Humboldt Community Services District Well Evaluation and Replacement

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Original South Bay Well

- 12-in.diameter steel casing from ground surface to 360 below ground surface (bgs)
- 60 ft of 0.030 in. slot size stainless steel screen from 360–420 bgs
- 10 ft steel sump from 420–430 bgs

HYDRAULIC SETTING

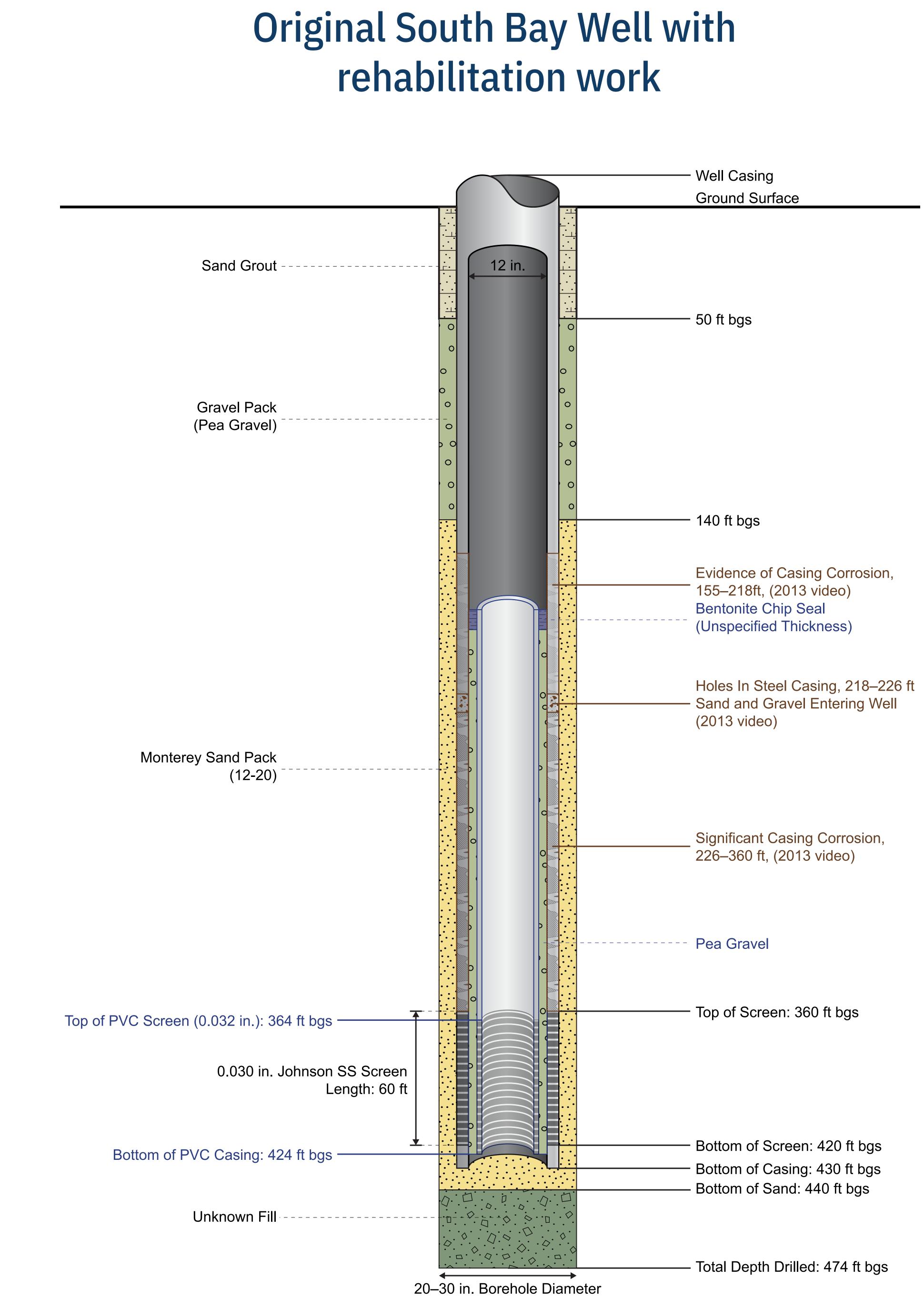
The original South Bay Well taps into the Pliocene Hookton formation, spanning 390 feet of the Hookton layer, overlying aquitard, and overlying Holocene unconsolidated alluvium.

