

HOUSTON LIGHTING AND POWER
SOUTH TEXAS PROJECT
ELECTRIC GENERATING STATION
PLANT PROCEDURES MANUAL

DEPARTMENT PROCEDURE

NON SAFETY-RELATED (NON-Q)

MOV Tracking and Trending Program

OPEP07-ZE-0007

Rev. 2 (General)

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APPROVED:


ENGINEERING PROGRAMS MANAGER

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DATE APPROVED

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1.0 Purpose and Scope

- 1.1 This procedure defines the engineering review requirements and documentation to satisfy provisions of Generic Letter 89-10, paragraph H.
- 1.2 This procedure applies to those MOVs defined by OPGP03-ZE-0037, Addendum I, Generic Letter 89-10 Motor Operated Valve Program.
- 1.3 This procedure describes the method by which MOVs requiring frequent and repeated use of maintenance resources are identified so that actions can be taken to remedy all detectable generic problems. In addition, operational impacts can be mitigated by the identification of generic problems.

2.0 Definitions

- 2.1 BASELINE TEST - The initial verification test of a set of MOV parameters to provide adequate assurance that the MOV will perform its intended function.
- 2.2 FAILURE - The inability of a motor operated valve or individual component to perform one or more of its required functions.
- 2.3 Service Request (SR) - Form used to document and evaluate the need for a maintenance work activity and to request general manpower support services.
- 2.4 Station Problem Report (SPR) - Form used to identify deficiencies or significant deficiencies.

- 2.5 TRACKING - The condition of being aware of a fact or progression.
- 2.6 TREND - The general movement over a period of time of some statistical change that indicates a prevailing tendency or inclination.
- 2.7 GROUP - A collection of MOVs with one or more common characteristics. The common characteristics used to define the group may vary depending upon the situation.
- 2.8 TRACKING AND TRENDING DATABASE (TTDB) - The combination of the MOV Database, Diagnostic Database and the MOV Maintenance History Database as used by EPD/MOV Group to determine trends of MOV failures and other characteristics.

3.0 Responsibilities

- 3.1 The Engineering Programs Department (EPD) Manager is responsible for the following:
 - 3.1.1 The development, maintenance, and implementation of this procedure.
 - 3.1.2 Assign MOV Tracking and Trending Coordinator.
 - 3.1.3 Assign MOV Engineer to perform Trend Investigations, maintenance trend analysis and test trend analysis.
- 3.2 The MOV Tracking and Trending Coordinator is responsible for the following:
 - 3.2.1 Maintain the MOV, Diagnostic, MOV Maintenance History and other related databases that apply to MOV tracking and trending activities.
 - 3.2.2 Down loading data from the plant Equipment History Database on a regular basis and formatting it for use with the other databases.
 - 3.2.3 Obtaining data from applicable activities for input to the MOV and Test databases.
 - 3.2.4 Produce reports as described in this procedure.

- 3.3 The MOV Engineer is responsible for the following activities:
 - 3.3.1 Initiate and perform Trend Investigations.
 - 3.3.2 Assignment of maintenance work codes shown in Addendum 1 to the records in the MOV maintenance history database.
 - 3.3.3 Analysis of maintenance activity and test data for trends.
 - 3.3.4 Publish reports and recommendations based upon maintenance activity and test data analysis.

4.0 Procedure

- 4.1 EPD SHALL establish a process for acquiring, compiling, storing, manipulating and analyzing selected MOV related information, and producing Trend Investigation Reports as described in this procedure.
- 4.2 Data Collection
 - 4.2.1 Information from the following databases is used to derive the trends described in this procedure:
 - 4.2.1.1 MOV Database
 - 4.2.1.2 Diagnostic Database
 - 4.2.1.3 MOV Maintenance History Database
 - 4.2.2 Collectively the information contained in and extracted from these databases is known as the Tracking and Trending Database (TTDB).
 - 4.2.3 All of the databases must be sufficiently protected (security measures such as passwords and read only files) to assure that the quality of source inputs and the resulting trend outputs is maintained. Data input by EPD/MOV SHOULD be validated prior to use for tracking and trending.
 - 4.2.4 The MOV Data Base provides the design information associated with each GL 89-10 Class 1E MOV. This information consists of design data on the valve and its actuator, its use in the system, its location within the plant and valve limit switch setpoints.

