

# Options for Measuring Extraction Volumes

## BACKGROUND

The Sustainable Groundwater Management Act (SGMA) requires extractors in unmanaged areas or probationary basins to file groundwater extraction reports with the State Water Resources Control Board (State Water Board). Extraction reports must include monthly extraction volumes for the preceding water year. SGMA requires that extraction volumes be measured by a device or method satisfactory to the State Water Board.<sup>1</sup>

This document provides options for measuring extraction volumes. The first section describes measurement methods. The second section is currently under development and will include examples and resources. For details on report requirements, unmanaged areas, and probationary basins, download the [State Intervention fact sheet](https://www.waterboards.ca.gov/water_issues/programs/sgma/docs/sgma/sgma_probation.pdf) ([https://www.waterboards.ca.gov/water\\_issues/programs/sgma/docs/sgma/sgma\\_probation.pdf](https://www.waterboards.ca.gov/water_issues/programs/sgma/docs/sgma/sgma_probation.pdf)).

## OPTIONS FOR MEASURING EXTRACTION VOLUMES

The State Water Board has identified two approaches that have reasonable accuracy for measuring extraction volumes. Other possible approaches are discussed on the next page.

- 1) **Totalizing flowmeter.** A totalizing flowmeter is permanently attached to the well and tracks the cumulative volume of water extracted from a well, similar to the odometer in a car.
- 2) **Run time method.** For wells without a totalizing flowmeter, extraction volumes may be estimated with the following equation:

$$\text{Extraction volume} = \text{Run time} \times \text{Flow rate}$$

**Run time** is the amount of time the well pump is on.

**Flow rate** is the amount of water produced by the well over a period of time, such as gallons per minute (GPM) or cubic feet per second (CFS).

The State Water Board has identified two ways to determine the **run time** of a pump:

- **Hour meter.** An hour meter (also known as a pump run time meter) is permanently attached to the pump motor and tracks the cumulative amount of time the pump is running, similar to a car's odometer.

- **Manual record.** For wells that are not equipped with an hour meter, the extractor can keep a written record of the time the pump switched on and off.

The State Water Board has identified three ways to determine the **flow rate** of a well:

- **Flowmeter.** A flowmeter can track the flow rate of a well, similar to car's speedometer.
- **Pump efficiency test.** A pump efficiency test measures various aspects of a pump's operation, including flow rate. Pump tests may be available from pump dealers, public utilities, or independent companies. Often, a pump test is conducted when the pump is first installed.
- **Pump curve.** If a flowmeter is not installed and recent pump test data are not available, flow rate can be estimated with a pump curve from the manufacturer and the pump lift of the well.

Because a well's flow rate can fluctuate throughout the water year, the State Water Board recommends that extractors measure flow rate periodically and use the most representative flow rate value for each month when estimating monthly extraction volumes.

## **OTHER APPROACHES**

There may be other approaches for measuring or estimating extraction volumes. If an extractor chooses to use a different approach, the device or method must be satisfactory to the State Water Board pursuant to Water Code Section 5202(e). The State Water Board will evaluate each approach on a case-by-case basis.

When selecting an approach, extractors need to ensure the approach is measuring or estimating the actual volume of water extracted from the well. This includes water losses, such as deep percolation, offsite surface runoff, conveyance leakage between the well and the place of use, etc.

For example, the Board did not identify remote sensing techniques as methods to measure extraction volumes, because remote sensing typically estimates the volume of water consumed by the plant (also known as evapotranspiration or ET). ET estimates often cannot be used to infer total extractions unless significant additional information relating to agricultural practices and field conditions is provided

Extractors also need to consider the accuracy of the chosen approach, because approaches with low accuracy may not be acceptable.

For example, the Board did not identify power consumption techniques as methods to measure extraction volumes, because applying average pump efficiency and energy consumption values to individual pumps typically produces inaccurate estimates of the volume of water extracted from the well.<sup>2</sup>

It is the responsibility of the extractor to provide adequate explanation and documentation of the chosen approach in the groundwater extraction report and maintain adequate measurement records. Inadequate explanations, documentation and/or records may not be acceptable to the State Water Board.

## **CONTACT US**

For more information or if you have questions, please contact the State Water Board's Groundwater Management Program

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<sup>1</sup> Water Code Section 5202 et. seq.

<sup>2</sup> Burt, C.M. 2017. Using Electricity Consumption to Estimate Water Volumes Pumped from Wells. ITRC Paper No. P 17-001. Prepared for the Department of Water Resources Office of Water Conservation. [Reference website \(http://www.itrc.org/papers/pdf/wellrecords.pdf\)](http://www.itrc.org/papers/pdf/wellrecords.pdf).

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