

The Limestone Inquiry

Contents: A role-play exercise concerning the quarrying of limestone.

Time: 2 periods for the role-play. Preparation time (about 1 period or homework) needed beforehand.

Intended use: GCSE Chemistry and Integrated Science. Links with work on calcium carbonate, limestone and mineral resources.

Aims:

- To complement and revise prior work on calcium carbonate, limestone and its uses
- To develop awareness of issues involved in the responsible exploitation of mineral resources, particularly concerning environmental impact
- To provide an opportunity to practise skills in communication, in particular assembling and presenting an argument.

Requirements: Each student will need copies of the General Briefing (GB) and a copy of one of the Specific Briefing sheets (B1 to B7). For a class of 30, 30 copies of the GB sheets and 4 copies of each of the B sheets will be needed. If possible, the ICI video on Limestone (see 'Further resources').

It is assumed that students will already have done some work on the chemistry of limestone, including experimental work. If possible, they should have seen the ICI video, *Limestone*, which includes a certain amount of laboratory demonstration of the chemistry of limestone, as well as much information relevant to this simulated inquiry.

A suggested approach

1 Preliminary

Tell the class that next lesson they will be taking part in a Public Inquiry about a proposed extension of a limestone quarry.

Divide them into seven groups. One group will play the role of Inspectors and will organize the Inquiry. They should elect a chairperson to do the talking. Members of this group need copies of B1. The Inspectors play an important role because they control the Inquiry. It is important to have students with appropriate personal qualities in these roles, particularly the Chairperson.

Three groups will be in favour of the quarry extension. They will represent Limeco, the quarry operators (B2), the Industrial Users of Limestone (B3), and the Trades Unions (B4).

Three groups will oppose the extension. They will represent the National Park Authority (B5), Local Residents (B6), and the Local Conservation Group (B7).

Issue each member of the class with copies of the General Briefing sheets (GB), and their Specific Briefing sheets (B1 to B7) according to the group they are in. They should study these sheets in class or for homework (or both).

In school trials it was found to be very important to allow plenty of preparation time for students to assimilate the information and discuss it together.

2 On the day of the Inquiry

Each group should first spend some time together using the Briefing Sheets, their notes and other sources of information to plan how they are going to present their arguments.

The Public Inquiry itself should as far as possible be organized by the team of Inspectors. It may be better to do this in a classroom or laboratory where there is movable furniture so that the Inspectors can arrange the seating suitably. The Inspectors should be encouraged to take firm control of the Inquiry to ensure everyone gets a fair hearing.

A suggested sequence of events for the Inquiry is given in the Inspectors' Briefing sheet (B1).

Further resources

The ICI video, *Limestone*, is very useful and can be purchased at a subsidised price from: Argus Film and Video Library, 15 Beaconsfield Road, London NW10 2LE.

ICI Mond Division have some useful resource material relating to limestone:

Lime Products, an illustrated colour booklet

Limestone and Lime Products, a sheet showing uses.

Available from: ICI Mond Division, PO Box 13, The Heath, Runcorn, Cheshire WA7 4QF.

The Council for the National Parks has a kit, *Know your National Parks*, which includes factsheets on many aspects of the parks, including geology and mineral resources. Available for a small charge from: Council for the National Parks, 45 Shelton Street, London WC2H 9HJ.

Acknowledgement Figure 5 supplied by ICI Mond Division.

THE LIMESTONE INQUIRY

General Briefing

You are going to take part in an imaginary Public Inquiry concerning a limestone quarry.

Limeco Ltd have a large limestone quarry set in beautiful country in the Peak District National Park in Derbyshire. Limeco have asked the National Park Authority for planning permission to extend the quarry. They want to double the amount of limestone produced. The Authority has refused permission. Limeco have appealed against the decision, and now there is to be a Public Inquiry.

You will be playing a part in the Inquiry, and later you will have to read a special briefing about that part. But first you should read the rest of this General Briefing.

What is limestone?

Limestone is calcium carbonate, CaCO_3 . It is formed from the remains of organisms that lived in ancient seas 300 million years ago. The limestone that occurs in the Peak District is especially pure, so it very useful, particularly for the chemical industry.

