

UNWITNESSED MECHANICAL INTEGRITY TEST FORM

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These instructions are adapted from those found in the Region 5 Underground Injection Control Branch Regional Guidance #5, Determination of Mechanical Integrity of Injection Wells, Revised June 11, 1998.

IV. CONDUCTING TESTS WITHOUT A REPRESENTATIVE OF THE USEPA (USEPA Region 5 Underground Injection Control Program Guidance #5, Determination of the Mechanical Integrity of Injection Wells, pp. 7-8)

It is, and has been, the policy of Region 5 to witness mechanical integrity testing to the extent practicable. Tests for which a mechanical, digital or third-party record is produced may be conducted without an Agency witness when it proves impossible to resolve scheduling conflicts with both the USEPA contract inspectors and the Regional technical staff.

In order to conduct testing without an USEPA representative the following procedures should be followed:

1. The owner/operator must submit proposed procedures including the information that no USEPA representative is available, and receive permission from the DI Section of the UIC Branch to proceed;
2. The test must be documented using either a mechanical or digital device which records the value of the parameter of interest, or by a service company job record;
3. A report of the testing including all data available at the conclusion of the test and a certification of accuracy which is signed by an authorized representative of the company must be submitted to the DI Section within 10 calendar days of the completion of testing; and
4. A final report, including any additional interpretation necessary for evaluation of the testing, must be submitted prior to or with the next regularly scheduled monitoring report or as required under the appropriate permit for the injection well.

NOTE: Region 5 may, at any time, require a test witnessed by a USEPA representative to verify the results of an unwitnessed test.

The Procedure is taken from Guidance #5, Attachment 1, Standard Annulus Pressure Test (SAPT), pp. 1-2 - 1-4.

D. Procedure for the SAPT:

To properly conduct the SAPT:

1. The tubing/casing annulus (annulus) must be completely filled with liquid (variations must be approved by Region 5). Temperature stabilization of the well and annulus liquid is necessary prior to conducting the test. This may be achieved by filling the annulus with liquid and either ceasing injection or maintaining stabilized injection (i.e., continuous injection at a constant rate and constant injection fluid temperature) before and through the test;

No unapproved substances may be added to the annulus liquid. Use of any substance which might affect the outcome of testing may constitute falsification of the test procedure, invalidate the test, and may subject the owner/operator to civil or criminal prosecution;

2. After stabilization, the annuluses of Class II wells should be pressurized to a surface pressure of no less than 300 psig. The annuluses of Class I wells should be pressurized to the greater of 300 psig or a pressure which

exceeds the maximum allowable injection pressure by 100 psi, unless an alternate pressure is approved by Region 5. A positive pressure differential between the pressure in the annular space and the injection tubing pressure of at least 100 psi should be maintained throughout the entire annulus (from the top of the packer to the surface) of all Class I wells. Specific gravity differences between liquids in the annulus and the tubing should be accounted for when determining the appropriate test pressure. Following pressurization, the annular system must be isolated from the source of pressure and the sealpot (if present) by a closed valve;

3. The annulus system must remain isolated for a period of no less than 30 minutes for Class II, III, and V wells. The isolation must be maintained for one hour for Class I wells. During the period of isolation measurements of pressure should be made at ten-minute intervals; and

4. After the SAPT test period has been completed, the valve to the annulus should be opened and liquid returns from the annulus observed and measured. This may be done by allowing liquid to flow into a sealpot assembly and measuring the volume of the returns or by opening a valve and catching the liquid flowback in a container. The volume of annulus liquid returns recovered is proportional to the volume of the annulus and the amount of pressurization. The liquid return test can serve as an indication as to whether the full length of the annulus has been tested. As an alternative, the amount of liquid needed to increase the pressure can be measured. If the entire length of the annulus, from the wellhead to the packer, set at the approved depth, is not tested, then the test is void.

E. Interpretation

The interpretation and confirmation of the SAPT include:

1. Comparison of the pressure change through the test period to 3% of the test pressure (0.03 X test pressure). If the annulus test pressure changes by this amount or more (gain or loss), the well has failed to demonstrate MI (for all wells), and operation may constitute a violation of the UIC regulations. If the annulus test pressure changes by less than 3 percent (gain or loss) over the test period, the well has demonstrated MI, pursuant to 40 CFR §146.8(a)(1); and

2. Evaluation of the amount of liquid returned. If less than a cup of liquid is returned, the annulus may be blocked at a shallow depth. In the past criminal charges have been brought as a result of investigations inspired by the observation that very little liquid was returned. The following formula can be used to find how much liquid should be returned:

$$dV = (P_t - P_f) \times V_f \times h \times 0.0000032$$

where:

dV = the amount returned, gals;

P_t = the pressure used to test the annulus, psi;

P_f = annulus pressure after depressurization, psi;

V_f = the volume of one foot of the annulus from Halliburton table 221-B, gals;

h = length of the annulus, ft; and

0.0000032 gal./gal./psi = the compressibility of water.

The result is the number of gallons of liquid which should be returned. It is also the amount of liquid needed to pressurize the annulus to the test pressure once the annulus is filled with liquid. For a small annulus which might be typical of a Class II well (4-1/2 inch, 11.6 lb/ft. casing and 2-3/8 inch tubing, pressurized to 300 psi), just under one half gallon of liquid should be returned for each 1,000 feet of depth to the packer. If several gallons of liquid are returned, it is fairly certain that the entire length of the casing and tubing have been tested.