- 4.2.5 The Diagnostic Data Base consists of test data collected in OPMP05-ZE-0309, Test Sheets -3, -4, -7 and Addendum 44. This test data is collected from both static and dynamic testing of the MOVs.
 - 4.2.6 The Equipment History System (OPGP03-ZA-0503) consists of historical records of corrective (SRs) and preventative maintenance (PMs) work associated with each MOV. This data is maintained by Systems Engineering Department (SED). Data is downloaded from this system and modified to add maintenance work codes in the MOV maintenance history Database.
 - 4.2.7 The MOV Maintenance History Database consists of information downloaded from the Equipment History System modified to add maintenance work codes (Addendum 1). This allows tracking and trending of specific types and categories of failures and maintenance work as defined by the MOV engineer.
- 4.3 Test Data Tracking and Trending
- 4.3.1 Test data tracking and trending consists of tabulating the test data from tests performed in accordance with OPMP05-ZE-0309 (Test Sheets -3, -4, -7 and Addendum 44), entering the data into the MOV Diagnostic Database and trending the data shown in Addendum 2.
 - 4.3.2 The MOV Tracking and Trending Coordinator SHALL:
 - 4.3.2.1 Produce reports of trends for the data shown in Addendum 2 at least 7 months prior to the Unit refueling outage.
 - 4.3.2.2 Produce other test data trending reports as requested by the MOV Engineer.
 - 4.3.3 The MOV Engineer SHALL
 - 4.3.3.1 Review the Test History Reports to determine if test data indicates an adverse MOV performance trend.
 - 4.3.3.2 Initiate and perform a Trend Investigation when test data indicates an adverse trend in MOV performance.

- 4.3.3.3 Initiate corrective action in accordance with OPGP03-ZX-0002 Corrective Action Program or OPGP03-ZA-0090, Work Process Program.
 - 4.3.3.4 Prepare a MOV Test Data Trend Summary (at least 6 months prior to the Unit refueling outage) that discusses MOV performance as indicated by the test data over the last period, conclusions drawn from the trends, corrective action taken for the period covered and EPD actions required during the next period. The report shall be forwarded to the Manager, EPD and a copy to Records Management filed under File No. G03.08 (GL 89-10 Program).
 - 4.3.3.5 All EPD actions identified in the MOV Test Data Trend Summary SHALL be placed in the Engineering Management Tracking System (EMTS).
- 4.4 Maintenance Activity Tracking and Trending
- 4.4.1 Maintenance activity tracking and trending consists of periodic downloading of equipment history data from the Equipment History System that is described in OPGP003-ZA-0503. The data is formatted for use with the MOV Database and MOV Diagnostic Database, additional maintenance work codes (Addendum 1) are added to each record in order to trend work history with other MOV data as desired.
 - 4.4.2 The MOV Tracking and Trending Coordinator SHALL
 - 4.4.2.1 Periodically (a minimum of once every 3 months) download from the SED/RE Equipment History Database the information shown in Addendum 3 for all MOVs in the GL 89-10 Program into the MOV Maintenance History Database. All SRs and PMs SHOULD be included in the downloaded data.
 - 4.4.2.2 Produce a MOV Maintenance Trend Report at least 7 months prior to the Unit refueling outage. The report trends maintenance work activity by the groups shown in Addendum 1.

4.4.2.3 Produce other reports and trends as requested by the MOV Engineer.

4.4.3 The MOV Engineer SHALL

4.4.3.1 Review the MOV Maintenance Trend Report and determine if adverse trends exist.

4.4.3.2 Initiate and perform a Trend Investigation when an adverse maintenance work trend is identified.

4.4.3.3 Initiate corrective action in accordance with OPGP03-ZX-0002, Corrective Action Program or OPGP03-ZA-0090, Work Process Program.

4.4.3.4 Prepare a MOV Maintenance Trend Summary (at least 6 months prior to the Unit refueling outage) that discusses trends analyzed, conclusions drawn from the trends, corrective action taken for the period covered and EPD actions required. The report shall be forwarded to the Manager, EPD and a copy to Records Management filed under File No. G03.08 (GL 89-10 Program).

4.4.3.5 All EPD actions identified in the MOV Maintenance Work Summary SHALL be placed in the EMTS.

4.5 Trend Investigation

4.5.1 The Trend Investigation is a detailed analysis of the MOV failure or adverse trend with consideration of related or similar failures, maintenance work history, test data and industry wide information.

