



BP's Deepwater Horizon - Closing the Well and the Series - and Open Thread

Posted by [Heading Out](#) on September 20, 2010 - 10:08am

Topic: [Environment/Sustainability](#)

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The operations to seal the Deepwater Horizon well in the Gulf have [now succeeded](#) in putting cement plugs into the well that have effectively ensured that it will remain dead. The well itself was effectively killed when the cement was injected some weeks ago, and the work since has been to ensure that some of the potential problems from subsequent failure of that cement could not occur. And so the relief well had shown that there were no effective quantities of hydrocarbon products in the annulus, meaning that the well failure had purely been through the shoe and up the production casing, and not up the annulus. Much of the original thought had been that the failure was the other way around, and the caution in the approach has been, in part, in case there was at least some failure up the annulus. That turned out not to be the case, but the relief well injected cement that filled in the voids in the annulus, so that with the cement already injected into the casing, the well is, as the Bureau of Ocean Energy Management, Regulation, and Enforcement certified, now permanently sealed.

This does not end operations at the well. Both the original well and the relief well must now follow the procedures for abandonment of the site. The DDII has been preparing for this, but the procedures that must be followed are relatively standard. I am presuming that the plugs that have been discussed are those at the bottom of the well, but there also need to be plugs installed within the well to ensure that there are no possibility of fluids migrating from one horizon to another. To a large extent this has likely been achieved with the filling of the annulus between the end of the lined well and the top of the cement injected earlier this summer. The well is now effectively totally lined on the outside, and there is a plugged production casing in the middle, which retained its integrity over the course of the events.

Nevertheless the regulations will be followed. For your information [the relevant bits](#) are, perhaps:

(a) Isolation of zones in open hole. In uncased portions of wells, cement plugs shall be set to extend from a minimum of 100 feet below the bottom to 100 feet above the top of any oil, gas, or freshwater zones to isolate fluids in the strata in which they are found and to prevent them from escaping into other strata or to the seafloor. The placement of additional cement plugs to prevent the migration of formation fluids in the wellbore may be required by the District Supervisor.

(b) Isolation of open hole. Where there is an open hole below the casing, a cement plug shall be placed in the deepest casing by the displacement method and shall extend a minimum of 100 feet above and 100 feet below the casing shoe. In lieu of setting a cement plug across the casing shoe, the following methods are acceptable:

(1) A cement retainer and a cement plug shall be set. The cement retainer shall have effective back-pressure control and shall be set not less than 50 feet and not more than 100 feet above the casing shoe. The cement plug shall extend at least 100 feet below the casing shoe and at least 50 feet above the retainer.

(2) If lost circulation conditions have been experienced or are anticipated, a permanent-type bridge plug may be placed within the first 150 feet above the casing shoe with a minimum of 50 feet of cement on top of the bridge plug. This bridge plug shall be tested in accordance with paragraph (g) of this section.

(c) Plugging or isolating perforated intervals. A cement plug shall be set by the displacement method opposite all perforations which have not been squeezed with cement. The cement plug shall extend a minimum of 100 feet above the perforated interval and either 100 feet below the perforated interval or down to a casing plug, whichever is the lesser. In lieu of setting a cement plug by the displacement method, the following methods are acceptable, provided the perforations are isolated from the hole below:

(1) A cement retainer and a cement plug shall be set. The cement retainer shall have effective back-pressure control and shall be set not less than 50 feet and not more than 100 feet above the top of the perforated interval. The cement plug shall extend at least 100 feet below the bottom of the perforated interval with 50 feet placed above the retainer.

(2) A permanent-type bridge plug shall be set within the first 150 feet above the top of the perforated interval with at least 50 feet of cement on top of the bridge plug.

(3) A cement plug which is at least 200 feet long shall be set by the displacement method with the bottom of the plug within the first 100 feet above the top of the perforated interval.

(d) Plugging of casing stubs. If casing is cut and recovered leaving a stub, the stub shall be plugged in accordance with one of the following methods:

(1) A stub terminating inside a casing string shall be plugged with a cement plug extending at least 100 feet above and 100 feet below the stub. In lieu of setting a cement plug across the stub, the following methods are acceptable:

(i) A cement retainer or a permanent-type bridge plug shall be set not less than 50 feet above the stub and capped with at least 50 feet of cement, or

(ii) A cement plug which is at least 200 feet long shall be set with the bottom of the plug within 100 feet above the stub.

(2) If the stub is below the next larger string, plugging shall be accomplished as required to isolate zones or to isolate an open hole as described in paragraphs (a) and (b) of this section.

(e) Plugging of annular space. Any annular space communicating with any open hole and extending to the mud line shall be plugged with at least 200 feet of cement.

(f) Surface plug. A cement plug which is at least 150 feet in length shall be set with the top of the plug within the first 150 feet below the mud line. The plug shall be placed in the smallest string of casing which extends to the mud line.

(g) Testing of plugs. The setting and location of the first plug below the surface plug shall be verified by one of the following methods:

(1) The lessee shall place a minimum pipe weight of 15,000 pounds on the cement plug, cement retainer, or bridge plug. The cement placed above the bridge plug or retainer is

not required to be tested.

(2) The lessee shall test the plug with a minimum pump pressure of 1,000 pounds per square inch with a result of no more than a 10-percent pressure drop during a 15-minute period.

(h) Fluid left in hole. Each of the respective intervals of the hole between the various plugs shall be filled with fluid of sufficient density to exert a hydrostatic pressure exceeding the greatest formation pressure in the intervals between the plugs at time of abandonment.

(i) Clearance of location. All wellheads, casings, pilings, and other obstructions shall be removed to a depth of at least 15 feet below the mud line or to a depth approved by the District Supervisor. The lessee shall verify that the location has been cleared of all obstructions in accordance with Sec. 250.704 of this part. The requirement for removing subsea wellheads or other obstructions and for verifying location clearance may be reduced or eliminated when, in the opinion of the District Supervisor, the wellheads or other obstructions would not constitute a hazard to other users of the seafloor or other legitimate uses of the area.

This means that there will be some continuing work at the well, but not a lot, and thus from now on I shall only be intermittently posting on that topic, and will start to write about the more general topics that have been neglected over the past few months.



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