Panola County Groundwater Conservation District
Guidelines for Preparation of Hydrogeologic Reports

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A. Introduction

The purpose of these guidelines is to provide an outline for hydrogeologic report preparation as required in the Panola County Groundwater Conservation District (PCGCD) Rules. Hydrogeologic reports provide water well owners and the PCGCD with vital information needed for groundwater resource management. The information is used by the PCGCD in granting approval to drill, use or transport groundwater, or to modify or increase the capacity of a well, and in the overall management of the groundwater resources in the PCGCD. The guidelines are intended to set standards and requirements for the completion and submission of hydrogeologic reports conducted within the PCGCD jurisdiction. The planning and implementation of hydrogeologic reports should be coordinated with the PCGCD. The PCGCD may exercise discretion in application of the guidelines on an individual and site-specific basis in order to allow a practicable application of the guidelines while ensuring a result yielding the information needed by the PCGCD to manage groundwater resources. The exercise of this discretion by the PCGCD shall not be constructed as limiting the authority of the PCGCD in any other matter. The PCGCD should be notified at least 24 hours in advance of the anticipated conduct of a pumping test conducted as part of the hydrogeologic report performed to meet the requirements of these guidelines. An electronic and paper copy of the results including all pump test data and electronic logs must be provided when the report is submitted to the PCGCD.

B. Hydrogeologic Report Requirements

In accordance with the PCGCD Rule 3.17(a), the following types of applications or registrations must be accompanied by a hydrogeologic report:

(1) an application or registration that requests to operate a well that is equipped to produce 200 gallons per minute or more.

(2) an application or registration that requests to transport groundwater produced within the PCGCD's boundaries to a location of use outside of the PCGCD's boundaries.

(3) an application that requests to modify or increase production capacity of a well if such increase would equip the well to produce 200 gallons per minute or more; or

(4) an application(s) or registration(s) for two or more wells (new or any combination of new and existing) that request:

(i) a combined total production capacity from the wells of 265 gallons per minute or more; and

(ii) approval to drill and produce from wells for the same project or end use and that would be located within a ¼ mile from one another; and

(iii) wells that are pumped into the same impoundment. For the purpose of this subsection, 'impoundment" means a facility or part of a facility which is a natural topographic depression, man-made excavation, or diked area formed primarily of earthen materials (although it may be lined with man-made materials), which is designed to hold an accumulation of water, and which is not an injection well or a corrective action management unit. Example of impoundments are holding, storage, settling and aeration pits, ponds, and lagoons.

The requirement that hydrogeologic reports submitted to the PCGCD meet the standards set forth in these guidelines developed by the PCGCD is contained in the PCGCD Rule 3.17(b). Hydrogeologic reports must be sealed by a Professional Geoscientist (P.G.) or Professional Engineer (P.E.) licensed to practice in the State of Texas.

C. Required Content of Hydrogeologic Reports

The hydrogeologic report content requirements are intended to provide information on the hydrogeologic parameters of the aquifer at the test location, the effect of the projected pumping of groundwater from the intended aquifer on nearby users, the general geologic setting of the test location, the construction of the test and monitor wells, and potential water quality changes that may occur as a result of the projected pumping. Prior to initiating any field activities for the hydrogeological report, a Work Plan, including a description of well locations and pump tests shall be submitted to the PCGCD for pre-approval.

1) **Hydrogeologic Parameters of the Aquifer at the Test Location** – The report shall:

(A) Identify the aquifer being tested and give the aquifer hydrogeologic parameters calculated from the results of well pumping test(s) that includes a minimum of one pump test per well for which a permit or registration is being sought (test well(s)) and other wells (monitor wells) used to measure the effects of pumping the test. The following requirements apply to the aquifer parameters required under this section:

i) Assumed, measured, or calculated aquifer parameters shall include the transmissivity, hydraulic conductivity, and storage coefficient (storativity) values for each test well.

ii) Aquifer parameters calculated using analytical software shall include a discussion of all assumptions used, such as the ratio of vertical to horizontal hydraulic conductivity, anisotropy and the solution method employed.

iii) The pumping test(s) shall consist of a monitoring phase where the static water levels of the test and monitor wells are periodically measured on a regular basis for 24 hours prior to the test, a pumping phase not less than 24 hours and a recovery phase of a period sufficient for a 90% recovery of beginning water levels at the test and monitor well locations or at least a 24-hour period, unless an alternative procedure is found acceptable by the PCGCD. The test well shall be pumped at a rate equal to or greater than the maximum requested permitted rate.

iv) Appropriately screened and constructed existing private wells within ¼ miles of the test location(s) or otherwise acceptable to the PCGCD may be used as monitor wells for the pumping test. All contact with the private well owners should be made through PCGCD unless worked out the PCGCD prior to contact and noted in the work plan.

v) Test wells equipped with a pump of 5 horsepower or less and where no existing private wells are available for use as a monitor well, may conduct single well tests and utilize published assumptive storage coefficient (storativity) values acceptable to the PCGCD.

vi) Electronic copies of all data logger data should be provided in final report along with a printed copy of the data table.

(B) Include a table giving the water level draw down and recovery data from which the aquifer parameters were calculated for each test well. If a data logger is used, an electronic file of the data may be provided in lieu of a table.

(C) Include a depiction giving the water level recovery data from which the aquifer parameters were calculated for each test well.

