS - X-RAY			
NO. REQUIRED UNIT 1 / UNIT 2	1 / 1	1 / 1	1 / 1
TOTAL COST			
MANUFACTURER	Anchor / Darling		
MODEL OR FIG. NO.			
VENDOR	Anchor / Darling		
P/O (S ITEM) NO. 8856-P-10	4.3 + 4.4	4.5 + 4.6	4.7 + 4.8
FOREIGN PRINT NO.	93-13802	93-13748	93-13668
WELD END DWG. REFERENCE 8856-P-10	SW-5 306 + 400	SW-5 306 + 400	SW-5 306 + 400
P & I DIAGRAM REF. 8856-M-	155	144	144
LOCATION DWG. REF.			
Seismic Class 1 (Yes/No)	YES	YES	YES
Active Valve (Yes/No)	YES	YES	YES

Ac 1561041

SUSQUEHANNA WORK AUTHORIZATION										WA NUMBER 500647			
I. PROBLEM/WORK DESCRIPTION			UNIT 1	SYSTEM 61	EQUIP. NUMBER HV-144F004	LOCATION A 27 E 744		NEED DATE 5TH R10					
PERFORM VOTES TEST ON HV-144F004.			RESPONSIBLE WORK GROUP		IEC	MECH	ELEC	LABOR	MSER	I&C	HP	CHEM	SUB GRP.
Identified (Print)						Date							
D. SARNY						3/24/90							
Approved (Signature)						Date							
K. V. Chandel						3/24/90							
MODIFICATION RELATED			<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		PMR/ECON								
II. WORK CLASSIFICATION			QUALITY	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	ASME CODE	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	ACCT. or ER NO.	LOC. for CODE					
			EQUIP QUAL	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	TECH SPEC	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	RELIABILITY RELATED	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	Work Group Supervisor		Date		
									K. V. Chandel		4/19/90		
III. WORK PLANNING			INITIAL INPUT STATUS / AE	PLAN CODE	P/SKS	T34	PRIORITY CODE	5	WORK CODE	1	PLANT STATUS CODE	FUEL	
A. INVESTIGATION			VOTES				Work Group Foreman		Date				
							Operations Authorization		Date				
B. WORK PLAN			- SEE ATTACHED				ERF NO.		ERF REQ.		HP REVIEW		
INSTALL VOTES SENSOR			PCR MT-20-021				B01851		7 YES <input type="checkbox"/> NO		2 YES <input type="checkbox"/> NO		
- R.A.C. VALVE IN UNSTRENGTH			HEALTH PHYSICS						EST. Man Hrs.		RWP Man Hrs.		
- WA RELEASED FOR SENSOR			<input type="checkbox"/> NO HP				C		2 MAN		1 MAN		
INSTALLATION ONLY			<input checked="" type="checkbox"/> HP OK		90-523				10 HRS		END		
ERF REQ'D TO PERFORM			<input checked="" type="checkbox"/> RWP REQUIRED										
VOTES TESTING AND			<input type="checkbox"/> REVIEW										
10/11			K. Harsh		8-23-90								
C. POST MAINTENANCE TESTING REQUIREMENTS			NONE				Quality Control Review		Date				
							H. G. Young		8-17-90				
							Operations Authorization		Date				
							M. Chandel		10-11-90				
IV. ACTION TAKEN - EQUIPMENT HISTORY SUMMARY													
PERFORMED VOTES TEST ON HV144F004													
VALVE IS OPERATING PROPERLY, OPENING													
RUNNING FORCE APPROX 500 LB HIGH.													
TORQUE SWITCH WAS NOT ADJUSTED													
ON THIS VALVE.													
NO QC REQ'D SAMPLE PLAN													
Work Completed													
A. K. Kishan													
Date													
10-15-90													
ERF SIGNED OFF													
Date													
<input type="checkbox"/> N/A <input checked="" type="checkbox"/> YES													
10-13-90													
Work Group Review													
Date													
10/13/90													
IEG Review (MOOS)													
Date													
N/A													
Quality Control Review													
Date													
10-14-90													
Operations Review													
Date													
10-15-90													
V. PROBLEM CODE			Copy <input type="checkbox"/> Yes To Planner <input type="checkbox"/> No	PROBLEM	CAUSE	ACTION	PMS						
				AV	XX	XX							

Test #2  
 18/12/98  
 13:51:18

VOTES SENSOR



CTS

OLS

LIGHTS

SWITCH D

Torque Switch Setting Open/Close.....: 2.000/2.000  
 Limit Switch Rotor Adjustment (Y/N).....: N  
 Flow (gpm) Start/Finish.....: 0/ 0  
 Upstream Pressure (psi) Start/Finish.....: 0/ 0  
 Downstream Pressure (psi) Start/Finish.....: 0/ 0

General Comments:  
 Target thrust met. Slight disc drag after pullout. OLS not seen, used light trace to mark end of stroke. Opening running load above limit. High RPM loading seen on opening stroke motor current.

Valve Information

Plant SUSQUEHANNA  
 Unit 1  
 Tag Number HV144F004  
 Type GATE  
 Size 6  
 Target Thrust 12079 lbs  
 Orientation VERT  
 Location EL/749 RMI-501  
 Stem Material A276-410  
 Stem Diameter 1.500 inches  
 Threads per in. 3.00  
 Elasticity (10E6) 23,200 psi  
 Poissons Ratio 0.300  
 Lead 1  
 VOTES Serial M A3877  
 Valve Calibration 2.069E-0002  $\mu\text{v/v/lb}$

Valve Actuator

Actuator Type LIM1  
 Size SMB/00  
 Max Thrust Rate 14000 lbs  
 Serial M 213610  
 Order M 381264E  
 H Worm Gear Teeth 45  
 Gear Ratio 49  
 Spring Pack M 0301-112

Actuator Motor

Voltage (AC/DC) DC  
 Volts 250  
 Amp rating 4.70 amps  
 Nominal Speed 1700.00 rpm  
 Start torque 15.00 ft-lb  
 Run Torque 3.00 ft-lb  
 Horse Power 1.10 h.p.

