Prepared by: [redacted]

HYDROSTATIC TESTING PROCEDURE A-37

Department:	Gas System Maintenance and Technical Support	**Section:** System Integrity	**Date:** 11-22-04
Approved by:	[redacted]	**Approved by:**	[redacted]

Rev. #00: This document replaces PG&E Drawing 086870. For a description of the changes, see Page 7.

Purpose and Scope

This gas standard provides instructions on the use of proper equipment, precautions, and procedures to be followed to ensure safety during a hydrostatic test.

Acronyms

CGT:	California Gas Transmission
CPUC:	California Public Utilities Commission
EH&S:	Environmental Health and Safety
GC:	General Construction
GSM&TS:	Gas System Maintenance and Technical Support
ml:	milliliter
OD:	outside diameter
psig:	pounds per square inch gauge
SMYS:	specified minimum yield strength
TES:	Technical and Ecological Services
WT:	wall thickness

References

Gas Standard

General

The supervisor in charge of the installation shall be responsible for hydrostatic testing. All employees involved with the hydrostatic test must be familiar with the test procedure and safety considerations to be followed during the hydrostatic test.

Safety Considerations

1. Take precautions, as necessary, to protect employees and the general public during testing. These shall include, but are not limited to, the following:
   A. Locate the test equipment and instrumentation a safe distance from the test section (typically 50' minimum).
   B. Keep employees not working on the test operation out of the test area.
   C. Place barriers along the test section, where appropriate, to prevent public access. During the test and water discharge processes, keep employees a safe distance from all pressurized pipelines.
   D. Physically secure all water discharge lines such that they are restrained if the pipeline or connections fail.
   E. Continuously monitor the pipeline pressure and inlet pressure during the test medium pressurization, testing period, and discharge process.
   F. Notify public agencies of the scheduled test, when necessary, and notify parties located in the general vicinity of the test section to avoid the area during the test.
   G. Patrol and use flagmen to keep people away during testing.
   H. Schedule the test at a time that will minimize public exposure in highly populated areas.

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2. Visually inspect temporary piping, closures, and other equipment used in conjunction with the test to verify that they are in safe working order and are used within the manufacturer's approved limits. Maintain a periodic visual inspection of this equipment from a safe distance during the test.
3. Do not remove caps, plugs, or valves from the test head, or any other test equipment, until a positive determination is made from two independent taps that the test section is depressurized.
4. During the preparation for a test or retest of a section of existing pipeline, consider the potential for gas leakage into the test section from an adjacent section of pipeline that remains in service, or from the release of gas from residual liquid which may remain in the line. Take special precautions to verify that a combustible mixture is not present in the section to be tested before performing cutting or welding operations on the section.

Test Procedure

5. Establish a plan for the hydrostatic test. The plan shall include:
   A. A sketch of the test section showing the stationing of the test section and points of maximum and minimum elevation (see Attachment D on Page 12).
   B. A copy of the completed Strength Test Pressure Report(s).
   C. Written instructions for the testing which include identification of potential problem areas for the specific test involved. The written plan shall be developed by the test supervisor in conjunction with the responsible CGT engineer and shall consider:
      (1) The potential for flooding or other damage should a failure occur.
      (2) The safety of Company employees and the general public.
      (3) The elevation differences to ensure the SMYS of the pipeline is not exceeded.
      (4) The type of pig to be used (foam, cup, poly, bi-directional, etc.).
      (5) The requirements to safely fill and dewater the pipeline. The pipeline is completely filled and pig speed is controlled.
      (6) Have a copy of the Strength Test Pressure Report and schematic sketch of the test section at the test location.

Test Equipment

6. Test Heads

   There are two approved styles of test heads for hydrostatic testing: permanent test heads and temporary test heads. Permanent test heads are reused and shipped out of a central location when needed. Temporary test heads are designed to be constructed in the field for a specific hydro test and then destroyed.

   A. Permanent Test Heads

      CGT is responsible for the construction and maintenance of all test heads. **The table in Attachment A on Page 9 of this standard lists all the test heads that are authorized for use to date. Test heads not on this list shall not be used until they have been inspected and issued serial numbers by GC.**

      (1) Permanent test heads are to be constructed and tested in accordance with drawing No. 386527 (shown in Attachment A on Pages 8 and 9). All test heads must be visually inspected, x-rayed, hydrostatically tested, properly tagged for maximum test pressure, and issued serial numbers before they are authorized for use. The necessary paperwork to verify the inspection and testing, and to verify the wall thickness, size, and grade of the pipe and fittings used to make each test head shall be on file in a central location.

      (2) Test heads shall be stored, maintained, requested from storage, and returned to storage per CGT guideline currently under development. In some instances, when a new test head must be fabricated, the lead time may be as long as 6 to 8 months. Expenses for newly fabricated test heads, and their shipment to and from the requesting location, will be charged to the project requesting the test head.

      (3) If the proper size test heads are not available for a test, substitute test heads may be used. Due to the unequal OD and WT of the pipe to be tested and the substitute test heads, approval, material specifications, and welding procedures must be provided by GSM&TS Pipeline Engineering.

      (4) For the safety of employees, the protection of the test head, and ease of shipment, special steel skids have been made for each test head. Care must be taken in placing the test head on the skid. For most

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test heads, there is only one mounting position which will allow for proper placement of the tie down chains. Improper mounting could result in an injury or damage to the test head.

(5) Modification, welding, or cutting shall not be made in the field (except welding the test head to the pipe being tested). If modifications are required, the modification must be made under the direction of the GC department responsible for maintaining the test heads in accordance with drawing No. 386527 (shown in Attachment A on Pages 8 and 9).

(6) When the test head is removed from the pipeline after the hydro test, all pipe attached to the test head in the field shall be removed (by cutting the transition can just beyond the weld). If a pup of tested pipe is left on the test head, it will be removed by the GC department responsible for maintaining the test heads upon receipt back in the central yard.

