

**SAN LUIS OBISPO COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT
WATER RESOURCES ADVISORY COMMITTEE**

City/County Library Community Room
995 Palm Street
San Luis Obispo

Wednesday, April 1, 2009
1:30 p.m.

1. **Introductions and Determination of a Quorum**
2. **Approval of March meeting minutes**
3. **Public Comment**
4. **Ongoing Updates:**
 - a. **IRWM**
 - b. **Master Water Plan**
 - c. **Invasive Mussels**
 - d. **Rainfall and Reservoir Update**
5. **Paso Robles Groundwater Basin Resource Capacity Study Update**
6. **Consideration of Forming a Subcommittee to Review the Revisions to the Resource Management System and to Review the Water and Wastewater Impacts of Ag Clusters**
7. **Consideration of Forming a Subcommittee to Review the Draft “Smart Growth” Revisions to the Framework for Planning GPA**
8. **Review Pump Test Requirements**
9. **Future Agenda Items:**
 - a. **Brief Summary of the April 4 Continued Meeting to Come**

--- Adjourn by 3:30 pm ---

Next Regular Meeting: **May 6, 2009 1:30 pm**
 San Luis Obispo City/County Library
 995 Palm Street, San Luis Obispo

Visit Water Resources on the Web at: www.slocountywater.org

Purpose of the Committee:

To advise the County Board of Supervisors concerning all policy decisions relating to the water resources of the SLO County Flood Control & Water Conservation District. To recommend to the Board specific water resource programs. To recommend methods of financing water resource programs.

Excerpts from WRAC By-Laws dated March, 6, 2007

SAN LUIS OBISPO COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT
WATER RESOURCES ADVISORY COMMITTEE

Meeting Minutes
March 4, 2009

Approximately 1:30 pm; Vice Chairperson Sue Luft called the meeting to order.

- 1) Introductions of Members and Attendees – Quorum Established
- 2) Approval of December Meeting Minutes – Item 7 of the February 4, 2009 WRAC meeting minutes was amended by Member O’Grady to read, “does not analyze the future required water treatment plant as required for EIRs” instead of “does not account for future treatment plant capacity.” The February 4, 2009 minutes were then approved as amended upon a first by Member Hyman, second by Member Garfinkel, and a unanimous vote with one abstention.
- 3) Public Comment – (An audio recording of the meeting and materials submitted during public comment are available under the WRAC link at www.slocountywater.org.) Los Osos resident Gwynn Taylor requested that the WRAC review the future of saltwater intrusion in Los Osos. Member Hyman inquired as to whether there was any additional information about a recent sewage spill in the San Luis Obispo area.
- 4) Ongoing Updates:
 - a. IRWM – No updates
 - b. Paso Robles Basin Groundwater Management Plan – The report on the status of the Paso Robles Groundwater Management Plan is included in the agenda packet.
 - c. Master Water Plan - Utilities Division Manager Dean Benedix informed the committee that the County has selected Carrollo Engineers as the consultant to prepare the Master Water Plan. Currently, the District is coordinating with Carrollo Engineers to refine the contract and scope of work. The District anticipates taking the contract to the Board of Supervisors on March 24, 2009.
 - d. Invasive Mussels - Utilities Division Manager Dean Benedix answered numerous questions regarding current and proposed decontamination measures and coordination efforts with Monterey County.
 - e. Rainfall and Reservoir Update - The Rainfall and Reservoir Update is included in the agenda packet.
- 5) Laetitia Ranch Development DEIR-Subcommittee Report – Subcommittee chairman Bill Garfinkel presented the results of the Subcommittee’s study of the Laetitia Ranch Draft EIR. Member Chipping reiterated the subcommittee’s lack of confidence in the 72-hr. pump test for making long-term well supply determinations and suggested the WRAC collaborate with experts to review and comment on the adequacy of current well testing methods for predicting long-term water supply. As suggested by Member Greening, the comments were amended to omit the statement at the top of page 14 of the agenda package regarding the ability of agricultural operations to adjust to

changes in water supply. After a discussion of the purpose and future of the subcommittee's comments, the comments were approved as amended upon a motion by Member Winholtz, a second by Member Greening, and a vote with 12 in favor and 3 opposed. Member Greening requested that an agenda item to examine the adequacy and perhaps recommend revision of the 72-hr pump test be included for next month's meeting. In response to a request from Member Greening, Member Luft added consideration of the RMS and Ag Clusters from a water resources perspective as items for the agenda in April.

