**R644. Natural Resources, Oil, Gas and Mining; Carbon Sequestration.**

**R644-13. Testing and Monitoring.**

**R644-13-1. Testing and Monitoring Requirements.**

(1) The operator of a Class VI well shall prepare, maintain, and comply with a testing and monitoring plan to verify that the geologic sequestration project is operating as permitted and is not endangering USDWs. The requirement to maintain and implement an approved plan is directly enforceable regardless of whether the requirement is a condition of the permit. The testing and monitoring plan shall be included with the permit application and shall include a description of how the operator will meet these requirements, including accessing sites for any necessary monitoring and testing during the life of the project. Testing and monitoring associated with geologic sequestration projects shall include, at a minimum:

(a) analysis of the carbon dioxide stream with sufficient frequency to yield data representative of its chemical and physical characteristics;

(b) installation and use of continuous recording devices to monitor injection pressure, rate, and volume; the pressure on the tubing-casing annulus; and the annulus fluid volume added. Continuous monitoring is not required during well workovers;

(c) corrosion monitoring of the well materials for loss of mass, thickness, cracking, pitting, and other signs of corrosion, that shall be performed on a quarterly basis to ensure that the well components meet the minimum standards for material strength and performance set forth in Subsection R644-9-1(5), by:

(i) analyzing coupons of the well construction materials placed in contact with the carbon dioxide stream;

(ii) routing the carbon dioxide stream through a loop constructed with the material used in the well and inspecting the materials in the loop; or

(iii) using an alternative method approved by the division;

(d) periodic monitoring of the groundwater quality and geochemical changes above each confining zone that may be a result of carbon dioxide movement through the confining zone or additional identified zones including:

(i) the location and number of monitoring wells based on specific information about the geologic sequestration project, including injection rate and volume, geology, the presence of artificial penetrations, and other factors; and

(ii) the monitoring frequency and spatial distribution of monitoring wells based on baseline geochemical data that has been collected under Subsection R644-4-3(1)(n) and on any modeling results in the area of review evaluation required by Subsection R644-8-2(3).

(e) a demonstration of mechanical integrity pursuant to Subsection R644-14-1(3) at least once every 12 months until the injection well is permanently plugged and abandoned and, if required by the division, a casing inspection log pursuant to Subsection R644-14-1(4) at a frequency established in the testing and monitoring plan;

(f) a pressure fall-off test at least once every five years unless more frequent testing is required by the division based on site-specific information;

(g) testing and monitoring to track the extent of the carbon dioxide plume and the presence or absence of elevated pressure, by using:

(i) direct methods in each injection zone; and

(ii) indirect methods, such as seismic, electrical, gravity, or electromagnetic surveys or down-hole carbon dioxide detection tools, unless the division determines that such methods are not appropriate, based on site-specific geology;

(h) the division may require surface air monitoring and soil gas monitoring to detect movement of carbon dioxide that could endanger a USDW;

(i) design of Class VI surface air monitoring and soil gas monitoring shall be based on potential risks to USDWs within the area of review;

(ii) the monitoring frequency and spatial distribution of surface air monitoring and soil gas monitoring shall be decided using baseline data, and the monitoring plan shall describe how the proposed monitoring will yield useful information on the area of review delineation and compliance with standards under Section R644-2-3;

(iii) if an operator demonstrates that monitoring employed under 40 CFR 98.440 to 98.449 accomplishes the goals of Subsections (h)(i) and (h)(ii), and meets the requirements pursuant to Subsection R644-15-1(b)(iv), a regulatory agency that requires surface air or soil, or both, gas monitoring shall approve the use of monitoring employed under 40 CFR 98.440 to 98.449. Compliance with 40 CFR 98.440 to 98.449 pursuant to this provision is considered a condition of the CO2 Sequestration facility and Class VI permits;

(i) any additional monitoring, as required by the division, necessary to support, upgrade, and improve computational modeling of the area of review evaluation required under Subsection R644-8-2(3)(a) and as necessary to demonstrate that there is no movement of fluid containing any contaminant into USDWs in exceedance of any primary drinking water regulation under 40 CFR 144.12;

(j) the operator shall periodically review the testing and monitoring plan to incorporate monitoring data collected under this rule, operational data collected under Rule R644-11, and the most recent area of review reevaluation performed under Subsection R644-8-3(2). In no case shall the operator review the testing and monitoring plan less often than once every five years. Based on this review, the operator shall submit an amended testing and monitoring plan or demonstrate to the division that no amendment to the testing and monitoring plan is needed. Any amendments to the testing and monitoring plan shall be approved by the division, shall be incorporated into the permit, and are subject to the permit modification requirements in Rule R644-7, as appropriate. Amended plans or demonstrations shall be submitted to the division as follows:

(k) within 12 months of an area of review reevaluation;

(i) following any significant changes to the CO2 Sequestration facility, such as the addition of monitoring wells or newly permitted injection wells within the area of review, on a schedule determined by the division; or

(ii) when required by the division.

(l) a quality assurance and surveillance plan for each testing and monitoring requirement.

**R644-13-2. Monitoring and Records.**

(1) Samples and measurements taken for monitoring shall be representative of the monitored activity.

(2) The operator shall retain records of all monitoring information, including the following:

(a) Calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least three years from the date of the sample, measurement, report, or application. This period may be extended by request of the division at any time; and

(b) The nature and composition of each injected fluid until three years after the completion of any plugging and abandonment procedures specified under Rule R644-16. The division may require the operator to deliver the records to the division at the conclusion of the retention period.

(3) Records of monitoring information shall include:

(a) The date, exact place, and time of sampling or measurements;

(b) The individual who performed the sampling or measurements;

(c) The date analyses were performed;

(d) The individual who performed the analyses;

(e) The analytical techniques or methods used; and

(f) The results of such analyses.

(4) Operators of Class VI wells shall retain records as specified in Subsections R644-8-3(4), R644-15-1(4), R644-16-1(5), R644-17-1(6), and R644-17-1(7).

**KEY: oil and gas law**

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