



Public Health Department

Environmental Health

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MEMORANDUM

DATE: September 13, 2016

TO: Well Drillers Advisory Committee and Stakeholders

FROM: Brad Banner 

RE: Meeting Follow-Up from September 1, 2016

I would like to thank all those who attended our September 1, 2016 Well Drillers Advisory Group meeting. We had state folks from Redding (WDR and CDPH) and industry folks from Oregon, Utah. We had well drillers and pump folks from Yuba and Shasta Counties. **Attachment One** is the sign-in sheet from the meeting.

We started out talking about the history of our local ordinance. In December 2006 the Butte County Board of Supervisors amended our Water Well Ordinance to adopted Bulletin 74-90 (supplementing Bulletin 74-81) as well standards for Butte County. The Board also established a Manual to assist in interpretation of the Bulletins. Here is the wording in our Water Well Ordinance (Butte County Code 23B) that was adopted in December 2006:

23B-5 Well standards.

Standards for the construction, repair, reconstruction, deepening, abandonment and destruction of wells in Butte County shall be as specified within bulletin 74-81 and its supplement bulletin 74-90, Water Well Standards, State of California, except where superseded by state or federal law or modified by resolution of the board of supervisors.

23B-5a Implementation and Local Interpretation of Standards.

The Health Officer shall, within 30 days of the date of adoption of this ordinance, develop a Well Construction Manual for the purpose of documenting interpretations to facilitate and implement adopted standards and to specify local implementation practices. The Manual shall be maintained and made available to the public by Butte County Public Health Department, Environmental Health Division.

After some discussion about the background of our ordinance, the group went into a discussion of a variety of issues of concern to well drillers and associated stakeholders. Issues discussed included:

- Status of Bulletin 74-90 and the need for enough flexibility to address local geological conditions



- Setback distance to watertight septic tanks
- Setback distance to septic leach fields
- Alternatives to the 50 foot annular seal required in Bulletin 74-90 where 100 foot setback cannot be maintained to a potential source of contamination
- Use of 3/8 inch bentonite chips for annular seal depths exceeding 30 feet

After the meeting, it was clear that the best approach for addressing the issues that were discussed is to update our Well Construction Manual that was created for this very purpose. So in order to follow up with the direction recommended by the Well Drillers Advisory Group, I've drafted some changes to the Manual for consideration. The proposed changes include:

- Clarification of the Manual's purpose
- Inclusion of a procedure for the consideration of performance standards
- Change from requirement to recommendation for a concrete slab around the well casing
- Reduction of the setback to watertight septic tanks to be consistent with current and past practice
- Process for considering future performance-based standard in lieu of the prescriptive standards specified in Bulletin 74-90
- Conditions for approval of drilling into consolidated non-fractured hard rock formations in lieu of a 50 foot seal
- Allowance for placement of 3/8 inch bentonite chips by free fall for 50 foot seals in hard rock wells

These changes are shown as tracked-edits in **Attachment Two**.

Please look these changes over and feel free to provide additional feedback. I am running the changes by the Debbie Spangler from DWR who attended the meeting to get her feedback also, because we need to be very cautious that we do not make changes that could have a negative public health impact down the road.

While last week's meeting is still fresh in everyone's mind, please look over the Manual and come to our next Well Drillers Advisory Committee to finalize the changes as needed. The next meeting is scheduled as follows:

Well Drillers Advisory Group
Thursday, October 20, 2016
Tahoe Room, 202 Mira Loma Drive, Oroville
3:00 - 5:00 p.m.



Attachment One



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**Well Drillers Advisory Group
 Sign-In Sheet**

Date: September 1, 2016

Location: Tahoe Rm, 202 Mira Loma Dr., Oroville

Name	Company	Email
Cody Stillwell	North State Drilling	Cody.Stillwell1189@gmail.com
Reed Rankin	Rankin Pump Drilling	
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Klaine McSpadden	BCFH	
Charlotte Dattas	BCFH	
Debbie Spangler	DWR	debbie@water.ca.gov
Paul Gosse	BCDWR	PGOSSELIN@BUTTECOUNTY.AE