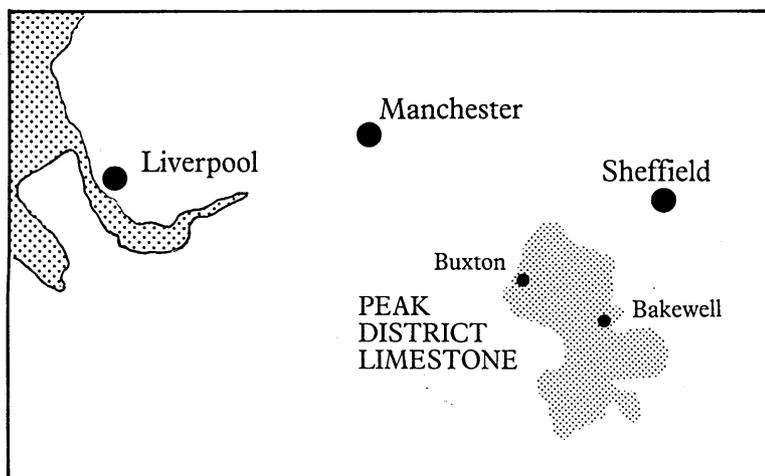


Figure 1 Map showing the Peak District

What happens in a limestone quarry?

Over a million tonnes of limestone are taken from the Limeco quarry every year. Explosives are used to blast the rock from the quarry face (Figure 2). The quarry face is 2 km long and 30m high.

The rock is loaded onto huge lorries and taken for sorting into pieces of different size. Part of the limestone is processed on the quarry site. It is used to make other things such as cement and quicklime. Part is carried away by rail or road to customers who use limestone itself. A lot of limestone is used for aggregate. Aggregate is lumps of rock or stone used to make concrete or in road-building.

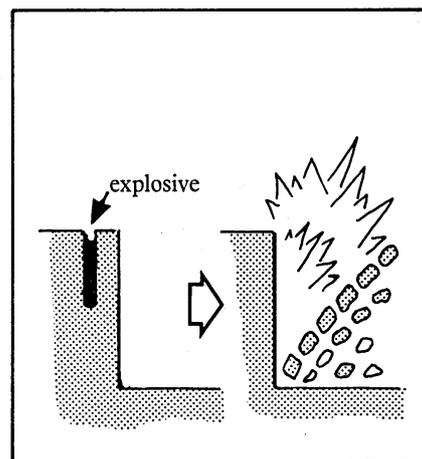


Figure 2 Blasting limestone.
60 000 tonnes are blasted at a time

What is limestone used for?

Figure 3 shows the main ways limestone is processed on the quarry site.

