

## Article 295 - Well Head Casing Extension

Adopted by the CGA Board of Directors on January 30, 1999

### BACKGROUND

In areas with hilly terrain, ground surface elevations may in some cases be altered, usually due to modifications to the property topography. When such modifications occur on land surrounding a well head and result in substantially higher grade, then the top of the existing well may now be below surface grade. Although this problem can sometimes be addressed by construction of a pit or vault, DWR Bulletins and good sanitation practices restrict pit depths to only 4 feet below grade. Even when pits can be constructed, the costs to do so are generally fairly extensive. Therefore, in most cases extension of the well head casing becomes necessary. Such casing extensions are generally done long after the initial construction of the well, often without the involvement of a licensed C57 contractor.

Even when a properly licensed contractor is involved, either in the capacity of performing the extension or simply as a consultant, there are no clear guidelines as to proper methods. Although DWR Bulletins 74 offer established guidelines for casing and annular seal construction when originally constructing a well, they are silent on the issue of extension of a casing.

While well head casing extension may be necessary for another reason, specifically to raise it above the flood plain, such modification is not relevant to this standard. This standard addresses only those modifications in which there is a substantial raise in elevation of the surrounding grade.

### DISCUSSION

Although not common, well head casings can be and are extended to accommodate raising of surface grade. For a variety of reasons, grade can be raised from a few feet to several meters. All too often a casing extension is added to the existing well head and either native or imported soil is simply dozed or dumped immediately around the extension. The new casing will then be in constant contact with soil while the original annular seal is now well below grade.

It may be argued that this original annular seal is still intact and, assuming the original construction was done properly, will serve its primary purpose of preventing infiltration of surface contaminants. Section 9 of Bulletin 74-90 specifies "the annular space shall be effectively sealed to prevent it from being a preferential pathway for movement of poor quality water, pollutants, or contaminants." However, soil conditions and morphology, along with surface water migration patterns, are subsequently altered and a preferential pathway, at least to the original grade, may be created. Furthermore, depending on the height above the original grade, surface water may exert hydrostatic pressure against the original seal, increasing the potential of deeper migration against the casing. Generally the seal is installed from specified depths to the ground surface.

However, in freezing areas, the Bulletins specify that the annular seal may end below the ground surface but no further than 4 feet below surface grade. Bulletins 74 recognized potential problems should any surface water settle around the well head and addressed them by requiring in Section 10A that a concrete base or slab be constructed at ground surface. The base is to be in contact with the annular seal unless the seal is terminated in a vault that is no more than 4 feet below surface grade.

Even if the stated primary purpose of the annular seal remains effective there are additional reasons to surround the casing. Again in Section 9, Bulletin 74 notes that "secondary purposes of the annular seal are to protect the casing against corrosion or degradation, ensure the structural integrity of the casing, and stabilize the borehole wall." If the casing is allowed to maintain contact with surrounding soil, it eventually may be breached.

Technically, with a casing extension there is no annulus since there is no borehole. However, an annulus can be created by using a conductor casing. If there is already an existing conductor casing this can also be extended. If there is not, one can be landed and grouted on the existing annular seal. In either case, the conductor may be stabilized to the casing by centering guides.

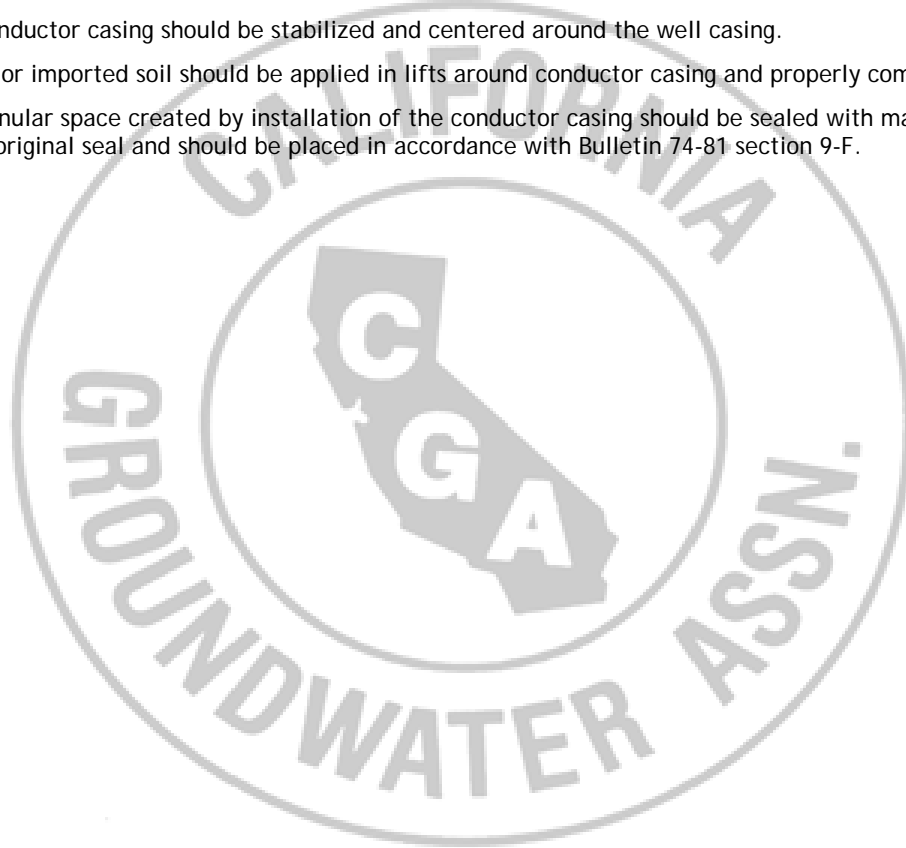
Well casing, whether steel or plastic, should be installed and joined as described in Section 12-B of Bulletin 74-81. Sealing the new upper "annular space" should be done as described in Section 9 of Bulletin 74-81.