(D) Include as an attachment a letter from the PCGCD indicating that the test methodology and Work Plan including the proposed monitor well location(s) was found acceptable to the PCGCD prior to the conduct of the test.

(E) Include a discussion of the pumping tests giving details of the significant events of the test, any equipment failures and any contingency measures that may have been employed.

(F) Include a discussion of the conclusions drawn from the analytical results of the calculations of the aquifer parameters at the test location(s) including the effects of any boundary conditions identified during the test(s).

(G) Include a map giving the location and elevation above mean sea level of the test well (or wells), any existing or newly constructed monitor wells and all surrounding wells that exist within a ½ mile radius of the test well (or wells). The map shall include streets, roads, and the bounds of land tracts sufficient to determine the location of the test well (or wells) within the tract of land on which it is located. The map or its accompanying documents must cite the source of all elevation data, and the data source must be approved by the PCGCD.

2) **General Geologic Setting** – The report shall include a discussion of the surface and subsurface geology of the tract of land on which each test well is located and shall specifically reference:

(A) The occurrence of any significant groundwater recharge features such as outcrop of the aquifer, surface water bodies, caves, sinkholes, faults, or other geologic features.

(B) Any effects which the geologic setting may have on groundwater availability.

(C) The occurrence of hydrologic features such as: streams, springs, or seeps within a ½ mile radius of the well or well field for which the permit is requested.

(D) The occurrence within ½ mile radius of the well or well field for which the permit is requested any features that may affect the water quality of the groundwater produced by a test well located on the tract such as potential sources of contamination.

3) **Well Construction** – The report shall include:

(A) A schematic diagram of the construction of the test well(s) and the known details of monitor wells used in the test(s).

(B) The State of Texas Water Well Report (Drillers Log) giving details of the construction of the test well(s) and Drillers Log for the monitor well(s) used in the test as available. A geophysical log shall be provided for the test well. The geophysical log, at a minimum, shall consist of a resistivity or induction curve and a spontaneous potential or gamma-ray curve. On wells cased with PVC, only

induction and gamma-ray logs should be used. All digital log files should be submitted in LAS format as well as printed.

(C) A plan view diagram of the tract(s) of land on which the test well(s) is/are located showing the location of recharge features, geologic features, the current or proposed location system features such as storage tanks and additional water wells, and potential sources of contamination.

4) **Effect of the Projected Pumping on Aquifer Users** – The report shall:

(A) Include a map showing land surface elevation and the static water levels measured in wells previously approved by the PCGCD and completed to produce water from the same source of groundwater to be tested and that are located within a ¼ mile radius of the test well prior to the date of the aquifer test. The specific number of wells to be monitored may be dependent on the number of wells completed to produce water from the same source of groundwater as the test well that may exist within ¼ miles radius and the granting of access to the wells by the well owner.

(B) A table identifying the wells and giving the land surface elevation, the date and static water levels measured prior to the aquifer pumping test. The map or its accompanying documents must cite the source of all elevation data, and the data source must be approved by the PCGCD.

(C) A projection of the draw down contoured in feet at each test well location and the radius of influence that would result from the anticipated daily rate of pumping (at maximum rate) from each test well after one month (30 days) and after one year (365 days). The radius of influence for this purpose is defined as the distance at which the draw down from the projected pumping is estimated to be equal to or greater than one (1) foot. The projection must also include:

i) A discussion of the specific projection methodology, if analytical software was used, the assumptions and/or solution method employed.

ii) A depiction illustrating the projected cone of depression projected to result from the anticipated operation of the complete well system after one month and one year, at the maximum pumping rate.

iii) A map showing the location of each test well and all wells with a ¼ mile radius and the projected radius of influence after one month (30 days) and one year (365 days) of anticipated operation of the complete well system.

iv) A discussion on the amount (or degree) of interference that each of the system wells may exert on other system wells.

v) A discussion of the potential effect of the projected use of the production or test well(s) on other users of the aquifer within a 3,000-foot radius stating the extent to which other users will be affected by the projected use of the well. If any pre-existing wells within the radius of influence are projected to lose access to groundwater due to pumping of the test or production wells, the PCGCD should be notified immediately to determine the next course of action. The amount of water to be used could be adjusted by the PCGCD based on the effect on other water wells.

(C) If any pre-existing well within the radius of influence are projected to lose access to groundwater due to pumping, please provide an action plan to suggest possible solutions.

5) **Water Quality Changes Resulting from Use** – The report shall:

(A) Include a table and time-series graph of specific conductance, temperature and pH measurements taken at hourly intervals during the pumping phase of each test giving the measured value and time of the measurement. Indicate whether the meter used for specific conductance measurements was temperature compensating.

(B) Include the laboratory analysis of a water sample taken at the end of the 24-hour pump test and at the end of use or every 90 days if continuous use, whichever comes first, for one year unless tests reveal damaging quality changes as determined by the PCGCD. The laboratory analysis shall include, at a minimum, tests for nitrate as N, calcium, chloride, copper, fluoride, iron, magnesium, potassium, sodium, sulfate, total alkalinity, total dissolved solids (TDS), total hardness, arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, and zinc.

(C) A discussion of the water quality analysis from each test well stating whether the sample was of a quality to meet Texas Commission on Environmental Quality Primary Drinking Water Standards.