The Hookton Formation surfaces over ~70% of the Elk River Basin and is recharged from local precipitation in surrounding hills. The natural sands and gravels of the formation are highly permeable, making them an excellent natural reservoir and source of high-quality water.

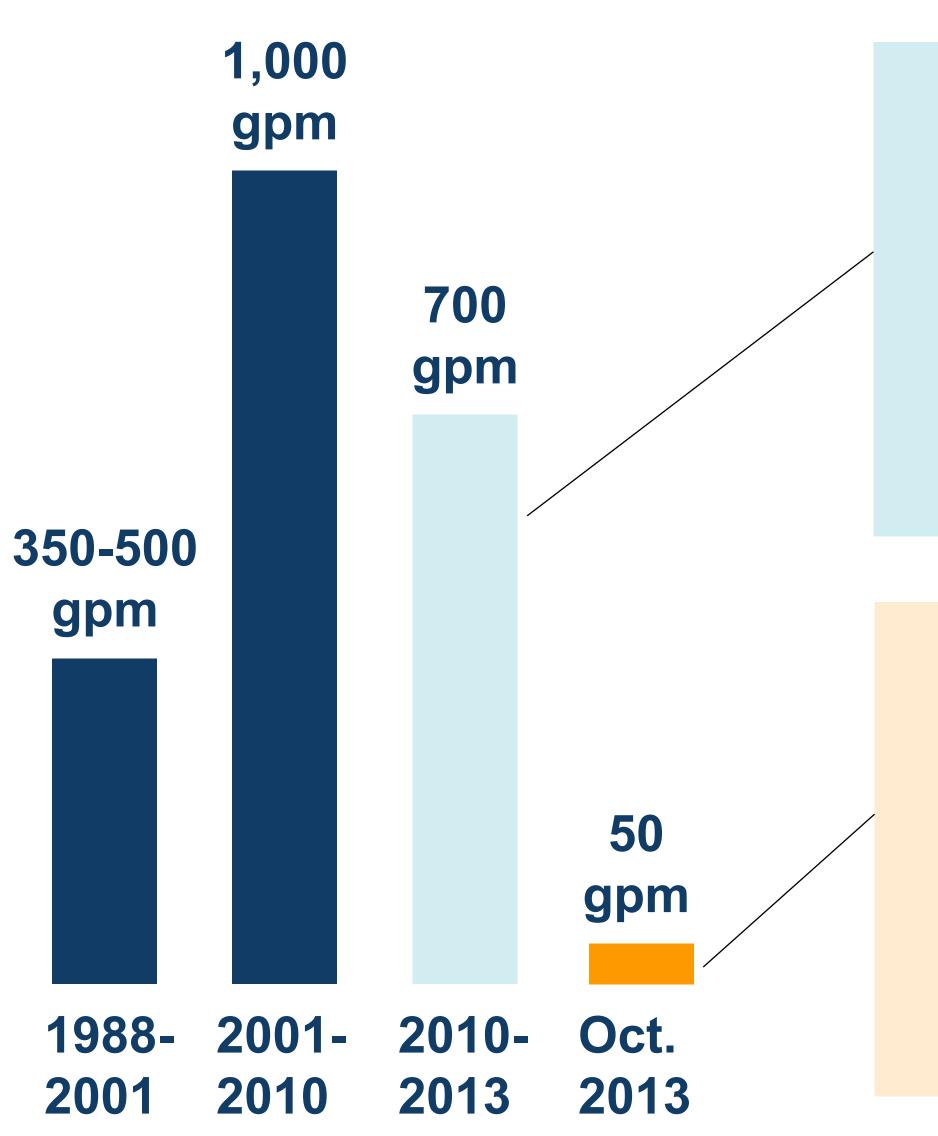
PERFORMANCE

When installed in 1988, the well flowed under artesian (natural) pressures at a rate of 100 gpm. During the well pump test, the well flowed at 1,500 gpm for 5 hours with 160 feet of drawdown.

The Humboldt Community Services District pumped the well at rates of 325 to 500 gpm for water supply. After the well was rehabilited in 2001, a pump rate of 1,000 gpm was achieved.



