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Pacific Gas and Electric Company	UTILITY OPERATIONS (UO)
	UO Standard S4220
ISSUING DEPARTMENT GSM&TS	EFFECTIVE DATE 05-03
UO SPONSORS VP – CGT	REVIEW DATE 05-08
VP – E&P	PAGE NO 1 OF 4
TITLE Gas Valve Maintenance Requirements	

Purpose

This UO standard provides the maintenance requirements and procedures for plug ball, and gate valves (referred to as valves ') installed in and determined to be necessary for safe or emergency operation of Pacific Gas and Electric Company s (the Company's) gas systems

Recision

This UO standard replaces and supersedes Gas Standard F 11, Valve Lubrication and Maintenance Requirements '

Safety

Failure to perform the required maintenance could pose risk to public safety in the event of an equipment or pipeline failure

Implementation Responsibilities

The vice president of California Gas Transmission (CGT) and the vice president of Engineering and Planning (E&P) are responsible for approving revising, and distributing this standard The vice president of CGT and vice president of E&P authorize the directors of Gas System Maintenance and Technical Support (GSM&TS) and Gas Distribution and Technical Services (GD&TS) to update and reissue the attachments to this standard

The Operations Maintenance and Construction (OM&C) superintendent and GSM&TS district superintendents are responsible for implementing this standard within their respective organizations

Compliance

The director of GSM&TS and the director of GD&TS are responsible for establishing and maintaining procedures to comply with this standard

Responsible superintendents and supervisors measure the implementation and effectiveness of this standard In addition, internal Company departments can conduct periodic audits The CPUC also conducts compliance audits on the requirements in this standard

Procedure

See Attachment 1 for detailed maintenance requirements and procedures

cronyms

BTU British Thermal Unit

49 CFR Title 49 of the Code of Federal Regulations – Transportation

ESD Emergency Shutdown

DOT Department of Transportation

G O 112E State of California Public Utilities General Order 112 E, which contains the rules governing design construction, testing maintenance, and operation of utility gas gathering transmission, and distribution piping systems

MAOP Maximum Allowable Operating Pressure

Definition of Terms

Distribution Regulator Station Valves Those valves identified in UO Standard S5351 District Regulator Station Maintenance '

Emergency An emergency is defined as Any unsafe condition that requires the **immediate shutdown and isolation** of an entire station or pipeline section in order to protect employees or the public and to prevent or minimize equipment damage and property loss

Emergency Valves California Gas Transmission (CGT) valves used to isolate a pipeline facility or pipeline section in the event of an emergency Valves in this category include transmission mainline valves cross-tie valves tap valves pipeline blowdown valves station upstream and downstream block valves line rupture control valves and all of the valves controlled by a station ESD system (varies by station includes uphole safety valves at storage fields)
Note Classify BTU Zone isolation valves as Emergency Valves because leakage across the valve may create a hazard for customers because of excessive BTU variations

Gas Distribution Critical Main Valves Gas distribution main valves that may be necessary for the safe operation of a distribution system See Attachment 3 for criteria to identify gas distribution s 'critical' main valves

Maintenance Valves CGT valves used to isolate equipment in order to facilitate maintenance or repairs Valves in this category include but are not limited to equipment isolation valves (e g separators filters, coolers etc) block valves installed on either side of a meter or individual regulator/monitor or load valve/trimmer runs unit block valves (compressor stations) bypass valves (unless controlled by an ESD system) fuel gas valves (unless controlled by an ESD system) valves on gas well Christmas trees (except uphole safety valves) tap valves for power and control gas and valves on power gas or instrument supply piping (supply racks) Valves are typically in open/close service and are generally manually operated A few valves may be power actuated

Operational Valves CGT valves used to facilitate system operations Valves in

this category include but are not limited to MAOP separation valves and valves used to change routing through a station (primarily terminals and compressor stations) Valves are typically in open/close service and may be manually operated or power actuated

Date Issued/Updated

Effective May 2003

Review Date May 2008

Signed,

Michael A Katz
Vice President
California Gas Transmission

Signed

Shan Bhattacharya
Vice President
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Reference Documents

49 CFR Paragraph 192 745, Valve maintenance Transmission lines '

49 CFR Paragraph 192 747 'Valve maintenance Distribution systems

G O 112 E Section 143 2 'Valve Maintenance'

GS&S Gas Standard F-21 1, Material Specification for Carbon Steel Ball Valves

UO Standard D S0333, 'Material Problem Reporting'

UO Standard S4432 ' Station Inspection, Testing and Maintenance Procedures

UO Standard S5000 'Gas Distribution Emergency Shutdown Zones'

UO Standard S5351 'District Regulator Station Maintenance '

Attachments

Attachment 1 'Valve Maintenance Requirements

Attachment 2 Valve Maintenance Record (with instructions)

Attachment 3 Gas Distribution Critical Main Valves '

Attachment 4, Buried Valve Identification

Attachment 5, Guidelines for the Use of Hydraulic Wrenches (and Other Devices That Can Provide High Torque) on Gas Transmission and Distribution Valves Such as Torque Multipliers for Box Wrenches on Gas Transmission and Distribution Valves"

Attachment 6 How to Estimate Torque When Manually Operating a Valve

Attachment 1

Valve Maintenance Requirements

Purpose

The purpose of this attachment, Valve Maintenance Requirements " is to provide procedural details for the inspection, lubrication, servicing, and operation of gas valves

1 Code Requirements

A **49 CFR Paragraph 192 745, "Valve maintenance Transmission lines"** requires that "Each transmission line valve that might be required during any emergency must be inspected and partially operated at intervals not exceeding 15 months, but at least once each calendar year

B **49 CFR Paragraph 192 747, "Valve maintenance Distribution systems"** requires that "Each valve the use of which may be necessary for the safe operation of a distribution system must be checked and serviced at intervals not exceeding 15 months but at least once each calendar year '

C **G O 112E Section 143 2, "Valve Maintenance"** requires that

Each valve the use of which may be necessary for the safe operation of a distribution system, must be inspected serviced, lubricated (where required) and partially operated at intervals not exceeding 15 months, but at least once each calendar year '

D **49 CFR 192 Subpart N – Qualification of Pipeline Personnel** requires that

All employees performing valve maintenance tasks need to be fully qualified to perform those tasks per the company s Operator Qualification Plan Refer to the Utility Task and Subtask list in the Operator Qualification Plan

2 Valve Maintenance Schedule

The responsible operating department shall establish a schedule for valve inspection and maintenance

Mandatory work requirements frequencies and guidelines on additional recommended inspections and maintenance are as follows

A New Valves

All valves shall be inspected and operated before installation When operating a valve verify that the ball plug, or gate actually moves

If a valve is to be buried, inspect the valve to ensure that any lubrication (or backup lubrication) and body cavity drain fitting(s) is extended upward to a serviceable location per Gas Standard F-21 The body cavity drain fitting is used to remove debris from the valve and to test the seat integrity Inspect the ball valve to ensure that all body reliefs are removed and plugged Reliefs are only necessary for valves in liquid service Replace the reliefs with steel plugs with a

pressure rating at least equal to that of the valve Also inspect the valve to ensure that shipping tabs and lifting eyes have been removed

Before installing any lubricated plug valve, **the valve must be lubricated** This ensures the proper flow and distribution of lubricant throughout the valve body (and lubricant extension pipe, if used) Construction employees should inspect and lubricate the plug valves in cooperation with the operating personnel responsible for the station after construction If a valve is found to be operating improperly, a Material Problem Report ' shall be submitted (See UO Standard D-S0333 "Material Problem Reporting)

Other valves requiring lubrication for proper operation shall be lubricated before installation (After lubrication, but before installation, internally inspect the valves to ensure that the lubricant is being properly distributed)

Note Some valves are designed to be operated without lubrication but are supplied with backup lubrication systems to provide a good seal if the valve is worn Do not lubricate these valves unless it is determined in the field that lubrication is necessary for proper operation Once these valves are lubricated they **may** require subsequent lubrication to achieve bubble-tight shutoff