## CGA Standard Practice Series

### RECOMMENDATIONS

The California Groundwater Association recommends the following practices with regard to well head casing extensions:

1. Work should be performed by a contractor licensed by the State of California with a classification of C-57, well drilling.
2. Similar and compatible casing material should be used and connected to the existing casing as described in Bulletin 74-81, section 12-B
3. A conductor casing with a minimum of 2" clearance around the well casing should be installed over the extension. The minimum 2-inch thickness shall be measured between the well extension conductor casing and the nearest interior pipe or casing. If there is an existing conductor casing, the new extension should be welded in accordance with Bulletin 74. If there is not an existing conductor, the extension should be landed into the existing annular seal material.
4. Provision should be made for extending such items as sounding tubes, gravel feed pipes, or camera ports that are present in the existing well. The minimum clearance for these facilities within the extended conductor casing should be as described in Recommendation 4, above.
5. The conductor casing should be stabilized and centered around the well casing.
6. Native or imported soil should be applied in lifts around conductor casing and properly compacted.
7. The annular space created by installation of the conductor casing should be sealed with material compatible with the original seal and should be placed in accordance with Bulletin 74-81 section 9-F.



## CGA Standard Practice Series

July 14, 1998

To: CGA Standards Committee

From: Ron Taylor

What follows is a very preliminary draft of standard article 295 addressing extension of well head casing. Although I have begun to define the problem, the issue should be discussed by the committee and recommendations resolved.

### CGA STANDARD PRACTICE SERIES ARTICLE 295 - WELL HEAD CASING EXTENSION

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However, soil conditions and morphology, along with surface water migration patterns, are subsequently altered and a preferential pathway, at least to the original grade, may be created. Furthermore, depending on the height above the original grade, surface water may exert hydrostatic pressure against the original seal, increasing the potential of deeper migration against the casing. Generally the seal is installed from specified depths to the ground surface. However, in freezing areas, the Bulletins specify that the annular seal may end below the ground surface but no further than 4 feet below surface grade. Bulletins 74 recognized potential problems should any surface water settle around the well head and addressed them by requiring in Section 10A that a concrete base or slab be constructed at ground surface. The base is to be in contact with the annular seal unless the seal is terminated in a vault that is no more than 4 feet below surface grade.

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Technically, with a casing extension there isn't any annulus since there isn't a borehole. However, an annulus can be created by using a conductor casing. If there is already an existing conductor casing this can also be extended. If there is not, one can be landed and grouted on the existing annular seal. In either case, the conductor may be stabilized to the casing by centering guides. Well casing, whether steel or plastic, should be installed and joined as described in Section 12-B of Bulletin 74-81. Sealing the new upper "annular space" should be done as described in Section 9 of Bulletin 74-81.

## CGA Standard Practice Series

### RECOMMENDATIONS

The California Groundwater Association recommends the following practices with regard to well head casing extensions:

- 1) Work should be performed by a contractor licensed by the State of California with a classification of C57, well drilling.
- 2) A report describing the alteration of the water well should be filed with the Department of Water Resources.
- 3) Similar and compatible casing material should be used and connected to the existing casing as described in Bulletin 74-81, section 12-B
- 4) A conductor casing with a minimum of 2" clearance around the well casing should be installed over the extension. If there is an existing conductor casing, the new extension should be welded in accordance with Bulletin 74. If there is not an existing conductor, the extension should be landed into the existing annular seal material.
- 5) The conductor casing should be stabilized and centered around the well casing.
- 6) Native or imported soil should be applied in lifts around conductor casing and properly compacted.
- 7) Annular seal material, compatible with existing seal, should be placed in accordance with Bulletin 74-81 section 9-F.

### [AUTHOR'S COMMENTS:]

Recommendation section is open to committee discussion. While these recommendations reflect my perspective, it may be argued that the original annular seal is sufficient and soil can be applied directly against casing extension.

Also, note that I have not addressed gravel packed wells, gravel feed pipe, etc.

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For more information, please contact the CGA at [wellguy@groundh2o.org](mailto:wellguy@groundh2o.org) or call 707-578-4408.