- 6) Consideration of the Los Osos Wastewater Project – Public Works Director Paavo Ogren discussed the project status and recommended to continue this item to a future date. Mr. Ogren recommended scheduling a meeting prior to the April 23rd Planning Commission Meeting. Discussion ensues regarding the schedule of the proposed special meeting. Member O'Grady moved to continue this agenda item to a special meeting on April 4, 2009, with a second by Member Garfinkel and a vote with 13 in favor and 2 opposed.
- 7) Future Agenda Items –
 1. Consideration and potential formation of a subcommittee to review the Resource Management System as it pertains to Ag Clusters
 2. Paso Robles Resource Capacity Study
 3. Pump Test Requirements

Meeting adjourned approximately 3:24 pm.

WATER RESOURCES ADVISORY COMMITTEE 2009													
Organization	Representative	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Cambria CSD	Jim Adams	M											
	Robert Reasons	A	X										
	Bob Gresens	Staff		X									
Heritage Ranch CSD	John D'Ornellas	M	X										
	Debbie Fransen	A											
Los Osos CSD	Maria Kelly	M		X	X								
	Marshall Ochylski	A		X	X								
	George Milanese	Staff			X								
	Margret Falkner	Staff	X										
Nipomo CSD	Bruce Buel	M	X	X	*								
	Ed Eby	A	X	X	X								
	Jim Harrison	Staff			X								
Oceano CSD	Kevin Walsh	M		X	X								
	Phil Davis	A											
Templeton CSD	Paul Sorensen	M	X		X								
	Laurie Ion	A											
San Simeon CSD	John Russell	M	X	X	X								
	Charles Grace	A											
San Miguel CSD	Mike Ellison	M	X	X	X								
	Dale Hamblin	A											
City of Arroyo Grande	Chuck Fellows	M											
	Jim Guthrie	A											
City of Atascadero	Steve Kahn	M											
	Russ Thompson	NM*											
City of Grover Beach	David Athey	A											
	Robert Mires	M	X	X	X								
City of Morro Bay	Debbie Peterson	A											
	Betty Winholtz	M	X	X	X								
City of Paso Robles	Dylan Wade	A	X		X								
	Christopher Alakel	M		X									
City of Pismo Beach	Doug Monn	A											
	Iris Prieststaff	Staff											
City of Pismo Beach	Kris Vardas	M											
	Ted Ehrling	NM*		X	X								
	Dennis Delzeit	A											
	Ed Waage	NA*											
City of San Luis Obispo	Dwayne Chisam	Staff	X		X								
	Allen Settle	M											
District 1	Andrew Carter	A											
	Ron Munds	Staff											
District 2	Gary Henderson	Staff	X	X									
	Steve Sinton	M	X	X	X								
District 3	Unappointed	A											
	Bill Garfinkel	M	X	X	X								
District 4	Unappointed	A											
	Marilee Hyman	M	X	X	X								
District 5	Unappointed	A											
	Michael Winn	M	X	X	*								
California Men's Colony	Unappointed	A											
	Dan O'Grady	M	X	X	X								
Camp SLO	Unappointed	A											
	John Kellerman	M	X		X								
Cuesta College	Mike Mintey	A	X										
	John Reid	M	X	X	X								
Atascadero Mutual	Nicole Balliet	A											
	Edralin Maduli	M											
Golden State Water	Terry Reece	A											
	Scott Demello	Staff			X								
Agriculture at Large	John Neil	M											
	Jaime Lien	A	X										
County Farm Bureau	Mark Zimmer	M		X	X								
	Patrick Vowell	A	X	X									
Environmental at Large	Ray Allen	M	X	X	X								
	Mike Broadhurst	A	X	X	X								
Coastal San Luis RCD	Joy Fitzhugh	M		X	X								
	Jackie Crabb	A	X										
	Sue Luft	M	X	X	X								
	Eric Greening	M	X	X	X								
Upper Salinas RCD	David Chipping	A	X	X	X								
	Sue Harvey	A	X	X	X								
Public Works Staff	Linda Chipping	M	X	X	X								
	Kathie Matsuyama	A											
	Tom Mora	M											
Planning Staff	Bill Bianchi	A	X	X									
	Gidi Pullen	Staff											
Parks Staff	Courtney Howard	Staff	X	*	*								
	Paavo Ogren	Staff			X								
	Dean Benedix	Staff	X	X	X								
	Sylas Cranor	Staff	X		X								
	Glen Priddy	Staff											
Env. Health Staff	Mark Hutchinson	Staff											
	John Hollenbeck	Staff											
Ag. Com. Staff	James Caruso	Staff	X	X									
	Brian Pedrotti	Staff		X									
	Don Melin	Staff											
Ag. Com. Staff	Laurie Salo	Staff											
	Leslie Terry	Staff		X	X								
	Megan Lillich	Staff		X	X								
Ag. Com. Staff	Michael Isensee	Staff	X	X	X								