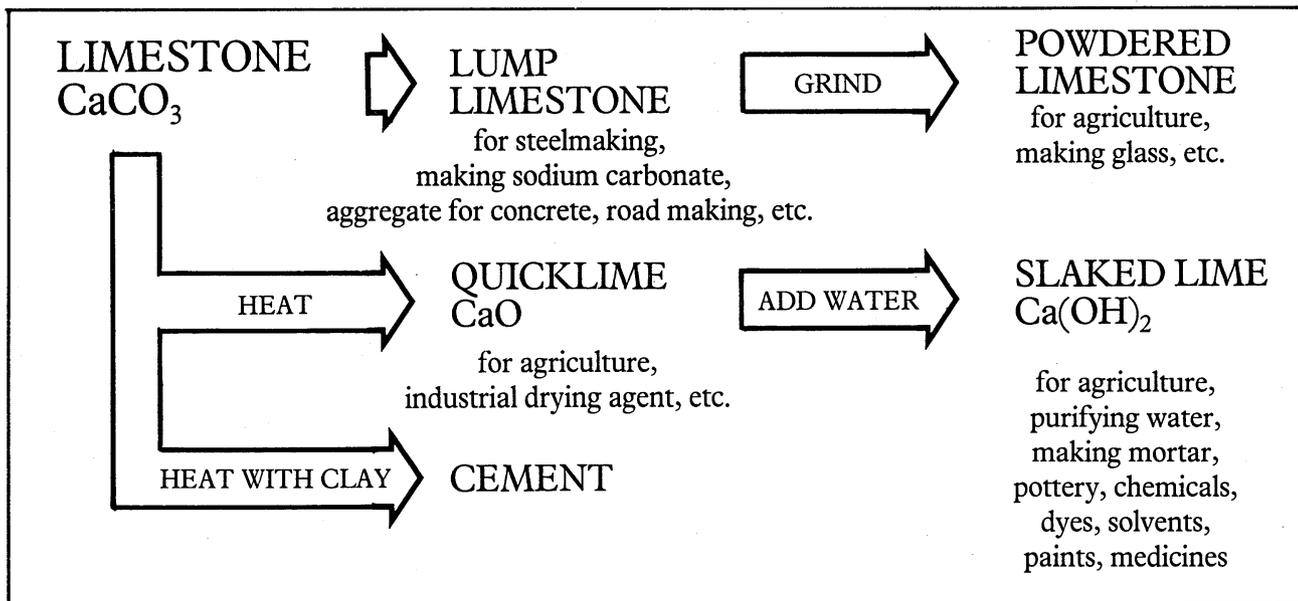


Figure 3 Some of the ways limestone is processed, and the main uses

Figure 4 shows the layout of the main parts of the Limeco quarry.