Signal Conditioner Calibration Due Date 9/29/98  
 Votes Force Offset: -2855 lbs

M-VLV-194 Rv. 0  
Page 34 of 40  
REFERENCE # 5

~~M-VLV-194~~  
~~Page 4 of 6~~  
Page 4 of 6

MOTOR OPERATOR INFORMATION SHEET

HV-G33-1F004

HV-G33-2F004

LIMITORQUE ORDER NO.: 381264 ITEM: E

OPERATOR SERIAL NOS.: 213610-11

OPERATOR TYPE: SMB OPERATOR SIZE: 00

DESIGN UNIT RPM (AS DEFINED IN LIMITORQUE SEL-3): 38.77

SPRING PACK NUMBER: 60-600-0022-1

NORMAL TORQUE SWITCH SETTING: 1 3/4

CORRESPONDING INPUT TORQUE (LB-FT): 12<sup>1#</sup>  
(SEE NOTE 1)

CORRESPONDING OPERATOR OUTPUT TORQUE (LB-FT): 149<sup>1#</sup>

CORRESPONDING OPERATOR OUTPUT THRUST (LBS): 11,164<sup>#</sup>

MAXIMUM TORQUE SWITCH SETTING: 2 3/4 \*

CORRESPONDING INPUT TORQUE (LB-FT): 19<sup>1#</sup>  
(SEE NOTE 1)

CORRESPONDING OPERATOR OUTPUT TORQUE (LB-FT): 236<sup>1#</sup>

CORRESPONDING OPERATOR OUTPUT THRUST (LBS): (A) 17,683<sup>#</sup>

(A) maximum thrust rating of unit 14,000<sup>#</sup>

GEAR RATIO INFORMATION

MOTOR PINION NUMBER OF TEETH: 31 WORM SHAFT GEAR NO. OF TEETH: 34

WORM TO WORM GEAR RATIO: (A) 45:1

OVERALL ACTUATOR RATIO: 49.0

NOTE 1: INPUT TORQUE IS TORQUE FROM WORMSHAFT ON SMB-00 & 000 AND FROM HANDWHEEL ON SMB-0 AND LARGER.

LIMITORQUE SIGNATURE: Bradley Stone

(A) Revision of 11/21/86 \* Max Setting reduced to 2 1/4,

M-VLV-194 Rv. 0  
Pg. 35 of 40  
REFERENCE # 5

Attachment A  
Page 5 of 6

Attachment 3

M-VLV-075  
Page 5 of 6

LIMITORQUE MOTOR NAMEPLATE

DATA SHEET

ORDER NUMBER: 381264E SERIAL NUMBER: 213610-11

MOTOR NAME PLATE DATA

IDENTIFICATION NUMBER: Not available

START TORQUE (LB-FT): 15 HORSEPOWER: 1.0

RUN TORQUE (LB-FT): 3 S.F.: 1.0

TYPE: N/A FRAME: DG56F PHASE: 1

MOTOR SPEED (RPM): 1900 HZ: 60

VOLTS: 250 CODE: N/A AMPS: FLA/LRA  
4.0/25.0

AMB. C: 60° INSULATION CLASS: RH DUTY: 5 minute

LIMITORQUE SIGNATURE: Bradley Stone

$$\text{Stroke Length} = \frac{\text{stem lead}}{\text{handwheel turns}} \times \frac{1}{\text{HWR}}$$

# STANDARD HANDWHEEL RATIOS FOR SMB & HMB UNITS

UNIT SIZE	HANDWHEEL RATIO	UNIT RATIO	EFF. %
SMB-000	1:1	All	100
SMB-00	1:1 *4.38:1	All All	100 95
SMB-0 SB-0	8.93:1 21.1:1 33:1 54.1:1	11.2-26.1 26.4-96.2 102.6-150.8 158.3-247	60 30 25 25
SMB-1 SB-1	10.75:1 25.3:1 49.0:1 66.7:1	11.6-25.6 27.2-88.4 92.4-171.6 191.7-234	60 30 25 25
SMB-2 SB-2	9:1 22.3:1 40.5:1 57.4:1	10.6-25.5 26.2-82.5 84.8-150 153-212.5	60 30 25 25
SMB-3 SB-3	7.15:1 11.07:1 28.37:1 39.4:1 55.36:1	11.1-24.1 25.7-37.3 43.9-95.5 98.6-132.8 138.4-186.4	60 60 30 25 25
SMB-4 SMB-4T SB-4	8.7:1 13.06:1 33.69:1 39.87:1 59.13:1	13.4-32.3 33.6-48.4 51.8-124.9 131.8-147.9 152.1-219.3	60 60 30 25 25
SMB-5 SMB-5T	86:1 163.5:1  142.0:1 269.8:1	61.4-93.4  101.4-230.2	25  25

UNIT SIZE	HANDWHEEL RATIO	UNIT RATIO	EFF. %
HMB-00	19:1 45:1	9.7-22.0 23.0-109.0	60 30
HMB-0	15.7:1 37:1 58:1 95:1	11.2-26.1 26.4-96.2 102.6-150.8 158.3-247	60 30 25 25
HMB-1	14.5:1 34:1 66:1 90:1	11.6-25.6 27.2-88.4 92.4-171.6 191.7-234	60 30 25 25
HMB-2	13.3:1 33:1 60:1 85:1	10.6-27.2 26.2-82.5 84.8-150.0 153-212.5	60 30 25 25
HMB-3	10.3:1 16:1 41:1 57:1 80:1	11.1-24.1 25.7-37.3 35.9-95.5 98.6-132.8 138.4-186.4	60 60 30 25 25
HMB-4 HMB-4T	12.7:1 50:1 58:1	10.1-32.3 40.0-124.9 131.8-147.9	60 30 25

\*This ratio supplied when torque required exceeds 65 ft/lbs.

△ For SMB-5 and SMB-5T unit, this ratio provided as standard. Alternate ratio shown provided only on request.



8856-P10A-109-1

11-VLV-194 R.O.  
Pg. 37 of 40  
REFERENCE # 8  
6-600



Anchor/Darling Valve Company  
Williamsport, Pa.