M= Member; A= Alternate; NM=New Member NA= New Alternate 0 = No nomination received as of 03/04/09
 *To be confirmed at a future BOS meeting
 * = Notified of Absence/Conflict

TO: Water Resources Advisory Committee
FROM: Syllas Cranor, SLO County Water Resources Engineer
DATE: April 1, 2009
SUBJECT: Agenda Item #4.c: Invasive Mussel Species

**San Luis Obispo County Regional Invasive Mussel Monitoring Program
 Monthly Summary Report for March 2009**

Monitoring Site Inspections

Reservoir	Agency	No. of sites	Were all sites inspected?	Any confirmed positives?
Lopez Lake	CDFG	1	Yes	No
Lopez Lake	SLO Co. PWD	3	Yes	No
Lopez Terminal	SLO Co. PWD	1	Yes	No
Salinas	CDFG	1	No	---
Salinas	SLO Co. PWD	2	Yes	No
Cayucos	Whale Rock Reservoir	1	Yes	No
Nacimiento	CDFG/Mo. Co. Parks	1	Yes	No
Nacimiento	SLO Co. PWD/OSCA	1	Yes	No
Nacimiento	HRCSD/SLO Co. PWD	1	Yes	No
Nacimiento	Mo. Co. Parks/SLO Co. PWD	1	Yes	No
Nacimiento	Mo. Co. Parks/MCWRA	2	Yes	No
San Antonio	CDFG/Mo. Co. Parks	1	No ⁽¹⁾	---
San Antonio	Mo. Co. Parks	1	Yes	No
Lake Cachuma	SB Co. Parks	10	Yes	No
(1) Substrate missing; will be replaced Information compiled on 3/18/09.				

General notes on monitoring site inspections

1. A site inspection may include inspection of an artificial substrate and/or a surface survey (docks etc). At some sites a fairly extensive inspection is performed, at others it may be more limited.
2. For more information about invasive mussel monitoring at Lake Cachuma contact Liz Mason-Gaspar, Park Naturalist, Santa Barbara County Parks Department, 805-688-4515, lmason@co.santa-barbara.ca.us.

**SUMMARY OF AQUATIC NUISANCE SPECIES BOAT INSPECTIONS
LOPEZ LAKE RECREATION AREA**

Period: February 24 through March 23, 2009

Boats Entering Park	579
Total Inspected	145
Decontaminated	15
Returning tag	445
Rejected	0

Returning Tags: Boats with Lopez Lake or Santa Margarita Lake wire clear tag attached to boat and trailer. These boats have not been removed from trailer since last visit to lake and are not subject to inspection or decontamination.

Rejected boats are not permitted to enter the park and are not counted in the "Boats Entering Park" category.

Reasons for rejection:

Water in bilge/hull	0
Water in live well/bait tank	0
Internal ballast system	0
Debris on boat hull	0
Refused inspection	0

As of 3/24/09 no mussel species have been located on any vessel entering Lopez Lake.

Information compiled directly from boat inspection forms.

Prepared by Don Melin, Supervising Ranger- Lopez Lake Recreation Area
March 24, 2009.

INVASIVE MUSSEL PREVENTION REPORT
Santa Margarita Lake Recreation Area
San Luis Obispo County Parks

Period: February 24 through March 23, 2009

Vessel entry	683
Decontaminations	5
Returning tags	573
Non-caution zone vessels <i>inspected/no decon required</i>	105
Rejected (disallowed entry) <i>Table below for breakdown</i>	2
Cabled at time of exit	620

Reasons for rejection:

Water in bilge/hull/ engine	1
Water in live well/bait tank	1
Internal ballast system	0
Debris on boat hull	0
Refused inspection	0

categories defined

Vessel entry: total vessels entering facility, summation of decontaminations and returning tags.

