EXHIBIT E.

PROCEDURES FOR BLEEDING PIEZOMETER LINES

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Prior to taking piezometer readings, the piezometer lines must be bled of air to prevent any erroneous readings. The following provide step-by-step instructions for bleeding the piezometer lines for the main operational gates and the MDL. These procedures can also be found with the Seven Oaks Dam Operations and Maintenance Manual, dated August 2002.

1) Gate Chamber Operational Instrumentation Manifold. The gate chamber operation area at Seven Oaks Dam has been equipped with state-of-the-art instrumentation to assist the dam operator(s) with the task of monitoring water level elevations in the fore bay of the dam, the intake structure, the upper conduit and the cone valves. The instrumentation consists of a series of gage pressure transmitters installed at the operation manifold as shown in Photo 7-1. The operational piezometer manifold is an array of copper pipes, valves and fittings, mounted to the wall of the gate chamber, that route piezometer lines to the proper pressure transmitter. These pressure transmitters, mounted just to the left of the manifold, are calibrated for a specific range of water level elevations that the dam may experience. Each transmitter is connected to the operational piezometer manifold by heavy Tygon tubing and to an electronic display panel, which provides the operator with the water elevation reading in ft.

At Seven Oaks Dam, the existing regulations specify that water retention periods at specific elevations will be short in duration. The fore bay water level will rise above and fall below the piezometer port locations placed throughout the intake structure and the main conduit. As a result, many of the operational piezometer pressure lines will trap air in the line as the water rises above the elevation of the piezometer port. Pockets of air in the piezometer line will cause an error in the pressure reading and must be evacuated from the line. The procedure for evacuating the air from the piezometer lines are as illustrated in the following example:

Example: Water has begun to rise in the reservoir due to significant rain and snowmelt in the higher elevations. Pressure transmitter O-4 is being used to monitor the lower water level elevation main wet well of the intake structure. Normally, when the water level is low in the reservoir, below the intake elevation of piezometer line O-4, the manifold valves (V1-O4 and V2-O4) are in the positions shown in Figure 1 to drain the water out of the piezometer lines. However, because the water level in the reservoir is rising above the O-4 intake port, water is now flowing out of the drainpipe at the bottom of the manifold.

Bleeding procedures for the operational pressure transmitters:

1. Close the valve V2-O4 (see Photo E-1). Do not close valve V1-O4. This should stop the water flowing from the bottom of the manifold. If water continues to flow from the manifold, then the water level must be above another piezometer intake elevation. Determine which piezometer line that it might be and close the lower of the two valves to that pressure transmitter.

2. As the valve is closed the electronic readout corresponding to O-4 should show a change in elevation.

3. At this time, carefully open the bleed port screw on the left side of the pressure transmitter, as shown in Photo E-2. The screw has been lightly tightened with a box-end wrench to prevent leakage. Once the screw has been loosened, begin opening the screw in ¼ turn increments, up to 1-1/2 turns of the vent screw. This should allow sufficient water to escape from the transmitter. Watch the flowing water for spurts and sputters of water flow, as this is usually an indication of air escaping from the line. Inspect the tubing for the presence of air bubbles. If any are present and appear to be adhering to the side of the tubing, tap the tubing with the fingernail or small screwdriver, to move them through the tubing.

4. After three minutes of letting the water flow from the pressure transmitter, the stream of water from the bleed vent should appear to be steady, close the screw to finger tight position. Using a box-end wrench, securely tighten the vent screw, not tightening more than ¼ turn from the finger tight position.

5. Repeat steps 1-4 for each pressure transmitter (O1 – O8) on the operational manifold as the water level continues to rise in the reservoir and cover the other piezometer intakes.