B Manually Operated Valves

Gas transmission valves classified as emergency gas distribution critical main valves, and district regulator station valves must be inspected, serviced/lubricated (where required, see the paragraph above) and operated (see Paragraph 1 on Page 1) at intervals not exceeding 15 months, but at least once each calendar year If a valve requiring lubrication is not lubricated regularly, it may become inoperable not shut off adequately when necessary or develop external valve stem leakage

The responsible operating department shall identify all gas transmission "emergency" valves gas distribution "critical main valves, and district regulator station valves, and ensure that these valves are properly maintained For gas distribution "critical" main valves see Attachment 3 Gas Distribution Critical Main Valves ' and for district regulator station valves, see UO Standard S5351 District Regulator Station Maintenance

Gas transmission valves that are classified as Operational" and Maintenance should be inspected lubricated, and operated annually

C Power Actuated Valves

All power-actuated valves installed in Company gas systems must at a minimum comply with the maintenance requirements of Paragraph 2 B for manually operated valves It is recommended however, to adopt more stringent maintenance schedules because of the following circumstances

(1) Power-actuated valves have added complexity of valve actuation and control

(2) Power-actuated valves are commonly used in throttling applications

(3) Power actuated valves are typically more critical to system operation

Power actuated isolation and block valves should be inspected serviced lubricated and operated (see Paragraph 4) twice each calendar year (at approximate 6-month intervals)

Power actuated regulating valves on standby (not required to regulate during normal operations) or power-actuated valves used for overpressure protection (monitors) should be partially

operated and inspected once a month, and serviced and lubricated (unless exempted by Paragraph 2 A) twice each calendar year (at approximate 6 month intervals)

Power-actuated ball and plug valve regulators used frequently during normal operations should be lubricated and inspected at least once every 2 weeks During the first days of operation or after a significant operating change, closely observe power actuated valves used as regulators If a valve is cycling often lubrication may be needed as frequently as every other day

D Modifying the Valve Maintenance Schedule

The valve maintenance timetables specified in Paragraphs 2 B and 2 C should be modified to provide additional inspecting servicing, and lubricating, when necessary This is especially important when valves are operated more frequently, or when there are special operating conditions

The recommended timetables for power actuated valves are written as guidelines and may be modified to reduce the frequency of maintenance activities when operating conditions allow

3 Inspection Procedures

A Before lifting the lid and entering any pit or vault observe the necessary precautions regarding barricading identifying sources of ignition and checking for combustible gases in accordance with UO Standard D S0213 "Work Procedures in Confined Spaces,' UO Standard S4414 "Confined Space Entry Program ' and the applicable section of the Company's *Code of Safe Practices*

B If a valve is located in a valve box or a vault

(1) Ensure that the valve box or vault is cleared of any debris that would interfere with or delay the operation of the valve

(2) Ensure that there is adequate access to the valve (the vault cover opens etc) that the valve is adequately protected (the vault and vault cover have integrity), and the vault is safe for the employee to enter

C The valve shall be inspected for

(1) Missing valve number tag

(2) Broken or missing valve components (e g lubrication fitting handwheel padlock etc)

(3) Any gas or oil leaking on the valve body high head extension or valve operator

(4) Signs of external corrosion and/or degradation of coating For buried valves with high head extensions the air-to-soil transition should be inspected for signs of corrosion or disbondment of wrap

Any issues shall be identified on the Valve Maintenance Record (see Attachment 2) and scheduled for repair as appropriate

4 Operating Valve (During Maintenance)

A When servicing a valve as required in Section 2, the valve shall be **operated** (or stroked) through its complete range when operating conditions permit When operating conditions do not permit full operation of the valve it shall be stroked through the maximum range that is practicable For normally closed valves, never stroke the valve less than the amount required to establish flow through the valve Listed below are recommendations for partially operating various types of valves

(1) **Plug valves with gearing** For a normally open valve, take the "slop ' out of the gearing, then go three complete turns For a normally closed valve just barely initiate flow or until the operator indicates approximately 25% of travel (22 5° open position) **Note** Plug valves do not start to flow until 20-23° open

(2) **Plug valves without gearing** For a normally open valve take the ' slop" out of the keyway then move through approximately 25% of travel (67 5° open position) For a normally closed valve, just barely initiate flow or until the valve wrench indicates approximately 25% of travel (22 5° open position)

(3) **Ball valves with gearing** For a normally open valve take the slop" out of the gearing then go three complete turns For a normally closed valve just barely initiate flow **Note** Ball valves do not start to flow until 6-8° open position

(4) **Ball valves without gearing** For a normally open valve take the "slop" out of the keyway, then move through approximately 25% of travel (67 5° open position) For a normally closed valve, just barely initiate flow

(5) **Gate valves** For a normally open valve take the "slop" out of the gearing then go one complete additional turn For a normally closed valve, just barely initiate flow

B After operating a valve, return it to the as found" position

C Any problems encountered when operating any valve either during scheduled maintenance or at any other time, shall be reported on a Material Problem Report," Form 620113A A "Work Request" should be completed to correct any problem on a CGT transmission valve

D As part of the maintenance program on valve-operator combinations, it is recommended to record the amount of torque and the time required to close and open the valve Plotting this information over a period will show changes which can indicate wear or binding of the operator or problems with operating the valve

5 Lubrication Procedure

A General

Periodic lubrication ensures that the valve operates with minimal effort, seals properly to provide shutoff, and can prevent external stem leaks in plug valves

All equipment, such as valve lubrication guns hyperguns and pumps need to be appropriate for the particular valve being maintained They must be kept in good condition and operated by qualified employees

(1) All lubricants must be clean and be the specific lubricants recommended by the valve manufacturer Refer to the Approved Valve Lubricants section beginning on Page 12 Using lubricants that are not recommended by the appropriate valve manufacturers voids the warranties and leaves the Company vulnerable in any potential lawsuit involving third-party damages that are considered caused by valve leakage Refer to the manufacturer s lubrication instructions for the proper use of lubricants

(2) When lubricating valves equipped with buttonhead lubricating fittings, use a high-pressure grease gun that includes the appropriate pressure gauge Lubricate valves equipped with lubricant screws with stick type lubricants

(3) [Optional] A tag may be attached to the valve to indicate if lubrication is required If the valve does require lubrication and a tag is used the tag should state the type of lubricant to be used

(4) When double block and-bleed type valves are exposed to water condensate, or other foreign matter, drain/blow the valve body to prevent damage to the valve Always drain/blow the valve body after hydrotests

(5) If a valve is difficult to operate or leaks from upstream to downstream, it may be necessary to flush out the old lubricant See the Valve Flushing Procedures ' section beginning on Page 14

(6) If a valve will not seal off completely after having performed the manufacturer's recommended procedures to stop leakage then inject the valve with limited amounts of Sealweld 5050 (12 ounce cartridge, Code 015572, 10-pound pail available, not coded) Valves requiring the use of Sealweld 5050 to operate should be scheduled for replacement as soon as economically feasible Note the use of Sealweld 5050 on the "Valve Maintenance Record

B Plug Valves

(1) Plug valves should always be lubricated in the fully open or fully closed position (fully open position is preferred) In either of these positions, all grease grooves in the body are connected with the circular grooves at the top and bottom of the plug and the grease grooves in the plug are mated to the grease grooves in the body This ensures a full and even spread of the lubricant over all the surfaces The lubricant then acts as a bearing interface as well as a sealant (Multi port valves have special lubrication systems and should only be lubricated in one of the 90° positions) After lubrication turn the valve

through its complete range or through the maximum range practicable, as described in Section 4 Operating Valve (During Maintenance)

Lubricate plug valves used as regulators, which are backed up by monitor valves, in the fully open position This permits the monitor valve to take over the control function Lubricate plug valve monitors in their normal fully open position