Decontaminations: +140 degree (F) water application to trailer, tow vehicle rear-end, vessel hull and internal vessel areas as required.

Returning tags: vessels with Santa Margarita Lake, Lopez Lake or Cachuma Lake stamped and sealed wire clear tag attached to vessel and trailer (ensures location of prior use). Not subject to decontamination procedure, only thorough inspection.

Rejected: these vessels are not permitted to enter the park due to unacceptable condition, and are not counted in the "Vessel entry" category.

Cabled at time of exit: stamped and sealed wire clear tag attached to vessel and trailer for re-entry at future date.

As of 3/23/09 no mussel species found at Santa Margarita Lake Inspection Station.
 Prepared by Santa Margarita Lake Recreation Area Staff, March 24, 2009.
 Submitted: to Lisa Wallender & Courtney Howard, 3-24-09 via email.

NOTE: Effective 2/12/09 new inspection/decontamination protocols were implemented at Santa Margarita Lake which do not require each non-tagged/non-caution zone vessel to be decontaminated, only thoroughly inspected.

TO: Water Resources Advisory Committee

FROM: Syllas Cranor, SLO County Water Resources Engineer

DATE: April 1, 2009

SUBJECT: Agenda Item #4.d: Rainfall and Reservoir Update

Region	ALERT Precipitation Station	2007-08 Water Year Annual Total (July '07 - June '08)	2008-09 Water Year Cumulative Total (July '08 - Current)	Average Annual Rainfall (in)	% of Annual Average
Santa Margarita	Santa Margarita (#723)	22.1	13.6	24	57%
San Luis Obispo	SLO Reservoir Gauge (#749)	20.2	11.2	24	47%
Lopez	Lopez Rec. Area (#707)	17.3	10.7	23	47%
Atascadero	Atascadero (#711)	13.2	7.1	17	42%
Cambria	Santa Rosa at Main St. (# 717)	*11.0	9.8	22	45%

* Due to equipment malfunction, not all rainfall was recorded during this water year.
Please note, this table contains provisional data from automated gauges and has not been verified.

Reservoir	Date	Water Elevation (ft)	Spillway Elevation (ft)	Storage (acre-feet)	Capacity (%)
Nacimiento	March 25, 2009 March 25, 2008	748.7 770.1	800.0	146,545 227,718	43% 67%
Lopez	March 24, 2009 March 24, 2008	497.9 508.4	523.0	29,833 37,380	60% 76%
Salinas (Santa Margarita Lake)	March 25, 2009 March 25, 2008	1290.5 1300.8	1300.7	17,120 23,850	72% 100%
Whale Rock	March 24, 2009 March 24, 2008	186.8 198.9	216.0	25,380 31,193	62% 77%
Twitchell	March 23, 2009	530.8	651.5	1,168	0.5%

TO: Water Resources Advisory Committee

FROM: James Caruso, County Department of Planning and Building

DATE: April 1, 2009

SUBJECT: Agenda Item #5: Paso Robles Groundwater Basin Resource Capacity Study Update

Preparation of the second and final phase of the Paso Robles Groundwater Basin Resource Capacity Study (RCS) is underway. This phase of the RCS will:

- Review current water demand by sector,
- Assess the sustainable yield of the basin,
- Evaluate areas of declining storage, and
- Provide recommendations to address identified issues.

The RCS will be based primarily on the information from the 2008 Pumping Report by Todd Engineers. The report was funded jointly by the County Public Works Department and the City of Paso Robles. The report is currently undergoing final review by these agencies. The review resulted in some valuable recommendations and necessary revisions to the report are anticipated. The final Pumping Report should be completed in the next few weeks. The RCS can not be completed until the Pumping Report has been finished.

Preliminary findings of the RCS include:

- The City of Paso Robles will start using Nacimiento water in the near future and their groundwater pumping will start to decrease.
- Collaborative efforts at water conservation should be continued and increased in the agricultural community.
- Actions to reduce future rural water use are consistent with greenhouse gas reductions of AB 32 and with sustainable communities' strategies of SB 375.

Other findings of the RCS will include a continued lowering of groundwater levels in the Estrella sub-area of the basin. While other areas have shown short term lowering of groundwater, this sub-area has been the focus of much of the large drops in groundwater levels. The Estrella sub-area of the basin area will also be the focus of recommendations of the RCS.