2) <u>Cone Valve Operation Room Pressure Transmitters</u>. Gage pressure transmitters and digital displays were also installed to monitor pressures for the low flow cone valve operations. The digital display meters for the cone valve operational instrumentation (O9 – O10) are located in the large display panel adjacent to the gate control panel in the entrance to the RCC and also in the cone valve operating room. A pressure tap with a single valve was installed on each pipe upstream of the cone valves (See Photo E-3A). Rigid Tygon tubing connects the pressure tap valve with the pressure transmitter. The pressure transmitters for each cone valve are located at the bottom of the pit in the cone valve operation room as shown in Photo E-3B.

The procedures for removing the air from the pressure lines are as follows:

1. Check that the valve on the pressure tap at the side of the pipe (Photo E-3A) is open. If it is not open, open it up.

2. At this time, carefully open the bleed port screw on the left side of the pressure transmitter, as shown in Photo E-2. The screw has been lightly tightened with a box-end wrench to prevent leakage. Once the screw has been loosened, begin opening the screw in ¼ turn increments, up to 1-1/2 turns of the vent screw. This should allow sufficient water to escape from the transmitter. Watch the flowing water for spurts and sputters of water flow, as this is usually an indication of air escaping from the line. Inspect the tubing for the presence of air bubbles.

If any air bubbles are present and appear to be adhering to the side of the tubing, tap the tubing to keep them moving through to the vent.

3. After three minutes of letting the water flow from the pressure transmitter, the stream of water from the bleed vent should appear to be steady, close the screw to the finger tight position. Using a box-end wrench, securely tighten the vent screw, not tightening more than ¼ turn from the finger tight position.

4. Repeat steps 1-3 for each pressure transmitter (O9 – O10) in the cone valve area.

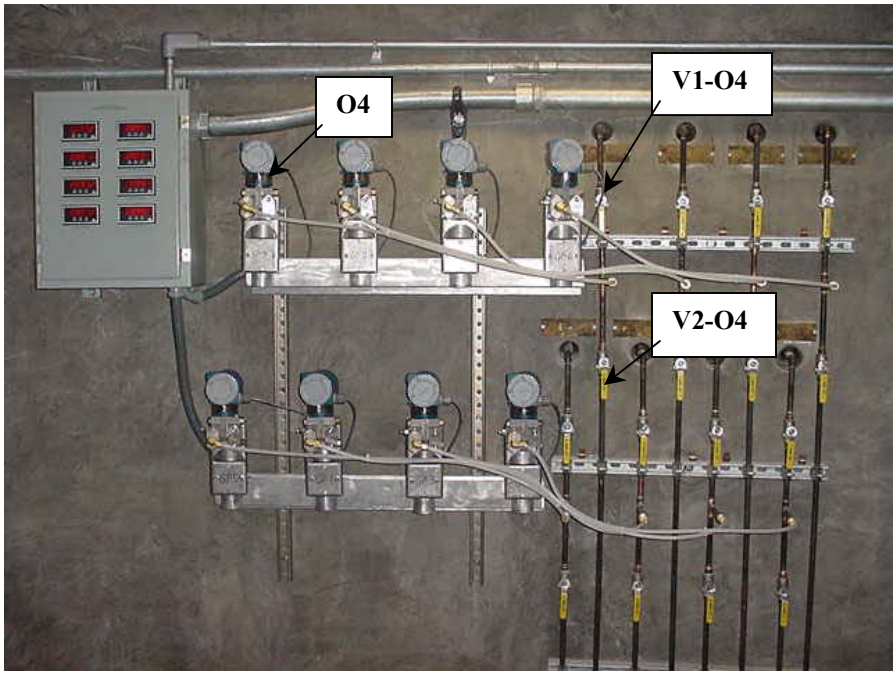

Photo E-1. Operational Piezometer Manifold, Pressure Transmitters, and Display.