Well Failure and Diagnosis





In December 2013, the District hired a well driller to rehabilitate the well. Rehabilitation consisted of installing an 8-in. diameter PVC casing inside the original casing. The bottom of the PVC casing extended to 424 ft bgs (6 ft above the original total depth). Sixty feet of 0.032-inch slot PVC casing was installed at the bottom, above which 180 ft of blank casing was installed to a depth of 184 ft bgs.

After rehabilitation, the well was returned to service, but users immediately reported the water quality as "salty."

In 2010, the well was producing "fine red iron silt," and the pumping rate was reduced to 700 gpm, which improved water quality.

In October 2013, pea gravel was entering the well, leading to a sharp decrease in flow to 50 gpm. The well was taken out of service.

A well video identified corrosion and holes in the casing at 218 to 226 ft bgs, which allowed the pea gravel pack to enter the well.



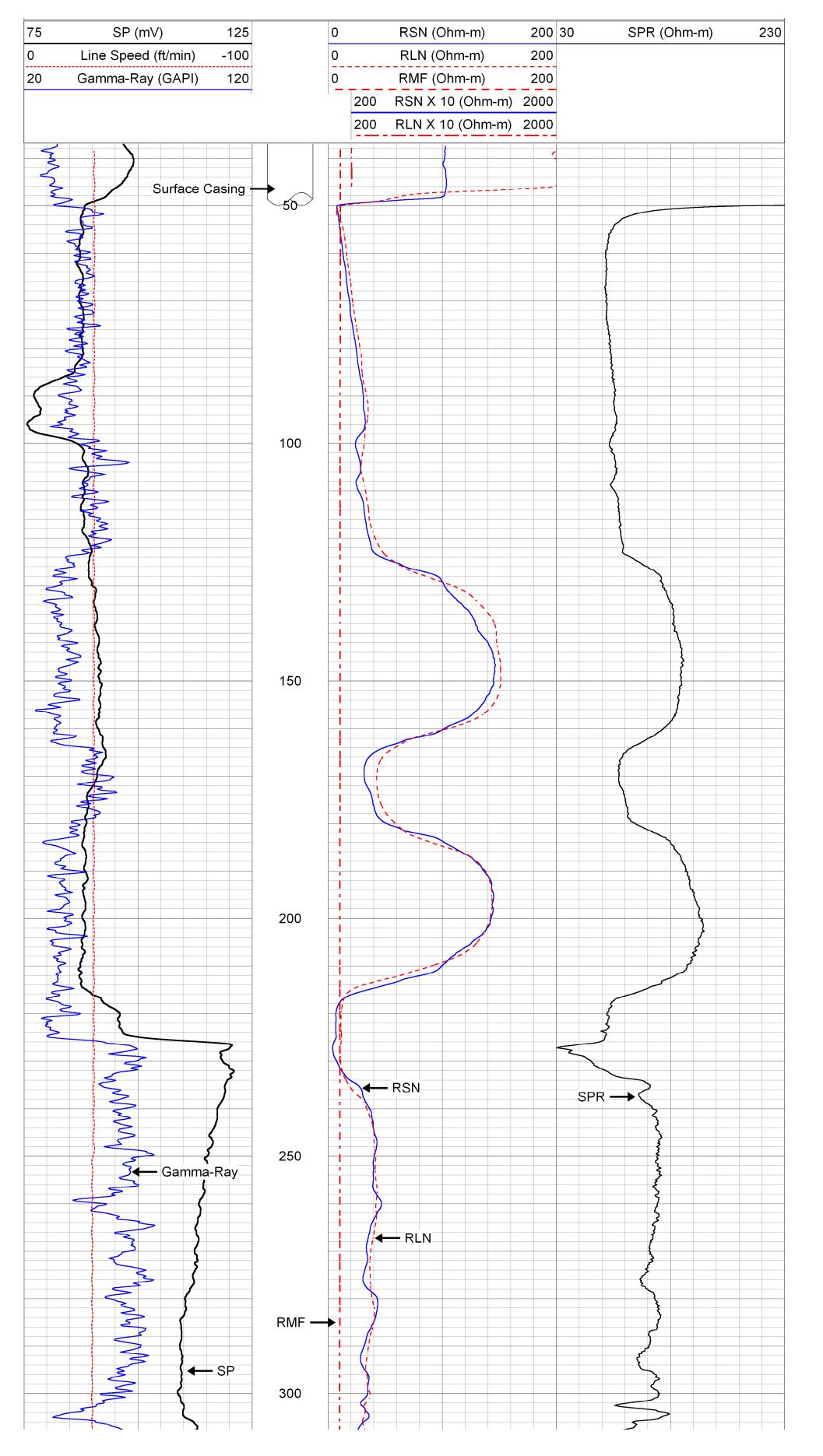
Replacement Well Design, Installation, and Performance

DESIGN

Integral designed a replacement well for the District in 2014. Two key elements of the design were the use of PVC casing and a bentonite barrier between the shallow saline water and the well.