The draft RCS will be completed once the Pumping Report is completed. We anticipate presenting the completed RCS and Pumping Update to the WRAC at the May 6, 2009 meeting.

TO: Water Resources Advisory Committee

FROM: Syllas Cranor, SLO County Water Resources Engineer

DATE: April 1, 2009

SUBJECT: Agenda Item #8: Review Pump Test Requirements

A review of recent EIRs for proposed projects in the unincorporated areas of San Luis Obispo County has brought to light the importance of well pump tests to quantify the amount of available groundwater for a project. Some members of the WRAC were concerned that the current pump test requirements are not always adequate and do not guarantee a sustainable supply of water for all projects. Consequently, a review of these requirements was agendaized for the April meeting.

The methodologies used to run pumps tests vary widely across the State. Some jurisdictions endeavor to demonstrate the likely availability of adequate water under current conditions. Others attempt to provide safeguards against extreme future declines in the resource. In a few cases imposed requirements are so stringent that individual property development may become prohibitively expensive or even impossible.

Currently, two County agencies regulate ground-water related requirements for residential development: the Planning and Building, and Environmental Health Departments. When a well pump test is required from the Environmental Health Department, the minimum length pump test required for each well is as follows:

Single Family Residence: Minimum of 4 hours with consistent production, with draw down and recovery data.

Shared Well: Minimum of 12 hours with consistent production, with draw down and recovery data.

Title 19 of The San Luis Obispo County Code (Chapter 19.07.04), requires that a domestic well shall be verified by a minimum four hour pump test with drawdown and recovery data by a licensed and bonded well driller or pump testing company. The pump test shall not be more than five years old.

Lastly, the California Groundwater Association offers a series of technical documents that describe standards for well pumping tests for 1-4 residential connections and for residential property transfers. These materials generally discuss the pumping duration, water level recovery, seasonality, equipment, personnel, and suggested protocols when performing well pump tests. The "Well Yield Pumping Tests for 1-4 Residential Connections" standard (Article 460) is attached for reference.



California Groundwater Association

An NGWA Affiliate State

PO Box 14369 * Santa Rosa * CA 95402

707-578-4408; FAX: 707-546-4906; email: wellguy@groundh2o.org

Article 460-WELL YIELD PUMPING TESTS FOR 1-4 RESIDENTIAL CONNECTIONS

Adopted by the CGA Board of Directors on October 14, 2006

BACKGROUND

As of 2006 approximately 32% of California counties require a pumping test to verify adequate well yield prior to acquiring a building permit for a single residential connection. The remaining counties either allow air lift indicator tests to demonstrate sufficient water or impose no requirements at all.

As rural areas increase in population and demographics change, increasing stress is being placed on groundwater resources in certain areas of the state. In regions identified as being water scarce, additional county governments have begun to write ordinances requiring pumping tests in an effort to protect property owners.

The methodologies used to run these tests vary widely. Some jurisdictions endeavor to demonstrate the likely availability of adequate water under current conditions. Others attempt to provide safeguards against extreme future declines in the resource.

In a few cases imposed requirements are so stringent that individual property development may become prohibitively expensive or even impossible.

Discussion

Climatic changes and the complexity of geologic formations make annual recharge unpredictable which in turn makes it difficult, if not impossible, to reliably forecast long term sustainability of an individual well. Even with extensive hydrogeologic analysis or excessive pumping times there are no absolute guarantees of future water production in a particular well. Arbitrarily stringent testing requirements mostly result only in an increased burden on a property owner without significant benefits in terms of long term reliability.

CGA Standard Practice Series

Pumping tests designed to prove water availability for parcel creation, or to determine a sustainable water source for a community water system, may require extended pumping time and detailed analysis of time-drawdown and time-recovery data. However, for this particular application a practical pumping test is one that will demonstrate that the well will yield a minimum volume of water over a reasonable time sufficient for normal household duty cycles and will provide some information regarding recovery into the borehole.

GENERAL PROTOCOL

Pumping test methodologies for this application can be generally categorized as:

- Total yield within a specified time
- Discharge yield after specified time or after well volume dewatering
- Constant flow rate at a constant pumping level for a specified time
- A combination of these

Additionally, following the end of pumping, recovery to a specified water level may be imposed.