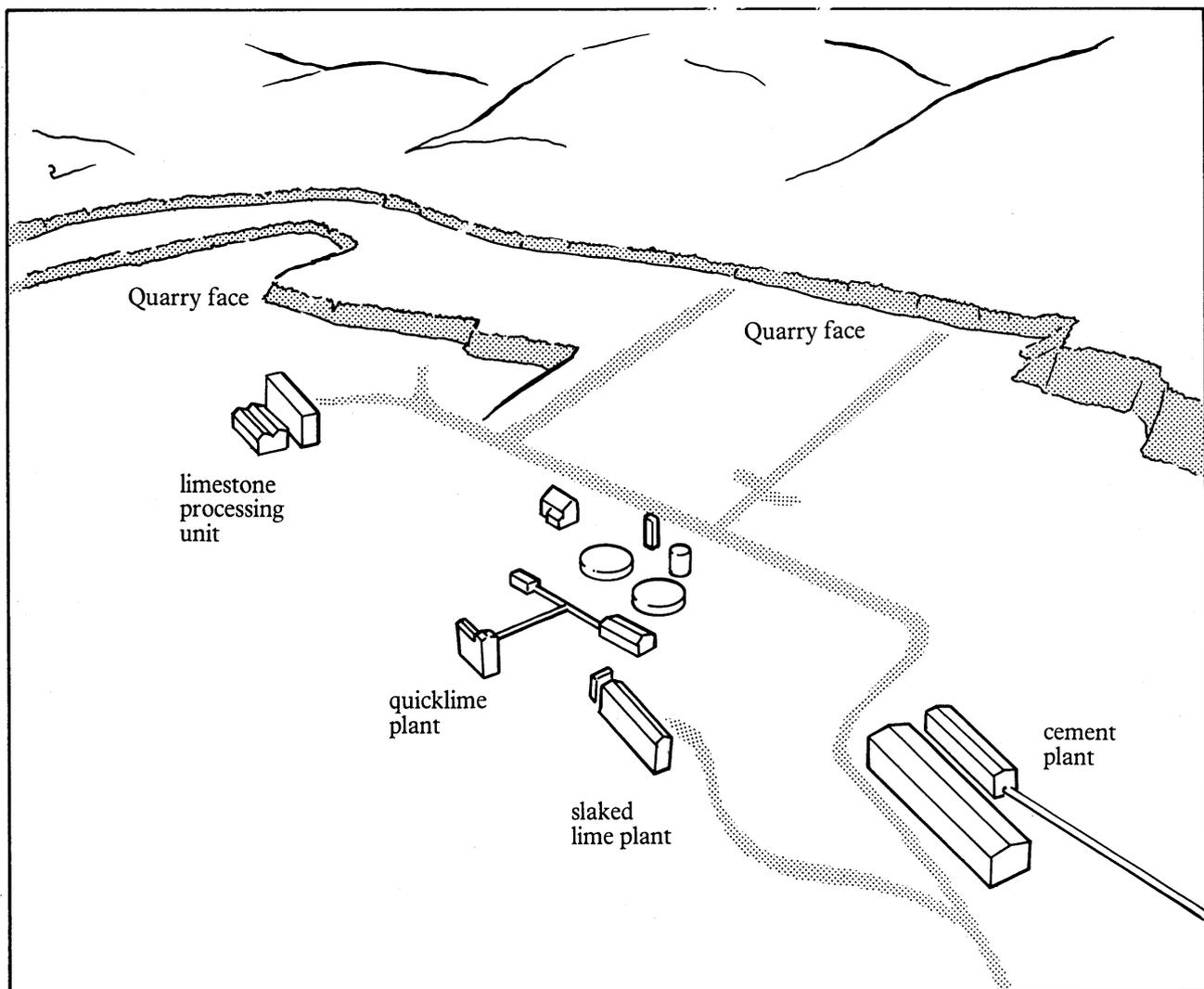


Figure 4 Layout of main parts of quarry

What you will be doing

At the Public Inquiry there will be a group of Inspectors who will listen to arguments for and against the quarry extension. These arguments will be put by the following groups:

- For: Representatives of Limeco
 Representatives of Industrial Users of Limestone
 Representatives of Trades Unions
- Against: Representatives of the National Park Authority
 Representatives of Local Residents
 Local Conservation Group

During the Inquiry you should bear in mind the 'Silkin Test'. This is three conditions which must be satisfied before planning permission can be given to extract minerals in a National Park.

- 1 There must be a clear need for the mineral which no other mineral can meet
- 2 There must be no other source of supply
- 3 The quarry company must guarantee to restore the site after use.

(These conditions are called the 'Silkin Test' after the Minister, Lewis Silkin who guided the 1949 National Parks and Access to the Countryside Bill through the House of Commons.)



Figure 5 Limestone processing equipment at a large quarry in the Peak District

Briefing Sheet 1

The Inspectors

You are one of the panel of Inspectors in charge of the Public Inquiry. You have to listen to the various arguments put forward, then present a report to the Secretary of State for the Environment.

While listening to the arguments you must bear in mind the three conditions of the 'Silkin Test', given in the General Briefing.

Before the Inquiry starts you should decide who will be the Chairperson of the panel of Inspectors. Your Chairperson will do the speaking at the meeting.

It will be the job of the Inspectors to run the Inquiry and keep order. Much of the success of the Inquiry depends on you!

Organizing the Inquiry

Preparation

Arrange the seating in the room where the Inquiry will be held. Remember there will be three groups speaking in favour of the quarry extension (Limeco, the quarry operators; the Industrial Users of Limestone; and the Trades Unions). There will be three groups against (the National Park Authority; Local Residents; and the Local Conservation Group.)

The Inquiry

- 1 Call the meeting to order. Remind them that they should bear in mind the 'Silkin Test' when they present their arguments. A maximum of two minutes will be allowed for the presentation of arguments. During the speeches, do not allow anyone to interrupt.
- 2 Call on the representatives of Limeco to state their case appealing against the decision by the National Park Authority not to allow the quarry extension.
- 3 Call on the representatives of the National Park Authority to explain why they refused planning permission.
- 4 Call on first the Industrial Users of Limestone, then on the Trades Unions to support the case made by Limeco.
- 5 Call on first the Local Residents and then the Local Conservation Group to make their case against the extension.
- 6 Give everyone a final opportunity to answer points made by opposing groups. If you think there are any matters which have not been clearly explained, ask questions to help clear them up. Do not allow anyone to talk *too* much!
- 7 Close the Inquiry by saying when you will be publishing your report with its recommendations.

After the Inquiry

After the Inquiry you will consult together and write a short report stating whether or not planning permission should be granted. If permission is granted you should state any conditions to be met by the quarry operators. You will submit your report to the Secretary of State for the Environment (your teacher) who will announce the final decision in about six months time — or possibly sooner.

Briefing Sheet 2

Representatives of Limeco

You represent Limeco, the quarry operators. At the Inquiry you will have to present your arguments for extending the quarry.

You and the other representatives should first read this briefing. Then discuss the arguments you will put forward in a two-minute presentation at the Inquiry. You may want to elect a single person to speak, or share it between you.