4.5.2 A Trend Investigation SHALL be initiated when:

4.5.2.1 A hardware SPR is generated for a MOV

4.5.2.2 A test data trend indicates deteriorating MOV performance

4.5.2.3 An adverse maintenance work trend is identified

4.5.2.4 Management request

- 4.5.3 The MOV Tracking and Trending Coordinator SHALL:
 - 4.5.3.1 Provide assistance to the MOV engineer to extract failure, maintenance and test data from the TTDB for the failed MOV and the defined group(s) for use in the Trend Investigation as requested by the MOV engineer.
 - 4.5.3.2 Update the MOV Database to show that a Trend Investigation has been completed for the failed valve.
- 4.5.4 The MOV engineer SHALL:
 - 4.5.4.1 Complete the Trend Investigation Data Request (Addendum 4) and obtain MOV Maintenance Work and Test Data History for the failed MOV from the MOV Tracking and Trending Coordinator.
 - 4.5.4.2 Obtain and review all previous Trend Investigations for the failed MOV.
 - 4.5.4.3 Obtain and review all previous SPRs for the failed MOV.
 - 4.5.4.4 Request industry related information based upon the MOV from the NPRDS Coordinator. Evaluate the data when received.
 - 4.5.4.5 Evaluate maintenance work and test data histories for the failed MOV.
 - 4.5.4.6 For Trend Investigations initiated by an adverse trend or when an individual failure indicates that a generic problem may exist, define a group or groups of MOVs with similar characteristics and perform steps 4.5.4.1 through 4.5.4.5.
 - 4.5.4.7 Initiate corrective action in accordance with OPGPO3-ZX-0002, Corrective Action Program or OPGP03-ZA-0090, Work Process Program.

- 4.5.4.8 Prepare a Trend Investigation Report using the outline in Addendum 5. The report SHALL be forwarded to the Manager, EPD and a copy to Records Management filed under File NO. G03.08 (GL 89-10 Program).
- 4.5.4.9 All EPD actions identified in the Trend Investigation Report SHALL be placed in the EMTS.
- 4.5.4.10 Notify the MOV Tracking and Trending Coordinator and obtain signoff on the cover sheet that the MOV Database has been updated.

5.0 References

- 5.1 NRC Generic Letter 89-10, "Safety-Related Motor Operated Valve Testing and Surveillance", dated June 28, 1989.
- 5.2 OPGP005-ZE-0309, MOV Diagnostic Testing
- 5.3 OPGP03-ZE-0037, Motor Operated Valve Program
- 5.4 OPGP03-ZA-0503, Equipment History Program
- 5.4 OPGP03-XX-0002, Corrective Action Program
- 5.5 OPGP03-ZA-0090, Work Process Program
- 5.6 OPGP03-ZE-0026, NPRDS Failure Reporting Procedure
- 5.7 OPGP03-ZA-0038, Nuclear Plant Reliability Data System Program

6.0 Support Documents

- 6.1 Addendum 1 - MAINTENANCE WORK CATEGORIES
- 6.2 Addendum 2 - TRENDED MOV TEST DATA
- 6.3 Addendum 3 - MAINTENANCE HISTORY DATA
- 6.4 Addendum 4 - MOV TREND INVESTIGATION DATA REQUEST
- 6.5 Addendum 5 - MOV TREND INVESTIGATION REPORT

ADDENDUM 1
MAINTENANCE WORK CATEGORIES

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ACTUATOR

Item	Work Scope
Refurbishment	Complete Refurbishment of the actuator (may be combined with others)
Motor	All maintenance work on the motor
Torque Switch	All maintenance work on the torque switches including replacement, adjustments and limiter plate adjustments
Limit Switch	All maintenance work on the limit switches including replacement and adjustment
Internal Wiring	All activities that repair or replace internal wiring including re-lugging, terminal strips and new or repaired wiring
Lubrication	All maintenance work involving lubrication including filling, replacing, cleaning to remove from unwanted areas, unacceptable grease samples and external leakage (not including PMs that did not add grease)
Stem Nut	All work involving the stem nut including rework, cleaning, replacement
Spring Pack	All work involving the spring pack including cleaning, modification, replacement
Internal Gears	All work on worm gear, pinion gear, wormshaft gear, pins and keys
HBC	All maintenance involving the HBC gearbox except lubrication
As Found Test	All SRs that performed an As Found diagnostic test
As Left Test	All SRs that performed an As Left diagnostic test
Other	All other work on the actuator. All SRs where work was performed including minor adjustments, loose items, gasket replacement.