(2) For valves using a lubrication screw to inject stick sealant, the lubrication screw must not be left in the plug stem beyond complete engagement of the threads (If the screw is left in this position a pocket is created where water, dirt or corrosion products could collect and make the lubricant screw difficult to remove) Insert another stick of the sealant into the valve to cause the lubricant screw to be backed out

(3) When lubricating valves, look for the following visual clue that the process is successful The grease gun s pressure gauge shows steadily increasing pressure with each stroke of the lubricant gun until the pressure gauge reading no longer rises but begins to drop and the pumping effort decreases At this point the valve has been sufficiently lubricated Stop injecting the lubricant

The quantity of valve sealant required is estimated by using the following table

Table 1 – Valve Sealant Quantity

Plug Valve Size	Amount of Sealant (for periodic lubrication)[1]
12 and smaller	0 5 oz / inch size
14 through 18	0 75 oz / inch size
20 and larger	1 0 oz / inch size

[1] For new valves or a valve with sealant flushed out use four times the amount stated Table A

Note If the sealant in the riser pipe must be purged with new sealant, estimate additional sealant to be used based on the following for ½ ' and ¾' riser pipe inject an additional 2 0 ounce and 4 0 ounce, respectively per foot of riser pipe

(4) The lubricant pressure on the grease gun gauge should read a minimum of 2,000 pounds per square inch (psi) for any plug valve The lubricant pressures should not exceed 5,000 psi when lubricating semi steel valves and 12 000 psi when lubricating steel valves Very low pressure or no static pressure on the gauge during injection indicates one of the following problems

(a) The gun is empty

(b) The valve plug is loose (see Paragraph 4 B (5) below)

(c) The gun is malfunctioning and should be checked No repairs are to be made to the hydraulic system If the gun is broken, recondition it

If excessive clearance exists between the plug and the body, either because the adjustment gland or the adjustment screw is backed off too far the lubricant migrates into the pipeline and the lubricant pressure will not build up properly

If the lubricant pressure immediately becomes high, it may indicate a defective lubricant fitting which could prevent lubricant from entering the valve

Caution Do not attach or detach couplers while guns are under pressure Relieve gun pressure by opening the gun by pass valve

(5) If a valve plug is difficult to operate or is stuck, inject it with a lubricant to free it After lubrication, operate the valve until it turns freely If lubricating the valve fails to loosen it, flush the valve as specified in the "Valve Flushing Procedures ' section

(6) The practice of loosening plug adjustment screws to obtain a temporarily free turning plug will invariably result in undesirable secondary effects The secondary effects of improper plug adjustment are

(a) Valve leakage Lubricant may be ineffective since too much clearance will not allow lubricant to distribute properly within the valve

(b) Excessive clearance which allows foreign or abrasive materials to be trapped between the plug and seat, can result in damaged sealing surfaces

(c) Higher torque characteristics as damage occurs

(d) Possible gear and operator damage as the torque becomes excessive

(e) An ultimate need to replace the valve

(7) Adjusting the packing gland on fixed-adjustment gland valves is generally not necessary Do not adjust the gland except as specified by the manufacturer

(8) When the valve plug is not properly seated or when lubrication is not effective in loosening a difficult-to-operate (malfunctioning) valve, and an approved valve flush has been used tighten the gland adjustment nuts Tightening the nuts will seal off lubricant leaks and will help develop the proper hydraulic pressure during lubrication Do not attempt to tighten the gland adjustment nuts without consulting the valve manufacturer unless the operator is experienced with the particular adjustment of the specific valve type (Never loosen the packing gland before lubrication)

(9) The Rockwell Hypreseal type valves have an adjustment screw in the bottom cover This screw is adjusted at the factory to strict specifications To prevent tampering, a cover is tack welded over this screw Do not adjust the screw position in the field unless trained personnel are on site

(10) When specified adjustments to adjustable valves are unsuccessful and they cannot be properly lubricated or when an inoperable plug valve requires adjustment submit a Material Problem Report Form 620113A

C Ball Valves

(1) Rockwell Hypresphere Ball Valves (old floating ball model, manufacture ended in 1973)

(a) Lubricate the Hypresphere valve when the valve is fully open or fully closed Some sizes have three lubricant fittings, one for each seat and one for the stem The stem must only be lubricated if stem leakage occurs Keep all valves lubricated for satisfactory operation Thoroughly lubricate the seat on the low pressure side of the valve, especially if the valve is difficult to operate

Note When a valve is closed and the line is blown down on what is normally the upstream side of the valve seat reversal occurs Before the line is pressurized and returned to service, lubricate **both** valve seats

(b) Rockwell s specified lubricant for Hypresphere valves is Rockwell No 1033 Do not use any other lubricant in Rockwell valves (see Table 3 on Page 14)

(2) Rockwell TM Hypresphere Ball Valves (trunnion mounted ball, manufactured since 1972)

(a) The Rockwell TM Hypresphere ball valve needs no lubrication for a tight shutoff However as noted below, perform periodic maintenance according to a schedule that is designed to keep the valve in good working order Obtain a longer seat life and easier operation by periodically injecting the valve with lubricant

(b) The valve has a lubricant injection system to provide a backup seat seal should the seats become damaged and tight shutoff is not possible Both valve seats have lubricant injection fittings on the sides of the valve body In addition there is a lubricant injection fitting at the base of the valve stem to provide a secondary stem seal The stem must only be lubricated if stem leakage occurs Valves 20 inches and larger have five lubricant injection fittings

(c) Although lubricant injection is not necessary for shutoff, Rockwell states that 'periodic lubricant injection with approved Rockwell lubricants helps maintain good operating conditions and minimizes wear and abrasion on the seats and ball ' Depending on the severity of the service environment, lubricant should be injected at least annually

(d) Lubricate Rockwell TM Hypresphere ball valves before installation Construction employees, in cooperation with the operating employees responsible for the station after construction, should lubricate the ball valves Visually check the valves for lubricant excretion around the ball port and valve body This inspection will verify the proper flow and distribution of lubricant throughout the valve body (and lubricant extension pipe, if used) Lubricate as often as necessary to ensure smooth operation when the valve is being throttled Lubricate the valves in the closed position, if possible Any problems with the operation of these valves either during scheduled maintenance or at any other time, shall be reported on a Material Problem Report form

(e) Rockwell s specified lubricant for Hypresphere valves is Rockwell No 1033 Do not use any other lubricant in Rockwell valves (see Table 3 on Page 14)

(3) Grove Ball Valves

(a) Grove Model B-4 B-5 B 6, and B-8 ball valves normally need no lubrication for bubble tight shutoff Lubricate the valves not used as monitors or standby regulators (using the fittings provided) only if a positive shutoff cannot otherwise be obtained Check valves that do not provide positive shutoff for possible valve seat or ball damage Once the valve is lubricated it may need lubrication to achieve bubble tight shutoff

(b) The manufacturer's specified lubricant for shutoff on Grove Model B 4, B-5, B 6 and B 8 ball valves and for Grove BVR 4 and BVR-5 ball valve regulators is Sealweld 911 (cartridge, Code 500004, 10 pound pail Code 500012) Do not use any other lubricant on Grove ball valve regulators

(c) Lubricate Grove Model BVR 4 and BVR 5 ball valve regulators before installation Construction employees, in cooperation with the operating employees responsible for the station after construction should lubricate the ball valve regulators Visually check the valves for lubricant excretion around the ball port and valve body This inspection will verify the proper flow and distribution of lubricant throughout the valve body (and lubricant extension pipe if used)

Note After release to operations lubricate the valves as often as necessary to ensure smooth operation when the valves are throttling Lubricate the valves in the closed position, if possible

(d) Grove regulating valves with retractable seats (commonly known as the Arcron Model) must not be lubricated This will destroy the retractable seat feature The valve has no lubrication fittings to lubricate the valve seats It does, however have Zerk fittings under the Arcron cover for lubricating the operator Use Sealweld No 911 lubricant to grease these fittings

