REDACTED

From: THOMAS Wesley * DEQ <wesley.thomas@deq.oregon.gov>
Sent: Thursday, October 26, 2023 9:05 AM
To: John Renda <jrenda@anchorqea.com>
Cc: Bob Wyatt <rjw@nwnatural.com>; Patricia Dost <pdost@pearllegalgroup.com>; Rob Ede <robe@hahnenv.com>; Halah Voges <hvoges@anchorqea.com>; Ryan Barth <rbarth@anchorqea.com>; Tim Stone <tstone@anchorqea.com>; Jen Mott <jmott@anchorqea.com>; NELSON Heidi * DEQ <Heidi.Nelson@deq.oregon.gov>; VANGLUBT Sarah * DEQ <Sarah.VanGlubt@deq.oregon.gov>
Subject: RE: Gasco PW-6U Replacement Well Design

Thanks John. No additional questions from DEQ.

Wesley Thomas, P.E.
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From: John Renda <jrenda@anchorqea.com>
Sent: Wednesday, October 25, 2023 5:09 PM
To: THOMAS Wesley * DEQ <wesley.thomas@deq.oregon.gov>
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Subject: RE: Gasco PW-6U Replacement Well Design

Thank you, Wes!

See responses to your questions below in orange.

Please let me know if you have any additional questions or would like some more information.

John J. Renda, RG

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Subject: RE: Gasco PW-6U Replacement Well Design

John,

Thank you for the thorough information to support the PW-6U replacement. DEQ approves the well replacement.

We understand that the PW-6Ub location is set back from the shoreline to accommodate the anticipated alignment of the proposed barrier wall. It is possible that pumping rates from PW-6Ub will be higher than PW-6U in order to maintain inward gradients at the control wells (since the new well is further inland). We also noticed that the new well location is co-located with B-57, which appears to have more silt lenses in the well screen interval compared to the existing PW-6U. PW-6Ub is in the area of boring B-57 but B-57 was terminated at 50 feet below ground surface (above the proposed screen interval for PW-6Ub) and shows no significant silt layers. Were you looking at a different boring log? The B-57 boring log is attached for your reference.
Have you anticipated the potential need to adjust pumping rates at PW-6Ub (and nearby pumping well locations)? PW-6Ub may pump at higher rates for the reasons you stated but since the system is automated, the operation will not need to be adjusted. Pumping will speed up and slow down to maintain the setpoint differential between the control well and the river.

Out of curiosity, how are you sizing the silica beads for the shur-pak? Is that based on the 20x40 silica sand placed around the shur-pak or more based on the surrounding formation? The filter packs for the Upper Alluvium extraction wells were designed based on grain size testing presented in the March 14, 2012 Upper Alluvium Extraction Well Design which selected a 16x40 filter pack sand. The sur-pak 30x40 glass beads and the 20x40 silica sand were selected to be within this design range.

Thanks,

Wes

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From: John Renda <jrenda@anchorqea.com>
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Subject: Gasco PW-6U Replacement Well Design

Hi Wes!

The replacement of PW-6U with PW-6Ub was recommended with the submittal of the HC&C Operational figures in an August 31, 2023 email due to declined well performance. Replacement extraction well, PW-6Ub is recommended to maintain consistent upward vertical gradients between the Upper and Lower Alluvium WBZs in the area near PW-6U and PW-14U, where DNAPL is present in the Upper Alluvium WBZ.

Proposed replacement well PW-6Ub will be of similar design and installation procedure as the most recently installed extraction wells, using stainless-steel for both the screen and riser pipe. The well screen depths, screen slot size, and filter pack will be consistent with PW-6U. As with the recently installed extraction wells, we propose to use a stainless-steel well screen prepacked with a glass bead filter pack. The estimated well design details are provided below.

PW-6Ub will be installed approximately 50 feet inland from top of slope to be outside the required footprint of the installation equipment for the proposed ISS barrier wall.

After PW-6Ub is installed, extraction well PW-6U will be decommissioned following the same procedures as previous Gasco OU extraction well decommissionings approved by DEQ. Extraction well PW-6U will be decommissioned according to the requirements within Oregon Administrative Rule (OAR) 690-240-0510 by overdrilling with a rotosonic drill rig with a minimum casing diameter of 12 inches to a depth of 48 feet and a minimum casing diameter of 10 inches from 48 to 70 feet which matches the diameter of the casing used to install PW-6U (see attached boring log for PW-6U).

Once the well is overdrilled to 70 feet below ground surface, a winch line will be attached to the well casing in an attempt to recover the well casing and screen. Following removal of the well casing and screen to the extent practicable, the borehole will be sealed with bentonite grout slurry with 10% organoclay placed from the bottom up using a tremie pipe to avoid segregation or dilution of the sealant. The drill casing will be loaded with bentonite grout while the casing is pulled upward. The grout level will be maintained within the casing during removal.

PW-6Ub Well Design and Installation Depths

- **0 to 45 feet**: 16-inch borehole with temporary casing (set bentonite seal)
- **45 to 70 feet:** 12-inch borehole with temporary casing
- **+2.5 to 50 feet**: 8-inch-diameter, stainless-steel blank riser pipe
- **50 to 65 feet:** Muni-Pak™ 8x10-inch diameter, 0.01-inch-slot continuous, wire-wrapped, stainless-steel screens prepacked with 30x40 Shur-Pak™ glass bead filter pack
- **65 to 70 feet:** 8-inch-diameter stainless steel sump (w/bentonite/organoclay grout around the sump)
- **0 to 5 feet:** concrete surface seal
- **5 to 48 feet:** bentonite grout with 10% organoclay
- **48 to 65 feet:** 20x40 silica sand
- **65 to 70 feet:** bentonite grout with 10% organoclay

Attached for reference are the following documents:

- Figure 1 – Proposed PW-6Ub location
- Figure 2 – Proposed PW-6Ub design drawing
- Boring log for PW-6U

- Muni-Pak and Shur-Pak Specification sheets

Please let me know if you have any questions or need any additional information to approve this design. Thanks.

John J. Renda, RG

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