Class 1 Valve Design Calculations  
1971 ASME Section III, Thru Winter 1972 Addendum

Valve Size: 6" 600 Lb. Gate  
Design Report No.: E 5853-23D

Customer: Bechtel Power Corporation  
Purchase Order: 8856-P-10A  
Design Specification: 8856-P-10  
Valve No.: 6-EBA-GT-M0-F001-P  
6-EBA-GT-M0-F004-T

Bechtel Item No.: 4.5, 4.6,  
4.7, 4.8

ORIGINAL

DISTRIBUTION		
	NO.	DATE
VENDOR	IP	
CLIENT	IP	
FIELD	IP	
G. E.		
CIVIL		
ELECT.		
PLT. DES.	IP	
MECH.		
CON. SYS.		
ARCH.		
PURCH.		
EXPED.		
INSPECT		
SCHED.		
START-UP		
SCHIFFER	IP	
RECORD	IP	
BECHTEL		
SAN FRANCISCO		

SEP - 2 1975

DESCRIPTION - DRAWING

LOCATION

DATE: 4/23/75  
JUN 26 1975

Prepared By: R. Maier  
Checked By: D.J. KEISTER

VENDOR'S DRAWING REVIEW									
1	<input checked="" type="checkbox"/>	Approved - Mfg. may proceed.							
2	<input type="checkbox"/>	Approved - submit final dwg. - Mfg. may proceed.							
3	<input type="checkbox"/>	Approved except as noted - Make changes and submit final dwg. - Mfg. may proceed as approved.							
4	<input type="checkbox"/>	Not Approved - Correct and resubmit.							
5	<input type="checkbox"/>	Approval not required - Mfg. may proceed.							

Approval of this drawing does not relieve supplier from full compliance with contract or purchase order requirements.

Reviewed	C	E	L	M	I	A	JOB No.
							8856

By: D.J. Keister Date: 9-2-75  
BECHTEL

M.VLV-194 R. 0  
 Page 38 of 40  
 REFERENCE # 8

ANCHOR/DARLING VALVE CO.

MOTOR OPERATOR DATA SHEET

Customer: Bechtel SF P.O. No. 8856-P-10-A

Prepared by: RHM Approved by: DJK 3-17-75 Sht 27 of 8

Form Line Number	S.O. No.	E 5853
	Vlv. Size, Press. & Type	6" 600 # Gate
	No. Req'd & (Item No.)	23, 24, 64, 65

1	Seat Mean Dia. In. & Area In. <sup>2</sup>	= $A = .7854 \times d^2 = .7854 (5.69)^2$	25.43
2	System Design Press. PSI	= Line Pressure = $P_1$ Use	1600
3	Design Diff. Press. PSI	= $\Delta P$ Use	1600
4	Disc Thrust LBS	= $T_d = A \times P$ (Line 1 x Line 3)	40688
5	Stem Thrust Tent. LBS	= $T_t = T_d \times f$ (Line 4 x Coeff Friction)*	12206
6	Stem End Thrust	= $T_e = .7854 \times D_s^2 \times P_1$ (stem area x Line 2)	2827
7	Stuff Box Load LBS	= $T_s$	1500
8	Total Stem Thrust LBS	= $F = T_t + T_e + T_s$ (Sum. of Lines 5, 6 & 7)	16533

$$D_s = 1\frac{1}{2} \text{ Dia}$$

\*Coefficient of Friction: Double Disc .2

Flex Wedge .3 ✓

Globe Valve 1.1

**PENNSYLVANIA POWER & LIGHT  
Susquehanna Steam Electric Station  
MOV - Design Basis Review**

VALVE TAG NUMBER:HV-144F004

UNIT 1

PRIORITY: 2

VALVE DWG NO.FF110100-4801

MFG. ANCHOR/DARLING

DESIGN DATA		REF NO	MATERIAL/DIMENSIONAL DATA		REF NO
Valve Type	GT	3	Stroke Length (in)	6.000	2
Valve Size	6.00	3	Stroke Time (sec)	28	4
Pressure Class	600	3	Orifice Diameter (in)	5.375	25
Valve Code	SA PC	6	Stem Diameter (in)	1.500	25
Area/Room	27/I-515	5,10	Stem Pitch (in)	0.33	25
Elevation	750'-7"	5	Stem Lead (in)	0.33	25
Line No.	DBA-101	1	Stem Material	A276-410T	3
Normal Valve Pos	O	1	Stem Mod of Elasticity	29.200	26
Actuator Size	SMB-00-15	3	Stem Mod of Rigidity	11.300	26
Valve Orientation	H	5	Valve Thrust Capability		
Stem Orientation	V	5	Dsk Guide Fac Mat	SA105II	3
Power Supply	1D274042	6	Dsk Seat Surf Mat	STELLITE	3
Rework Window	SEC TS 4.4.4				

**DEFINITION OF SAFETY RELATED FUNCTION**

HV-144F004 IS THE REACTOR WATER CLEANUP SUCTION OUTBOARD CONTAINMENT ISOLATION VALVE. THIS VALVE IS NORMALLY OPEN AND WILL CLOSE ON REACTOR LOW LEVEL, RWCU LINE BREAK, STANDBY LIQUID CONTROL ACTUATION, OR RWCU NHRX HIGH OUTLET TEMPERATURE. THIS VALVES SAFETY FUNCTION IS TO CLOSE ON ANY OF THE ABOVE SIGNALS. ~~THE VALVE MUST BE CAPABLE OF RECOVERY FROM MISPOSITIONING.~~ Recovery from mispositioning is not required since this valve is not classified as position changeable.

**VALVE OPERATIONAL DATA**

	Lrge Brk LOCA	Sml Brk LOCA	Station Blackout	HELB	LOOP	Fire	Inadvert Oper
Max Diff Press	O <del>983</del>	O <del>1115</del>	0	<del>1053 1162</del>	0	O <del>1056</del>	NA <del>1056</del>
Dir Diff Press	D	D	NA	D	NA	D	NA <del>D</del>
Flow Rate	310	310	0	436	0	310	NA <del>436</del>
Line Press(psig)	<del>979 983</del>	<del>1112 1115</del>	<del>1053 1162</del>	<del>1053 1162</del>	<del>1053 1056</del>	<del>1053 1056</del>	NA <del>1056</del>
Fluid	W	W	W	W	W	W	NA <del>W</del>
Process Temp(F)	542	558	563	563	551	551	NA <del>551</del>
Duty Cycle	1	1	1	1	1	1	NA <del>1</del>
Time Line (sec)	*	*	0	0	0	I	NA <del>I</del>
Envr Profile(F)	126	126	110	130	110	110	NA <del>110</del>
Initiate Signal	L2	L2	*	F1	*	S	NA <del>M</del>
Valve Cycle	C	C	C	C	C	C	NA <del>C</del>
Normal Cond					O,C		

See CN # 6 : Basis for Operational Development has been updated.