The main points of your case

- You argue that the quarry has been a supplier of high quality limestone to industry for a long time. Transport links already exist and modern equipment (including kilns and crushing plant) is already on the site. To start a new quarry outside the Park would be very expensive because of the cost of new roads and new plant.
- It is unfortunate that the best, high purity limestone occurs in areas of natural beauty. However, extension of an existing quarry will have less effect on the environment than opening a new quarry somewhere else.
- New wheel-washing equipment will be installed to ensure that lorries do not deposit mud on the roads. New roads built to the quarry extension will be tarred to reduce the nuisance of dust and mud.
- Tree planting and landscaping will be carried out around the site before quarrying starts on the extension site. In the new part of the quarry the faces will be about 20 metres high instead of 30 metres as in the old quarry. This will reduce the visual impact of the extension.
- You consider that the extension will allow a much more natural restoration scheme for the whole site when quarrying ends. Restoration will produce a new dale which will in time look natural. You will restore the whole site for recreational use when quarrying finishes.
- If the quarry extension is permitted you will be able to increase your grants to two university groups who are investigating better ways of restoring quarries after use. You will also make grants to local trusts who are developing abandoned quarries in the area as nature reserves.

Note You may decide not to use all these arguments when making your initial presentation to the Inspector. You may want to keep some of the points in reserve, ready to answer points made by groups opposing the quarry extension.

Briefing Sheet 3

Industrial Users of Limestone

You represent some of the industrial users of the limestone quarried by Limeco. At the Inquiry you will have to present your arguments in support of the extension to the quarry.

You and the other representatives should first read this briefing. Then discuss the arguments you will put forward in a two-minute presentation at the Inquiry. You may want to elect a single person to speak, or share it between you.

The main points of your case

- For industrial purposes it is essential that the calcium carbonate used is pure. Any impurities have to be removed, and this requires extra and expensive processes. There is also the problem of disposing of the waste impurities.
- Limestone deposits are widely distributed in Britain and are quarried for many different uses. The deposits in the Peak District of Derbyshire are particularly useful. They are very pure. The deposits are easy to get at. They are near to the big industrial centres of the Midlands and the North, but unfortunately they are also in areas of outstanding beauty.
- Limestone from this district has supplied the chemical industry in Cheshire and South Lancashire since the early nineteenth century. The quarry operators understand the needs of the chemical industry. There are suitable transport links by rail and road. It would be very disruptive socially and economically if other supplies had to be found.
- The National Park Authority considers that too much of the limestone is being used for aggregate in road-building and for concrete. You will therefore wish to stress the important uses of limestone in the chemical industry, in agriculture and in steelmaking. Figure 3 in the General Briefing summarizes some of the uses of limestone and limestone products in industry. You can point out that it is unavoidable that some aggregate is produced. This is because only part of the limestone is of the right size for use in the chemical industry.

Briefing Sheet 4

Representatives of Trades Unions

You represent the trades unions involved in the work at Limeco's quarry. At the Inquiry you have to present your arguments in support of the extension to the quarry.

You and the other representatives should first read this briefing. Then discuss the arguments you will put forward in a two-minute presentation at the Inquiry. You may want to elect a single person to speak, or share it between you.

The main points of your case

- You represent the people who work in the quarry. The extension will safeguard their jobs for up to twenty years.
- You also represent the self-employed lorry drivers who transport two-thirds of the quarry output. The extension will safeguard their employment too.
- Limestone from the quarry is necessary for the steel, glass and chemical industries. It helps to maintain employment in these areas too.
- You realize that local people are affected by noise, dirt and the visual impact of the quarry. However, quarry operators make a big contribution to the local rates (Table 1).

Table 1 Where the local council get their money

	%
Household ratepayers	51
Quarry ratepayers	10
Other industrial ratepayers	8
Commercial ratepayers	11
Other non-domestic ratepayers (for example, water, gas, schools, etc.)	20

- You realize that local people are annoyed by dust and mud from lorries. Some of this is caused by workers who do not follow the rules about covering the lorries and washing mud off the wheels. You are prepared to support the employers to make sure the rules are followed. However, the workers must be allowed enough time in the work schedules.

