Coal seam gas: practice data test.

Name: Class: Date:

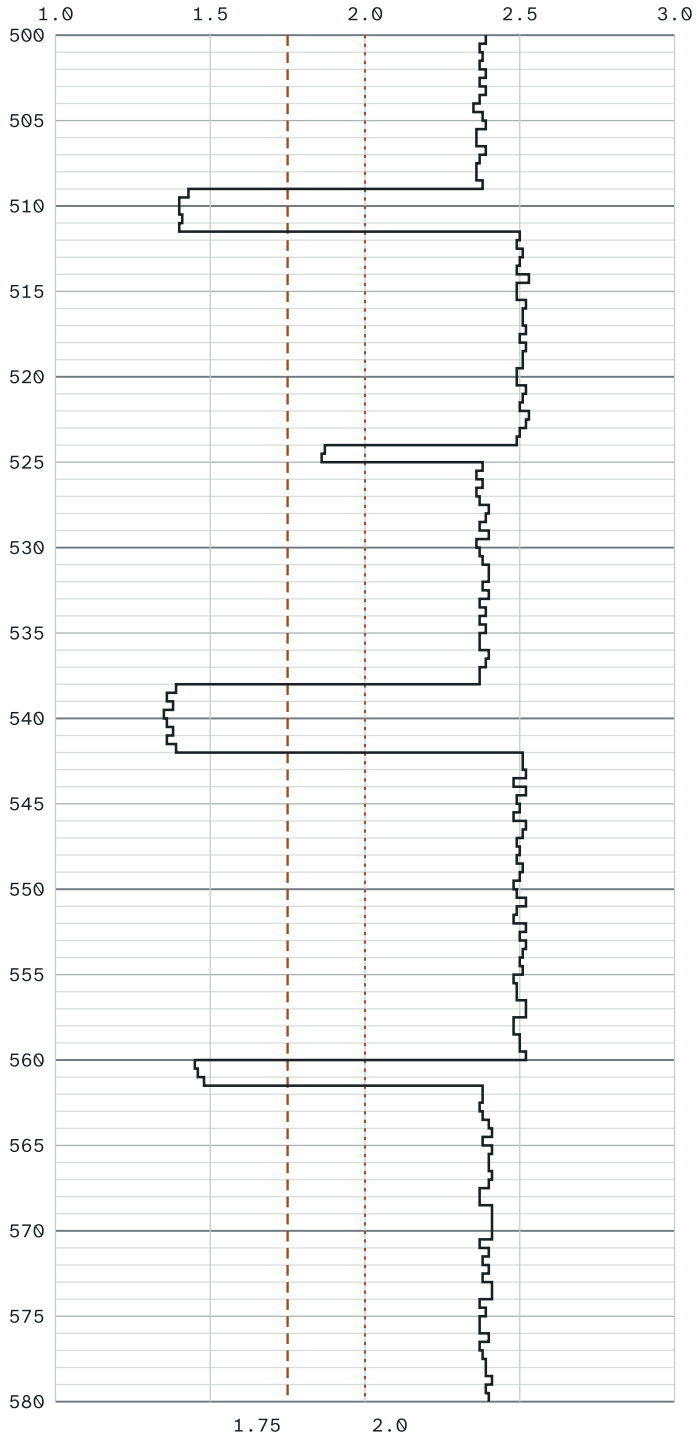
Perusal: 2 minutes. Working time: 25 minutes. You may use a calculator. Datasets A and C are model data; dataset B is real. Answer in the spaces on pages 3 and 4, and show your working for calculations.

DATASET A **Well 4 and Block D**

Model data

Well 4: density log

Depth below the surface (m) down the side; density (g/cm³) across. Each reading covers 0.5 m.



Well 4 is in Block D, which covers 1.5 km². The coal in Block D has a density of 1.45 g/cm³. Three samples of the coal from Well 4 were tested for their gas content.

Gas content of the coal samples

Sample	Gas content (m³/t)
1	3.8
2	4.6
3	5.4

Coal with little ash is below 1.75 g/cm³, and coal with a lot of ash below 2.0 g/cm³ (Lange, 2003). The dashed lines on the log mark 1.75 and 2.0.