REF #14

M-VLV-194 Rev. 0

**Anchor/Darling**

Valve Company

701 FIRST STREET  
P.O. BOX 3428  
WILLIAMSPORT, PA 17701-0428  
(717) 327-4800  
TELEX: 769963Date 3/28/91

Page 46 of 40

FAX: (717) 327-4805

>>>----->  
From ToFax 215-774-7830TO: Joe Panckinson - PPLSUBJ: A/DV EB109Stem Factor used for motor actuator sizingfor SSES was based on  $\mu = 0.15$ .Rmatt 3/23/91

Signed:

Bobbie Bergman



## Test Results

Tag Number :HV144F004

Test Number :2

Test Date :10/12/90

Close		Open	
Close Stroke Time	22.170 seconds	Open Stroke Time	23.824 seconds
Close Bypass Time	28.661 seconds	Open Bypass Time	seconds
Max Running Force	-1422 lbs	Max Running Force	2628 lbs
Avg Running Force	-1000 lbs	Avg Running Force	1903 lbs
Thrust at CST	-18748 lbs	Thrust At Disc Pullout	8732 lbs
Maximum Thrust	-12032 lbs		
Disc-To-Seat Thrust at CST	-9305 lbs	Torque Switch Setting (O/C)	2.000/20

Target thrust met. Slight disc drag after pullout. OLS not seen, used light trace to mark end of stroke. Opening running load above limit. High RPM loading seen on opening stroke motor current.

Torque Switch Setting Open/Close.....: 2.000/2.000  
 Limit Switch Rotor Adjustment (Y/N).....: N  
 Flow (gpm) Start/Finish.....: 0  
 Upstream Pressure (psi) Start/Finish.....: 0  
 Downstream Pressure (psi) Start/Finish.....: 0

General Comments:  
 Target thrust met. Slight disc drag after pullout. OLS not seen, used light trace to mark end of stroke. Opening running load above limit. High RPM loading seen on opening stroke motor current.

## Valve Information

Plant SUSQUEHANNA  
 Unit 1  
 Tag Number HV144F004  
 Type GATE  
 Size 6  
 Target Thrust 12079 lbs  
 Orientation VERT  
 Location EL/749 RMI-501  
 Stem Material A276-410  
 Stem Diameter 1.500 inches  
 Threads per in. 3.00  
 Elasticity (10E6) 29.200 psi  
 Poissons Ratio 0.300  
 Lead 1  
 NOTES Serial # A3877  
 Valve Calibration 2.069E-0002  $\mu$ V/V/lb

## Valve Actuator

Actuator Type LIM1  
 Size SMB/00  
 Max Thrust Rate. 14000 lbs  
 Serial # 213610  
 Order # 381264E  
 # Worm Gear Teeth 45  
 Gear Ratio 49  
 Spring Pack # 0301-112

## Actuator Motor

Voltage (AC/DC) DC  
 Volts 250  
 Amp rating 4.70 am  
 Nominal Speed 1900.00  
 Start torque 15.00 ft.  
 Run Torque 3.00 ft.  
 Horse Power 1.10 h.;

Signal Conditioner Calibration Due Date 9/29/90

Votes Force Offset: -2835 lbs

**PENNSYLVANIA POWER & LIGHT  
Susquehanna Steam Electric Station  
MOV - Design Basis Review**

**VALVE TAG NUMBER:HV-144F004**

**UNIT 1**

**PRIORITY: 2**

**VALVE DWG NO.FF110100-4801**

**MFG. ANCHOR/DARLING**

DESIGN DATA		REF NO	MATERIAL/DIMENSIONAL DATA		REF NO
Valve Type	GT	3	Stroke Length (in)	6.000	2
Valve Size	6.00	3	Stroke Time (sec)	28	4
Pressure Class	600	3	Orifice Diameter (in)	5.375	25
Valve Code	PC	6	Stem Diameter (in)	1.500	25
Area/Room	27/I-515	5,10	Stem Pitch (in)	0.33	25
Elevation	750'-7"	5	Stem Lead (in)	0.33	25
Line No.	DBA-101	1	Stem Material	A276-410T	3
Normal Valve Pos	O	1	Stem Mod of Elasticity	29.200	26
Actuator Size	SMB-00-15	3	Stem Mod of Rigidity	11.300	26
Valve Orientation	H	5	Valve Thrust Capability		
Stem Orientation	V	5	Dsk Guide Fac Mat	SA105II	3
Power Supply	1D274042	6	Dsk Seat Surf Mat	STELLITE	3
Rework Window	SEC TS 4.4.4				

**DEFINITION OF SAFETY RELATED FUNCTION**

HV-144F004 IS THE REACTOR WATER CLEANUP SUCTION OUTBOARD CONTAINMENT ISOLATION VALVE. THIS VALVE IS NORMALLY OPEN AND WILL CLOSE ON REACTOR LOW LEVEL, RWCU LINE BREAK, STANDBY LIQUID CONTROL ACTUATION, OR RWCU NHRX HIGH OUTLET TEMPERATURE. THIS VALVES SAFETY FUNCTION IS TO CLOSE ON ANY OF THE ABOVE SIGNALS. THE VALVE MUST BE CAPABLE OF RECOVERY FROM MISPOSITIONING.