B. Temporary Test Heads and Test Caps

(1) Temporary test heads and test caps are constructed in the field in accordance with Attachment B on Page 10. The specific design of the temporary test head or test cap must be approved by the responsible CGT pipeline engineer. Temporary test heads and test caps must be visually inspected, x-rayed, hydrostatically tested, and properly tagged with the maximum allowable test pressure. Documentation (including a note stating the date the test head was destroyed) must be forwarded with the as-built drawings to Mapping.

(2) Upon completion of the hydro test(s) on a specific project, the temporary test heads must be destroyed by cutting the cap in half. Temporary test heads and test caps may only be used a maximum of three times on a single project if the test pressure exceeds 72% SMYS of the test head or test cap. Temporary test heads and test caps may be used on a second project with the approval of the responsible CGT pipeline engineer.

(3) The 6" manifolds, which can be used in conjunction with temporary test heads, are available for watering and dewatering the pipeline. The manifolds have been constructed in accordance with Attachment C on Page 11 and can be requested per CGT guideline currently under development. Requirements 6A(1), 6A(2), 6A(4), and 6A(5) listed above for permanent test heads apply to 6" manifolds.

7. Test Instruments

A. Pressure records are required on all hydrostatic tests. A chart or digital printout with appropriate intervals and pressure range is required. Pressure recording devices must be accurate within 0.5%, checked every 6 months, and calibrated yearly. Dead weight testers must be calibrated within 12 months of each use.

B. An electronic pressure recorder or dead weight tester is required when testing any segment of the test section over 90% SMYS. Electronic pressure recorders must record the pressure a minimum of every 15 seconds and print out the pressure recordings a minimum of every 15 minutes.

C. Any time an electronic pressure recorder or dead weight tester is used, the pressure records are to be attached to the Strength Test Pressure Report and submitted to GSM&TS as part of the permanent records.

D. Indicating pressure gauges should be available for possible installation at the remote end of the test section or at maximum or minimum elevations of the test section. These gauges are for information purposes only.

Pressurizing equipment, hoses, and other associated equipment must be visually inspected and determined to be in good working condition before the test. Make sure the equipment is properly sized and rated for the maximum test pressure.

Verify the Strength Test Pressure Report

If Part I of the Strength Test Pressure Report does not show the latest design changes on the design drawings, the actual pipe to be tested, or the test pressure exceeds any component within the test section, return the Strength Test Pressure Report to the responsible CGT engineer for necessary corrections (Gas Standard A-34 provides complete instructions for completing the Strength Test Pressure Report).

CPUC Notification Of Construction

8. Piping projects costing more than $2,500,000 and designed to operate at more than 20% of SMYS must be reported to the CPUC in writing 30 days before construction. See Gas Standard A-34.1 for reporting details and additional criteria requiring CPUC notification. GSM&TS is responsible for initiating the report.

9. If the job was reported to the CPUC, the hydrostatic test may be witnessed by a member of the CPUC staff accompanied by a member of GSM&TS and/or Gas Engineering and Planning.

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Hydrostatic Testing Procedure

Water Supply

10. The water source selection, testing of water for contaminants before and after the hydro test, and the hydro test water discharge permits must be coordinated through the EH&S department before construction begins. In general, the water used for hydrotesting shall be reasonably clean. Contaminated water or salt water shall not be used. Water shall be obtained from the most readily available clean source, subject to authorization by the appropriate local, county, state, or federal regulating agency or agencies.
11. Potable water is preferred, however, other water from other sources such as wells, lakes, rivers, and non-potable distribution systems can be used as hydro test water.
12. If wells must be used as the water source and the quantity of water needed for the test is substantial, a draw-down test shall be performed. If the wells prove to be inadequate, find an alternate source. Transporting water by truck shall be used only as a last resort when the quantity of water needed is substantial.
13. If non-potable water is to be used as the water source for a hydro test, the water must be tested for the presence of microbes and contamination before placing the water into the pipeline. Microbes can cause internal corrosion. Contamination, such as the presence of hydrocarbons and heavy metals, is an environmental concern. The microbe test is called a "MIC kit III" test and should be performed by the GSM&TS Corrosion department or TES Corrosion department. The type of test for contamination should be determined and performed by the EH&S department.
14. If non-potable water with a microbe concentration more than 1,000 bugs per ml or any contaminant concentrations above the allowable limits is to be used as source water for a hydro test, the Corrosion or EH&S department must be consulted to determine the best mitigation strategy. A few potential alternatives are:
    A. Find another source of water.
    B. Use the water for the hydro test and then, after water removal, dry the pipeline to a dew point temperature of –20°F to minimize the amount of water left in the pipeline before putting the pipeline in service.
    C. Treat the water to kill the microbes and/or remove the contamination before placing it into the pipeline.
    D. Use the water for the hydro test and then treat the water upon discharge.

Water Filling (See Attachment D on Page 12 for Typical Setup)

15. Consider the following points in the water filling operation:
    A. The test section must be completely filled with water. A pig must be run ahead of the water to force as much air as possible out of the test section. For test sections where a pig cannot be used, the air must be vented at the high points.
    B. Fill the test section from only one direction, preferably from the low end.
    C. If necessary, anchor or support the pipe to prevent excessive stress levels caused by the weight of the water. Give special consideration to bridge crossings and spans.
    D. Open/close fill and drain valves slowly to prevent pressure surges resulting from rapid changes in water velocity.
16. Water Filling Equipment
    A. Size the fill pumps considering static head due to elevation difference in the test section and the fill time desired.
    B. Install filters or other necessary treatment equipment on the suction line of the pumps to prevent fish and other foreign matter from entering the test section if necessary.
    C. The exhaust of the pump engine must have spark arrestors and be positioned to minimize fire hazards.
    D. Water may be transferred from one test section to another by use of a hairpin. The hairpin shall not be left in place during the test.

Test Section Pressurization

17. Once the test medium has filled the test section, pressurize the test section slowly while continuously monitoring the test section pressure, and then maintain the test pressure within the upper and lower bounds of the test as specified by the Strength Test Pressure Report.