Attachment
Two

BUTTE COUNTY WELL CONSTRUCTION MANUAL



MANUAL UPDATED: APRIL 17, 2007
DRAFT EDITS UPDATED: SEPTEMBER 9, 2016

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Purpose and Development of Manual

This manual has been established as required by Butte County Code Chapter 23B Water Wells in order to provide local interpretation and guidance in the application of Bulletins 74-81, its supplement 74-90, and future revisions and supplements. [As stated in the General Introduction of Bulletin 74-90:](#)

[Standards in Bulletin 74-81 and this supplement \(Bulletin 74-90\) do not ensure proper construction or function of any type of well. Proper well design and construction practices require the use of these standards together with accepted industry practices, regulatory requirements, and consideration of site conditions.](#)

Provisions in the manual are developed by the Division in collaboration with the Well Drillers Advisory Group (WDAG).

The WDAG is an informal association of well drillers and other interested engineers and contractors who are involved in the design and construction of domestic water systems in Butte County. The WDAG meets a minimum of twice a year for the purpose of assisting the Division in enforcing Butte County Code Chapter 23B in a manner that maintains and enhances the protection of public health, is user-friendly for both the public and contractors, and addresses the practical conditions encountered in the field by well drillers.

The Division is responsible for establishing meeting agendas, providing needed meeting logistical support, and maintaining meeting records.

~~Requirement of~~ Recommended Use of Concrete Slabs

Regulatory Requirement and Rationale

Bulletin 74-90 Section 10.A. states: "A concrete base or pad, sometimes called a pump block or pump pedestal, shall be constructed at ground surface around the top of the well casing and contact the annular seal... the base shall extend at least two feet laterally in all directions from the outside of the well boring, unless otherwise approved by the enforcing agency...the base shall be a minimum of 4 inches thick."

The purpose of concrete slabs is to protect the well casing from accidental damage and to prevent surface water from ponding over a shrunken bentonite seal and possibly contaminating the aquifer.

Concerns

Reasons have been considered for why concrete slabs may not be desirable. They may cover the ground surface immediately over a shrunken bentonite seal, obscuring the problem and preventing the addition of more bentonite to resolve the problem, while at the same time being ineffective at preventing the intrusion of surface water.

Reasons have also been considered for why concrete slabs should be required as part of the homeowner's building permit and parcel development process rather than ~~at the time of well construction as a condition for final approval and certification of completion of the Water Well Construction Permit~~. Well construction may take place some time before the property owner proceeds with their building project, and therefore occurs before construction contractors begin working the site ~~but also and~~ might thereby interfere with the construction of a future well house.

In addition, well slabs prevent future addition of bentonite to fill the space created by shrunken bentonite, while themselves being subject to erosion that limits their usefulness in preventing the introduction of surface water into the annual space around the well casing.

Analysis

~~The potential benefits outweigh potential concerns about the requirement of well slabs. The Well slabs, though small at approximately 30 inches x 30 inches, potentially provide an adequate degree of protection of the well seal from ponding surface water, erosion of the bentonite, or the disturbance of the bentonite through weathering or vandalism. Although the slabs prevent future addition of bentonite to fill the space created by shrunken bentonite, in practice well drillers seldom return to wells to add bentonite and instead the well seals remain exposed to the weather. The slabs do not prevent the construction of well houses with larger slabs.~~ Delaying slab construction until the property owner constructs the home, could mean that parcels developed with only septic systems and wells could remain in the vacant condition for many months or even years prior to construction of the house.

~~When wells are constructed not as part of an overall building project, they may be expected to be on the parcel for a period of time without a building. These wells in particular need the added protection of a well pad at the time of construction approval. A well that is constructed in conjunction with permits for a building may more legitimately have the installation of their pad delayed until the building is ready for occupancy approval. Well drillers and associated industry representatives, as well as an active member of the public, met on September 1, 2016 in a well-attended meeting of the Well Drillers Advisory Group. This group reached a consensus that the current well slab requirement for Water Well final approval should be replaced by an advisory to the homeowner and no longer be considered a mandate. The group pointed out that well slabs were not requirement in a number of surrounding counties.~~

