Attachment C

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MONTEREY COUNTY
DEPARTMENT OF HEALTH Ray Bullick, Director
ANIMAL SERVICES
BEHAVIORAL HEALTH
CLINIC SERVICES
EMERGENCY MEDICAL SERVICES
ENVIRONMENTAL HEALTH
PUBLIC HEALTH
PUBLIC ADMINISTRATOR/PUBLIC GUARDIAN

Source Capacity Testing Procedures

Purpose

All wells that are proposed to supply water for domestic use or to be connected to a water distribution system shall first undergo a continuous source-capacity (pumping) test to determine the yield of the well. These testing procedures outline the requirements for conducting a source capacity test and are based on the recently revised Water Works Standards in Chapter 15 of Title 22 of the California Code of Regulations, which may be downloaded at:
http://www.cdph.ca.gov/services/DPOPP/regs/Pages/R-14-03-RevisionofWaterworksStandards.aspx

Definitions

Alluvial: Pertaining to or composed of alluvium or deposited by a stream or running water.

Alluvium: A general term for clay, silt, sand, gravel, or similar unconsolidated material deposited during comparatively recent geologic time by a stream or other body of running water as a sorted or semisorted sediment in the bed of the stream or on its floodplain or delta, or as a cone or fan at the base of a mountain slope.

Non-alluvial: A general term for consolidated or bedrock material.

Source Capacity Test: A test that is conducted to determine aquifer or well characteristics.

Static water level: The level of water in a well that is not being affected by withdrawal of groundwater.

Steady State: Steady-state is indicated if the last four hours of drawdown measurements and the elapsed time yield a straight line in a plot of drawdown data (vertical axis) versus the time data (horizontal axis) on semi-logarithmic graph paper.

Well yield: The volume of water discharged from a well in gallons per minute or cubic meters per day.

Conditions

Tests for non-alluvial wells and alluvial wells in areas of known water shortage problems shall be conducted during the months of August, September, or October and shall start on a Monday or Tuesday between 9 a.m. and 2 p.m. If it is proposed to pump multiple wells at the same time, an application must be completed for each well.

Source capacity testing for wells located within the Monterey Peninsula Water Management District (MPWMD) shall also follow MPWMD's testing protocol, which may have more rigorous testing and review procedures. Some of the additional requirements include taking additional water level/flow rate reading during the test. For larger projects, such as subdivisions, a premeeting with MPWMD staff is advisable. Please refer to the MPWMD website "Wells Page" for information on well registration, metering and obtaining a Water Distribution System permit, including well testing procedures, at:
http://www.mpwmd.dst.ca.us/pae/wds/wds.htm

Source capacity testing for wells that will serve a noncommunity or community public water system must adhere to additional requirements detailed in the Application for Source Capacity Test

All tests shall be witnessed by a representative of the Monterey County Health Department, Environmental Health Bureau (EHB) and shall follow the procedures set forth herein. A qualified individual approved by the Director of Environmental Health (hydrogeologist, engineer with experience in hydrology, experienced licensed well or pump contractor (C-57 or C-61), etc.) shall complete the test(s) and documentation. The test results shall be submitted in a form for direct comparison to the criteria set forth in this procedure. Once the information is submitted, a determination shall be made as to the yield of the well in gallons-per-minute that can be credited towards the required minimum flows for the potable use requested.

Requests for variances from the following procedures shall be submitted to EHB for review in advance of the test start date. All tests shall adhere to these procedures unless the variance is approved.

Procedure

1. Test set-up
    A. Complete the application form for scheduling a source capacity test and return to EHD. The test will not be scheduled without a completed application form, supporting documents and payment of 4 hours of time at EHB's current hourly rate for test witnessing fees. Time spent in addition to 4 hours will be billed at the completion of the test.

    B. Well shall be equipped with a meter that measures instantaneous and total flow. Tests conducted on wells that produce less than 10 gpm shall be equipped with a meter with 1 gpm increments.

    C. Discharge water shall be managed to prevent recharge of the well during the testing/recovery period and shall not be allowed to pond/percolate within 200 feet of the well.

    D. If multiple proposed production wells for the same water system are located within:
        i. 500 feet of each other in a non-alluvial formation, the wells shall be pumped simultaneously in order to receive source capacity credit for all wells.
        ii. 300 feet of each other in an alluvial formation, the wells shall be pumped simultaneously in order to receive source capacity credit for all wells.

    E. If there is a nearby well within 1000 feet in on the same or neighboring parcel, the well should be monitored for drawdown as the source well is tested.

    F. Well shall be equipped with a sounding tube.

    G. The sounding line shall be clearly marked with a minimum of 10-foot intervals. The sounding line will be checked before it's lowered into the well to verify starting measurement.