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18. Pressurize short test sections slowly and cautiously as the pressure can build up quickly. If necessary, nitrogen can be used to pressurize the test sections once the test section has been filled with water.
19. Follow all safety considerations identified in Item 1 on Page 1.

Test Pressure Relief and Water Testing

20. Use extreme caution when releasing water at the test pressure. The test pressure should be relieved by partially opening a small tap valve before initiating the testing or water removal process.
21. The hydro test water should always be tested for contaminates and pH level before it is discharged, even if the water supply was potable. New pipelines rarely introduce contamination into the hydro test water. Existing pipelines can introduce contamination into the hydro test water. The discharge water testing determines the appropriate treatment (if necessary) and ultimately documents that the discharge water is clean.
22. Remove hydro test water from the pipeline as soon as practical after the hydro test. Hydro test water should never to be left in the pipeline more than 2 weeks. Storage tanks such as Baker tanks can be used to store water on site before discharge.

Water Removal From the Pipeline

Removal of water from the pipeline must be included in the written hydro test plan.

23. Pre-Approved Typical Dewatering Plans:

    Attachment E on Page 13 and Attachment F on Page 14 are approved written plans for typical short (300-feet long test sections) and long (greater than 300-feet long test sections). Both typical drawings have less than 100-feet elevation change. Location-specific plans that include all the aspects of the approved typical plans are approved for use. Any deviation from the typical plan must be approved by the responsible CGT engineer.

    A. Under 300' long test section dewatering plan (see Attachment E on Page 13):

       The plan includes safety zone, steel discharge piping between the test head and the 2" or 3" flexible hoses, coupling connections, valves, pressure gauge, and anchor points.

    B. Over 300' long test section dewatering plan (see Attachment F on Page 14):

       The plan includes safety zone, continuously welded 4" or 6" steel discharge piping, valves, pressure gauge, and anchor points.

24. Location-Specific Dewatering Plan:

    Consider the following guidelines when developing a dewatering plan:

    A. Study the piping system.

       During the initial planning stage of a dewatering operation, an analysis of the existing and temporary piping system shall be performed to identify the pressure associated with fluids and other forces that could adversely affect the integrity of the pipeline or the stability of the drainage and its components (such as: dewatering outlet pressure, inlet pressure, elevation difference, water hammer, pig velocity, discharge rate, force on elbows, etc.). Be sure that adequate valving is planned to safely throttle down the pressure ensuring control of the operation at all times.

    B. Anchor the dewatering lines.

       Establish effective anchoring systems based on expected forces and ensure that the systems are used during dewatering projects. Anchoring may be such as: placing heavy equipment on top of dewatering lines to prevent uncontrolled whipping, restraining dewatering line supports, standard anchoring/restraining devices, etc.

    C. Ensure condition of couplings and parts.

       When flexible hoses are used, all couplings and parts of the dewatering system need to be properly selected for their application. The associated piping which connects the couplings is a significant variable in the entire mechanical piping system. The couplings are manufactured in a controlled environment, and variations in the quality of the couplings should be limited. Ensure that couplings are within manufacturer's tolerances and free of damage that may result in connection failure. A chain is only as strong as its weakest link. In dewatering piping systems, the weakest link frequently is the temporary dewatering pipe connections. Use a fail-safe link between mechanical couplings (these are similar to safety chains on air hoses and prevent connections from whipping if disconnected under pressure).

D. Establish safety zone.

During the dewatering process, there may be hazards that have not been completely controlled. Unexpected high pressure or high discharge rate may exceed the designed capacities of the temporary discharge piping system or the anchorages. Therefore, access to the safety zone shall be limited to only those persons who are necessary to perform the dewatering work. The safety zone is typically a circle area centered at the connection of temporary system to the main pipeline.

E. Provide adequate employee training.

Instruct employees on dewatering installation designs and techniques, including proper coupling and anchoring methods, and the procedures they should implement to protect themselves and others working around them.

F. Consider all discharge options, including: drainage to a body of water, a sewer system, or onto the surface of the adjacent land; returning it to the original source; or hauling the water to an approved dump site. Take precautions to minimize erosion or other hazards when discharging water from the pipeline.

25. Dewatering Procedure

Ensure the written dewatering plan is followed on the jobsite.

A. Install the temporary dewatering piping per the written plan.

B. The field supervisor shall inspect the dewatering piping and the anchoring system before dewatering.

C. Clear the safety zone, except for those persons who are necessary to perform the dewatering work.

D. Relieve the pressure by partially opening a small tap valve before opening the main dewatering valve.

E. When removing the water from long test sections with a pig, control the pig speed between 1 to 5 miles per hour.

F. Control the discharge valve and monitor the discharge rate. Ensure that the discharge rate complies with the written plan and discharge permit (if applicable).

G. Dispose of the water in a manner that will prevent damage to the environment and comply with any water disposal regulations.

Drying the Pipeline

26. Remove the water from long test sections with a poly pig. The most effective pig speed for dewatering is considered to be 1 to 5 miles per hour.

27. Long test sections on single feeds, dead ends, and other critical lines should be dried to a dew point temperature of –20°F to –40°F.

28. Short sections may be inclined to drain and swabbed dry by hand.

CAUTION

29. **Caution!** Although pigging will remove most of the free water from the test section, a substantial amount of moisture will remain on the surface of the pipe. If long test sections are not dried to a dew point temperature of –20°F to –40°F, hydrates can form while the moisture in the pipeline dissipates after the line has been returned to service. Take precautions at regulator stations located downstream of the test section to prevent the possibility of freezing. These may include monitoring the dew point of the gas until it has dropped below the level where freezing can occur, injecting methanol into the gas stream ahead of the regulators, or using heaters to heat the gas stream and/or the regulators.

Reports

30. Gas Standard A-34.1 provides complete instructions for completing the Strength Test Pressure Report. Completed reports must be signed, and all copies for distribution must be clear and show all pertinent data (including all test pressure records).

31. The test records required depend on the operating pressure in psig or as percent of SMYS of the gas facility being tested. Refer to Gas Standard A-34. The Strength Test Pressure Report indicates the required distribution of test records.

