

Durham County Council

**Killhope Museum
Creative Science Programme**

Key Stage 1 & Key Stage 2

“A zest for life combined with a will to experiment”

**Overground
Underground Sound**

**Science Detectives Discover
Killhope**

Resources for Teachers

SMA

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KS1 & KS2 Overground Underground Sound

Teachers Resource Pack Killhope Museum Creative Science Programme

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Killhope Lead Mine

Background Information

The 18th Century Boom

Over 200 years ago the Killhope valley experienced a mining boom. New people moved into the area. Shafts, levels, 'hushes' and 'dead heaps' were scattered far and wide over the hillsides. Many of the scars of mining are hidden beneath the trees, but the landscape must have looked devastated. Nearly all the houses you can see in the valley were built during the boom times of the second half of the 18th century. The houses were not huddled together in a village, but scattered over the south-facing hillside. Each family was surrounded by land they could farm to add to the small income they got from the mines.

At Killhope the 'W B Lead' company worked the mines. This was a family business owned by the wealthy Blckett family (later through marriage the Beaumont family). The company leased the mining rights and most of the land in the valley from the Bishop of Durham. This meant that many miners had their bosses as landlords. With a tight grip on employment prospects the Blckett family was a powerful influence on the lives of the workers and their families.

Park Level Mine

Until 150 years ago the area that is now Killhope Lead Mining Museum was field, open moorland and fell. In the 1850s a new mine was started. First, a tunnel was dug to reach the lead veins upstream, then the mine shop was built, and by the 1870s the Killhope Lead Mine was one of the most productive in the whole country. W B Lead's company supplied about one-quarter of the lead mined in England. They had a prestige product that sold at premium prices on the London market. Killhope's second boom had arrived.

W B Lead built the big wheel and buildings near it, to power and house brand new ore crushing and separating machinery. This plant, known as Park Level Mill, started production in 1878.

Shortly after this the price of lead fell by half, undercut by foreign competition. The Weardale Lead Company took over Killhope and prospered, but the mine was almost worked out. The last ore was brought out in 1910.

In some places in Weardale fluorspar mining took over from lead mining and saved many jobs but this did not happen in Killhope. Machinery was sold. Stone was sold off for building. Timber and metal were scavenged. Sheep were the new inhabitants.

A new beginning

In the 1950s the Forestry Commission bought the land of the Killhope valley. The 'Weardale Forest' was planted as an experiment - the highest plantation in England. By chance, the Killhope water wheel had been left in its original location. In 1968 Durham County Council took a lease on Park Level Mill, its wheel and buildings, to develop as a picnic site. Then in the mid 1980s the County Council bought the site and adjacent woodland.

Overground Underground Sound

Teachers Resource Pack Killhope Museum Creative Science Programme

National Curriculum Science KS1 and KS2

The **Overground Underground Sound** Pack is part of the Creative Science Programme developed for Killhope Lead Mining Museum and Durham County Council.

The **Overground Underground Sound** teachers' resources offer a range of possible pre and post-visit activities linked to the focus of on-site activities that pupils will be involved in at Killhope supported by the expert team of Information Assistants.

These activities are in no way comprehensive and neither are they meant to be. But they do provide a selection of cross-curricular activities that will support pupils in preparing for their visit and ideas for follow up work.

As you will be aware, for the value of the visit to have the maximum impact good preparation is essential. Good preparation also gives children the confidence to allow their imaginations to work, giving full reign to their thinking skills in making connections and creating their own tests and experiments before, during and after their visit to Killhope Museum. On-site the class will experience the creative application of scientific principles in the context of a 'real life' situation – Killhope – a nineteenth century lead mine in the North Pennines, County Durham.

The activities in the **Overground Underground Sound** Killhope Creative Science Teachers Resource Pack both on and off site are centred on the requirements of the National Curriculum and in particular the QCA **Unit 1F Sound and Hearing** and **Unit 5F Changing Sounds**. They focus on the science principles and concepts that can be best explored at Killhope Lead Mining Museum.