(4) TK and KF (Series P3) Ball Valves

(a) TK and KF (Series P3) ball valves normally need no lubrication for bubble-tight shutoff Lubricate the valves not used as monitors or standby regulators (using the fittings provided) only if a positive shutoff cannot otherwise be obtained Check valves that do not provide positive shutoff for possible valve seat or ball damage Once the valve is lubricated, it may need lubrication to achieve bubble-tight shutoff

(b) The manufacturer s specified lubricant for shutoff on TK and KF (Series P3) ball valves is Sealweld 911 (cartridge Code 500004 10 pound pail, Code 500012) Do not use any other lubricant on these ball valves

(5) PBV USA Ball Valve

(a) PBV-USA Series 5700/6700 trunnion mounted ball valves do not require periodic lubrication as they are manufactured with seals and bearings that are permanently lubricated These valves are also equipped with seat seals which are designed not to require sealants

(b) Although lubricant injection is not normally necessary periodic injection of Sealweld 911 helps maintain the valve in good operating condition by minimizing wear on the ball and seats This operation purges old greases and residual build-up which contributes to seat leakage and excessive operating torque

(c) In the presence of excessive line contaminants the possibility of leakage due to erosion is greater than when the valve is used for normal on/off service If the primary seal and the secondary metal-to metal seal are damaged an emergency shutoff may be obtained with a sealant injected through buttonhead grease fittings located in the end closures First, purge the sealant passages by injecting Sealweld Valve Cleaner (cartridge, Code 015568) Then, with the valve in the fully closed position slowly inject Sealweld 5050 ball valve sealant through the large buttonhead fitting provided on the upstream end closure If possible, move the ball slightly during injection to ensure that the sealant is evenly distributed over the seating surfaces of the seat ring and ball

(6) WKM Dynaseal Ball Valves

(a) WKM Dynaseal ball valves do not normally require lubrication for bubble-tight shutoff However, it may be necessary to inject lubricant (emergency seat renewal) if the seats become damaged The recommended lubricant for shutoff is WKM Lubricant No 103, or an approved equivalent, such as Rockwell No 1033 Close the valve and inject lubricant at both seats under block-and-bleed conditions

(b) Should a leak develop around the stem, it can be stopped under pressure by injecting WKM plastic stem packing No 107 or Sealweld Slick Stick

(7) Cameron Ball Valves

(a) Cameron all-welded ball valves do not normally require lubrication The valve is sealed for life Seals and stem bearings are self-lubricating and are designed for the life of the valve Although lubricant injection is not normally necessary periodic injection of Sealweld 911 helps maintain the valve in good operating condition by minimizing wear on the seats and ball and ensuring free movement of the valve seats

(b) The valve has lubricant-injection ports with check valves to provide a backup seat seal should the sealing surfaces become damaged and bubble tight shutoff cannot be obtained

Note 2 inch to 4-inch valves have a smaller buttonhead fitting, requiring a 5/8 inch coupling on the handgun

(c) The injection system can also be used for flushing the seat ring area when necessary

(d) If the primary seats become damaged, it may be necessary to inject lubricant through the lubricant injection fittings The recommended lubricant for Cameron ball valves is Sealweld 911

(e) For Cameron valves 14 inches and larger the rotating seat design creates an increased torque for the last 15° when the valve is being closed Although lubricant injection is not normally necessary periodic injection of Sealweld 911 helps ensure easy rotation of the valve seats, which thereby minimizes operating torque Use the valve position indicator to determine when the valve is fully closed Some early version Cameron valves have excessive stem wind-up which must be accounted for when determining the position (open closed etc) of the valve

(8) VSI and Kerotest Weldball Valves

(a) The VSI Model 111 and Kerotest Weldball valves do not require lubrication or any maintenance These valves are sealed for life Seals and stem bearings are self-lubricating and are designed for the life of the valve

(b) The opening torque for a VSI valve may be higher than normal if there is a high differential pressure across the valve

Note VSI valves only operate 87° from fully closed to fully open

(c) Before removing the bonnet from a VSI valve (no pressure in the line) the valve must be in the fully open position In any other position, the internal parts cannot be removed

D Gate Valves

(1) Kerotest M 1 Gate Valves

(a) The Kerotest M 1 gate valve does not normally require lubrication or gland tightening A stem leak requires replacing the packing seals and gland gasket Repack the valve and lubricate it as described in Kerotest s procedure for primary or secondary" repacking The primary repacking procedures may be performed with the line pressurized See the Kerotest M-1 *Gate Valve Operations Manual* for more information

(b) If the bonnet gasket leaks, retighten the bonnet screws per torque specifications found in the Kerotest operations manual If leakage persists, remove the valve from service disassemble it, and inspect it for damage to the gasket or sealing area Replace the gasket and/or polish the sealing area with a very fine emery cloth Coat the bonnet gasket with a light film of multipurpose grease and reassemble it

(c) Be careful if the valves are in the open position in a pipeline for a period of time Sediment or dirt can collect inside the valves and prevent the wedges from fully closing When these valves are to be closed, do it slowly The valves should not be closed completely, but 'throttled" for a short period of time so the turbulence created will flush away any sediment or dirt that might have settled in the valves In the event of an emergency, close the valves as quickly as possible

(d) If a valve does not shut off completely the valve may be reseated using the following procedure

(i) Throttle the valve to flush out loose sediment

(ii) Close the valve using moderate effort This will force the wedge partially into the seat and loosen accumulated sediment

(iii) Open the valve one or two turns to retract the wedge from the seat

(iv) Repeat this procedure if necessary

(2) Kerotest Model EV 11 "Stirrup" Gate Valve

(a) The EV 11 gate valve does not normally require lubrication for a bubble tight seal Lubrication is required only during cleaning and inspecting as specified in Kerotest s maintenance procedures

(b) If a leak develops in the bonnet retighten the bonnet screws to Kerotest s torque specifications If leakage persists replace the bonnet O ring This repair cannot be done under pressure

(c) A stem leak requires replacing the stem seal and gland bushing O rings Replacing the stem seal and gland bushings O rings can be performed under pressure if Kerotest s repair procedure is followed

(d) If the valve does not shut off completely, it may be necessary to disassemble the valve and clean or replace the wedge seals

(e) For repair procedures and torque requirements refer to EV 11 gate valve maintenance instructions

(3) RMI Weld Patent Gate Valve (WPV)

(a) The WPV does not require lubrication for a bubble-tight seal

(b) A stem leak requires replacing the stem O-rings Replacing the stem O rings can be performed under pressure if WPV s repair procedure is followed

(c) The WPV is an all welded design therefore, the valve cannot be disassembled to replace the stem or wedge

E Plastic Valves

(1) Perfection, Kerotest and Nordstrom Plastic Valves

(a) The Perfection Kerotest and Nordstrom Plastic Valves listed in Gas Standard F 90 do not require lubrication

(b) Ensure that the valve stem is vertical, the valve is not under strain the top of the valve is exposed, and the valve box does not rest on the plastic pipe

6 Approved Valve Lubricants

A Plug Valve Lubricants

(1) The specified types of general purpose lubricants for plug valves are listed in Table 2 Currently Rockwell No 1033 is the only recommended lubricant Standard sizes and packages of approved lubricants are available by specifying the code number shown

Caution Avoid the **routine** use of Teflon bearing lubricants, such as Sealweld 5050 in plug valves Teflon particles can clog orifices in the Company's pneumatic control equipment and customers appliances, resulting in serious problems If Sealweld 5050 must be used to stop internal leakage, the valve must be scheduled for replacement See Section 5 A(6)

Note A Material Safety Data Sheet (MSDS) must be on file in each operating department for each valve lubricant being used

(2) Rockwell No 1033 lubricant is also the recommended lubricant for Resun Serck AUDCO and Walworth plug valves Its use will not void the manufacturer's warranty Rockwell No 386 and No 555 lubricants are not allowed for use on the above referenced brands of valves