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Attachments

Attachment A . . . . "Permanent Pipeline Test Head"
Attachment B . . . "Temporary Pipeline Test Head and Test Cap"
Attachment C . . . "Hydro Test Manifold to Be Used With Temporary Test Heads and Caps"
Attachment D . . . "Sample of Hydrostatic Test Sketch"
Attachment E . . . "Typical Hydro Test Discharge Plan for Test Sections Less Than 300' Long"
Attachment F . . . . "Typical Hydro Test Discharge Plan for Test Sections More Than 300' Long"

Revision Notes

Revision 00 has the following changes:

1. Converted PG&E Drawing 086870 to Gas Standard A-37.
2. This document is part of Change 55.

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Attachment A

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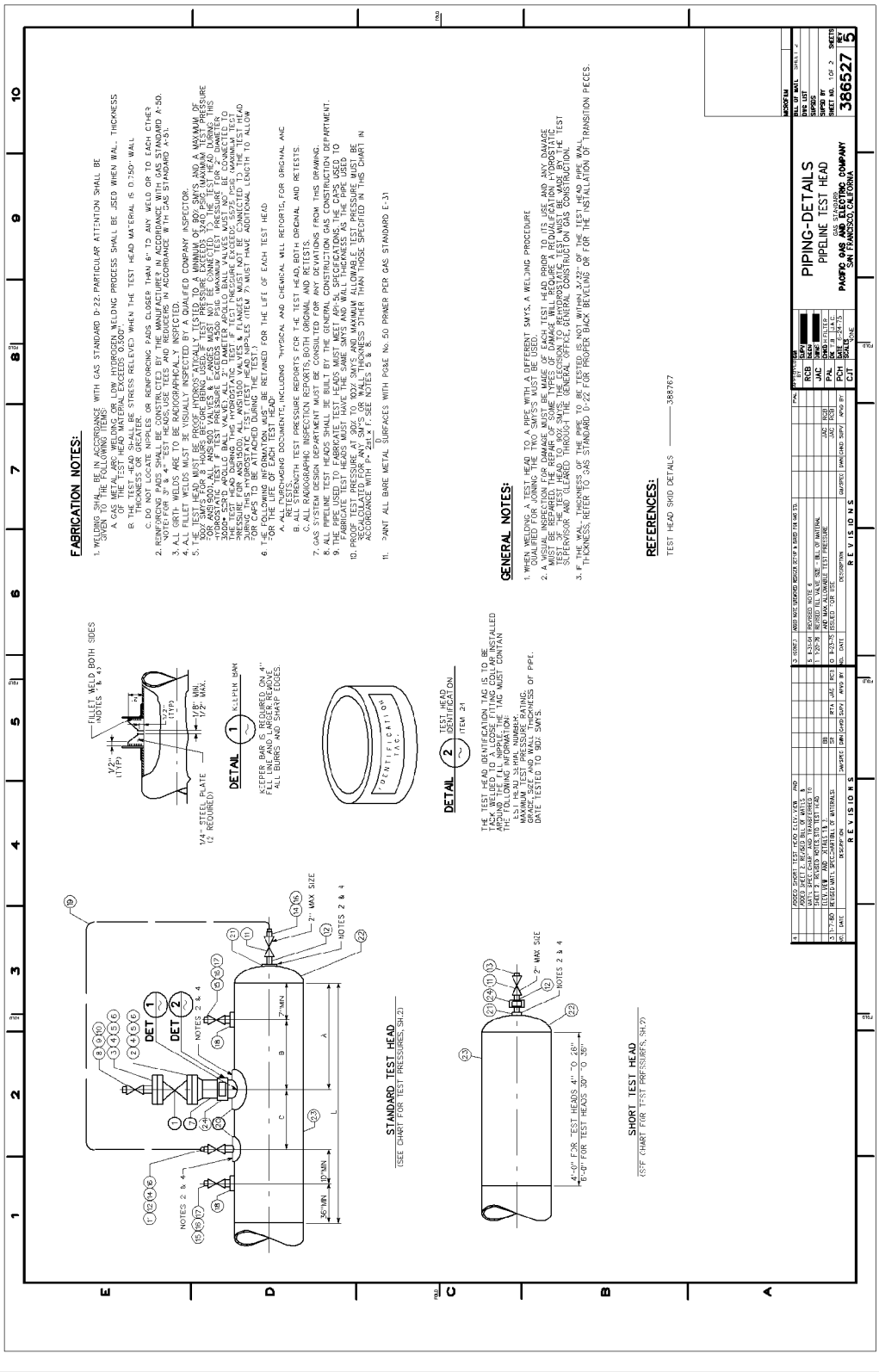
PERMANENT PIPELINE TEST HEAD



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Hydrostatic Testing Procedure