There is also a strong emphasis on cross-curricular links. Literature, poetry, music and art are used to engage children in exploring and developing an understanding of the science and significance of sound to our daily lives. Listening and creative thinking skills are developed through story telling using the specially written Killhope Sound story: '*What is this Place?*' and the sound creation activities following a visit to Killhope Museum.

The other three Killhope Creative Science Packs for KS1 and KS2 are

Forces & Motion
Materials Maze – Materials and their Properties
Rocks and Soils

Sound in Context

Visiting Killhope Lead Mining Museum

'A safe and stimulating environment for learning'

At Killhope Lead Mine in Upper Weardale in the 19th century questions (and answers) about science were fundamental to running a successful lead mining business and for personal survival in the isolated location and harsh climate of Pennine Hills.

Over 100 years later, Killhope is no longer a working lead mine but is a museum run by Durham County Council. The purpose of Killhope Museum is to care for and display buildings, refurbished industrial equipment and show life above and below ground in a nineteenth century lead mine in the North Pennines. Current features of the museum include: tours of the mine, refurbished working water wheel, displays in the miners' living accommodation, blacksmith's shop, and mineral displays, washing floor, jigger house, woodland areas, museum display areas and café, shop and toilet facilities.

Killhope Lead Mining Museum provides a safe and stimulating environment for educational visits.

Educational visits to Killhope have a very good reputation. Visiting teachers and pupils particularly value the involvement of trained staff from the museum during every visit, and the focus on hands on and participatory activities. This approach to site-based learning was commended recently in *The Guardian's* Education supplement. The newspaper reported that Killhope is "an inventive and vibrant museum with an excellent tour and educational package.....the Museum prides itself on being a worksheet -free zone: pupils are encouraged to 'do' rather than observe....."

The Killhope Creative Science Programme builds on the established reputation of Killhope Lead Mining Museum for 'hands on' and participatory activities, making full use of the expertise of the trained staff team. The Killhope Museum site and collection of buildings, machinery and artifacts in their original setting within the landscape of the North Pennine hills offer a unique opportunity to explore innovatory approaches to science education at KS1 and KS2 and sound in context.

Creative Science at Killhope

Inspiring learning through Creative Science

The concept of creative science is an exciting new approach to engaging pupils in learning about science supported by QCA. Creativity allows for greater flexibility in terms of learning opportunities. Thinking creatively means that science can be inspiring. Once the traditional boundaries between arts and science are broken the creative arts can also be a rich source of inspiration for science learning.

Other boundaries are crossed too. Links can be made to real life situations beyond the home/ school environment. Undertaking interesting, new scientific experiments relevant to a particular place and industrial practices enables pupils to gain a better understanding of scientific principles, their application and usefulness.

Science Detectives

Detectives need to be equipped with a range of special qualities and some special equipment. Discuss with the class what these special qualities are and what equipment would be helpful in looking at different materials in detail.

Explain that when the class arrives at Killhope, the children will be divided into several groups. Each group will explore and undertake experiments around the site. When the class gets back to school one of the tasks will be for each group to report back to others in the class on their observations, the evidence they have found, the tests and experiments they have carried out and their experiences.

It is up to individual teachers how far they pursue the 'science detective' idea. Digital cameras, video cameras and voice recorders would be useful for recording purposes.

Pupils will need to understand the importance of

- Close observation and examination of clues
- Gathering and sifting through evidence, then sorting it into different categories
- Carrying out investigations and tests
- Using different methods to solve a problem

Subject links and cross-curricular learning

Across all four Killhope Creative Science Packages art, drama and dance are used when appropriate as innovative approaches to experiential learning in primary science alongside 'hands-on', inter-active practical sessions at the Museum.

Cross-curricular learning is encouraged, in particular the use of ICT and literacy. In turn pupils of primary school age are inspired to explore, experiment and gain an understanding of the application of scientific principles in the context of a 'real life' situation – Killhope – a nineteenth century lead mine in the North Pennines, County Durham.

Overground Underground Sound: Creative Science Learning Activities

The **Overground Underground Sound** Teachers' Resource Pack is divided into three sections focussed on Pre-visit, On-site and Post-visit Follow Up Activities.