VALVE

Packing	All valve stem packing work including leaks, adjustments and replacement
Stem	All maintenance work involving the valve stem including bent, galled, scratched , repaired and replaced stems
Internal	All maintenance work involving the valve internals including seats, disks, guides and other internal parts
Other	All maintenance work on the valve itself except the items listed above

ELECTRICAL DISTRIBUTION

Electrical	All external electrical work related to the Tag/TPNS number of the valve or actuator including wiring and breakers
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ADDENDUM 2
TRENDED MOV TEST DATA
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ALL TEST DATA IS FROM STATIC TESTS

ALL VALVES (RISING STEM AND QUARTER TURN)

<u>ITEM</u>	<u>SELECTION CRITERIA</u>
Running Current, Opening (Corrected for measured voltage)*	Last test value > Nameplate Current
Running Current, Closing (Corrected for measured voltage)*	Last test value > Nameplate Current
Peak Inrush Current, Opening	Greater than 10% increase over last 4 tests
Peak Inrush Current, Closing	Greater than 10% increase over last 4 tests
Contactors Drop Out Time, Open	Any consecutive increase over last 4 tests
Contactors Drop Out Time, Closed	Any consecutive increase over last 4 tests
LIMIT CONTROLLED VALVES ONLY	
Stroke Time, Open	Any consecutive increase over last 4 tests
Stroke Time, Closed	Any consecutive increase over last 4 tests

* Measured Current x $\frac{\text{Measured Voltage}}{\text{Nameplate Voltage}}$

ADDENDUM 2
TRENDED MOV TEST DATA
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RISING STEM VALVES

ITEM

SELECTION CRITERIA

Stem Factor, QSS
Stem Factor, DMT

Any value above design allowable

Running Load Thrust, Opening

Any As Left to As Found increase > 20% or any value above design allowable

Running Load Thrust, Closing
Running Load Torque, Opening
Running Load Torque, Closing

		LIMIT CONTROLLED	TORQUE CONTROLLED
Thrust :	At CST	AL* - AF* > 10%	AL - AF > 20%
	Total	"	"
	Unseating	"	"
Torque:	At CST	"	"
(Springpack)	Total	"	"
	Unseating	"	"
Torque:	At CST	"	"
(QSS)	Total	"	"
	Unseating	"	"

* AL = As Left AF = As Found

ADDENDUM 2
TRENDED MOV TEST DATA

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OVERTHRUST/OVERTORQUE - YES

NOTE: EVALUATION REFERENCES ARE TO OPMP05-ZE-0309 REV 8.

BUTTERFLY VALVES:

HBC Overtorque Full Stroke Open (Evaluation A)
HBC Overtorque BARTS* Open (Evaluation B)
HBC Overtorque Full Stroke Closed (Evaluation E)
HBC Overtorque BARTS Closed (Evaluation F)
SMB Overtorque Open or Closed (Evaluation I)

*Butterfly Analysis, Review and Test System

RISING STEM VALVES

SMB Overthrust Open (Evaluation A)
SMB or Valve Overthrust Closed (Evaluation E)
SMB Overtorque Open or Closed (Evaluation F)

ADDENDUM 3
MAINTENANCE HISTORY DATA
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The following data is transferred from the Equipment History System:

Tag/TPNS Number
Work Activity Number (WAN)
Work Activity Description
SR or PM Number
Date Work Activity Closed
As Found description
Failure Description
Action Taken Description
As Left Condition
Referenced Documents
Severity Level*
Failure Symptom*
Failure Detection*
Cause Category*
System Effect*
Plant Effect*
Corrective Action*
Part Numbers , Descriptions and Quantities

* Refer to OPGP03-ZA-0503, Equipment History Program for description and codes

ADDENDUM 4
MOV TREND INVESTIGATION DATA REQUEST
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MOV TREND INVESTIGATION
DATA REQUEST

FAILED ITEM DESCRIPTION

TAG/TPNS _____ MODEL _____

FAILED ITEM DATA

Test History : From _____ To _____

Fields to print _____

Sort By: _____

Maintenance History: From _____ To _____

Fields to print _____

Sort By: _____

GROUP DESCRIPTION (Records to Select)

Valve Characteristics: _____

Actuator Characteristics: _____

Test History _____

Test Data _____

Maintenance History _____

GROUP DATA REQUIRED (Data to be printed in the report)

Valve Characteristics: _____

Actuator Characteristics: _____

Test History _____

Test Data _____

Maintenance History _____

Sort Records By _____

ADDENDUM 5
MOV TREND INVESTIGATION REPORT
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