Attachment A, continued

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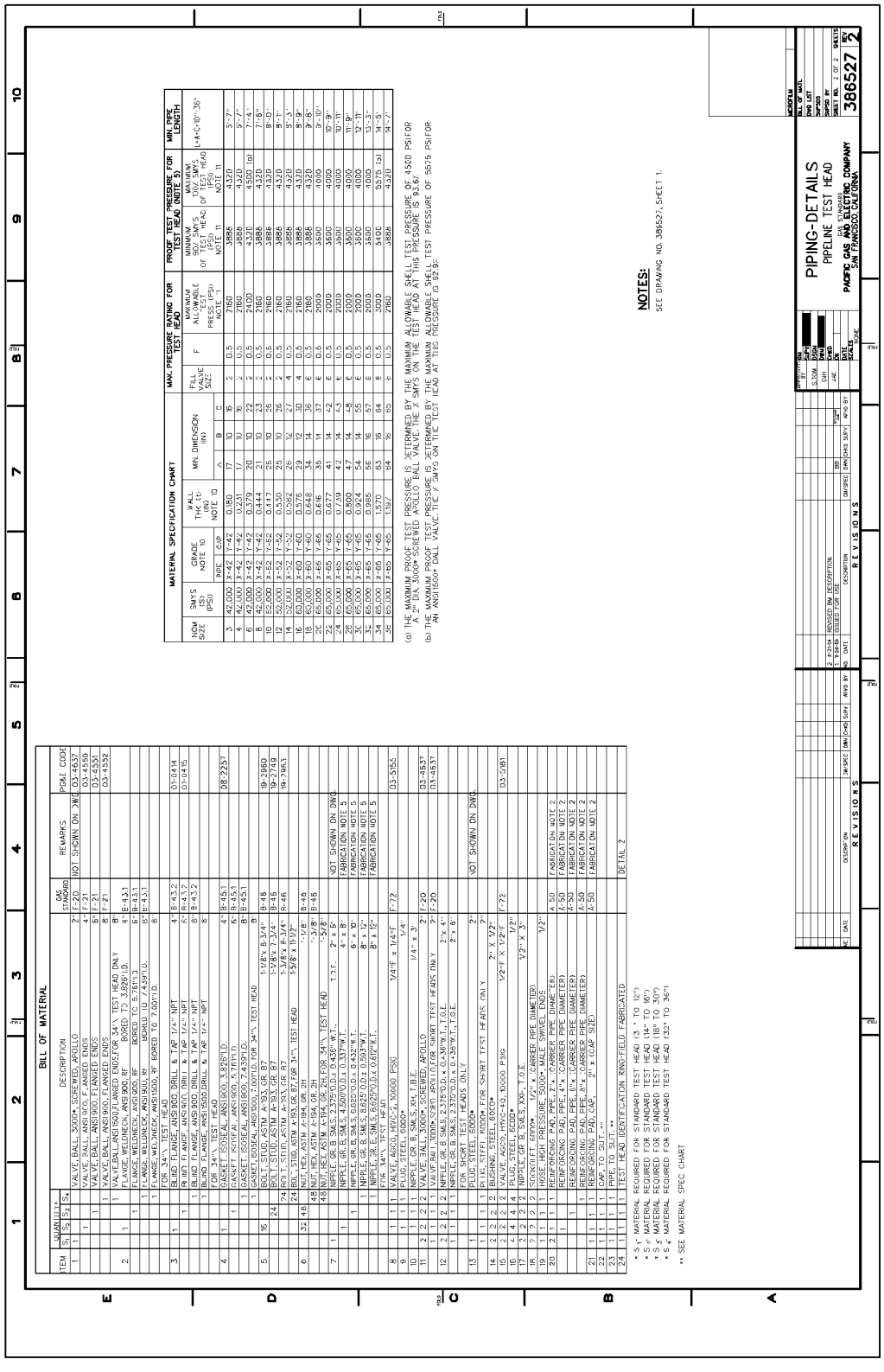
PERMANENT PIPELINE TEST HEAD, continued



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Attachment B

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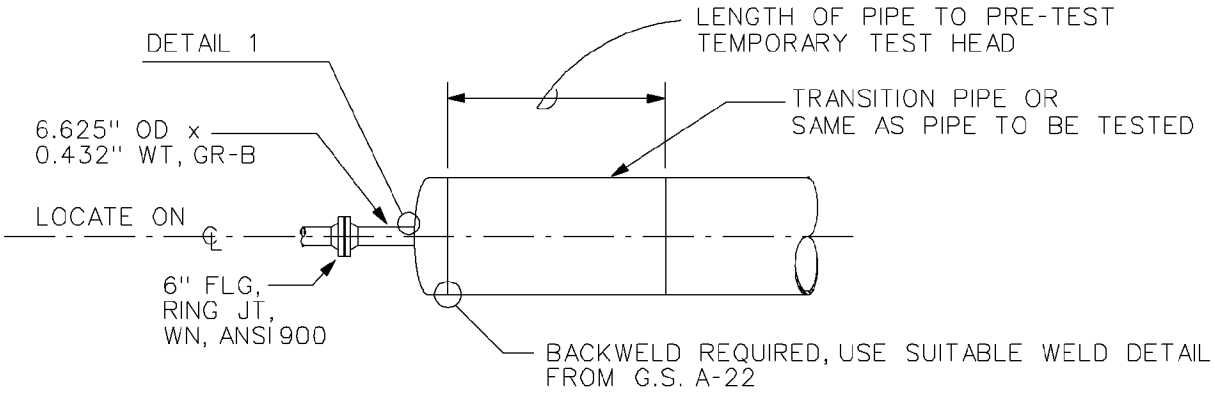
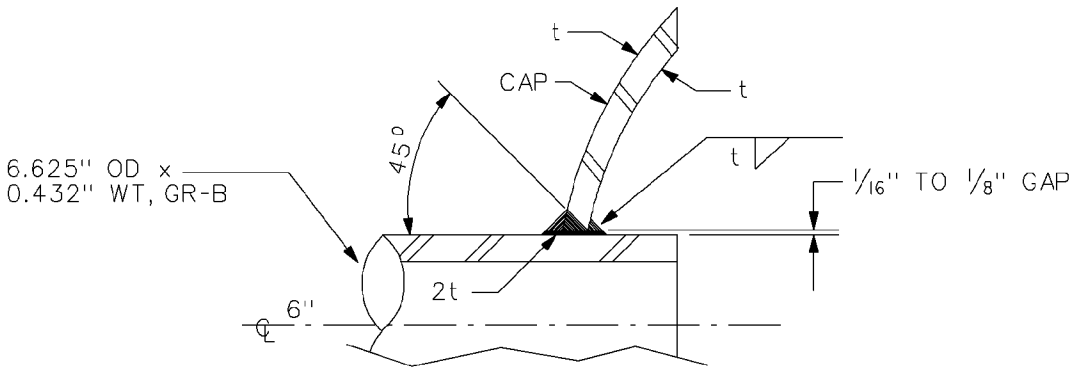
TEMPORARY PIPELINE TEST HEAD AND TEST CAP



HYDROTEST HEAD



DETAIL 1

TABLE:

CAP			NOZZLE			MAX. TEST PRESSURE
DIAMETER	MIN. WALL THICKNESS	SMYS	DIAMETER	WALL THICKNESS	SMYS	
16-INCH	0.500 INCH	60,000 PSI	6.625 INCH	0.432 INCH	42,000 PSI	2,160 PSIG
18-INCH	0.500 INCH	60,000 PSI	6.625 INCH	0.432 INCH	42,000 PSI	2,160 PSIG
20-INCH	0.500 INCH	60,000 PSI	6.625 INCH	0.432 INCH	42,000 PSI	2,160 PSIG
24-INCH	0.500 INCH	60,000 PSI	6.625 INCH	0.432 INCH	42,000 PSI	1,800 PSIG
26-INCH	0.500 INCH	60,000 PSI	6.625 INCH	0.432 INCH	42,000 PSI	1,662 PSIG
30-INCH	0.500 INCH	60,000 PSI	6.625 INCH	0.432 INCH	42,000 PSI	1,440 PSIG
32-INCH	0.521 INCH	60,000 PSI	6.625 INCH	0.432 INCH	42,000 PSI	1,406 PSIG
34-INCH	0.600 INCH	70,000 PSI	6.625 INCH	0.432 INCH	42,000 PSI	1,779 PSIG
36-INCH	0.750 INCH	70,000 PSI	6.625 INCH	0.432 INCH	42,000 PSI	2,100 PSIG
42-INCH	0.750 INCH	70,000 PSI	6.625 INCH	0.432 INCH	42,000 PSI	1,800 PSIG

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Attachment C

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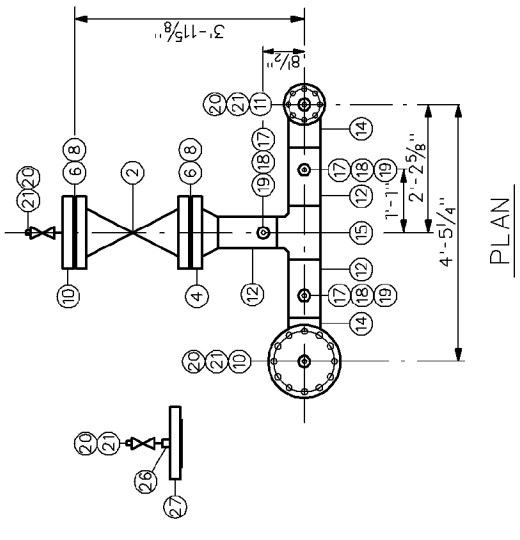
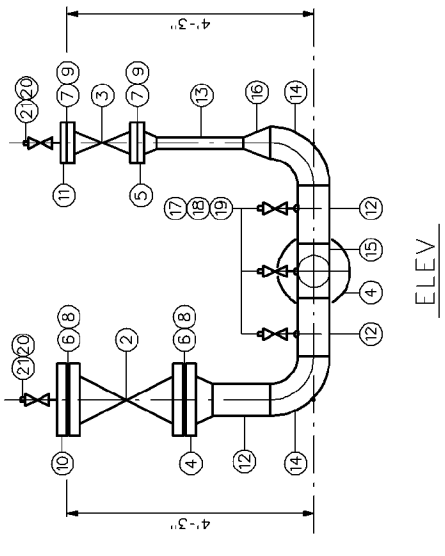
HYDRO TEST MANIFOLD TO BE USED WITH TEMPORARY TEST HEADS AND CAPS

MATERIAL LIST

ITEM	QTY	DESCRIPTION
1	1	6" Cameron Ball Valve, RTJ Flange, ANSI 900, Gear Opertion, S.N. 1103O267-009
2	1	6" Cameron Ball Valve, RTJ Flange, ANSI 900, Gear Opertion, S.N. 1103O267-002
3	1	2" Cameron Ball Valve, RTJ Flange, ANSI 900, Gear Operation, S.N. 1147685J-4
4	2	6" Steel Flange, W.N., R.T.J., ANSI 900, SA 105, XH Bore
5	1	2" Steel Flange, W.N., R.T.J., ANSI 900, SA 105, XH Bore
6	48	1⅛" x 7¾" Steel Bolts W/2HT Nuts, A193-B-7, A194 Gr. 2H
7	16	⅞" x 6" Steel Bolts W/2HT Nuts, A193-B-7, A194 Gr. 2H
8	4	6" Oval Ring Gasket, ANSI 900, SS316, R-45
9	2	2" Oval Ring Gasket, ANSI 900, SS316, R-24
10	2	6" Blind Flange, RTJ, CS, ANSI 900 with ¼" NPT Tap in Center, SA-105
11	1	2" Blind Flange, RTJ, CS, ANSI 900 with ¼" NPT Tap in Center, SA-105
12	4'	6.625" O.D. Steel Pipe, 0.432" W.T., API 5L Gr. B, SMLS
13	1'-5⅜"	2.375" O.D. Steel Pipe, 0.218" W.T., API 5L Gr. B, SMLS
14	2	6" Steel Elbow, 90 Degree, Long Radius, XH, Gr.B ASTM A234
15	1	6" x 6" x 6" Tee, XH, Gr. B, ASTM A234
16	1	6" x 2" Steel Reducer, XH, Butt Weld, Gr.B, ASTM A234
17	3	½" Needle Valve, AGCO H1VDC-44Q, 6000 PSIG
18	2	½" Threadolet, CS, MSS SP97, 3000 PSIG to fit 8"X3"
19	3	½" Hex Head Solid Plug, CS, 6000 PSIG, Threaded, SA-105
20	3	¼" Needle Valve, AGCO H1VDC-22, 6000 PSIG
21	3	¼" Hex Head Solid Plug, CS, 6000 PSIG, Threaded, SA-105
22	1	¾" Ball Valve, Watt C7100-02-SS, 2160 WOG, Threaded
23	1	¾" Hex Head Solid Plug, CS, 6000 PSIG, Threaded, SA-105
24	1	¾" Threadolet, CS, MSS SP97, 3000 PSIG to fit 12"X6"
25	1	¾" x 2" Steel Pipe Nipple, XH, SMLS, Gr. B, A106, T.B.E.
26	1	2" Bull Plug, Threaded, with ½" NPT Tap in Center, SA-105
27	1	6" Blind flange, RTJ, CS, ANSI 900, with 2" NPT Tap in Center, SA-105