Conclusion

Based on the information provided, ~~t~~The Division Health Officer will ~~continue to~~ recommend, rather than require, concrete slabs for wells. ~~The Division will continue to specify that slabs extend 18 inches laterally in all directions outside the well boring. To help mitigate concerns that the well slab should not be considered part of the well construction process, the Division's Well Compliance Certificate has been modified to distinguish between well construction activities and the slab construction activity to clarify that slab construction is the property owner's responsibility.~~

Continuous Pour of Concrete Slab with Concrete Seal

Regulatory Requirement and Rationale

Bulletin 74-90 Section 10.A. states: “Where cement-based annular sealing material is used, the concrete base shall be poured before the annular seal has set, unless otherwise approved by the enforcing agency.”

The intent of this requirement is to have a base that is an integral part of the annular seal.

Concerns

Some settling may occur after placement of annular seals, including concrete, cement, and bentonite materials. Cement can have issues with shrinkage.

Analysis

Immediate placement of the cement base will not result in a superior seal and base installation in many cases; it is often preferable to pour the slab after the seal has been placed and set.

Conclusion

The ~~Division~~ [Health Officer](#) will continue to approve the current practice of allowing construction of the cement base subsequent to seal placement [when well slabs are utilized](#).

Use of Bentonite as Annular Seal Material

Use in Vegetated Areas

Regulatory Requirement and Rationale

Bulletin 74-90, Section 9.D.3, states: *“Bentonite clay shall not be used as a sealing material if roots from trees and other deep rooted plants might invade and disrupt the seal, and /or damage the well casing. Roots may grow in an interval containing a bentonite seal depending of surrounding soil conditions and vegetations.”*

Concerns

This requirement is vague and could be misapplied to preclude use of bentonite from any vegetated area that would include the majority of well sites were it is utilized.

Analysis

Well drillers and staff concur that there have been no known problems with roots growing in bentonite at vegetated well sites.

Conclusion

The current practice of allowing the use of bentonite in vegetated areas at the discretion of the well driller will continue.

Use in “Arid Areas”

Regulatory Requirement and Rationale

Bulletin 74-90, Section 9. D.3., states: *“Unamended bentonite clay seals shall not be used where structural strength of the seal is required, or where it will dry. Bentonite seals may have a tendency to dry, shrink, and crack in arid and semi-arid areas of California where subsurface moisture levels can be low....”*

Concerns

This requirement could be interpreted to preclude use of bentonite from use as an annular seal material in much of Butte County.

Analysis

Well drillers and staff concur that there have been no known problems with shrinkage and/or drying of bentonite products designed and marketed for use as annular seal materials, when mixed and placed in accordance with manufacturer’s directions.

Conclusion

The current practice of allowing the use of bentonite products designed and marketed for use as annular seal materials at the discretion of the well driller will continue. Bentonite based seal materials shall be mixed and placed in accordance with manufacturer’s directions, and applicable County standards.

Screened Well Vents

Regulatory Requirement and Rationale

Bulletin 74-81 Section 10.E. states: “Air vents are also (in addition to requiring them for community water systems) recommended for other types of wells except those having jet pump installations requiring positive pressure (which cannot have a vent).”

Bulletin 74-81 Section 10.A. states: “Access openings designed to permit the entrance or egress of air or gas (air or casing vents) shall terminate above the ground and above known flood levels and shall be protected against the entrance of foreign material by installation of down-turned and screened “U” bends.”

Concerns

Members of the Well Drillers Advisory Group strongly recommend screened vents for all wells.

Analysis

Both knowledgeable well drillers and pump installers state that well vents are needed to assure proper pump operation.

Conclusion

~~Environmental health~~ [The Health Officer](#) will require screened pump vents constructed according to the specifications described above.

Well Installation in Areas Subject to Flooding

Regulatory Requirement and Rationale

Butte County Code, Chapter 23B-9c Flood Protection, states:

“Whenever possible, wells shall be located outside of any area subject to flooding. If it is not possible to locate a well outside of a flood area, the well casing shall extend three (3) feet or more above the one hundred (100) year flood elevation. Within “areas of special flood hazard,” as defined in section 26-29 of this Code, for which flood elevations have been established, the casing shall terminate three (3) feet or more above the established one hundred (100) year flood elevation. The health officer may accept an approved watertight “pitless adapter” as a means to provide flood protection for an individual well to serve a single-family residence.”

