

Environmental Management and Construction Plan

Appendix F

Hydrostatic Test Plan

**Empire Generating Co, LLC
16" Gas Pipeline Interconnect Project**

August 28, 2008

**ISSUED FOR CONSTRUCTION
REV. 0**

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1.0 GENERAL REQUIREMENTS

- 1.1. All high pressure piping installed (piping which will operate above 125 PSIG) shall be pressure tested with water as the testing medium prior to being placed in-service.
- 1.2. All connections regardless of size, which can be practically installed, shall be made prior to pressure testing.
- 1.3. Piping assemblies, to the maximum extent practical, shall be pressure tested after installation as complete assemblies and extra pipe shall be pressure tested at each tie-in weld so that every foot of piping being added is pressure tested.
- 1.4. Fabricated piping assemblies may be pressure tested prior to final installation if it is not practical to do so after installation; however, fabrication shall be as complete as possible. Multiple assemblies may be joined and pressure tested as a single unit. If necessary, fabricated assemblies may include cuts which may require field tie-in welds upon final installation in the field.
- 1.5. Pressure testing through any vessel shall not be permitted.
- 1.6. Ball valves and gate valves are to be tested in the ½ open position (preferred position). Plug valves may be tested in either the full open or full closed position. Pressure testing against any closed ball or gate valve shall not be permitted.
- 1.7. Only blinds and closures with proper ANSI design and pressure rating (ANSI 600) shall be used. Field fabricated blinds and closures shall not be used.
- 1.8 Per 16 NYCRR 255.505(h), at least five business days prior to starting the test, the operator shall make notification. In order to maintain continuity of service during emergencies, shorter notice is permissible. DPS staff shall be notified a minimum 48 hours prior to discharge of hydrostatic test water.
- 1.9 Per 16 NYCRR 255.505(i), pressure tests on this pipeline are not considered as satisfactorily accomplished unless certified by an inspector of the Gas and Water Division of the Department of Public Service.

2.0 SAFETY REQUIREMENTS

- 2.1. Empire shall ensure that every reasonable precaution is taken to protect its employees and the general public during the testing. Empire shall take all practicable steps to keep persons not directly associated with the testing operation outside of the testing area. Empire shall coordinate hydro tests with NYSDOT.
- 2.2. Existing safety regulations pertaining to work areas, safety devices and work practices are not intended to be replaced by the following safety requirements:

2.2.1. Test equipment and personnel shall be positioned to minimize potential hazards. Typical positioning shall include a barrier between the test equipment and test manifold and/or placement of test equipment a minimum distance of 25 feet from the test manifold. Personnel performing the test should approach the pressured line only in the performance of their duties.

2.2.2. At no time shall testing personnel attempt to tighten flanges or screwed fittings during testing. The test pressure must be bled off prior to tightening.

2.2.3. Adequate support, bracing, and location of pumping equipment and pressure piping shall be used in connecting to the facility to be tested.

2.2.4. Adequate lighting shall be available for testing operations performed at night.

2.2.5. When bleeding the pressure from a section of line, extreme caution (adequate support & bracing) shall be taken when deflectors such as ells are used.

2.2.6. The discharge pipe for dewatering the pipeline shall be a minimum of 6 in. Schedule 40 and is not to be attached to mainline until the test pressure has been bled off. The discharge pipe will be cleaned, constructed and secured prior to discharging test medium.

2.3 Hydrostatic test water discharge will be continually monitored. A positive means of controlling the rate of discharge and, if necessary, terminating the discharge shall be provided.

3.0 PRESSURE REQUIREMENTS

Per 16 NYCRR 255.505(b), the test pressure shall be at least equal to 90 percent of SMYS or 1.5 times the maximum allowable operating pressure whichever is less. For the purposes of effectively testing this pipeline, the required test pressure will be twice the MAOP (900 psig) of the pipeline, or a minimum of 1800 psig. See Table 1 for a detailed breakdown of the proposed pressure test parameters and test pressure summaries.

TABLE 1. PRELIMINARY PRESSURE TEST PARAMETERS AND TEST PRESSURE SUMMARIES

	Station	Pipeline MP	Segment Length Miles	Segment Line Fill gallons	Segment Compression Fill gallons	Lowest Percent of SMYS	Test Begin PSI	Test End PSI	Test Minimum PSI
Begin Test	0+00	0.00	4.54	227,709	1924	59.0%	1800	1800	1800
End Test	240+00	4.60							

4.0 PRESSURE TEST DURATION

The test duration on the pipeline shall be a minimum of 12 hours.

