

ANGLAIS

GROUPE 11

Brevet de Technicien Supérieur GÉOLOGIE APPLIQUÉE

Durée : 2 heures

Coefficient : 2

L'usage d'un dictionnaire bilingue est autorisé.

Tout autre matériel est interdit.

Avant de composer, le candidat s'assurera que le sujet comporte bien
3 pages numérotées de 1/3 à 3/3.



Traiter les deux questions suivantes :

I - Rédiger en anglais un compte-rendu de ce texte (en 250 mots, à ± 10 % près).

(Indiquer le nombre de mots utilisés).

15 points

II - Traduire en français, l'extrait suivant (lignes 38 à 43) :

"Before creating a large burial pit, it is important to assess the risk of the decomposing carcasses contaminating local water resources. Several geological factors influence this. You have to know how impermeable and porous the underlying rocks are, and whether they could contain faults, joints and fractures along which fluid could run. You also have to know how the glacial deposits over the rocks will affect the movement of surface water or pollutants and if it will protect any water-bearing rocks below it."

5 points

PAST ENVIRONMENTS, PRESENT CRISIS.

No-one who lived through the foot-and-mouth disease¹ epidemic of 2001 will forget the sight of enormous pyres of cattle and sheep burning. All in all around four million animals were killed to prevent the virus spreading. There was a public outcry against the pyres. That, and the sheer numbers of dead animals in areas such as northern Cumbria, eastern Dumfries and Galloway, meant that not all of them could be burned or rendered², and the government were left with a serious problem. Just how do you dispose of so many carcasses? They decided to bury them; but where?

The Ministry for Agriculture, Fisheries and Food (now part of the Department for Environment, Food and Rural Affairs (DEFRA)), the Environment Agency (EA) and the army all had a say in it. They picked Watchtree, near Great Orton, Carlisle, for one of the sites. Watchtree was an airfield in the Second World War and in the last few years was turned into a wind farm. Before they could go ahead and bury 466,312 carcasses on the rest of the land, they needed to know the site was suitable. The British Geological Survey supplied the information so they could make a decision.

Understanding the rocks underlying a proposed mass burial site is vital. The environment when the rocks were formed and the geological history since this time determine the characteristics of the rocks. These data provide an understanding of water movement at the site, both on the ground and below it. From this, the risk of contamination and pollution can be worked out.

20 History of the rocks

205 million years ago (the early Jurassic period), England was at a latitude of approximately 20 degrees N – about the present-day position of the Bahamas. It was in this environment that the rocks (the Lias Group) in the Carlisle area were deposited. Silts accumulated in shallow seas and mud in the deeper water; later deposits buried these sediments compressing them into siltstones and carbonaceous mudstones that now exist beneath Watchtree.

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Today, Carlisle is at a latitude of 55 degrees N. England's slow move north has been caused by plate tectonic movements that have subjected the rocks to stress over millions of years. Faults, joints and fractures developed and the rocks of the Jurassic seabed have been uplifted and slightly tilted during the last 65 million years to form the geological sequence of the Carlisle Plain.

During the last ice age (18,000 years ago), glaciers coming down from the western Highlands of Scotland covered the Carlisle Plain in ice up to 2,000m thick. These glaciers left behind a superficial deposit composed of clay, sand and rock boulders, known as till (or boulder clay), that smothered the Lias age siltstones and mudstones. We know this from boreholes drilled in the area.

The Watchtree site.

Before creating a large burial pit, it is important to assess the risk of the decomposing carcasses contaminating local water resources. Several geological factors influence this. You have to know how permeable and porous the underlying rocks are, and whether they could contain faults, joints and fractures along which fluid could run. You also have to know how the glacial deposits over the rocks will affect the movement of surface water or pollutants and if it will protect any water-bearing rocks below it.

Watchtree was suitable. The siltstones and mudstones of the Lias Group are fine-grained and do not allow a lot of water through. There are no known major faults and few fractures in the bedrock under the site. The till is mostly clay with relatively few sandy patches, through which fluid could move, and it is thick enough to dig out a burial pit.

The role of the British Geological Survey

The British Geological Survey (BGS), as the national geological survey of the United Kingdom, has a wealth of data including maps, reports and memoirs dating back to the late 19th century, plus site investigations and borehole records. Using these data, the BGS was well placed to provide information on this site's geology to the evaluating authorities.

The need was for local information as up-to-date, detailed geological maps. This emphasizes the importance of geological maps that show the difference between one field and another. For example, even small patches of peat in hollows may indicate the drainage characteristics of the till, so we need to know where these are.

Seventy-one boreholes were drilled at Watchtree as a part of a detailed investigation. We have recently received some cores from these. Information gained on the rock types and fossils will contribute to the study of the Lias Group strata and further increase our understanding of the region's geology.

These data will form part of the area's resurvey, to be published in a new edition of BGS 1:50,000 scale Scottish geological sheet 6E (Annan). Although the epidemic was a tragedy it has helped improve the scientific understanding of the area.

Charlotte Vye, Planet Earth, Spring 2003

Glossaire :

¹Foot-and-mouth disease : la fièvre aphteuse

²Render/rendering : équarrir/équarrissage.