Table 2 Recommended Lubricants for Rockwell Serck AUDCO Resun, and Walworth Plug Valves [1]			
Lubricant Fitting Type	Thread Size (Inches)	Lubricant Form Designation (Units per Box)	Rockwell No 1033 Codes
Threaded	1/2	B (24) Stick	Not Available
Threaded	3/8	C (24) Stick	Not Available
	1/2	D (24) Stick	Not Available
	3/4	G (24) Stick	Not Available
Buttonhead Fitting [2]		K (12) Stick GP (6) Gun Pack [3]	015585 015593
		GP (6) Gun Pack J (6) Stick Cartridge (4) [4]	015593 015540 015564
		Bulk (1) 5 Quart Can [5]	034873
1 The color of Rockwell No 1033 lubricant is green 2 Requires a lubricant handgun 3 Use with Rockwell No 400A handgun or Sealweld SuperGun 4 Use with Rockwell No 400D handgun 5 Use with Rockwell Hypregun or Sealweld Activ 8			

B Ball Valve Lubricants

(1) The recommended types of general-purpose lubricants for ball valves are summarized in Table 3 and Table 4 Use only the manufacturer s recommended lubricant as shown in the tables, for each valve Standard sizes and packages of approved lubricants are available by specifying the code numbers shown
Note A Material Safety Data Sheet (MSDS) must be on file in each operating department for each lubricant being used

(2) The recommended lubricant for TK Grove, Cameron, KF, and PBV USA ball valves is Sealweld No 911 Sealweld No 911 contains micro-fine Teflon particles which can cause serious problems if used in plug valves and other valves requiring more frequent lubrication or large quantities of lubricant However, a limited amount of Teflon-bearing lubricant if used in TK Grove, Cameron, KF and PBV-USA ball valves to obtain a bubble-tight shutoff should not cause a problem

Table 3 Recommended Lubricants for WKM Dynaseal and Rockwell Hypresphere Ball Valves[1]

Lubricant Fitting Type	Thread Size (Inches)	Lubricant Form Designation (Units per Box)	Codes for Specified Lubricants
			Rockwell No 1033
Threaded	1/2	B (24) Stick	Not Available
	3/8	C (24) Stick	Not Available
	1/2	D (24) Stick	Not Available
	3/4	G (24) Stick	Not Available
Buttonhead Fitting[2]		K (12) Stick GP (6) Gun Pack[3]	015585 015593
		GP (6) Gun Pack J (6) Stick Cartridge (4)[4]	015593 015540 015564
		Bulk (1) 5 Quart Can[5]	034873

1 The recommended lubricant for Dynaseal and Rockwell valves is Rockwell No 1033 green
2 Requires a lubricant handgun
3 Use with Rockwell No 400A handgun or Sealweld SuperGun
4 Use with Rockwell No 400D handgun
5 Use with Rockwell Hypregun

Table 4 Recommended Lubricant for Grove (BVR-4 and BVR-5) and Becker Ball Valve Regulators and TK KF PBV USA Grove (Model B-4 and B-5) and Cameron Ball Valves[1]

Cartridge Designation (Units per Case)	Code
#1 Gun Cartridge (16) 12 Ounce[2]	500004
Five Quart Can	500012

[1] The recommended lubricant is **Sealweld 911**
[2] Can be used with a Rockwell 400 handgun

7 Valve Flushing Procedures

A Inject an approved cleaning solvent into plug valves that are seized or difficult to turn or ball valves and gate valves that leak This will soften old lubricants and purge the grease grooves The valves should then be lubricated with the manufacturer's recommended lubricant to provide proper lubrication on the mating surfaces when the valves are operated

B Follow the valve flushing agent manufacturer's procedures when performing any valve cleaning operation

C Table 5 lists the approved valve flushing agents for use on any brand of valve and with existing valve lubrication equipment

Table 5 Recommended Valve Flushing Agent		
Agent Name	Quantity	Code
Rockwell Valve Purge VPX	Gun Pak (6 per Box)	015565
	Cartridges (4 per Box)	015566
	5 Quart Can	015567
Sealweld Equa Lube Gold Flush	One 32 Ounce Bottle (4 per Box)	490177
Val Tex Valve Flush	1 Quart Bottle (4 per Box)	015570
	5 Quart Can	015602
Sealweld Valve Cleaner	16 Ounce Cartridge	015568
	10 Pound (5 Quart) Pail	015569

It is recommended that the valve-flushing agent be left in the valve for a minimum of 12 hours to a maximum of 3 days

Caution Valve flushing agents can have a damaging effect on elastomers if they are left in contact for extended periods Minimize contact time with rubber sealant gun components by cleaning valve-flushing agents out of the gun Do this by pumping sealant through the handgun When the softening process is complete always inject fresh lubricant (as recommended by the valve manufacturer) into the valve

Note A "Material Safety Data Sheet (MSDS) must be on file in each operating department for each valve-flushing agent being used

8 Valve Maintenance Records

Valve maintenance shall be recorded on the appropriate "Valve Maintenance Record, Form F4220-1 See Attachment 2 for the "Valve Maintenance Record and instructions for completing the form The maintenance history of each valve shall be recorded on an individual form The maintenance department shall have records documenting valve maintenance records for the previous 5 years (minimum)

9 Miscellaneous Lubricant-Sealant Injection Fittings

A Rockwell Fittings

Table 6 lists Rockwell manufactured combination buttonhead fittings and lubricant screws for use with Rockwell plug valves These fittings have parallel (straight) pipe threads Do not use them with the tapered pipe threads of ball valves or screwed pipefittings

Table 6 Miscellaneous Rockwell Fittings			
Parallel Pipe Threads Size (Inches)	Size of Stick for Valves Using Rockwell Lubricant	Rockwell Part Number	Code
1/4	B	37415	208416
3/8	C	37416	208417
1/2	D	37417	208418
3/4	G	37418	201048

B Sealweld Flow Wolf Fittings (Ball Valves)

Table 7 lists Sealweld Flow Wolf buttonhead fittings used as the seat lubricant sealant injection fitting on ball valves These fittings have low internal flow restriction to minimize plugging the fitting s internal ball check valve when injecting the sealant These fittings have tapered pipe threads Never use them on the straight pipe threads found on plug valves

Table 7 Miscellaneous Sealweld Flow Wolf Fittings

Tapered Pipe Threads Size (Inches)	Sealweld Flow Wolf Part Number	Code
3/8	F FW 3/8	441174
1/2	F FW 1/2	441175

Pacific Gas and Electric Company

0612
(Rev 11/05)
GD&TS

Leak Survey Log

PCC NUMBER

REPORTED BY

- ☐ CALL IN
- ☐ MOBILE SURVEY
- ☐ FOOT SURVEY
- ☐ OTHER EMPLOYEE

REVIEWED BY

REVIEW DATE

DATE	OPERATOR	INST TYPE[a]	INST #	MILES OF MAIN	# OF SERVICES

LEAK NUMBER	DATE FOUND	TIME FOUND	ADDRESS/CITY	Paved W/W	SOIL[b]	LEAK LOC. WM/PLT	REC. LOC. WM/PLT	BLOCK	READING	GRD[c]	2% or Less or Suspect Copper	Leak Downgraded Via Ventilation (Yes/No)	LOCATION REMARKS	CREW

a INSTRUMENT TYPE Enter H Hydrogen flame ionization *or* C Combustible gas indicator

b SURFACE OVER LEAK Enter C Concrete T Tar Compound U Unsurfaced *or* O Other

c GRADE Enter Grade or 2+ for Priority Grade 2 Enter a 0 (zero) if no leak is found on a customer Call In
2 / or Less reason code is required if a leak is Graded as 1 2+ or 2
A Wall to Wall and traveling **B** Next to at or under a building **C** Odor & next to public gathering location **D** In foreign structure **E** Audible and/or visible **F** On facility in extremely poor condition
G At least second customer call out **H** Leak is reported as 0 / Gas Visual **S**-Suspect copper service leak