PLAN



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Attachment D

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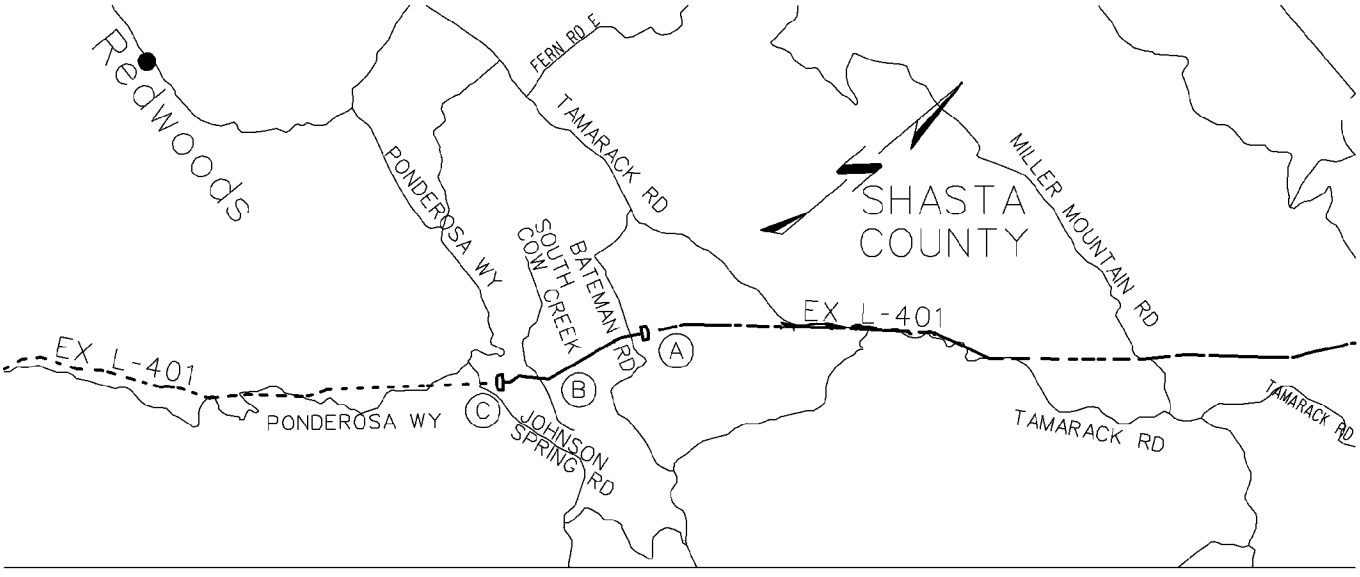
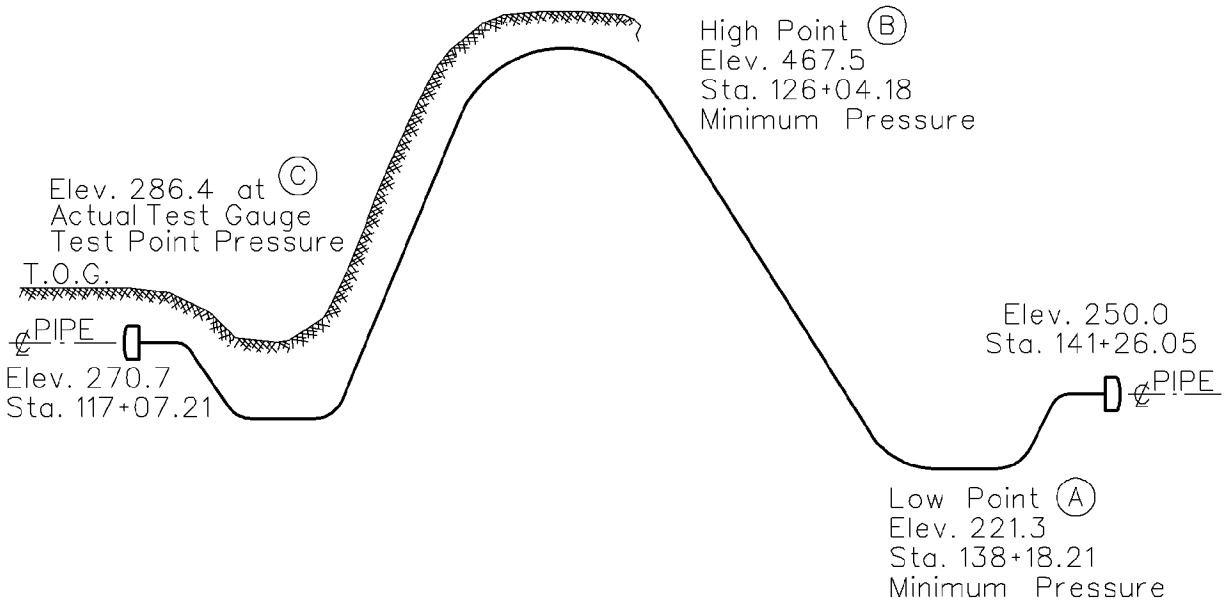
SAMPLE OF HYDROSTATIC TEST SKETCH





NOTE:

Actual test pressure is at the elevation of the pressure recording device, not the elevation of the connection point between the pipe and connecting hose. Use the pressure recording device elevation to determine the pressure differential between the test point and the high and low elevations of the pipeline when using water as the testing medium.