    H. For the purpose of obtaining an accurate static water level value, at least twelve hours before beginning the test, pump the well at the proposed pump discharge rate for no more than two hours, then discontinue pumping:

2. Length of test
    A. Non-alluvial formations - pumping shall be a minimum of 72 hours with a recovery period equal to the length of time of pumping.

    B. Alluvial Formation – pumping shall be a minimum of 8 hours with a recovery period equal to the pumping length. Consult with EHB staff prior to initiating the test to determine if the length of time for the test needs to be increased due to site specific factors including: distance to bedrock, known problems in the area, large fluctuating groundwater levels, drought conditions, etc.

3. Measurements Required (record each reading). Minor adjustments to flow rate may only be made during the first 24 hours of the pump test. After 24 hours, the flow rate shall remain constant.
    A. The meter's accuracy shall be verified by the bucket test within the first hour of the test. To conduct the bucket test, determine the time it takes to fill a 5 gallon bucket and convert to gallons per minute by dividing 300 by the number of seconds it takes to fill the bucket. The results shall be compared to the meter readings to determine if a correction factor is needed.
    B. If a continuous data logger that records water level is used, water depth measurements must be able to be read in the field. This can be accomplished by:
        i. Providing a computer that displays the readings from the data logger
        ii. Using a separate sounder

    C. Before pumping begins
        i. Record Static Water Level
        ii. Record totalizer on meter
        iii. Record pump size

    D. During pumping, record time, water level, gpm, and total gallons with every measurement at the intervals listed below. Plot the drawdown data versus the time data on semi-logarithmic graph paper, with the time intervals on the horizontal logarithm axis and the drawdown data on the vertical axis
        i. Alluvial test (minimum of 8 hours)
            a. 0-120 minutes – measure every 15 minutes
            b. 120 minutes until end of test– measure every hour-(well must have achieved steady-state in order to end test and receive credit. Steady state is indicated if the last four hours of drawdown measurements and the elapsed time yield a straight line in the plot. If steady state is not achieved, the test shall be continued for a longer period of time or adjusted until steady-state is achieved. If the pumping rate is adjusted, the test must be run for at least 8 hours at the new pumping rate)
        ii. Non-Alluvial - 72 hour test
            a. 0-240 minutes – measure every 30 minutes
            b. 240-480 minutes – measure every 60 minutes
            c. 480 minutes until end of test– measure every 4 hours thereafter until water drawdown level is constant for at least the last four remaining measurements
        iii. Non-Alluvial - 10 day test
            a. 0-240 minutes – measure every 30 minutes
            b. 240-480 minutes – measure every 60 minutes
            c. Every 8 hours for the remainder of the first four days
            d. Every 24 hours for the next five days
            e. Every 4 hours thereafter until the water drawdown level is constant for at least the last four remaining measurements

    E. Recovery - The well must demonstrate that, within a length of time not exceeding the duration of the pumping time of the pump test, the water level has recovered to within two feet of the static water level measured at the beginning of the well capacity test or to a minimum of ninety-five percent of the total drawdown measured during the test, whichever is more stringent. (Record time and water level with every measurement).

        i. Alluvial test

a. 0-120 minutes – measure every 15 minutes
b. After 120 minutes, measure every hour until either the water level in the well recovers to within two feet of the static water level measured at the beginning of the well capacity test or to at least ninety-five percent of the total drawdown measured during the test, which ever occurs first.

ii. 72 hour or 10 day test
a. 0-240 minutes – measure every 30 minutes
b. 240 -480 minutes – measure every 60 minutes
c. After 480 minutes, measure every 12 hours until either the water level in the well recovers to within two feet of the static water level measured at the beginning of the well capacity test or to at least ninety-five percent of the total drawdown measured during the test, which ever occurs first.

4. Reporting requirements – After the test is complete, submit a report to EHB for review and approval. At a minimum, the report shall:
   A. Include all data and observations associated with a well capacity test conducted as well as the estimated capacity determination methods and calculations. The data shall be submitted in an electronic spreadsheet format. A copy of the data logger results shall be included, if applicable.

   B. Plot the drawdown and pump discharge rate data versus time data on semi-logarithmic graph paper, with the time intervals on the horizontal logarithmic axis and the drawdown and pump discharge rate data on the vertical axis. (Graphing program should be used to plot data.)

5. After evaluation of the results, EHD may require further interpretation from a third party hydrogelogist.

Source Capacity Credit

1. The credited source capacity (approved well yield) will be based on the lowest flow measurement of the following: starting, ending, lowest recorded flow after 24 hours of pumping, and average. The credited source capacity will be based on actual flow measurements and not calculated yield.