The protocol used may be governed by such aspects as minimum acceptable well yields, minimum thresholds for storage requirements, number of connections, and local aquifer characteristics. The specific testing procedures will be determined by the jurisdiction having authority, must be well defined, and shall be empirical in nature. A specific form to record test results and data should be provided by the authority.

Pumping Time

Pumping duration will be directly related to the test methodology and the time limitations imposed by the jurisdiction having authority. Once borehole storage has been removed characteristics of the well may be established within 8 hours, particularly for those relatively high production residential wells of 5 gpm or more. In the absence of hydrogeologic analysis, which is an unnecessary burden and expense for this application, further pumping usually does not provide significant additional benefit. Data from lower production wells may be more reliable with longer pumping, but even then, continuing much beyond 24 hours generally shows diminishing benefits.

CGA Standard Practice Series

Water Level Recovery

Water level recovery data is often used in aquifer analysis. Following constant discharge and draw down pumping, residual drawdown measurements are used to calculate coefficients of transmissivity. Such analysis is, however, beyond the scope of well yield tests for residential water use. Nevertheless, even in these empirical yield tests recharge should be observed. Some conclusions may be drawn by a return, or non return, of water level to a percentage of the static water level at the beginning of the test. A failure for water level recovery to reach a reasonable level within a reasonable time may indicate the aquifer is a closed system with little or no recharge. However, caution must be exercised when stipulating recovery levels or time limits for those levels to be reached.

When observing water level recovery during aquifer analysis, 90% recovery is a typical benchmark. This percentage has been arrived at primarily by the observation that most wells recover to that level within a reasonable time relative to the pumping duration. However, very reliable wells that drawdown very little during the pumping phase of a test may be affected by abnormal conditions. In areas where the cone of depression is large, or seasonal/regional water level decline is in process, or the pumped well is being impacted by nearby wells, 90% recovery may not occur within anticipated time limits. To address these impacts a higher water level return within longer time limits should be considered, preferably as a subsequent alternative.

While the 90% recovery benchmark may be applicable to residential yield tests, the time allowed for that recovery may exceed the drawdown phase of the test. Regardless of the pumping duration, the volume of water pumped during these limited yield tests will generally exceed water use during a normal 24 hour duty cycle. Therefore 90% recovery within 24 hours or 150% of pumping duration, whichever is longer, is an acceptable target. Should the water level fail to return to within the 90% prescribed level within that time, then the water level should be monitored for one additional week. Then, after one week, the water level should return to within 95% of the starting water level. Failure to return to either of these prescribed levels may indicate the well is inadequate or that further testing may be required.

Because a return to a percentage of the static water level could be a factor in a given well's meeting jurisdictional criteria, thereby passing or failing a prescribed test, determining that static water level prior to test pumping is a critical factor. Static water level is generally defined as the water level in the well when it is not being pumped. However, if the well has been idle for a long period, the measured water

CGA Standard Practice Series

level may not be indicative of the level under normal operation. For example, water in a well under artesian pressure in a confined aquifer may reach its “working” static level and return to 100 feet from the surface in a few hours or even minutes. Sitting idle however, the water level may continue to slowly rise over the next several days, weeks, or months. The level eventually reached should not be considered the “working” static water level during normal operation.

To remove any “false head” and determine the effective static water level for purposes of testing, the well may be pumped for any duration at any time prior to beginning the test but all pumping should cease at least 24 hours prior to beginning the test. Recovery requirements would then be based on the “working water level” established following this pre-pumping.

Seasonality

Particularly with short term pumping durations, adjustments for seasonality may be necessary or at least prudent. Many wells, particularly those that are supplied from upper weathered or fracture zones, may show significant declines during late summer and fall compared to production rates determined during spring or early summer months*.

To address this, acceptable yield may be calculated as a percentage of the pumping yield determined during testing, with the percentage seasonally adjusted.

** Dry season may be defined differently in desert regions*

Equipment

The equipment used for a pumping test will depend on the actual methodology used. All will require a properly calibrated totalizing flow meter to accurately measure discharge rates and cumulative yield. Field calibration of flow meters is acceptable, with accuracy verified through the use of a bucket and stop watch during the test. Generally, water should be discharged far enough away from the well head so that data is not influenced. For the relatively short pumping durations required for these applications, 50 to 100 feet down gradient will normally be sufficient.