Concerns

When it is not possible to locate a well outside of a flood area, the code specifies only two alternatives: (1) Extend the well casing at least three feet above the one hundred year flood elevation, or (2) Install an approved watertight “pitless adapter” for single family residences.

Well drillers indicate that both of these alternatives are problematic.

Extending well casings high into the air makes the wells difficult to access and service, and flood maps are not always accurate. On the other hand, pitless adapters are often not watertight.

Analysis

The intent of Chapter 23-Bc is clearly to protect the aquifer from contamination from floodwater. The Chapter attempted to offer an alternative to extended casings for wells that will serve single family residences by allowing pitless adapters. It can be assumed that it was not the intent of the Chapter to exclude other watertight construction features or backflow prevention methodologies that are equal or more effective than watertight pitless adapters.

Conclusion

When is not possible for wells serving single family residences to be drilled outside of areas subject to flooding, the ~~Environmental Health Director~~ [Health Officer](#) may consider approval of other backflow prevention devices and methodologies that provides protection equal to or greater than the “watertight pitless adapter” referenced in the code. Consideration of these methodologies or devices will be based on the ~~following criteria~~ [following considerations](#):

1. Is the proposal based on sound technical and scientific principles?
2. Is the proposal supported by the Department of Water Resources, Department of Health Services, and the Well Drillers Advisory Group?
3. If the proposal is a mechanical backflow prevention device, has there been third-party review by a mechanical engineer?

Future cleanup language for this code section will be proposed in the future.

Reduced Well Setback to Watertight Septic Tank

Regulatory Requirement and Rationale

Bulletin 74-90 Section 8.A. identifies a “watertight septic tank” as a “Potential Pollution or Contamination Source” with a minimum setback of 100 feet. Section 8.A. also states:

“Lesser distances than those listed above may be acceptable where physical conditions preclude compliance with the specified minimum separation distances and where special means of protection are provided. Lesser separation distances must be approved by the enforcing agency on a case-by-case basis.”

Bulletin 74-90 Section 9.2. requires a 50 foot deep annular seal when a 100 foot setback from a potential source of pollution or contamination cannot be maintained.

The reason behind the requirement is that when a 100 foot minimum setback cannot be maintained, a deeper annual seal will mitigate the concern by providing the well with greater protection from pollution originating for a leaky septic tank.

Concerns

There are many small parcels that have been approved in the past that cannot meet a 100 foot setback to the septic tank. Requiring mitigation, such as a 50 foot seal, to allow a reduced setback would add significant cost to construction of the well.

Analysis

In the 25 years since Bulletin 74-90 was written, there has been a consensus among regulators that a 50 foot setback to watertight septic tanks is adequately protective and more appropriate given the majority of parcel configurations. A 50 foot setback to a watertight septic tank applied by surrounding counties.

In addition, local regulations for onsite septic systems, including the regulations adopted in Butte County, require a 50 foot rather than 100 foot setback from wells to watertight septic tanks and a 50 foot setback has been recognized in Butte County for many decades.

Finally, septic tank standards were significantly upgraded for Butte County in 2010, requiring monolithic poured 1,500 gallon tanks and watertight testing after tank installation, greatly minimizing any risk of future tank leakage.

Based on these considerations, after review by staff, and after consultation with the Well Drillers Advisory Group on September 1, 2016, the consensus is that the current practice of requiring a minimum setback of 50 feet to a watertight septic tank is adequately protective of water quality should remain in place.

Conclusion

The minimum setback from a well to a watertight septic tanks will continue to be 50 feet.

Process for Development of Performance Standards

Regulatory Requirement and Rationale

Bulletin 74-90 is a guidance document developed by the Department of Water Resources (WDR) as a supplement to Bulletin 74-81 to serve as “minimum standards” for local enforcement agencies. The bulletin was developed in collaboration with a variety of stakeholders, including the scientific community, regulators, and well drilling professionals. The bulletin continues to provide sound technical guidance needed by local enforcement agencies for implementation of an effective well permitting program and serve as a basis for regulation of well construction across the State of California.

