Guidelines for Using Hydraulic Wrenches and Other High-Torque Devices on Gas Transmission and Distribution Valves

1. General Information

Gas transmission and distribution valves must operate properly when a reasonable amount of torque is applied to them. Usually, valves that are difficult to operate are not 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, submit a Material Problem Report (MPR) . If the difficulty is due to restricted access, consult the Pacific Gas and Electric Company (Company) engineer responsible for the gas facilities in the division or district to review the situation.

Consider installing a gearbox or a hand-wheel on valves that are currently configured for wrench operation and have a design torque higher than reasonable for proper operation. Some smaller older valves were configured for wrench operation. A particular model valve today may be provided with a gearbox or a hand-wheel, due to revised requirements or policies for lower torque limits. Some valves cannot be converted from wrench to gearbox operation.

2. Valve Maintenance Practices

Always follow the instructions in this work procedure, including those that pertain to difficult-to-operate valves. Inoperable valves require special reporting per the requirements set forth in Section 5, "Operating Valves During Maintenance," in Work Procedure WP4430-04.

3. Employee Qualification

Only employees qualified by training and experience may operate a hydraulic valve wrench.

4. Preparation for Valve Maintenance Using a Hydraulic Torque Wrench

Before using a hydraulic torque wrench on a valve, identify its type, size, manufacturer, and model number. See the revised "Valve Maintenance Record" form (Attachment 1) for a listing of required information.

5. Valve Torque Limits

After a valve is identified, determine the torque limits for that particular valve. Identify the normal torque required to operate a valve that is in good condition and the maximum allowable valve stem torque.

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Note: Never exceed valve stem torque limits for a particular valve. This is true whether the valve is operated manually or with the assistance of a hydraulic wrench or other mechanical or pneumatic device.

6. Safety Issues

If the torque limit for a particular valve is exceeded, the valve stem could fail, which could result in the severed portion of the valve stem being ejected by the pressure in the valve body. The result depends 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 in the following scenarios:

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

7. Difficult-to-Turn Valves

Only after all of the procedures relating to difficult-to-operate valves in this work procedure are 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 must be submitted if there is an actual material issue (but 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 cannot be manually operated within the torque limits and normal operating parameters), repair or replace the valve. Review the need for a particular valve before proceeding with its 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, use the hydraulic valve wrench to operate the valve until the valve can be repaired or replaced.

8. Material Problem Report (MPR)

Report problems with operating any valve, either during scheduled maintenance or at any other time, on a Material Problem Report.

9. 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, use the hydraulic valve wrench to operate that valve until the limited access condition can be evaluated and/or corrected. The evaluation is made by the division or district Maintenance and Construction (M&C) supervisor and the engineer responsible for the specific facility. In general, do not leave valves that are difficult to operate in service.

If it is determined that the valve must remain in a restricted access location, note applicable information on the "Valve Maintenance Record" (Attachment 1). 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 at the time of an emergency.

10. Limitations on the Use of Hydraulic Valve Wrenches

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

B. 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.

C. Only use hydraulic valve wrenches on valves configured for wrench operation. Hydraulic valve wrenches must **not** be used on valves that are hand-wheel or gearbox operated.

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

E. 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 stroked.

F. If the hydraulic wrench is 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, take extra caution to ensure that an unsafe condition does not develop while the valve is operated with the hydraulic wrench.

The following table shows all Rockwell (Nordstrom) and Walworth brand valves known to exist in the Company's gas systems, along with their type, model number, size, and torque limits.

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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

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Brand	Type	Model/Figure Number	Size (inches)	Torque Limit (foot-lbs.)
Walworth	Plug	1412	3	274
Walworth	Plug	1412	4	372
Walworth	Plug	1412	6	570
Walworth	Plug	1412	8	840
Walworth	Plug	1700	2	57
Walworth	Plug	1718	6	390
Walworth	Plug	1718	8	450
Walworth	Plug	1749	2	180
Walworth	Plug	1749	3	255
Walworth	Plug	1749	4	300
Walworth	Plug	1750	2	122
Walworth	Plug	1750	3	275
Walworth	Plug	1760	2	195
Walworth	Plug	1760	3	277
Walworth	Plug	1760	4	408
Walworth	Plug	1796	2	57
Walworth	Plug	1796	3	129
Walworth	Plug	1796	4	231
Walworth	Plug	1797	2	57
Walworth	Plug	1797	3	129
Walworth	Plug	1797	4	231
Walworth	Plug	1966	2	150
Walworth	Plug	1966	3	195
Walworth	Plug	1966	4	225
Walworth	Plug	2720	2	84
Walworth	Plug	2720	3	163

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Brand	Type	Model/Figure Number	Size (inches)	Torque Limit (foot-lbs.)
Walworth	Plug	2720	4	223
Walworth	Plug	3412	2	202
Walworth	Plug	3412	3	342
Walworth	Plug	3412	4	499
Walworth	Plug	3414	2	202
Walworth	Plug	3414	3	342
Walworth	Plug	3414	4	499
Walworth	Plug	3612	6	720
Walworth	Plug	3612	8	840