PROJECT SUMMARY

Public Infrastructure Project

Project Description

360 was engaged to conduct a detailed investigation and repair of an undocumented leaking wellbore discovered during construction of public infrastructure. The undocumented wellbore did not have casing strings extended to surface and was emitting methane and H_2S gas. A work plan was created including re-entry of the wellbore using a Class III single drilling rig. On-site construction was temporarily suspended and operations were executed under the management of 360 with the intent of eliminating the gas emissions.

Operational Steps

1. Initial Rig-up
   - Made up a 349 mm drill bit and bit sub on 171 mm drill collars.
   - Centered over the top of the existing wellbore and spudded the well.
   - Rotated and drilled to 11.5 meters and then pulled out of the hole.
   - Assembled a 508 mm drill bit on 171 mm drill collars and ran into the hole to 11.5 m.
   - Installed and set one joint of conductor casing (406.4 mm x 111.6 kg/m, J-55, BT&C R1) on bottom.

2. Casing Cementation
   - Cemented the casing with 1.32 tonnes of 0:1:0 Class Oilwell “G” + 3% $CaCl_2$ to accelerate setup time.

3. Bottom Hole Assembly and Drilling
   - Assembled and ran bottom hole assembly with a 159 mm drill bit.
   - Drilled from 7.6 meters to 14.37 meters with minimal weight required (indicated being in the original wellbore).
   - Encountered an obstruction at 14.37 meters; drilling fluid circulation showed only sand.
   - Drilled down to 15.5 meters; circulation of drilling fluids was lost, resulting in a total fluid loss of 2 m^3 into the formation.
   - Lost circulation material was blended into the drilling fluid system while pumping and full circulation of drilling fluids was regained.

4. Further Drilling and Sample Analysis
   - Drilled to 17.1 meters; collected and analyzed drilling fluid sample with minimal evidence of bedrock cuttings.
   - Drilled to 20.1 meters; second fluid sample showed low concentrations of bedrock cuttings.
   - No Indication of existing wellbore below the top of the bedrock. The drilling conditions indicated that new hole was being drilled below the top of the bedrock.

5. Investigative Drilling Attempts
   - Smaller pipe was sourced to further investigate and locate a sub-bedrock borehole.
   - Assembled a 121 mm drill collar string and 127 mm bit sub without a drill bit; unsuccessful in lowering below 20.1 meters.

- Attempted with a 102 mm tapered mill on 60.3 mm tubing; reciprocated from 14 to 20.2 meters, did not locate wellbore below bedrock.
- Attempted to run a 60.3 mm tubing joint with a 45-degree mule shoe; reciprocated between 14 to 20.2 meters, did not locate wellbore below bedrock.
- Bent tubing above the mule shoe and attempted to find an existing hole around the perimeter; did not locate wellbore below bedrock
- Replaced with a bit sub and a 95 mm drill bit and made multiple attempts to run in hole; did not locate wellbore below bedrock

Conclusion

The wellbore was re-entered and cleaned out to a total depth of 20.2 meters with a 408 mm conductor casing placed at 11.5 meters and cemented. At a depth of 14.37 meters, the bottom hole assembly encountered bedrock. Despite five attempts using various bottom hole assembly variations, locating the original wellbore beyond 20.2 meters was unsuccessful. The 360 team concluded that the undocumented well was not drilled with the intent to produce hydrocarbon and was successfully abandoned with a cement plug. The cement plug sealed the wellbore and eliminated the emission of methane and H_2S, allowing on-site construction to continue.