**VALVE OPERATIONAL DATA**

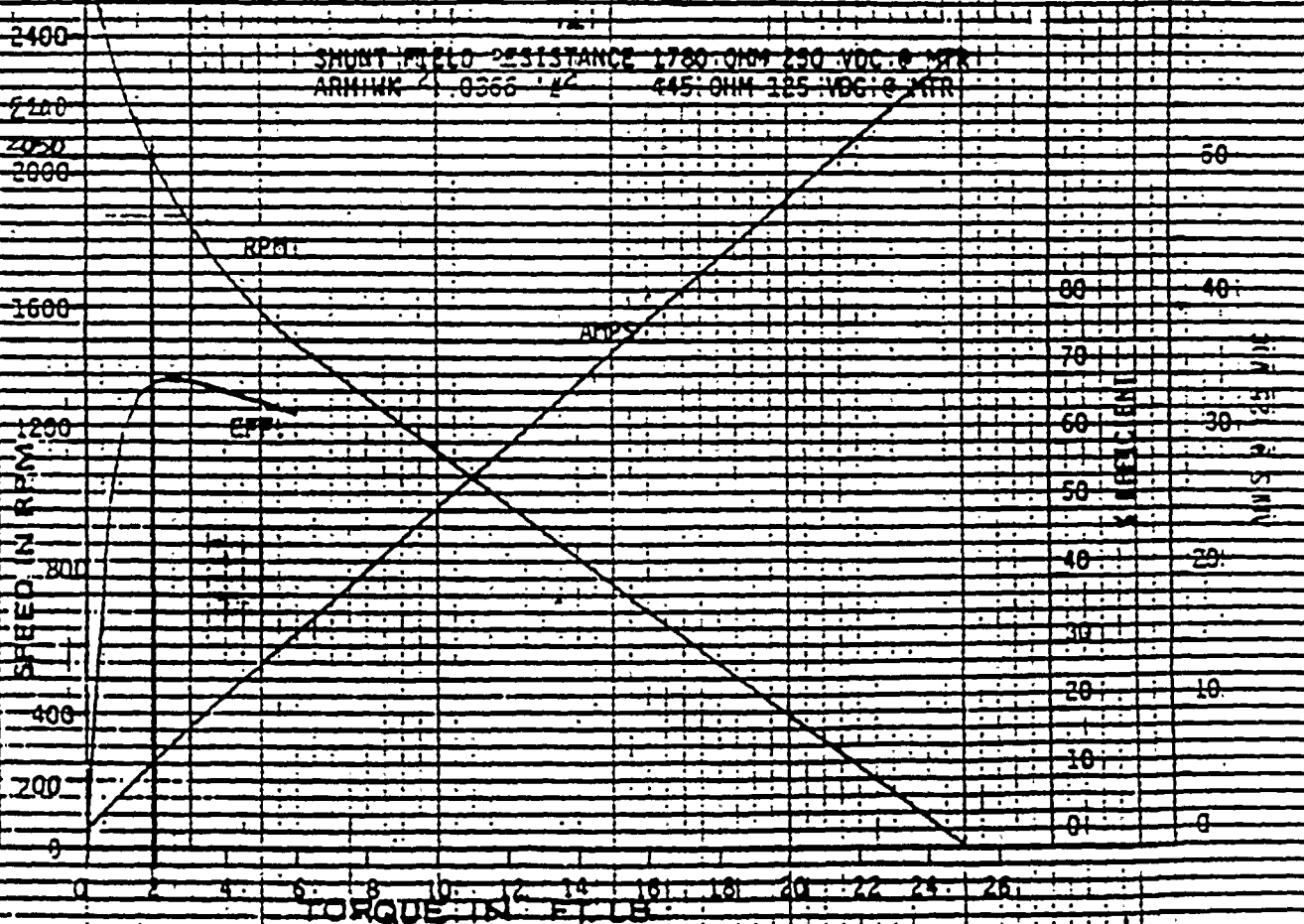
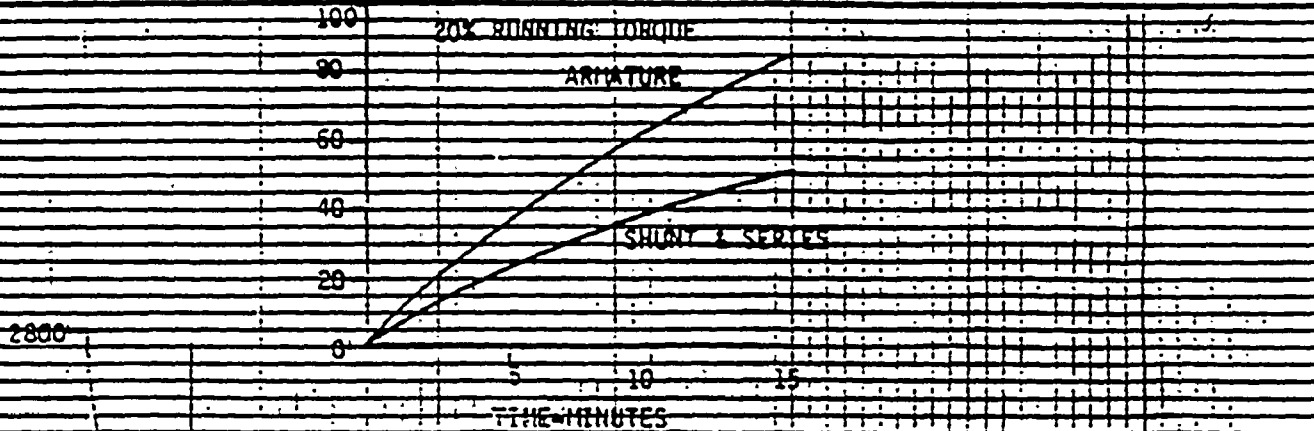
	Lrge Brk LOCA	Sml Brk LOCA	Station Blackout	HELB	LOOP	Fire	Inadvert Oper
Max Diff Press	983	1115	0	1162	0	1056	1056
Dir Diff Press	D	D	NA	D	NA	D	D
Flow Rate	310	310	0	436	0	310	436
Line Press(psig)	983	1115	1162	1162	1056	1056	1056
Fluid	W	W	W	W	W	W	W
Process Temp(F)	542	558	563	563	551	551	551
Duty Cycle	1	1	1	1	1	1	1
Time Line (sec)	*	*	0	0	0	I	I
Envr Profile(F)	126	126	110	130	110	110	110
Initiate Signal	L2	L2	*	F1	*	S	M
Valve Cycle	C	C	C	C	C	C	O,C
Normal Cond					O,C		



# LIMITORQUE CORPORATION

M-VLV-025  
Page 6 of 8

FINAL LOCKED ROTOR TORQUE	15	FILES	PHASE
INDUCTION H.K. PORTER	CURVE No.	K-5010	HOURS
BASE POWER 1.0	CURVE DATE	2/26/68	CHICK
P/M 1900	DUTY	S-MIN.	INSOL 8
ITS 250 VDC	TEMP. RISE	750C	ENCL TENV
MPS 1.7 @ ARM.	AMBIENT	40°C	FRAME 0565



SIGNED: MIKE CHIEFFO



AC 1561041

## SUSQUEHANNA WORK AUTHORIZATION

WA NUMBER  
800647

## I. PROBLEM/WORK DESCRIPTION

UNIT 1	SYSTEM 61	EQUIP. NUMBER HV-144FO04	LOCATION A 27 E 749	NEED DATE 5TH RID
-----------	--------------	-----------------------------	------------------------	----------------------

PERFORM VOTES TEST ON  
HV-144FO04.