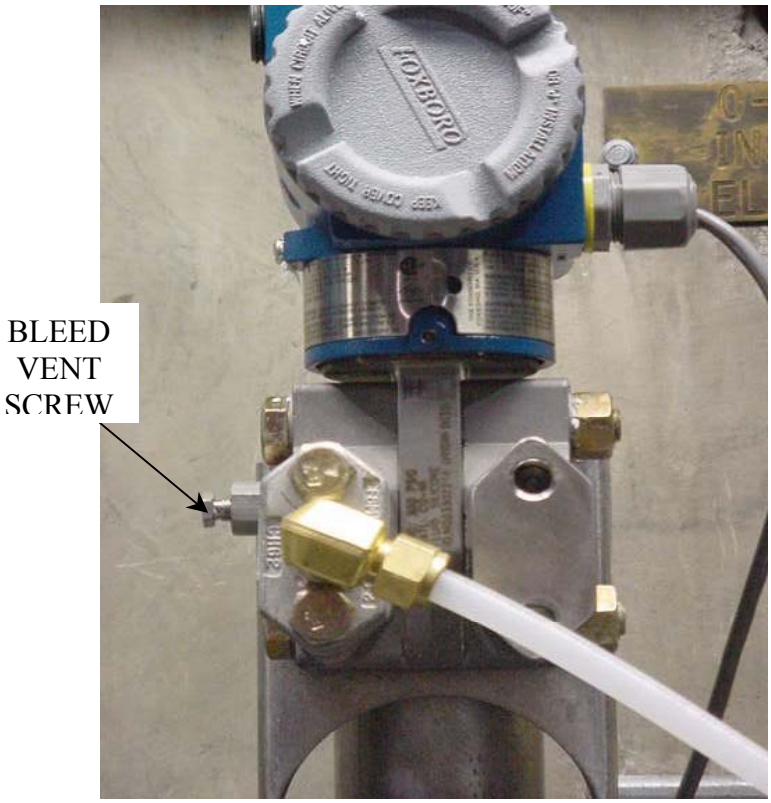

Photo E-2. Pressure transmitter bleed vent screw location

Photo E-3A. Pressure Tap on Cone Valve Pipe

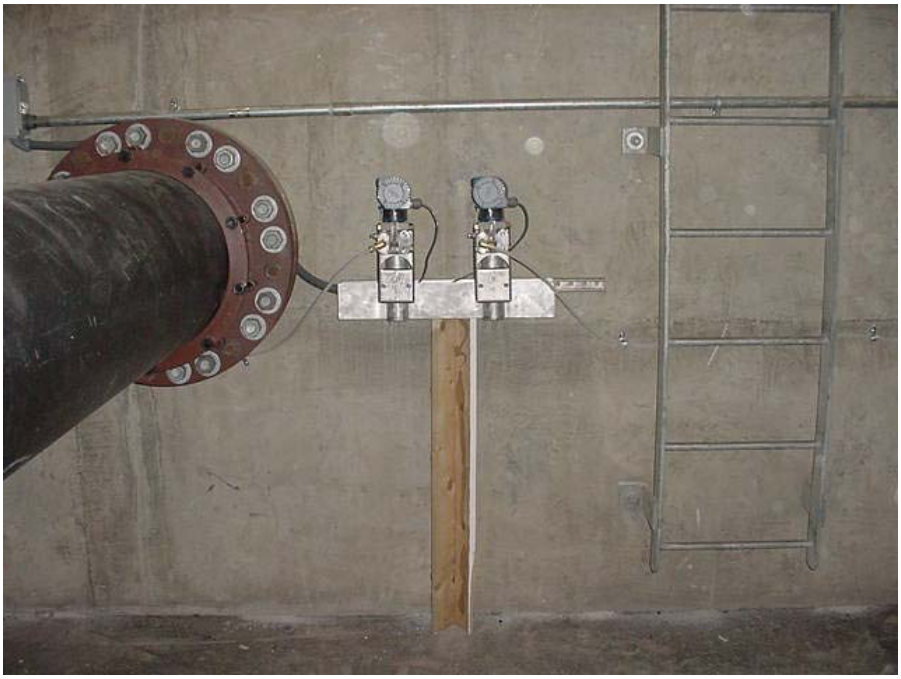

Photo E-3B. Cone Valve Pressure Transmitters O-9 and O-10