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Attachment E

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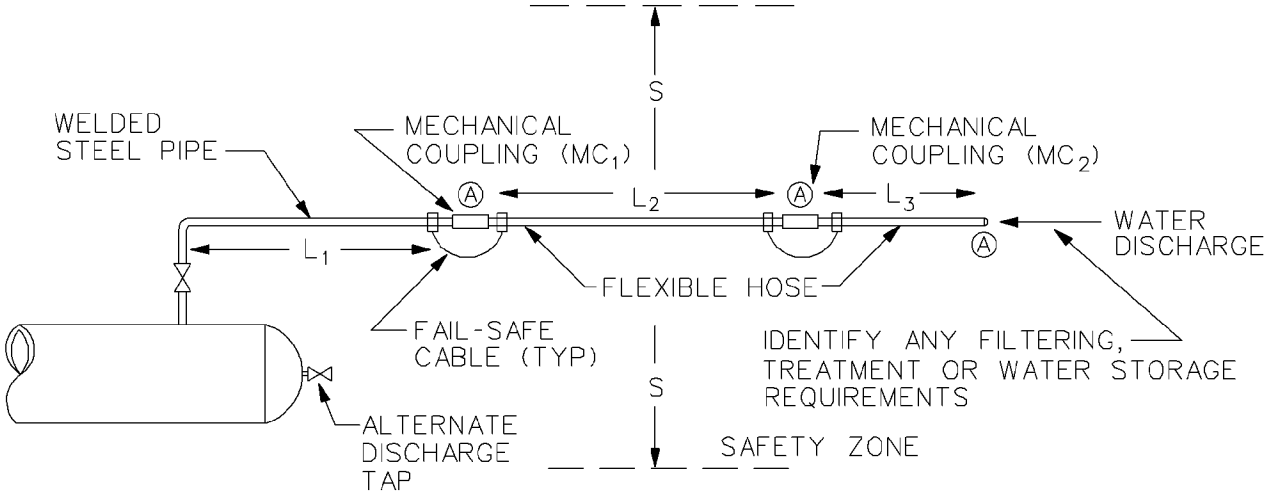
TYPICAL HYDRO TEST DISCHARGE PLAN FOR TEST SECTIONS LESS THAN 300' LONG



Ⓐ POTENTIAL ANCHOR POINTS

NOTES:

1. IDENTIFY PRESSURE MONITORING AND ANCHOR POINTS ON DRAWING.
2. SAFETY ZONE IS DEFINED BY LENGTH OF DISCHARGE PIPE THAT COULD MOVE OR BREAK FREE DURING DISCHARGE.
3. ADD ADDITIONAL FAIL-SAFE CABLE AT EACH MECHANICAL COUPLING.
4. THE RESPONSIBLE GSM&TS ENGINEER MUST APPROVE ANY DEVIATIONS FROM THIS TYPICAL DRAWING.
5. COMPLETE TABLE:

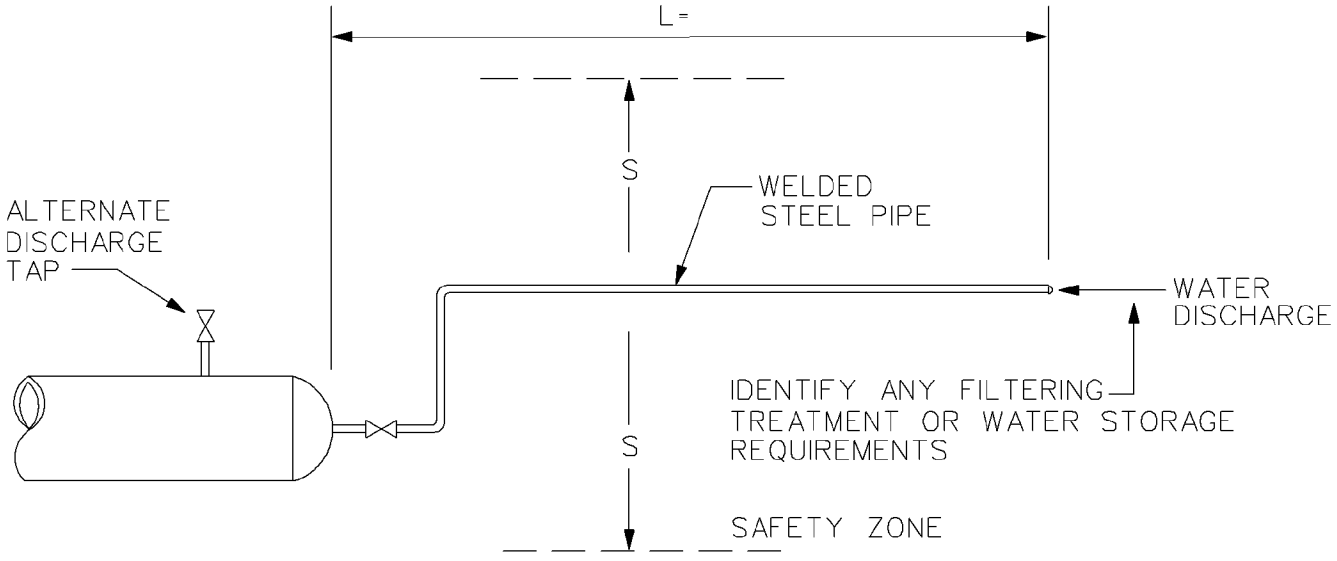
L_1 =	(FEET)
L_2 =	↓
L_3 =	
L_4 =	
S_1 =	(FEET)
S_2 =	↓
S_3 =	
MC_1 =	MAX. PSIG
MC_2 =	MAX. PSIG

[redacted] [redacted]

Attachment F

Gas Distribution and Technical Services
Rev. 11/04

TYPICAL HYDRO TEST DISCHARGE PLAN FOR TEST SECTIONS MORE THAN 300' LONG



NOTES:

1. IDENTIFY PRESSURE MONITORING AND ANCHOR POINTS ON DRAWING.
2. SAFETY ZONE IS DEFINED BY LENGTH OF DISCHARGE PIPE THAT COULD MOVE FREE OR BREAK DURING DISCHARGE.
3. REFER TO TYPICAL DRAWING FOR TEST SECTION <300 (ATTACHMENT E) IF FLEXIBLE HOSE OR MECHANICAL COUPLINGS ARE TO BE USED.
4. THE RESPONSIBLE GSM&TS ENGINEER MUST APPROVE ANY DEVIATIONS FROM THIS TYPICAL DRAWING.

[redacted] [redacted]