Refer to UO Standard S4110

Pacific Gas and Electric Company

Gas Distribution and Technical Services
Rev 05/03

VALVE MAINTENANCE RECORD

Form F4220 1

☐ EMERGENCY
☐ OTHER

DIVISION _____ DISTRICT _____ **VALVE NO** _____

LOCATION (SKETCH ON BACK IF REQUIRED) _____ GAS FM (or PLM) NO _____

LINE/STATION NAME _____ ☐ TRANSMISSION

OPER OR WALL MAP _____ OPER DIAG OR PLAT _____ BLK _____ ☐ DISTRIBUTION

VALVE DATA

SIZE _____ MAKE/MODEL _____ TYPE _____ (Ball Plug Gate) PRESS RATING _____ SERIAL NO _____ USE _____ (MLV BTU Zone Station etc)

RECOMMENDED LUBRICANT/SEALANT _____ (Brand/Type o NA) LUBE/INSPECT FREQ _____ (Annual Monthly Other) Gearbox Breather (Bettis) Installed? ☐ YES ☐ NO ☐ NA

RECOMMENDED STEM PACKING MATERIAL _____ (Brand/Type or NA) High Head Extension Vent Installed? ☐ YES ☐ NO ☐ NA

ACTUATOR TYPE _____ COMMENTS _____

Manual Lever Exposed Gearing (no gearbox) Enclosed Gearing Power Actuated

Manual gearbox filled with oil? ☐ YES ☐ NO drained? ☐ YES ☐ NO

SERVICE HISTORY (see notes)

DATE	BY	MAN HR	INSPECT	LUBE (If reqd)	OPERATE	REPAIRS REQUIRED (If any)	ACTION TAKEN (If required)	REPAIRED BY/DATE	REVD BY/DATE

NOTES 1) Use check mark to indicate item performed and completed 2) LUBE pertains to lubrication of the ball plug or gate 3) OPERATE means to partially operate as a minimum

Pacific Gas and Electric Company

Gas Distribution and Technical Services
Rev 05/03

VALVE MAINTENANCE RECORD
Form F4220 1

☐ EMERGENCY
☐ OTHER

SERVICE HISTORY (see notes)

DATE	BY	MAN HR	INSPECT	LUBE (If reqd)	OPERATE	REPAIRS REQUIRED (If any)	ACTION TAKEN (If required)	REPAIRED BY/DATE	REVD BY/DATE

NOTES 1) Use check mark to indicate item performed and completed 2) LUBE pertains to lubrication of the ball plug or gate 3) OPERATE means to partially operate as a minimum

"Valve Maintenance Record" Form Instructions

General Information

Ensure that all natural gas block valves (2 and greater for California Gas Transmission [CGT] maintained facilities) requiring maintenance per this standard and ball or plug valve regulators have a completed Valve Maintenance Record form For CGT maintained valves smaller than 2 use the Technical Maintenance Equipment Card

Note The 'Valve Maintenance Record form should be copied on to white 67–pound weight card stock Copy the front and back sides of the form onto the card stock unless a location sketch is needed If a sketch is required copy only the front of the form and leave the back of the card blank for the sketch

Explaining Form Entries

1 General Information (upper portion of the form)

A Emergency or Other (CGT only) An Emergency' valve is

a CGT maintained transmission line valve that might be required during any emergency

Other CGT maintained valves are considered non emergency Insert an X in the box in order to signify whether the valve is an Emergency' valve or an Other' (non emergency) valve

B Division / District List the name of the division or district that is maintaining the valve

C Valve No This is the unique number assigned to the valve This number is consistent with the operating map or operating diagram or division plat sheets

D Gas FM (or PLM) No This is the unique number used by the work scheduling program to identify the maintenance required on the specified valve

E Location This refers to the physical location of the valve If a location sketch is necessary provide a sketch on the back of the form Generally if the valve is located in a gas facility with an associated operating diagram the location description is not required

F Transmission or Distribution Insert an X in the box to signify whether the valve is located on a CGT (transmission) or a distribution line CGT pipelines are any lines operating in excess of 60 pounds per square inch gauge (psig)

2 Valve Data

Fill out the information in the Valve Data section The Serial Number field is optional

Complete the information on the recommended valve lubricant/sealant and the frequency of lubrication and/or inspection Although a manually–operated ball valve does not require lubrication the valve is generally required to be operated annually The following table summarizes the recommended seat and stem sealant for the various makes of valves

If the valve has an enclosed gearbox operator document whether the gearbox

has a Bettis breather installed on top of the actuator and

is filled with oil

Subsequently if the oil is ever drained indicate this action on the form It is acceptable not to refill the gearbox

If the valve is buried and has a high–head extension document whether the extension has a vent installed The vent can indicate whether or not the entire valve stem seal on a buried valve has failed

Use the Comment' section to provide any additional maintenance information or notes

Note If a gearbox or a high head extension does not have a Bettis bearther prepare a work request to install a breather

3 Service History

Use this portion of the form to document the maintenance performed on the valve as well as to document any required repairs and action taken Retain the valve maintenance service history for a minimum of 5 years

Table 1 Recommended Seat and Stem Sealant Summary

Manufacturer	Type	Seat Sealant	Stem Sealant
Rockwell Nordstrom	Plug	Rockwell 1033	Rockwell 909
Walworth	Plug	Rockwell 1033	Walworth 630 (909)
Resun	Plug	Rockwell 1033	Contact GSM&TS
Serck Audco	Plug	Rockwell 1033	Rockwell 909
Becker Ball Valve Regulator	Ball	Sealweld 911	See Note 1
Grove	Ball	Sealweld 911	See Note 1
KF	Ball	Sealweld 911	See Note 1
Orbit	Ball	Sealweld 911	Orbit GP 6
Cameron	Ball	Sealweld 911	Sealweld 911
Rockwell	Ball	Rockwell 1033	Rockwell 950 (5050)
TK	Ball	Sealweld 911	See Note 1
WKM	Ball	Rockwell 1033	WKM 107
Grove	G 4 Gate	Sealweld 911	See Note 1
Grove	G 3 G 9 Gate	NA	See Note 1
Grove	G 5 Gate	NA	NA

Note 1 Use 80/90 weight gear oil for a minor leak If the leak does not stop and a large buttonhead fitting is furnished for the stem sealant injection use Sealweld 911 If the leak still does not stop use Rockwell 950 (Sealweld 5050) as a last option

Attachment 3

Gas Distribution Critical Main Valves (Operating at 60 psig and Below)

1 General Information

A gas distribution 'critical" main valve is one that may be necessary for the safe operation of a distribution system Any valve that is expected to operate when needed shall be maintained All critical valves shall be numbered included in the division valve maintenance program and maintained, inspected, serviced, lubricated (where required) and partially operated at intervals not exceeding 15 months but at least once each calendar year

The senior gas operations engineer and the OM&C distribution supervisor who are responsible for the gas facilities in a particular division have the responsibility to jointly determine which valves are critical in the gas distribution system(s) in that division The criteria included in this standard shall be applied, but not exceeded The Gas Engineering and Planning (GE&P) section of the Gas Distribution and Technical Services department will periodically review each division s application of these criteria to ensure consistency on a systemwide basis

2 Criteria for Gas Distribution Critical Main Valves

The following valves are considered critical

A Gas distribution system emergency shutdown zone valves (identified in the UO Standard S5000, "Gas Distribution Emergency Shutdown Zones")

B Gas distribution system BTU separation valves

C Gas distribution system MAOP separation valves

D Gas distribution main valves at shopping centers with distribution systems (three or more customers) on the roof

E High and semi high pressure gas distribution main valves at critical areas where there is an extreme likelihood or history of pipeline failures or a need for accelerated emergency response (due to natural disasters e g , liquefaction fault crossings, erosion landslides fire, or storms) GE&P will periodically review each division s application of this criterion to ensure consistency on a systemwide basis

F High pressure (other than low pressure) gas distribution main valves on
(1) Large ribs (10 inch and larger), unless other methods of controlling gas are established
(2) 6-inch and 8-inch ribs where excavation for pipe squeezing is not practical (a busy street, etc), unless other methods of controlling gas are established