INSTALLATION

The well was constructed in summer 2018. After construction, an electric log identified the likely high-saline interval at 225 ft bgs—the same interval where casing corrosion and entry of the gravel pack was observed on the old well.



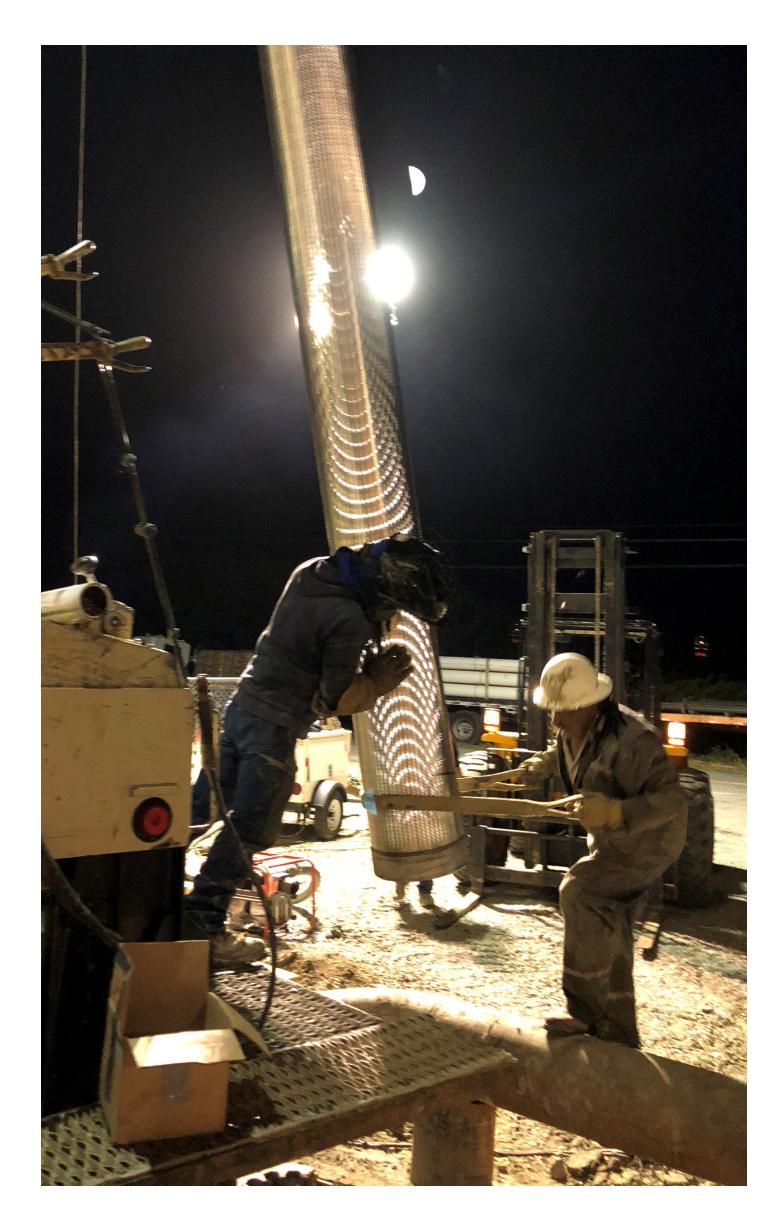
E-log of new South Bay Well with interpreted saline water zone at 225 ft bgs directly above the aquitard overlying the Hookton Formation

PERFORMANCE

The new well was pump tested at a flow rate of 800 gpm for more than 24 hours. The District currently operates the well at a pumping rate of 700 gpm. The new well installation was a success, and the design should prevent casing corrosion and protect the well from saline water entry over the long-term.

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Well screen installation in new South Bay Well



Artesian water flow from PVC casing of new South Bay Well