RESPONSIBLE WORK GROUP	IEG	MECH	ELEC	LABOR	MSER	I&C	HP	CHEM	SUB GRP.
---------------------------	-----	------	------	-------	------	-----	----	------	-------------

Identified (Print)	Date
D. SANCARY	3/24/90

Approved (Signature)	Date
Ken V. Chumbley	3/24/90

MODIFICATION RELATED ☐ YES ☒ NO PMR/IECON

## II. WORK CLASSIFICATION

QUALITY	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	ASME CODE	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	ACCT. or EA NO.	LOC. for CODE
EQUIP QUAL	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	TECH SPEC	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	RELIABILITY RELATED	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO

Work Group Supervisor	Date
Ken V. Chumbley	4/19/90

III. WORK PLANNING  
A. INVESTIGATION

INITIAL INPUT STATUS	PLAN CODE	PRIORITY CODE	WORK CODE	PLANT STATUS CODE
P/SKS	T3A	5	1	FUEL

VOTES

Work Group Foreman	Date
--------------------	------

Operations Authorization	Date
--------------------------	------

## B. WORK PLAN

INSTALL VOTES SENSOR - SEE ATTACHED  
PCR MT. EO.021

- RAC VALVE LN UNSTRIPPED  
- WA RELEASED FOR SENSOR  
INSTALLATION ONLY  
ERF REQ'D TO PERFORM  
VOTES TESTING AND  
IDN

## HEALTH PHYSICS

☐ NO HP  
☐ HP OK  
☒ RWP REQUIRED  
☐ REVIEW #

Signature: K. Houch  
8-23-90

ERF NO.	ERF REQ.	HP REVIEW
801851	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO

RWP NO.	EST. Man Hrs. 10MRS	RWP Man Hrs. 1MAN EHAS
C		

Work Group Foreman/Engineer	Date
K. Houch	10/14/90

Work Group Supervisor	Date
Ken V. Chumbley	8-17-90

## C. POST MAINTENANCE TESTING REQUIREMENTS

NONE

Quality Control Review	Date
M. G. King	8-17-90

Operations Authorization	Date
M. G. King	10-11-90

## IV. ACTION TAKEN - EQUIPMENT HISTORY SUMMARY

PERFORMED VOTES TEST ON HV144FO04  
VALVE IS OPERATING PROPERLY, OPENING  
RUNNING FORCE APPROX 500 LB HIGH.  
TORQUE SWITCH WAS NOT ADJUSTED  
ON THIS VALVE.

N/A NO AC REQ'D  
SAMPLE PLAN

Work Completed	Date
W. G. King	10-15-90

ERF SIGNED OFF	Date
<input type="checkbox"/> N/A <input checked="" type="checkbox"/> YES	10-13-90

Work Group Review	Date
K. Houch	10/13/90

IEG Review (MODS)	Date
N/A	

Quality Control Review	Date
M. G. King	10-14-90

Operations Review	Date
D. King	10-15-90

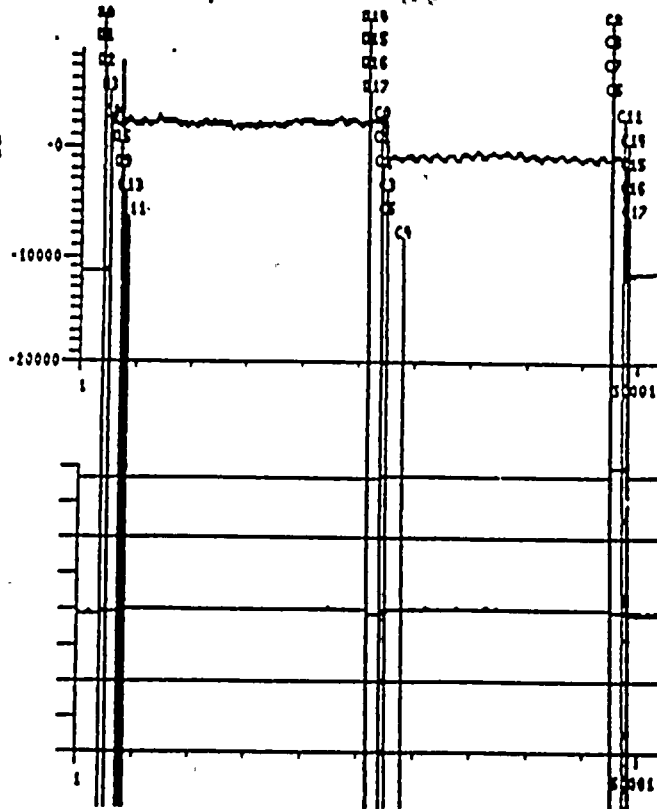
## V. PROBLEM CODE

Copy ☐ Yes  
To Planner ☐ NoPROBLEM  
AVCAUSE  
XXACTION  
XX

PMS

Test #2  
18/12/98  
13:51:18

VOTES SENSOR



CTS

OLS

LIGHTS

SWITCH D

Torque Switch Setting Open/Close.....: 2.000/2.000  
Limit Switch Rotor Adjustment (Y/N).....: N  
Flow (gpm) Start/Finish.....: 0/ 0  
Upstream Pressure (psi) Start/Finish.....: 0/ 0  
Downstream Pressure (psi) Start/Finish.....: 0/ 0

General Comments:

Target thrust met. Slight disc drag after pullout. OLS not seen, used light trace to mark end of stroke. Opening running load above limit. High RPH loading seen on opening stroke motor current.

Valve Information

Plant SUSQUEHANNA  
Unit 1  
Tag Number HV144F004  
Type GATE  
Size 6  
Target Thrust 12079 lbs  
Orientation VERT  
Location EL/749 RMI-501  
Stem Material A276-410  
Stem Diameter 1.500 inches  
Threads per in. 3.00  
Elasticity (10E6) 29,200 psi  
Poissons Ratio 0.300  
Lead 1  
VOTES Serial # A3877  
Valve Calibration 2.069E-0002  $\mu\text{v/v/lb}$

Valve Actuator

Actuator Type LIMIT  
Size SMB/00  
Max Thrust Rate. 14000 lbs  
Serial # 213610  
Order # 381264E  
Worm Gear Teeth 45  
Gear Ratio 49  
Spring Pack # 0301-112

Actuator Motor

Voltage (AC/DC) DC  
Volts 250  
Amp rating 4.70 amps  
Nominal Speed 1300.00 rpm  
Start torque 15.00 ft-lb  
Run Torque 3.00 ft-lb  
Horse Power 1.10 h.p.