5.0 OTHER PIPING SYSTEMS

5.1. Utility line piping inside a station shall be tested to a minimum test pressure of 1.5 times MAOP for a duration of 1 hour using water. If testing pneumatically, the minimum test pressure shall be 1.2 times MAOP for water piping and 1.1 times MAOP for other utility piping.

5.2. Instrument and control piping may be pressure tested using air, natural gas or inert gas as the test medium and maintaining the minimum test pressure, after it stabilizes, for at least one continuous hour and checked for leaks by using a leak detector such as "SNOOP". Soap shall not be used as a leak detector.

6.0 MATERIAL

6.1. All material and equipment required for testing shall comply with USDOT and NYSPSC requirements.

6.2. Test manifolds used to hydrostatically test the pipeline facilities shall be fabricated in accordance to the following requirements:

6.2.1. The minimum wall thickness and yield strength of pipe and components used to fabricate test headers shall be designed such that the maximum test pressure experienced during facility testing does not exceed 80% of SMYS.

6.2.2. In instances where the proposed test pressure shall exceed 80% of SMYS of the test headers, an initial pre-test shall be conducted on the entire test header to 100 percent of the test header's specified minimum yield strength (SMYS) for two (2) continuous hours. Subsequent testing shall be at the discretion of Empire, dependent upon the condition of the test manifold and verification of qualification documentation (Test, NDE, Welding & Material Records).

6.2.3. A qualified welder using a qualified welding procedure shall weld all pressure piping related to the hydrostatic test.

6.2.4. All butt and fillet welds shall be nondestructively tested in accordance to established NDE procedures.

7.0 TEST WATER

The proposed water source for the hydrotest water is the Papsanee Creek. At the point of withdrawal, the rate of pipeline filling will not exceed 50% of the actual stream flow. See the Plan and Profile drawings for the proposed test water acquisition location. Table 2 provides an estimate of the required volume of water to complete the pressure test.

TABLE 2. ESTIMATED TEST VOLUME AND DISCHARGE RATES

Project Component	Water Source	Test Sections (MP)	Approximate Fill Volume (gallons)	Approximate Compression Volume (gallons)	Discharge Rate (gal/min)
Test Section 1	Papscanee Creek	0.0 - 4.60	227,709	1,924	300

8.0 FILLING THE LINE WITH WATER

8.1. The line filling operation shall serve the dual function of cleaning the line and providing the water necessary for running the caliper pig and for the hydrostatic test.

8.2. The pipeline section will be filled with water at a moderate and continuous fill rate. Should the fill stop at any time due to uncontrollable circumstances, the fill line shall be purged of air. Care shall be taken to ensure that no excess air is entrapped in the pipeline.

8.3. The pipeline and components shall be completely filled with clean water, free of silt, trash or any substance that might be injurious to the system. A filter shall be employed rated at sufficient capacity to accommodate the output of the fill pump. The filter shall be equipped with a 100- mesh screen and valves, gauges and fittings sufficient to allow any necessary backwashing. There shall be sufficient gauges on the filter, in order that the differential pressure across the filter and positive pressure on the discharge side of the filter can be observed.

9.0 PRESSURING

9.1. One of the primary concerns during the pressuring of a test section is safety, both for the public and personnel associated with the Work. There shall be no contractor personnel or equipment working over a test section after the test pressure has exceeded the operating pressure. There shall be a minimum number of personnel around a section during pressuring and testing, and no personnel shall be in the ditch during pressuring. In addition to instruments being kept at a safe distance, consideration should also be given to the location of the pressure pump and its operator. Prior to pressuring, all valves shall be in the half open position and shall be blinded or plugged, and the only valves to be tested in the closed position are the hydrostatic testing valves.

9.2. The stabilization period shall begin after the fill operation is complete. Sufficient time shall be allowed for the temperature of the pipe, test medium and backfill (if any) to become relatively stable. If necessary, Empire shall verify stabilization by comparing temperature reading taken from a pair of temperature probes (or thermometer) having matching calibration and placed as follows: one probe is to be buried in soil at pipe depth at least 10 feet from the pipe in a location representative of general ground temperature, and the other probe is to be placed in contact with the buried pipe near the same location.

9.3. After the stabilization period, the test section shall be pressurized to the test pressure with caution, recognizing the possibility of failure of the piping or equipment or the potential over-pressurization of the pipe. Pressure shall be increased or decreased as necessary during the hold period in order to maintain the test pressure. Should the volume of water required to achieve compression of 1800 psig be greater than the anticipated volume of 1,924 gallons, an inspection of the pipeline shall be performed to determine whether or not a rupture has occurred.

