Information Sheet

www.ciphercoal.com

GAS CANISTER RESULT CERTIFICATIONS

For coalbed gas reservoirs to be assigned **Contingent Resources** under the *Petroleum Resource Management System* (PRMS[1]), direct gas content measurements are needed. These measurements are almost always undertaken using 'gas canisters'.

Cipher has been providing 3rd-party, independent certification of results on a canister-by-canister basis for over a decade. The certification ensures that the results are real, correctly collected and calculations are standard.

Cipher recommends that gas content determinations follow one of the widely accepted standards such as *ASTM D7569*[2] or the *Australian Standard AS 3980-1999*[3].

Two types of gas canisters

For Cipher to certify canisters the following information is needed to calculate **lost gas** and confirm **measured gas**:

- Drilling time information:
  - » Start coring time
  - » Time core off bottom
  - » Time core reaches surface
  - » Time sample is sealed in canister
- Gas volume measurements (cc) each with the corresponding information:
  - » Ambient temperature
  - » Water (or foam) bath temperature (if taken)
  - » Atmospheric pressure (absolute, uncorrected for elevation)
- For determination of canister head space and coal mass:
  - » Canister weight – empty
  - » Canister weight – with coal
  - » Canister weight – with water
- All electronic measurement instruments (barometers, temperature sensors and balances) must be calibrated on site and calibration records must be available upon request
- All data above is ideally given in computer spreadsheet form, updated daily, and with robust data entry cross check methodology
- Original hand written field sheets are also required for further verification of entered data

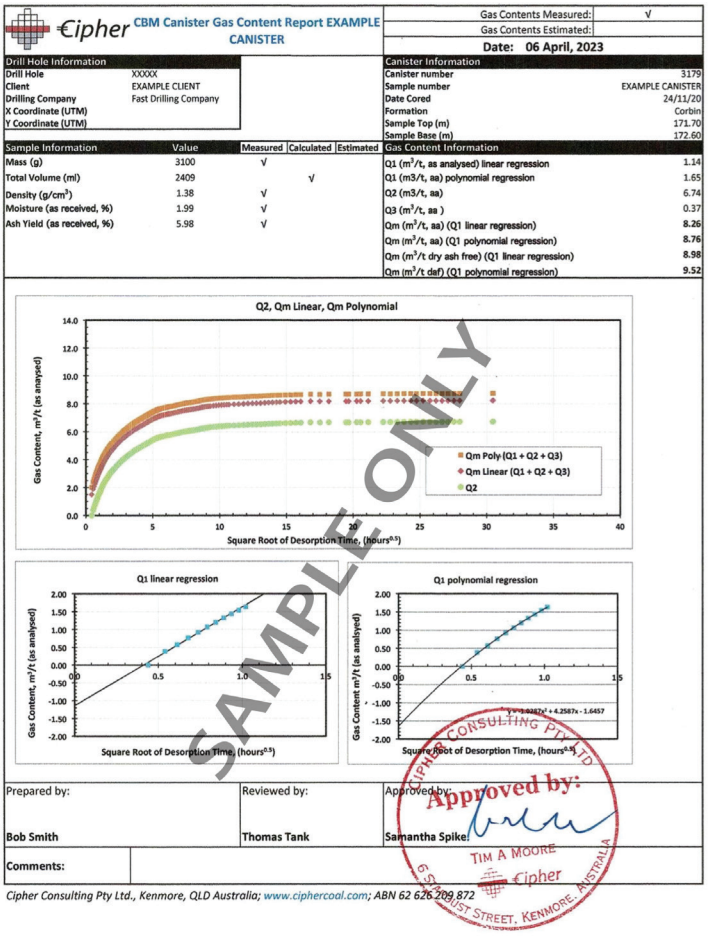
[1] Society of Petroleum Engineers, 2018. Petroleum Resources Management System. Society of Petroleum Engineers, 57 pp.
[2] American Society Testing Material, 2015. Standard practice for determination of gas content of coal - direct desorption method. D7569/D7569M. ASTM International, West Conshohocken, PA, 12 pp.
[3] Australian Standard, 1999. Guide to the determination of gas content of coal - Direct desorption method. AS 3980-1999. Council of Standards Australia, Strathfield, NSW, Australia, 33 pp.

If residual gas is determined (which is always recommended) then the following information is needed for certification:

- Sample mass
- Volume of evolved gas
- Ambient pressure, temperature and time/ date of measurement.
- Verification that samples are regularly checked to have been crushed to specified size in order to comply with testing standard

Final gas determinations also require the following analyses for samples on a canister-by-canister basis:

- % ash yield (as-received or as determined basis)
- % moisture (as-received or as determined basis)
- Relative density



Certification Deliverable

Each canister has an individual certificate, which is signed, stamped and shows lost, measured and total gas curves. Final gas content values on both an as-received and dry, ash-free basis are also given.

To ensure viable certifications contact us before you start drilling!

Tim Moore | tmoore@ciphercoal.com | +61 439 228 188

Cipher Consulting Pty Ltd
Brisbane, Australia
ACN: 626 209 872
tel Australia: +61 439 228 188
email: tmoore@ciphercoal.com | web: www.ciphercoal.com