

Utah Division of Oil, Gas and Mining Guidance Document

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Prepared By:

Mark Reinbold
Environmental Scientist



Standard Annulus Pressure Test Guidance Document (re: Utah Oil & Gas Conservation General Rules R649-5-5 Testing and Monitoring of Injection Wells)

This document is intended for use while preparing for, and conducting a Standard Annulus Pressure Test. Utah Administrative Code R649-5 pertaining to requirements for Underground Injection Control of Recovery Operations and Class II Injection wells should be used in conjunction with this guidance.

FOR FURTHER INFORMATION CONTACT:

Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
P.O. Box 145801
Salt Lake City, Utah 84114-5801
Telephone: (801)538-5340 Fax: (801)359-3940

Our Mission

The Utah Oil and Gas Program within the Division of Oil, Gas and Mining:

- Promote the exploration, development and conservation of oil and gas resources*
- Foster a fair economic return to the general public for those resources*
- Maintain sound, regulatory oversight to ensure environmentally acceptable activities*

1.0 Introduction

This guidance document addresses making a determination of mechanical integrity through the use of a Standard Annulus Pressure Test (SAPT).

2.0 Mechanical Integrity

The Underground Injection Control (UIC) regulations require that a Class II injection well have mechanical integrity at all times (R649-5-5). A well has mechanical integrity if:

- There is no leak in the tubing, casing, or packer and
- There is no fluid movement into an underground source of drinking water (USDW) through vertical channels adjacent to the injection wellbore.

3.0 Mechanical Integrity Test

Mechanical Integrity Test (MIT) must be conducted and passed at least once every five years for Class II injection wells in the State of Utah. If for any reason the tubing/packer assembly is released, pulled, modified, or if changes are made to the wellhead hanger assembly, Class II injection wells are required to pass another MIT of the tubing, casing, and packer prior to recommencing injection, regardless of when the last test was conducted. MIT's conducted by operators in the absence of Division of Oil, Gas and Mining Staff (Division) must be conducted according to these procedures. Following a MIT a detailed report of test results shall be provided to the Division for review and approval. A pressure recording chart documenting the actual SAPT should be included in the report.



4.0 Standard Annulus Pressure Test

Although there are several methods allowed for determining mechanical integrity, the principal method involves running a pressure test of the tubing/casing annulus, a SAPT. This guidance functions to inform operators of Class II injection wells of procedures required for a SAPT.

4.1 Test Frequency

Mechanical integrity of an injection well must be maintained at all times. An MIT is required at least once every five (5) years. If for any reason the tubing/packer is pulled, the injection well is required to pass a new SAPT prior to recommencing injection regardless of when the last test was conducted. The Division must be notified of workovers, wellhead modifications

or loss of integrity. Notification should include a proposed plan of action and anticipated date of SAPT.

Provided an injection well passes a SAPT, and documentation is adequate, the five (5) year MIT cycle will start from the date of the passing test. MIT's, including SAPT, may be required on a more frequent basis, depending on conditions of permit approval, construction or condition of well bore, and nature of the injectate.

4.2 Test Pressure

To assure casing is subjected to pressure similar to what would be applied if the tubing or packer fails, the tubing/casing annulus should be tested at a pressure equal to maximum allowed injection pressure or 1000 psi, whichever is less. No test pressure shall be less than 300 psi. The annular test pressure must have a difference of at least 200 psi, either greater or less than the injection tubing pressure.

4.3 Test Criteria

- The duration of the pressure test is 15-30 minutes, as determined by Division Staff. In the absence of Division Staff the duration of test shall be 30 minutes.
- Both the annulus and tubing pressures should be monitored and recorded in five (5) minute increments.
- Pressure must remain stable for a minimum of 15 minutes. If there is consistent pressure change the well has failed to demonstrate mechanical integrity, and should be shut-in until it is repaired or plugged
- A consistent pressure change during the test shall constitute a failure to demonstrate mechanical integrity regardless of the percentage of original test pressure lost.