These valves should be spaced as follows

(1) At ½-mile intervals in all locations with predominantly four-story or higher buildings and wall to wall paving in downtown and business areas

(2) At 2½ mile intervals in all other locations

Consideration should be given to valve location and the area affected in case of system isolation GE&P will periodically review each division's application of these criteria to ensure consistency on a systemwide basis

G Gas distribution main valves (tap valves) on laterals off ribs, as described in Item 6 where excavation for pipe squeezing is not practical (a busy street etc) These valves are critical unless other methods of controlling gas are established and where that lateral must be maintained to feed an adjacent gas distribution emergency shutdown zone Exception those taps that extend more than one block in an urban area, or feed more than 25 customers in a rural area GE&P will periodically review each division's application of this criterion to ensure consistency on a systemwide basis

3 Actions Required for Critical Valves

A Ensure that valves are properly numbered tagged mapped, and included in the valve maintenance program and in Emergency Zone Shutdown Procedures (Zone Valves)

B Perform and document the required maintenance and replace valves when necessary

C When replacement is necessary, consider moving the valve to a more advantageous location

4 Actions Required for Non-Critical Valves (When Converting From Critical to Non-Critical)

A When removal is required, replace the valve with straight pipe and install insulating fittings when CPA boundaries are involved Valve boxes shall be removed or broken in and the hole filled

B If valves are not being removed, remove any valve number tags The senior gas operations engineer or the OM&C distribution supervisor should notify the Mapping department in writing to remove valve numbers from plats If a valve will not operate, add a note on the plat sheet as follows Non operational

C Remove these valves from the valve maintenance program

D Place valve maintenance records in the inactive file

Attachment 4
Buried Valve Identification

General Information

The new "Valve Maintenance Record" (see Attachment 2) and proper implementation of this standard both require the need for detailed valve data There are numerous ways to attempt to identify valves that are buried, some of which are listed below

1 Research valve maintenance records
2 Research valve installation records
3 Research equipment cards
4 Examine the exposed parts of the valve in the valve frame and cover
5 Excavate the valve

Although excavating a valve is the only positive way to get all the information needed, Methods 1 through 4 above may provide the information needed to properly lubricate a valve and safely operate it Currently do not use Method 5 (excavate the valve) unless there are unusual circumstances such as excavation to repair a leak or coating next to the valve

A review of the exposed parts and how the valve operates can provide some vital information

1 Ball and plug valves are quarter-turned (However if a buried gearbox on a ball and plug valve exists the gearbox pinion shaft is extended and is multi-turned) Gate valves are multi-turned
2 Before 1955, virtually all valves installed in the Company's transmission and distribution systems were plug valves with the bulk of those being of Rockwell manufacture The year of installation should be known from existing records
3 Old gas standards can shed some light on which types and brands of valves were purchased in certain years This information may be available from Technical Document Management group
4 Plug valves have the grease fitting in the middle of the stem Ball valves are supposed to have the backup grease feature fittings extended and external to the valve stem Gate valves have no grease fittings, as they are not designed to be lubricated

Using the above data a conservative maximum torque value can be established for each buried valve

Attachment 5

Guidelines for the Use of Hydraulic Wrenches (and Other Devices That Can Provide High Torque, Such as Torque Multipliers for Box Wrenches) on Gas Transmission and Distribution Valves

Gas transmission and distribution valves should operate properly when a reasonable amount of torque is applied to them Usually, valves that are difficult to operate should not be allowed to remain in that condition This is true whether the cause of the difficulty is high torque requirements or restricted access If the difficulty is due to high valve torque requirements a Material Problem Report" (MPR) must be submitted If the difficulty is due to restricted access, the Company engineer responsible for the gas facilities in the division or district should be consulted to review the situation

Consider installing a gearbox or a handwheel on valves that are currently configured for wrench operation and have a design torque higher than reasonable for proper operation Some older valves were configured for wrench operation That particular model valve today is provided with a gearbox or a handwheel due to revised requirements or policies for lower torque limits Some valves cannot be converted from wrench to gearbox operation

1 Valve Maintenance Practices

The procedures in this standard shall always be followed, including those that pertain to difficult to-operate valves

2 Employee Qualification

Only employees who are qualified through training and experience may operate a hydraulic valve wrench

3 Preparation for Valve Maintenance

Before performing maintenance on a valve, its type, size, manufacturer, and model number must be identified See the revised Valve Maintenance Record form in Attachment 2 for a listing of the information that is required

4 Valve Torque Limits

After a valve has been identified the torque limits for that particular valve can be determined Identify the normal torque required to operate a valve that is in good condition and the maximum allowable valve stem torque

Note Valve stem torque limits for a particular valve shall never be exceeded This is true whether the valve is being operated manually or with the assistance of a hydraulic wrench or other mechanical or pneumatic device

5 Safety Issues

If the torque limit for a particular valve is exceeded the valve stem could fail This could result in the severed portion of the valve stem being ejected by the pressure in the valve body The result will depend on the type of valve

For the hydraulic valve wrench to apply torque to a valve stem it must push against something that can safely handle the same load that is applied to the valve (for every action there is always an equal and opposite reaction) It is critical to position the hydraulic valve wrench so that the force it exerts will not cause an unsafe situation such as

- If the bolts holding the bonnet of the valve in place were used as an anchor for the wrench and were overloaded this could cause the valve bonnet to loosen and leak or completely separate
- If the wrench were not securely located so it could slip and injure the operator, cause property damage or not allow the wrench to properly operate the valve

6 Difficult-to-Turn Valves

Only after all of the procedures relating to difficult-to-operate valves in this standard have been followed without resolving the difficult to operate (or impossible to turn) condition, the hydraulic valve wrench may be used along with proper valve flushing/cleaning/lubrication procedures to restore the operability of difficult-to operate valves This may allow the proper flushing/cleaning/lubrication to be effective where it was not possible when attempting to turn the valve manually A Material Problem Report" (MPR) must be submitted if there is an actual material issue (not for situations where lubricating, flushing or cleaning resolve the issue)

If following these procedures does not correct the difficult to-operate condition (the valve can not be manually operated within the torque limits and normal operating parameters) the valve should be either repaired or replaced The need for a particular valve should be reviewed before proceeding with replacement Operating parameters (such as configuration of shutdown zones) may have changed since the valve was originally installed

If a decision is made to repair or replace a valve that is difficult to operate the hydraulic valve wrench may be used to operate the valve until the valve can be repaired or replaced

7 Material Problem Report (MPR)

Any problem experienced with the operation of any valve either during scheduled maintenance or at any other time shall be reported on an MPR

8 Valves Located Where Access Is Restricted

If a valve is difficult to operate because it is in a location where access is restricted (close to vault walls, etc) and a valve is still required at that location the hydraulic valve wrench may be used to operate that valve until the limited access condition can be evaluated and/or corrected The

evaluation should be made by the Gas Operating supervisor CGT superintendents, and the engineer responsible for the facilities In general valves that are difficult to operate should not be left in service

If it is determined that the valve is to remain in a restricted access location, applicable information shall be noted on the Valve Maintenance Record " This information is beneficial when preparing to operate that valve The limited access can be accounted for (locate a hydraulic valve wrench etc) before arriving at the particular valve for required operation or performing routine maintenance Use conventional valve wrenches during an emergency because a hydraulic valve wrench may not be available then

9 Limitations on the Use of Hydraulic Valve Wrenches

Do not use hydraulic valve wrenches when the torque limit of the particular valve is unknown

Do not use hydraulic valve wrenches for routine valve maintenance Situations are described above where the use of a hydraulic valve wrench is appropriate Using a hydraulic wrench for routine valve maintenance bypasses a key function of the valve maintenance program, which is to determine the condition of a valve When the hydraulic wrench is used it is much more difficult to sense the condition of the valve

Hydraulic valve wrenches shall only be used on valves configured for wrench operation Hydraulic valve wrenches shall **not** be used on valves that are handwheel or gearbox operated