9.4. Once the test pressure has been reached and the pressure stabilizes, deadweight readings shall be recorded every 10 minutes during the first hour; every 15 minutes during the second hour; every 30 minutes thereafter until the test has been completed. Both pressure and time shall be recorded for any "bleeding-off" or repressuring. The pipeline will be pressurized at a uniform rate, which can be maintained until test pressure is reached, and at a reasonable rate which allows accurate pressure readings and proper collection of data. Any abrupt changes or breaks on the charts should be labeled as to the cause, at that point on the face of the chart. Pressure charts should have the dead weight pressures noted at the beginning and end of the test.

10.0 HYDROSTATIC TEST

10.1. The pipeline shall be hydrostatically tested to the pressures indicated on Table 1 for the specified period of 12 hours; however, Empire reserves the right to require the Contractor to maintain pressure beyond the specified period, if the pressure has not stabilized due to temperature or it cannot be determined if there is a leak within the test section.

10.2. The pressure and temperature recorders shall be started with the charts in real time orientation. The pressure and temperature shall be recorded continuously during the entire test. Dead weight tester checks shall be made at the beginning and ending of the test and every hour. An evaluation as to the cause of any pressure-temperature changes occurring during the hold period shall be made. Section 12 describes the procedures that are to be followed if the loss of pressure is discovered to be the result of pipe failure.

11.0 TEST RUPTURES

11.1 The pipe or fitting which ruptured should be removed from the leak site as soon as possible for careful examination by Empire and DPS staff.

11.2 In the case of pipe failure, the whole joint of pipe is to be removed. If Empire decides that the cause of the rupture is not obvious the section in question will be sent to a metallurgical laboratory for analysis.

11.3 In cases of weld associated fractures, the entire weld shall be removed.

12.0 RECORDS

12.1. Empire shall make, and retain for the useful life of the pipeline, a record of each test performed under this Section. Only Empire approved forms shall be used and shall be completely filled in, have the pressure recording charts with calibration certifications attached, and be properly signed and approved.

12.2 Per 16 NYCRR 255.517, the test records must contain:

- (1) the operator's name, the name of the operator's employee responsible for making the test, and the name of any test company used;
- (2) test medium used;
- (3) test pressure;
- (4) test duration;
- (5) pressure record charts;
- (6) elevation variations, whenever significant for the particular test; and
- (7) leaks and failures noted and their disposition.

12.3. Test reports on pipelines shall also include an as-tested profile showing actual elevations whenever significant for the particular test, manifold locations, deadweight and recorder locations, and any other information of record such as hourly fill log with water temperatures, deadweight pressure log sheets, and pressure volume plots.

12.4. Test reports on plants shall include a piping drawing showing what piping is included in each test and on each test chart.

12.5. The Contractor Representative and the Empire Representative shall sign and date all original charts, immediately upon completion and acceptance of the test. The original charts shall remain with Empire.

13.0 DEWATERING

13.1. Immediately after completion of tests, the pipeline shall be completely dewatered by running a sufficient number of pipeline "pigs". The discharge pipe shall not be attached to the mainline until the test pressure has been bled off. The discharge pipe will be cleaned, constructed and secured.

13.2. Hydrostatic test water shall be discharged within the same immediate drainage system or watershed from which it was drawn and shall be discharged in a proper

manner, so as to reduce the potential for erosion. See Appendix B for details of the discharge structures. See Table 2 for a summary of the discharge locations and discharge rate (gallons/minute).

14.0 CALIPER/GEOMETRY INSPECTION

14.1. Empire will run a caliper/geometry inspection tool with defect location capabilities that will provide information necessary to find any significant ID reduction in the pipe in order that the indication may be uncovered, inspected and possibly removed.

14.2. Any ID reduction found in pipe 12.75" in outer diameter or greater that exceeds 2% of the nominal diameter, or exceeds 0.25" in pipe with an outer diameter less than 12.75", shall be removed. Any ID reduction that contains a stress concentrator such as a scratch or gouge shall be removed.

15.0 CLEANING AND DRYING

15.1. After dewatering is complete, Empire will run a train of drying pigs until specified dew point of -30°F is achieved inside pipeline.

15.2. Pipeline will be considered clean and dry when required dew point has been achieved and dust penetration of ¼ " or less is visible in a 2.5 pds./ft³ density foam pig.

15.3. After cleaning and drying, pipeline should be tied-in, purged and loaded as soon as practical.