4.4 Recordkeeping and Reporting

The test results must be submitted through e-Permit using a Form 9, Sundry Notice. Tests conducted in the absence of a Division inspector must follow these procedures.

- Test pressures should be recorded at five (5) minute intervals
- A pressure recording chart documenting the actual annulus test pressures must be submitted
- Tubing pressure at the beginning and end of test must be recorded
- Volume of the fluid used to pressure up casing/tubing annulus should be recorded.

- Volume of fluid bled back should be recorded.

4.5 Procedures for SAPT

- Scheduling SAPT should be done with a Division inspector at least two (2) weeks in advance. Such advance notice may not be practical in the case of a workover or repairs.
- The pressure gauges used to monitor injection tubing pressure and tubing/casing annulus pressure should have a pressure range which will allow the test pressure to be near the mid-range of the gauge. Gauge must be of sufficient accuracy and scale to allow an accurate reading.
- Ideally, all Class II Salt Water Disposal (SWD) wells should be shut-in prior to the test. A 12 to 24-hour shut-in is preferable in order to assure temperature of fluid in the wellbore is stable. This shut-in period may not be practical in all cases.
- Class II enhanced recovery wells may be operating during test, but it is recommended the well be shut-in.
- Fill casing/tubing annulus and record volume to fill tubing/casing annulus.
- Read tubing pressure and record.
- Maximum authorized injection pressure should be used to determine test pressures.
- Read pressure on casing/tubing annulus and record value. If there is pressure on the annulus, it should be bled off prior to test.
- Connect casing/tubing annulus to pressure source and apply pressure until SAPT value is reached
- Isolate pressure source from tubing/casing annulus and start timing test.
- Once test pressure has been reached and well has been isolated, tubing casing annulus pressure should be recorded. Test pressure is required to remain stable for a minimum of 15 minutes (30 minutes if test is conducted in the absence of Division Staff). Tubing and annulus pressures should be recorded every five (5) minutes. During this time pressure should be stable and constant. If pressure is lost due to temperature or a gas bubble, the test may be restarted. The annulus may be pressured back up to required pressure and time will be reset.
- At the end of test, record the final tubing pressure. Acceptable test results must display a stabilization of pressure for no less than 15 minutes. Consistent change of pressure over the duration of an SAPT shall constitute unacceptable test results, regardless of the percent of the initial test pressure lost.
- If results are unacceptable, check valves, bull plugs, and well head closely for possible leaks and retest well.
- If second test indicates well lacks mechanical integrity, The Division should be informed of failure by the operator within 24 hours. A follow-up letter should be prepared by the operator, outlining expected cause of SAPT failure and

proposing a course of action. This report should be submitted to the Division within five days following a test failure.

- Volume of fluid bled back should be recorded.

5.0 Procedures for Class II UIC wells with Unacceptable SAPT Results

Wells with unacceptable SAPT results shall be shut-in and either repaired and subsequently retested, or plugged and abandoned, as follows:

5.1 Underground Source of Drinking Water (USDW)

- Any well which poses an imminent threat to an Underground Source of Drinking Water (USDW) shall be repaired or plugged and abandoned immediately following an unacceptable SAPT result.
- Any well which potentially threatens a USDW shall be either repaired or plugged and abandoned within 30 days following an unacceptable SAPT result.

5.2 Casing Leak

- Any well with an unacceptable SAPT result due to known casing leaks should be repaired or plugged and abandoned within 90 days following the test result. A plan of action shall be prepared by the operator and presented to the Division for review within 30 days following failed test.

5.3 Failed SAPT

- All wells with unacceptable SAPT results, regardless of reason for failure, shall be either repaired or plugged and abandoned within 180 days. A plan of action shall be prepared by the operator and presented to the Division for review within 30 days following the failed test.



References

Horsley Witten Group, June 2011: Final Report California Class II Underground Injection Control Program Review

State of Colorado Oil & Gas Conservation Commission, September 9, 2013: Practices and Procedures Mechanical Integrity Test

US EPA Region 8, September 27, 1995: Ground Water Section Guidance No. 39