Briefing Sheet 5**Representatives of the National Park Authority**

You represent the National Park Authority, who have refused permission for Limeco to extend their quarry. At the Inquiry you will need to present your arguments supporting your refusal.

You and the other representatives should first read this briefing. Then discuss the arguments you will put forward in a two-minute presentation at the Inquiry. You may want to elect a single person to speak, or share it between you.

The main points of your case

- Your main concern is to preserve the natural beauty, scenery and wildlife of the National Park.
- You accept that some quarrying is necessary. The quarry produces very pure limestone which is needed by the chemical industry. However, you argue that the needs of the chemical industry can be met from the present quarry for many years.
- You consider that the extension is only required because too much stone is being used as aggregate for road building and concrete. Limestone for road building and concrete can be found outside the National Park. The figures show that over half the limestone output from National Park quarries is being used as aggregate for road building.
- Even if you lose the Inquiry, and permission for the extension is given, you feel there should be strict conditions. There should be conditions on the area of working and landscaping, and restoration when the quarry is worked out.
- You are convinced that there is no need to take a decision quickly. There is not enough information about the national need for limestone. A national survey of limestone deposits needs to be carried out. A long-term plan for the extraction of limestone should be developed. Until this is done no further permission for quarrying in National Parks should be granted.

Briefing Sheet 6

Representatives of Local Residents

You represent the residents living in the area around the Limeco quarry. At the Inquiry you will have to present your arguments against the extension of the quarry.

You and the other representatives should first read this briefing. Then discuss the arguments you will put forward in a two-minute presentation at the Inquiry. You may want to elect a single person to speak, or share it between you.

The main points of your case

- The quarry is ugly, dirty and noisy. It is only 150 metres from the nearest houses.

Ugly — the quarry is a blot on the landscape, an ugly scar in otherwise beautiful countryside.

Dirty — you suffer from dust falling in and around your homes. Dust comes from drilling, blasting and stone crushing. There is even more dust when they tip waste on dry and windy days.

Noisy — you suffer from the noise of machinery and traffic.

- The quarry operators say they will restore the quarry at the end of its life. However, you are suspicious because in the past they have not restored quarries properly. They have left ugly heaps of waste.
- The lorries from the quarry are too big for the roads. They cause a lot of dirt in the air and mud on the roads. The lorries are not always covered as they should be. The wheel-washing equipment seems inadequate when the quarry is busy. The lorries are often driven too fast.
- Limeco say the quarry extension will create extra employment. But statistics show that employment in the quarries has fallen in the last thirty years (Table 1). So local people and local shops get less benefit from the quarry even if it does create employment further away.

Table 1 *Employment statistics in the Peak National Park 1953-1976*

Year	1953	1963	1970	1976
Number employed in quarries	4978	4042	3300	2180

Briefing Sheet 7

Local Conservation Group

You are a member of a local conservation group, concerned about the effect of the quarry extension on the local environment. At the Inquiry you will have to present your arguments against the extension of the quarry.

You and the other representatives should first read this briefing. Then discuss the arguments you will put forward in a two-minute presentation at the Inquiry. You may want to elect a single person to speak, or share it between you.

The main points of your case

- Quarrying limestone permanently changes the landscape. This area was made a National Park because it has some of the most beautiful scenery in Britain. It should be kept beautiful and natural for everyone to enjoy.
- Quarrying destroys the characteristic vegetation of the district and removes the habitat of wildlife.
- If permission to extend the quarry is granted, you are very concerned that the quarry site should be properly restored after use. This means making sure the disused quarry blends in with the landscape. A restoration plan must be produced before quarrying starts. The operators should also show how they will prepare for restoration during the working life of the quarry. For example, the planting of trees to screen the site needs to be planned up to thirty years ahead.
- You are worried that the quarry operators will be looking for the cheapest method for restoring the site. You insist that restoration must be done properly. You are particularly concerned that the disused quarry should not be used as a waste tip.
- If permission is granted, you insist that the quarry face should be shallow. Towards the end of the life of the quarry, the face should be left so that it will weather to look like a natural cliff. Ledges and screes should be left which will give opportunities for colonization by plants.