When developing plans for emergency operations (dig-in, landslide earthquake etc), the use of a specialty tool such as a hydraulic valve wrench cannot be allowed All emergency valves must be operable manually because specialty tools or the power to operate the specialty tool may not be available to the employees responding to a particular valve emergency

Whenever a hydraulic wrench is used to operate a valve, move the valve slowly off the stop Pause to inspect the condition of valve Then proceed cautiously, observing the gauge pressure to operate the valve as it is being stroked

If the hydraulic wrench is to be used on a buried valve it is critical that the valve be adequately identified Without clear identification the torque limits for that particular valve cannot be determined Excavation may be required if there are no other means to adequately identify the valve In addition, since the condition of a buried valve cannot be observed, extra caution must be taken to ensure that an unsafe condition does not develop while the valve is being operated with the hydraulic wrench

Examples of Valve Torque Limits

Brand	Type	Model/Figure Number	Size (inches)	Torque Limit (foot-lbs)
Rockwell	Plug	143	2	260
Rockwell	Plug	143	4	910
Rockwell	Plug	143	6	975
Rockwell	Plug	165	4	975
Rockwell	Plug	165	6	2196
Rockwell	Plug	165	8	4191
Rockwell	Plug	1165	6	975
Rockwell	Plug	1943	2	260
Rockwell	Plug	1943	3	570
Rockwell	Plug	1943	4	910
Rockwell	Plug	1945	2	305
Rockwell	Plug	1945	4	798
Rockwell	Plug	1945	6	1,539
Rockwell	Plug	1945	8	2 303
Rockwell	Plug	2024	2	580
Rockwell	Plug	2024	3	1,150
Rockwell	Plug	2045	2	383
Rockwell	Plug	2045	3	819
Rockwell	Plug	2045	4	1,213
Rockwell	Plug	2045	6	2 488
Rockwell	Plug	2245	2	519
Rockwell	Plug	2245	3	1 207
Rockwell	Plug	2245	4	1,938
Rockwell	Plug	2245	6	4,147

Attachment 6

How to Estimate Torque When Manually Operating a Valve

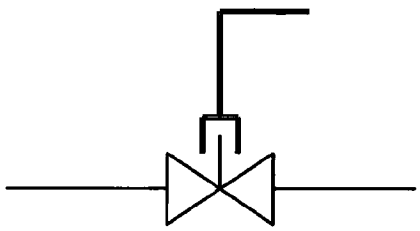
General Information

Torque is the amount of effort that is being exerted in an attempt to rotate something, such as a valve stem Torque is typically measured in foot pounds The amount of torque being applied can be determined by multiplying the force being put on a lever arm times the length of that lever arm Assume that a person can exert about 100 pounds of force on a valve wrench Here are some examples

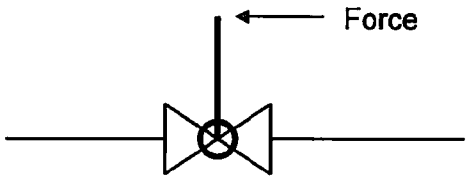
Example #1

One person operating a valve with a 12-inch long wrench

Torque = (100 pounds) x (1 foot) x (1 person) = 100 foot-pounds



Side View

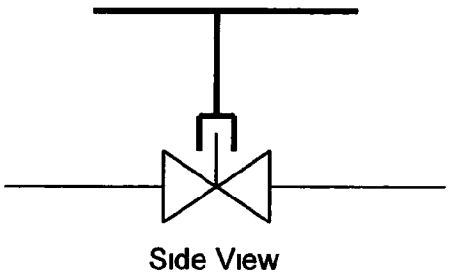


Top View

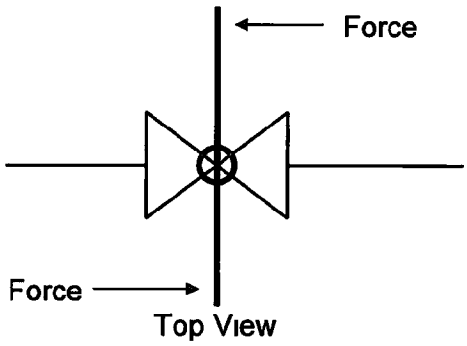
Example #2

Two people operating a valve with a T-handle wrench that is 48 inches long (24 inches on each side of the shaft)

Torque = (100 pounds) x (2 feet) x (2 people) = 400 foot-pounds



Side View



Top View

UO Document Title (and #)	S4220 Gas Valve Maintenance Requirements
Document Type	UO Standard
Project Coordinator	[redacted]

IMPLEMENTATION ANALYSIS

Impact and resource assessment	This standard primarily impacts transmission gas mechanics division gas measurement and control employees supervisors gas engineers gas distribution managers and the GD&TS director As indicated in the Talking Points Summary valve maintenance is currently being performed and there are minimal changes impacting the existing workload
Communication plan	This standard will be issued as part of the normal UO standard distribution process The Talking Points Summary describes the changes
Distribution plan	This standard will be issued electronically via the TDM distribution system and a hard copy will be sent to each affected organization Additionally the standard will be distributed in the next update to the *CGT Standards Manual* The standard will be available online to all employees
Training plan (by job classification)	Area T&R supervisors and district superintendents will be responsible for training their employees The standard will be part of the M&C Apprentice Training Program and the M&C Short Course for Supervisors
Follow-up plan	After implementation at their discretion the managers of Gas Engineering and Planning Mapping and Gas Field Support and System Integrity will provide periodic internal auditing to ensure compliance with this standard
Stakeholder involvement/expert review	(See the next page)

UO Document Title (and #)	S4220 Gas Valve Maintenance Requirements
Document Type	UO Standard
Project Coordinator	[redacted]

STAKEHOLDER/SUBJECT MATTER/TECHNICAL EXPERT REVIEW (OF THE DOCUMENT)

Name	Department	Phone #	Review Dates
[redacted]			March 2003
			March 2003
			March 2003
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Susan Chwistek	GSM&TS	583-4193	March 2003
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STANDARD COMMITTEE REVIEW (OF THE IMPLEMENTATION ANALYSIS)

Date presented for review	January 27 2003
Date approved by committee	January 27 2003

UO Document Title (and #)	S4220 Gas Valve Maintenance Requirements
Document Type	UO Standard
Project Coordinator	[redacted]

TALKING POINTS SUMMARY

Whom does this document affect?	This standard affects CGT Gas Transmission mechanics and OM&C gas maintenance crews who are responsible for the maintenance of gas valves
What are the document s mandatory requirements?	This standard sets uniform procedures for inspecting and maintaining gas transmission emergency valves gas distribution critical main valves and district regulator station valves
Is this document new or revised? If this is a revised document what will change?	This is a new UO standard however this standard contains many of the requirements formerly in Gas Standard F-11 Valve Lubrication and Maintenance Requirements which is being superseded Specific changes from Gas Standard F-11 include ▪ Identifying transmission valve classification (i e emergency operational and maintenance) previously issued in the Gas Information Bulletin #137 ▪ Identifying distribution critical main valves ▪ Clarifying valve inspection requirements ▪ Clarifying valve stroking requirements ▪ Adding expected sealant usage quantity per valve ▪ Updating recommended seat and stem sealant list ▪ Adding maintenance on KF and PBV USA ball valves ▪ Adding guideline for use of hydraulic powered wrenches ▪ Adding how to estimate valve torque
When is this document to be implemented?	Most of the requirements of standard are currently being followed

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What will this document accomplish?	This standard will help to ensure 1) public and employee safety 2) compliance with 49 CFR Part 192 requirements and 3) operational efficiency
How is this document going to be implemented?	This standard is to be implemented by including it as part of the *Gas Distribution Maintenance Manual* and *CGT Standards Manual* and by distributing this standard to all distribution managers in Utility Operations with responsibilities for gas piping The standard will be part of the M&C Apprentice Training Program and the M&C Short Course for Supervisors In addition Gas System Maintenance & Technical Support and Gas Distribution & Technical Services will conduct internal audits to ensure implementation and compliance with this standard