Concerns

Rigid adherence to the requirements of Bulletin 74-90 does not allow limitations inherent to the Bulletin to be addressed.

The General Introduction to Bulletin 74-90 acknowledges that the standards it contains “are not necessarily sufficient for local conditions” and may require local agencies to adopt stricter standards. The General Introduction goes on to state: “In some cases, it may be necessary for a local enforcing agency to substitute alternative measures or standards to provide protection equal to that otherwise afforded by DWR standards.”

Bulletin 74-90 is a 25 year old document that has been described by staff of the authorizing agency (DWR) as being a “guidance” document and a “work in progress” and “currently undergoing revision.” So while it is clear that Bulletin 74-90 is built on sound science and strong technical grounds, a degree of flexibility is needed to allow current industry standards in construction practices and materials to be considered for approval in addition to the specific standards contained in the bulletin.

Analysis

The requirements in Bulletin 74-81 and Bulletin 74-90 are considered prescriptive minimum standards. They are minimum standards because local conditions may require application of more restrictive standards. They are prescriptive standards because they specify requirements that must be followed based on geological conditions and materials used in the well construction process.

Prescriptive requirements are restrictive because they do not allow alternative approaches that may be equally or more effective than the prescriptive requirements in achieving the same desired outcomes. In contrast to prescriptive standards, **performance standards** allow alternative approaches to be used provided they are demonstrated to achieve the same outcomes as envisioned by the prescriptive standards

Conclusion

Performance standards should be considered by the Health Officer when the outcomes anticipated to result from adherence to the provisions in Bulletin 74-90 are expected to be met or exceeded by the proposed alternative measures. The procedure for proposing an alternative to a requirement in Bulletin 74-90 based on performance is as follows:

1. The licensed professional will submit a proposed alternative and justify it in writing

2. The Health Officer will review the proposed alternative, investigating the proposal's feasibility on technical grounds and the ability to verify that the proposed alternative standard adhered to by the licensed well driller as proposed
3. The Health Officer will issue the Water Well Permit based on the proposed standard
4. The licensed well drill will construct the well utilizing the proposed standard, allowing the Health Officer to verify, as appropriate, that the standard is followed
5. The Health Officer will approve the construction of the well upon receipt of the Water Well Report, the disinfection statement, and any documentation required to document that the proposed standard was followed

Reduced Well Setback to Leach Field in Hardrock Geology

Regulatory Requirement and Rationale

Bulletin 74-90 Section 8.a. identifies a “subsurface sewage leaching field” as a “Potential Pollution or Contamination Source” within a minimum setback of 100 feet. Section 8.A. also states:

“Lesser distances than those listed above may be acceptable where physical conditions preclude compliance with the specified minimum separation distances and where special means of protection are provided. Lesser separation distances must be approved by the enforcing agency on a case-by-case basis.”

Bulletin 74-90 Section 9.2. requires a 50 foot deep annular seal when a 100 foot setback cannot be maintained from a potential source of pollution or contamination.

The reason behind the requirement is that when the 100 foot minimum setback cannot be maintained, a deeper annual seal will mitigate the concern by providing the well with greater protection from pollution originating for a leaky septic tank.

Concerns

The requirement for a 50 foot seal to mitigate an unavoidable reduction in setback to a leach field where the minimum 100 foot setback cannot be maintained adds significantly to the well’s cost of construction when methods of mitigation proposed by the licensed well driller other than a 50 foot seal could provide equal or better protection of the aquifer from contamination.

Analysis

A proposed performance standard for a well to be sited between 50 and 100 feet from a leach field is to seal the annular space to a minimum depth of at least 20 feet and at least 5 feet into consolidated, non-fractured hardrock.

This proposed alternative was discussed on September 1, 2016 at a well-attended meeting of the Well Drillers Advisory Group. The consensus of the group was that the proposed alternative would be equally or more protective of the aquifer than the 50 foot seal required in Bulletin 74-90. No contradictory information concerning this alternative was introduced by regulators attending the meeting, provided that the consolidated hardrock was known to be non-fractured. The licensed well drillers attending the meeting stated that they could recognize the presence of consolidated hardrock formation by the difficulty of their drill rigs to penetrate the material and could recognize the absence of fractures by the back pressure present during the drilling process.