DATASET B Water bores predicted to be affected

Real data

Long-term affected area: bores predicted to pass the trigger threshold at any time

Formation, in the order OGIA lists them	Bores
Alluvium (Main Range Volcanics)	1
Westbourne Formation	9
Gubberamunda Sandstone	2
Springbok Sandstone	103
Walloon Coal Measures	321
Hutton Sandstone	8
Bandanna Formation	1
Existing bores	**445**
Bores with make good agreements, decommissioned, or of uncertain status	302
All long-term affected bores	**747**

Immediately affected area: bores predicted to pass the trigger threshold in 2026 to 2028

Formation	Bores
Springbok Sandstone	20
Walloon Coal Measures	56
All immediately affected bores	**76**

Most of the gas comes from the Walloon Coal Measures. The Springbok Sandstone lies above them, and the Hutton Sandstone below. A bore's trigger threshold is a fall in water level of 5 m in a consolidated aquifer, or 2 m in an unconsolidated aquifer.

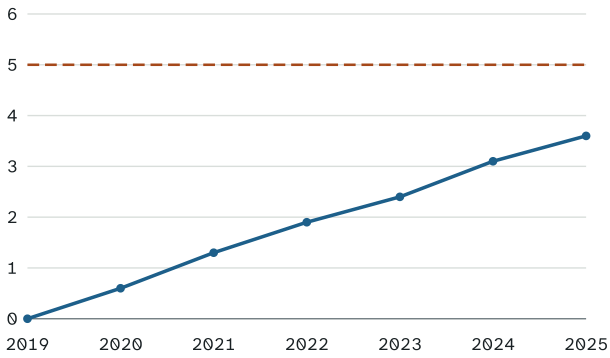
Source: OGIA, Underground water impact report 2025 for the Surat Cumulative Management Area, consultation draft, Tables 11-1 and 11-4. The parts of the Springbok Sandstone and the Walloon Coal Measures are added together.

DATASET C Two monitoring bores

Model data

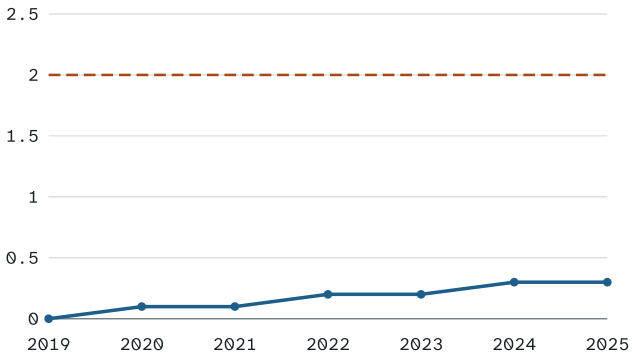
Bore X, sandstone

Drawdown since 2019 (m), with the trigger threshold of 5 m (dashed).



Bore Y, river alluvium

Drawdown since 2019 (m), with the trigger threshold of 2 m (dashed).



Drawdown (m)	2019	2020	2021	2022	2023	2024	2025
Bore X	0.0	0.6	1.3	1.9	2.4	3.1	3.6
Bore Y	0.0	0.1	0.1	0.2	0.2	0.3	0.3

Bore X draws water from sandstone, a consolidated aquifer. Bore Y draws water from river alluvium, an unconsolidated aquifer.

Questions. The tag beside each question says what kind it is and which dataset it uses.

1 `WORK OUT · DATASET A` **What is the net thickness of coal with little ash in Well 4?**

2 `WORK OUT · DATASET A` **Using the middle gas content, calculate the gas in place in Block D. Show your working.**

3 `WORK OUT · DATASET C` **Calculate the average rate of drawdown in Bore X from 2019 to 2025.**

4 `TRENDS AND LIMITS · DATASET B` **Identify the pattern in which formations hold the existing long-term affected bores.**

5 `TRENDS AND LIMITS · DATASET C` **Compare the trends in Bores X and Y.**

6 `TRENDS AND LIMITS · DATASET A` **Identify two sources of uncertainty in your answer to question 2.**

7 CONCLUDE · DATASET C **Predict when Bore X will pass its trigger threshold, and state the assumption you made.**

8 CONCLUDE · DATASET C **In 2025, should Bore Y have a bore assessment? Justify your answer.**

9 CONCLUDE · DATASET B **Infer why most of the affected bores draw water from the Walloon Coal Measures.**

10 CONCLUDE · DATASET A **Block D will only make a profit if it holds at least 70 million m³ of gas. Using your answers to questions 2 and 6, justify whether the company should develop Block D now. Use up to 150 words.**