Signal Conditioner Calibration Due Date 9/29/90

Votes Force Offset: -2855 lbs



MOTOR OPERATOR INFORMATION SHEET

HV-633-1F004

HV-633-2F004

LIMITORQUE ORDER NO.: 381264 ITEM: E

OPERATOR SERIAL NOS.: 213610-11

OPERATOR TYPE: SMB OPERATOR SIZE: 00

DESIGN UNIT RPM (AS DEFINED IN LIMITORQUE SEL-3): 38.77

SPRING PACK NUMBER: 60-600-0032-1

NORMAL TORQUE SWITCH SETTING: 1 3/4

CORRESPONDING INPUT TORQUE (LB-FT): 12<sup>1#</sup>  
(SEE NOTE 1)

CORRESPONDING OPERATOR OUTPUT TORQUE (LB-FT): 149<sup>1#</sup>

CORRESPONDING OPERATOR OUTPUT THRUST (LBS): 11,164<sup>#</sup>

MAXIMUM TORQUE SWITCH SETTING: 2 3/4 \*

CORRESPONDING INPUT TORQUE (LB-FT): 19<sup>1#</sup>  
(SEE NOTE 1)

CORRESPONDING OPERATOR OUTPUT TORQUE (LB-FT): 236<sup>1#</sup>

CORRESPONDING OPERATOR OUTPUT THRUST (LBS): (A) 17,683<sup>#</sup>

(A) maximum thrust rating of unit 14,000

GEAR RATIO INFORMATION

MOTOR PINION NUMBER OF TEETH: 31 WORM SHAFT GEAR NO. OF TEETH: 34

WORM TO WORM GEAR RATIO: (A) 45:1

OVERALL ACTUATOR RATIO: 49.0

NOTE 1: INPUT TORQUE IS TORQUE FROM WORMSHAFT ON SMB-00 & 000 AND FROM HANDWHEEL ON SMB-0 AND LARGER.

LIMITORQUE SIGNATURE: Bradley Stone

(A) Revision of 11/21/86 \* Max Setting reduced to 2 1/4,  
was 41:1 as 12/6/90



## LIMITORQUE MOTOR NAMEPLATE

## DATA SHEET

ORDER NUMBER: 381264E SERIAL NUMBER: 213610-11

## MOTOR NAME PLATE DATA

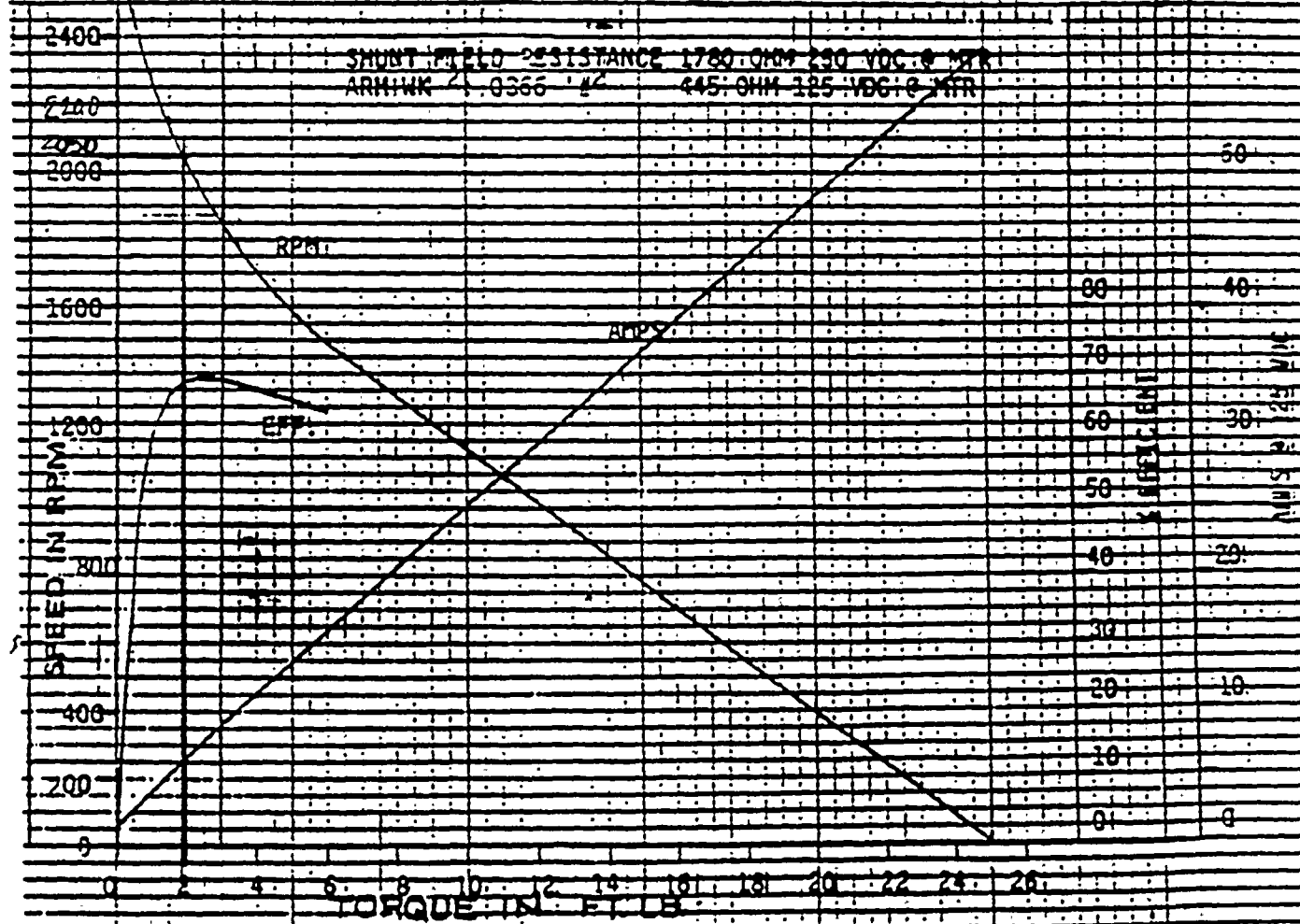
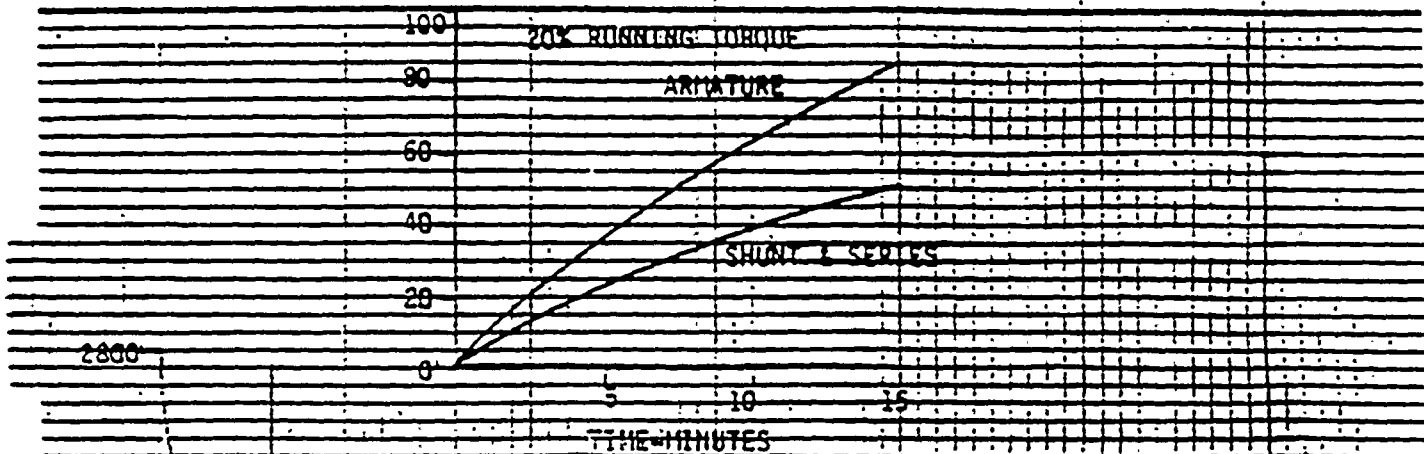
IDENTIFICATION NUMBER: Not availableSTART TORQUE (LB-FT): 15 HORSEPOWER: 1.0RUN TORQUE (LB-FT): 3 S.F.: 1.0TYPE: N/A FRAME: DG56F PHASE: 1MOTOR SPEED (RPM): 1900 HZ: 60VOLTS: 250 CODE: N/A AMPS: FLA / LRA  
4.0 / 25.0AMB. C: 60° INSULATION CLASS: RH DUTY: 5 minuteLIMITORQUE SIGNATURE: Bradley Stone