2. 25/50% Policy - Wells produced from non-alluvial formations may be credited as follows for public water systems (a public water system has 15 or more service connections or regularly serves at least 25 individuals daily at least 60 days out of the year):

   A. 72-hours of pumping receives 25% credit of the approved well yield.

   B. 10-days of pumping receives 50% credit of the approved well yield

3. The well must demonstrate that, within a length of time not exceeding the duration of the pumping time of the pump test, the water level has recovered to within two feet of the static water level measured at the beginning of the well capacity test or to a minimum of ninety-five percent of the total drawdown measured during the test, whichever is more stringent. If the well recovery does not meet these criteria, the well capacity cannot be determined using the proposed pump rate.

The Health Officer may make changes to the above procedures in order to protect the public health due to site specific conditions.

Revised 3/96, 1/02, 5/06, 6/08, 6/09, 9/09, 8/11

Required Source Capacity for New Development

Non-Residential[1]

Provide engineered calculations using similar size/type system or water demand charts.

Residential[2]

Type of System	Capacity Needed[1]
Private Well (unshared)	3 gpm
2 connections	6 gpm
3 connections	9 gpm
4 connections	12 gpm

	Alluvial	Non-Alluvial
5 connections	13 gpm	15 gpm
6 connections	13 gpm	18 gpm
7 connections	13 gpm	21 gpm
8 connections	13 gpm	24 gpm
9 connections	13 gpm	27 gpm
10 connections	14 gpm	30 gpm
11 connections	14 gpm	33 gpm
12 connections	14 gpm	36 gpm
13 connections	14 gpm	39 gpm
14 connections	14 gpm	42 gpm
≥15 connections (metered)	1 gpm/conn[2]	1 gpm/conn[2,3]

[1]The minimum required source capacity calculations must include the 25/50% policy for all Public Water System utilizing a well in a non-alluvial formation. For example, a business with a non-alluvial well that needs 10 gpm must have a well that is credited to produce 40 gpm.

[2]The minimum required source capacity for ≥15 connections is 1 gpm/connection unless existing usage data is available and calculations are done according to Section 64554 of Title 22 of the California Code of Regulations (see requirements on next page).

[3]The 25/50% credit policy does **not** apply to wells in non-alluvial formation that will serve 1-14 residential connections since the minimum capacity already addresses the concern that many non-alluvial wells lose production over time. The 25/50% credit policy **does** apply to wells in non-alluvial formation that will serve 15 or more residential connections. The 1 gpm/residential connection is the amount required all the approved well yield has been appropriately reduced for non-alluvial wells.

Additional Requirements (based on Chapters 15 and 19 of the Monterey County Code and Title 22 of the California Code of Regulations)

- New community water systems (serves 15 or more residences) are required to have two sources of supply.
- New community water systems are required to meet maximum day demand with the highest producing source offline
- All water systems with treatment are required to size the treatment facility to produce at least maximum day demand
- All water systems with treatment are required to increase the source capacity to meet maximum day demand after subtracting losses from the treatment facility (i.e., backwash, brine, filter-to-waste)

Section 64554 of Title 22 of the California Code of Regulations for public water systems (15 or more connections).

(a) At all times, a public water system's water source(s) shall have the capacity to meet the system's maximum day demand (MDD). MDD shall be determined pursuant to subsection (b).

(3) Both the MDD (max day demand) and PHD (peak hourly demand) requirements shall be met in the system as a whole and in each individual pressure zone.

(b) A system shall estimate MDD and PHD for the water system as a whole (total source capacity and number of service connections) and for each pressure zone within the system (total water supply available from the water sources and interzonal transfers directly supplying the zone and number of service connections within the zone), as follows:

(1) If daily water usage data are available, identify the day with the highest usage during the past ten years to obtain MDD; determine the average hourly flow during MDD and multiply by a peaking factor of at least 1.5 to obtain the PHD.

(2) If no daily water usage data are available and monthly water usage data are available:

(A) Identify the month with the highest water usage (maximum month) during at least the most recent ten years of operation or, if the system has been operating for less than ten years, during its period of operation;

(B) To calculate average daily usage during maximum month, divide the total water usage during the maximum month by the number of days in that month; and

(C) To calculate the MDD, multiply the average daily usage by a peaking factor that is a minimum of 1.5; and

(D) To calculate the PHD, determine the average hourly flow during MDD and multiply by a peaking factor that is a minimum of 1.5.

(3) If only annual water usage data are available:

(A) Identify the year with the highest water usage during at least the most recent ten years of operation or, if the system has been operating for less than ten years, during its years of operation;

(B) To calculate the average daily use, divide the total annual water usage for the year with the highest use by 365 days; and

(C) To calculate the MDD, multiply the average daily usage by a peaking factor of 2.25.

(D) To calculate the PHD, determine the average hourly flow during MDD and multiply by a peaking factor that is a minimum of 1.5.

(4) If no water usage data are available, utilize records from a system that is similar in size, elevation, climate, demography, residential property size, and metering to determine the average water usage per service connection. From the average water usage per service connection, calculate the average daily demand and follow the steps in paragraph (3) to calculate the MDD and PHD.

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