Well Abandonment with HOLEPLUG® Graded Sodium Bentonite

INTRODUCTION

HOLEPLUG® naturally occurring Wyoming sodium bentonite clay is sized and graded chip material used to seal and plug wells and boreholes. HOLEPLUG® is produced in 3/8" and ¾" size chips. The chips can be poured in open wells and boreholes through standing columns of water to provide a low permeability barrier for groundwater protection.

PROJECT SCOPE

Well Drilling Contractor was charged with de-commissioning a well that was drilled circa 1935 at an Industrial factory site. The well was a 12-inch diameter borehole 550 feet deep with surface casing from 30-40 feet. The pump was pulled and the borehole had to be abandoned. The plan was to fill the bottom interval with # 1B Stone (550-120 feet) and the top 120 feet with ¾" HOLEPLUG® Graded Sodium Bentonite.

SOLUTION

HOLEPLUG® was selected as a sealing product that did not require special mixing and pumping equipment to grout and seal the well. 50 lb. bags of HOLEPLUG® could be easily handled to pour the chip bentonite into the well. An estimate of approximately 3 pallets (+/- 144 bags) was expected to fill the 120ft. of 12" diameter well.

HOLEPLUG® Graded Sodium Bentonite Chips
50-lb Bags

Limited Wellhead Access
The ease of handling and application of HOLEPLUG® were key selection criterion for backfill and abandonment of well

OBSERVATIONS AND CUSTOMER FEEDBACK

A screen trough utilizing ¼" square mesh screen was constructed to separate the "fines" from the chips that accumulate in the bag from transportation, handling and bagging process.

Screen Trough design for separation of "fines" from ¾" HOLEPLUG®

Technique of separating "fines" from ¾" HOLEPLUG® using screen trough.
Note variable size of fine material below screen

ADDITIONAL PROJECT PHOTOS AND DISCUSSION

The technique of applying sodium bentonite chips onto a screen allows the material to roll down the screen to eliminate “fines” prior to the individual chips entering the open borehole and falling to bottom through the standing water column. The primary reason for elimination of the fines is to further limit the potential for bridging to occur. If the “fines” are allowed to be introduced into the open borehole they will accumulate at the static water level within the well. In scenarios where the static water level is at a given depth below ground surface the fines begin to accumulate and continue to build up. This point is where the “bridge” is more likely to occur. This could possibly result in incomplete backfill of the open borehole and inadequate abandonment of the existing well.

Controlling the application rate of HOLEPLUG® Graded Sodium Bentonite during pouring operations is another key element to minimizing the potential for bridging to occur. The application rate must not be faster than 2 minutes per 50-lb sack. A “controlled pour rate” allows the individual chips to fall through the water separately and at a reasonable distance apart. This practice limits the direct interaction between individual chips and further limits the potential for bridging. Faster application rates create a condition where the individual chips are in closer proximity to one another and eventually may collide and stick together creating a higher potential for problems to occur. As borehole diameters or annular space become smaller the importance of “controlled pour rate” is magnified.

With attention to detail, HOLEPLUG® Graded Sodium Bentonite can be successfully placed to depths greater than 1000 feet (where regulations allow) using a direct pour method. The relative unaltered state of the 3/8” or ¾” HOLEPLUG® allows for the material to hydrate at a slow rate as compared to other bentonite materials. This characteristic provides the user with flexibility in placement methods and adds value to the overall well abandonment operation.

Pouring application of ¾” HOLEPLUG® for well abandonment operations.

INDUSTRIAL DRILLING PRODUCTS
BAROID
HALLIBURTON

A CASE STUDY: *Well Abandonment*

Well-site abandonment operations using 50-lb bags of HOLEPLUG® Graded Sodium Bentonite

BOREHOLE GEOMETRY

Diameter:	≈12.0 inches (estimated, as actual diameter was variable)
Depth of Abandonment Interval:	120 feet
Material Requirement for Project Completion:	4 pallets (192 bags) - ¾" HOLEPLUG® Graded Sodium Bentonite

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