# LIMITORQUE CORPORATION

M-VLV-DZE  
Page 6 of 6

MIN. LOCKING TORQUE	15	STARS	PHASE
INDUCTION H.K. PORTER	CURVE NO. K-5010	REMARKS	
BASE POWER 1.8	CURVE DATE 2/26/68	CODE	
P.M. 1980	DUTY 5 MIN.	INSOL 8	
ITS 250 VDC	TEMP. RISE 750C	WIND TENV	
MPS 1.7 2 ARM.	AMBIENT 40°C	FRAME 0565	



SIGNED: MIKE CHIEFFO

Ac 1561041

# SUSQUEHANNA WORK AUTHORIZATION

WA NUMBER  
500647

## I. PROBLEM/WORK DESCRIPTION

PERFORM VOTES TEST ON  
HV-144FOO4.

UNIT 1	SYSTEM 61	EQUIP. NUMBER HV-144FOO4	LOCATION A 27 E 749	NEED DATE 5TH R10
RESPONSIBLE WORK GROUP IEG		MECH <input checked="" type="checkbox"/> ELEC <input checked="" type="checkbox"/> LABOR	MSER	I&C HP CHEM
				SUB GRP.

Identified (Print) Date  
D. SARNARY 3/24/90

Approved (Signature) Date  
Ken V. Chumbley 3/29/90

MODIFICATION RELATED ☐ YES ☒ NO PMR#IECON

## II. WORK CLASSIFICATION

QUALITY <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	ASME CODE <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	ACCT. or ER NO. 402287	LOC. for CODE 902
EQUIP QUAL <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	TECH SPEC <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	RELIABILITY RELATED <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	Work Group Supervisor Ken V. Chumbley 4/19/90

## III. WORK PLANNING A. INVESTIGATION

INITIAL INPUT STATUS P/SKS	PLAN CODE T3A	PRIORITY CODE 5	WORK CODE 1	PLANT STATUS CODE FUEL
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VOTES

Work Group Foreman Date

Operations Authorization Date

## B. WORK PLAN

INSTALL VOTES SENSOR - SEE ATTACHED P/R MT. EO.021

- R.A.C. VALVE IN UNSTRENGTH
- WA RELEASED FOR SENSOR INSTALLATION ONLY
- ERF REQ'D TO PERFORM VOTES TESTING AND

HEALTH PHYSICS

☐ NO HP  
☒ HP OK 70-523  
☒ RWP REQUIRED  
☐ REVIEW #  
K. Harsh 8-23-90

ERF NO. B01851	ERF REQ. <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	HP REVIEW <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
RWP NO.		

C	EST. Man Hrs. 2160	RWP Man Hrs. 1 MAN
	10/13	8/13

Work Group Foreman/Engineer Date  
K. Harsh 10/14/90

Work Group Supervisor Date  
K. Harsh 8-17-90

## C. POST MAINTENANCE TESTING REQUIREMENTS

NONE

Quality Control Review Date  
K. Harsh 8-17-90

Operations Authorization Date  
K. Harsh 10-11-90

## IV. ACTION TAKEN -EQUIPMENT HISTORY SUMMARY

PERFORMED VOTES TEST ON HV144FOO4  
VALVE IS OPERATING PROPERLY, OPENING  
RUNNING FORCE APPROX 500 LB HIGH.  
TORQUE SWITCH WAS NOT ADJUSTED  
ON THIS VALVE.

N/A GC REQ'D  
SAMPLE PLAN

Work Completed Date  
K. Harsh 10-15-90

ERF SIGNED OFF Date  
☐ N/A ☒ YES 10-13-90

Work Group Review Date  
K. Harsh 10/13/90

IEG Review (MODS) Date  
N/A

Quality Control Review Date  
K. Harsh 10-14-90

Operations Review Date  
K. Harsh 10-15-90

## PROBLEM CODE

Copy ☐ Yes  
To Planner ☐ No

PROBLEM  
AV

CAUSE  
XX

ACTION  
XX

PMR  
K

78 amp  
8.00 ft  
88 ft  
88 ft  
10 h.

3/98