Conclusion

Whenever the prescriptive minimum 100 foot setback to a leach field can be maintained, a reduction in setback should **not** be approved by the Health Officer. However, when the prescriptive minimum 100 foot setback to a leach field cannot be maintained but a 50 foot or greater setback is proposed, the licensed well driller has the following alternatives:

1. Placement of a 50 foot seal as specified in Bulletin 74-90

2. Submitting a report by a certified hydrogeologist or an engineering geologist stating that, based on geological conditions, the reduced setback will be adequately protective
3. Propose at least 5 feet into consolidated, non-fractured hardrock formation with a total minimum depth annual seal of 20 feet.

The procedure required by the Health Officer to verify that the proposed Alternative #3 performance standard listed above was adhered to will be as follows:

1. The licensed professional will submit the proposed alternative sealing depth and rationale with the Water Well Construction Permit application
2. The Health Officer will issue the Water Well Permit based on the proposed alternative
3. The licensed well drill will construct the well utilizing the alternative sealing depth and methodology, allowing the Health Officer to verify, as appropriate, that the standard is followed
4. The Health Officer will approve the construction of the well upon receipt of:
 - a. Water Well Report
 - b. Disinfection statement
 - c. Written statement by the well driller that stating the depth of the seal and verifying the depth that the seal extended into consolidated, non-fractured hardrock formation
 - d. Water sample, if any potential source of contamination is within 100 feet of the well, showing an absence of total and fecal coliform

Free Fall Placement of Bentonite Chips for 50 Foot Annular Seal in Hardrock Well

Regulatory Requirement and Rationale

Bulletin 74-90 Section 9.F.4. states in part: "Annular sealing materials shall not be installed by freefall unless the interval to be sealed is dry and no deeper than 30 feet below ground surface."

The reason for this restriction is concern that the material used for sealing may form a restrictive dam between the side of the boring and the well casing in a condition known as "bridging." This conditions can result in portions of the annular space not being sealed.

Concerns

Placement of a cement seal is considerably more time consuming and costly than placement of a bentonite seal. A newer innovation for sealing the annular space around a well casing is the use of 3/8 inch bentonite chips. Because of the size and weight of the bentonite chips, it has been reported that they can be successfully dropped and allowed to free fall into a 2 inch annular space in clean bored hardrock wells to greater depths than currently allowed under Bulletin 74-90.

Analysis

The use of the 3/8 inch bentonite chips for sealing the annular spaces around wells was extensively discussed at the well-attended September 1, 2016 Well Drillers Advisory Committee meeting. Guests at the meeting included two representatives from Baroid Industrial Driller Products. The consensus of the well drilling and industry representatives at the meeting was that 3/8 bentonite chips can be effectively placed by free fall to depths exceeding the restriction specified in Bulletin 74-90, even when water is entering the annual space before or during placement of the chips.

Given this level of comfort with free fall placement of the 3/8 inch the bentonite chips by the well drilling profession, it appears to be highly unlikely that any problems with "bridging" would be experienced when the chips are applied to a 50 foot depth in hardrock wells with clean bores.

Conclusion

Whenever a 50 foot annular seal is prescribed under Bulletin 74-90 for a well drilled into a hardrock formation, the well driller may propose sealing the annular space with 3/8 inch annular space by free fall. Conditions required by the Health Officer to verify that the proposed performance standard is adhered to will include the following:

1. The licensed professional will submit the proposed alternative sealing depth, material used for the seal, and seal placement methodology (free fall) with the Water Well Construction Permit application
2. The Health Officer will issue the Water Well Permit based on the proposed alternative
3. The licensed well drill will construct the well utilizing the alternative sealing depth and methodology, allowing the Health Officer to verify, as appropriate, that the standard is followed
4. The Health Officer will approve the construction of the well upon receipt of:
 - a. Water Well Report

- b. Disinfection statement
- c. Written statement by the well driller that verifying that, based on comparison of the anticipated and actual amount of chips that were used, the seal depth was achieved without “bridging”
- d. Water sample, if any potential source of contamination is within 100 feet of the well, showing an absence of total and fecal coliform