CGA Standard Practice Series

Qualified Personnel

By far the majority of California counties require testing under supervision of one of the following California professional licenses:

- C57 well drilling contractor
- C61/D21 pump contractor
- Professional Geologist, Certified Engineering Geologist, or Certified Hydrogeologist
- Professional Civil Engineer with experience in groundwater hydrology

Only properly classified contractors are licensed to install for compensation the pumping equipment necessary for testing, while Professional Geologists or Certified Hydrogeologists are required only if groundwater surveys are performed with attendant data analysis and reports. Each of the disciplines listed above is recognized under California law as being capable of performing pumping tests and gathering the empirical data for this application as defined in this standard.

SUGGESTED PROTOCOLS

The following are typical procedures that are commonly used to demonstrate available water for residential domestic use.

Total Yield

In this procedure a specified total volume must be pumped within a specified time. The volume to be pumped will be based on the minimum well yield as established by the authority having jurisdiction. Data is reliable only if the specified volume is credited after first removing all borehole storage. This is best verified by calculating casing storage, discharging that volume, and then continuing until the prescribed thresholds are reached. Alternatively, required pumping volumes can be large enough to ensure casing storage will have been removed under all situations.

Reliability is further improved if the minimum required well yield is also demonstrated at the end of the test period.

Additional benefits may be realized if minimum recovery is required, as described above.

CGA Standard Practice Series

Minimum Discharge Yield

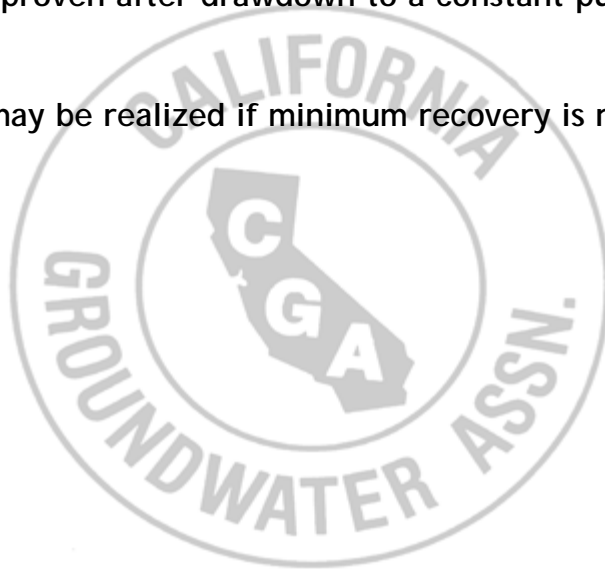
In this procedure the minimum well yield as established by the authority having jurisdiction must be proven after a specified pumping time has passed; or after a specific number of well volumes has been discharged.

Additional benefits may be realized if minimum recovery is required, as described above.

Constant Pumping Level

In this procedure the minimum well yield as established by the authority having jurisdiction must be proven after drawdown to a constant pumping level and for a specified time.

Additional benefits may be realized if minimum recovery is required, as described above.



CGA Standard Practice Series

RECOMMENDATIONS

1. CGA recommends pumping tests as the most reliable method to demonstrate well yield. However, in regions where general water conditions or historical aquifer data allow, a controlled air lift test may be sufficient to describe water availability.
2. Where pumping tests are required by a jurisdiction the specific procedures must be clearly defined by that jurisdiction. Reporting forms shall be provided by the authority.
3. Pumping tests for residential wells should be done under the supervision of one of the following California professional licenses:
 - C57 well drilling contractor
 - C61/D21 pump contractor
 - Professional Geologist, Certified Engineering Geologist, or Certified Hydrogeologist
 - Professional Civil Engineer with experience in groundwater hydrology
4. Where pumping tests are performed a properly calibrated totalizing flow meter, installed as per manufacturer's recommendations, shall be used to record discharge rate from a pumped well.
5. Where water level measurements are required a sounding tube shall be available throughout the total maximum drawdown range of the well. The sounding tube shall be capable of accommodating an electrical sounder, a pressure transducer, or an air tube. If total length of the tube is known, it may serve as the air tube.

Flow rates, total gallons pumped, and water levels (where applicable) shall be recorded at regular intervals.

* * * *

Adopted by the CGA Board of Directors on October 14, 2006

NOTE: This Standard, Article 460 & Standard Article 495 replace existing article 450 - production testing- small capacity wells, adopted in 1992. Any copy of Article 450 should be destroyed, as it is now obsolete.