

INQUIRY INTO COAL SEAM GAS - Attachment

APPEA – Australian Petroleum Production and Exploration Association - Technical Experts
Ross Neumann and Mike Roy transcript – **Thursday 17 November 2011**

Chair: Mr Roy will you provide the committee with a technical explanation as to how you carry that assessment? What type of technology is used?

Written Response – Mr Roy

The following response explains how well construction – cementing and casing of a wellbore is designed and how an assessment is done and what technology is used.

1. Cement design and laboratory work as part of the well design
 - a. Design cement slurry properties taking into consideration specific well conditions such as, bottom hole temperature, hole size, rheology, well lithology characteristics and compressive strength requirement of the cement.
 - b. Cement design – based on formation fracture gradient and pore pressure in static and dynamic conditions and other geological factors. Review well geometry and model flow conditions ensuring you do not fracture a weak formation nor do you allow fluid or gas inflow. For Coal Seam Gas wells you will not do a comprehensive design for each well in a given field as the properties do not alter much within a field. You would typically have an overarching design for wells within a known geological area.
 - c. Casing centralisation – You would run a simulator based on hole geometry to ensure you have adequate casing standoff or centralisation to ensure cement is placed around the entire diameter of the casing and open hole.
 - d. Casing – as mentioned Petroleum Operators in the CSG operations use API (American Petroleum Institute) approved casing, which is designed to a specification (pressure, fabrication process etc) and high safety standard.
2. Job execution
 - a. Record and document critical parameters during the cement job such as:
 - i. Injection rate
 - ii. Slurry density and consistency
 - iii. Total volume
 - iv. Pressure
 - v. Observations, when cement slurry is observed back to surface during displacement
 - vi. Samples of cement slurry are taken during the job and observed for 24 hours to ensure they get set hard

The recording of these parameters ensures the job execution is in tolerance to the job design.
3. Post Cement Job Evaluation
 - a. Cement Bond Logs are a diagnostic tool, which will evaluate the quality of the cement job.

Cement Bond Log (CBL) is the most widely used method to evaluate cement jobs. The tool is a wireline conveyed tool. Geophysical logging service companies provide CBL logging as a service to the Petroleum industry. The CBL tool is lowered into a well via an electric wireline cable logging unit and the tool records measurements that provide an indication of the quality of the cement, and its bond to the casing and the openhole. The tool consists of an acoustic transmitter and two receivers

located at 1m and 1.5 m from the transmitter. The transmitter emits bursts of acoustic energy expanding away from the tool in all directions. The refraction and how the waves are received (Snells Law) provides information such as amplitude and transit-time measurements. These signals are interpreted to understand the cement bond to casing and formation as well as the cement strength. It should be noted that CBL logs are not run on all CSG wells but are run on random wells as a quality check and on wells where the cement job execution experienced density control issues that may have compromised the job itself. The CBL will confirm whether adequate hydraulic zonal isolation exists or whether remedial squeeze cementing may be required. It is good practice to ensure a CBL log is run on all wells that may be hydraulically fractured.