There is a logical development from one section to the next linked closely to the National Curriculum Science with an emphasis on repeating and therefore reinforcing the learning about the science of sound communication and the creative stimulus of sound.

(Note: Children under the age of 4 years are unable to go on the mine visit underground)

Section 1: Pre-visit Activities – Sound Communication Experiments & A Sound Story

Sound Bites; Splash; Tell Me Your Name; Tunnel Sound; 'Overground' Sound Story for Killhope

Section 2: On-site Activities - Creative Science: Sound at Killhope

More Sound Bites; A Greater Splash; Overground Sound Story at Killhope; Underground Sound at Killhope; Collecting and Recollecting Killhope Sounds

Section 3: Post-visit Follow Up Activities - Creative Science: Sound at Killhope

Sound Story Workshop; 'Killhope Orchestra'; ICT dimensions to Sound at Killhope; Developing Creative Thinking Skills; Breaking the Sound Barrier: Art & Science

However, many of these activities are also designed for a flexible approach. You may choose to do more preparation or more follow up. You may choose to take a strong science focus supported by the creative work or you may choose to integrate 'arts/science' learning.

How you decide to approach using the **Overground Underground Sound Teachers Resources** will depend on how you want to include the on-site learning at Killhope within your curriculum planning, schemes of work and the timing of the visit to Killhope.

Overground Underground Sound

Section 1: Pre-visit Activities: Sound Communication Experiments & A Sound Story

1a Activity 1: Sound Bites (Continued on-site at Killhope Museum)

Sound Bites – Sound Collection & Communication

Make a collection of different sounds using tape recorders, CDs, DVDs.

- **Animals and birds** - bird song, whales, cats, dogs, horses, frogs etc
- **Natural elements** - wind, water, fire
- **Household** - washing machine, toilet flushing, vacuum cleaner
- **Street** - cars and lorries, fire engines, police, ambulance, refuse collection vehicles
- **Music** - classical, pop, jazz (voices and instrumental)
- **People** - talking, singing, shouting, calling, coughing, crying, snoring, whistling

Group work discussion

Identifying different sounds made by natural forces, machines, instruments, animals, birds or people.

- How do you know who or what is making the sound?
- Are the sounds from one machine, animal, person or natural phenomenon always the same?
- How are they different? Loud, soft, happy, sad, urgent, fast, slow etc.
- What do different sounds and noises communicate?
- Compare happy sounds and unhappy sounds made by machines, people, birds and animals: how are they different?

Sound Road Map

Either on the computer or as a frieze on the classroom wall design a 'class' Sound Road Map that goes from the School to Killhope - houses, streets, countryside with people, cars, lorries, animals, birds and of course the weather!

Make a sequential 'sound recording' to accompany the journey. This 'sound journey' could start at home before the children arrive at school and could include sheep 'baa baa' at the end!

The sounds could be made by the children using their voices or playing instruments and could also include their own tape recordings and extracts from CDs.

1b Activity 2: Splash

Using a robust water tank or water tray like those found in Nursery and Reception classes or even better a park/ village/ school or garden pond

- Drop a small object into the water and observe the small ripples traveling away from the splash
- Drop a larger object into the water and observe the larger ripples traveling away from the splash

Note: different sized pebbles give different sized ripples and represent louder or quieter sound waves.

Explanation

- The source of a sound is a similar thing to a splash in the water
- A stone dropped into water is very much like a sound being made in the air. Ripples or waves move across water from the splash in exactly the same way as 'sound waves' move through the air from a 'sound source'. Ripples or waves moving out from the splash will 'disturb' the smooth water
- Sound waves moving out from the sound source will disturb smooth air in exactly the same way
- This disturbance to the smooth air can be called a 'vibration'
- A small sound is like a small splash sending little soft 'sound waves' through the air
- A big sound is like a big splash sending large noisy 'sound waves' through the air
- Ripples near to the splash are big but get smaller as they move further away from it
- In the same way, sound waves get smaller the further they move away from the 'sound source'. (See next activity)

1c Activity 3: Tell Me Your Name

In the school hall or playground.

- Stand children in pairs facing each other about half a metre apart. They tell their partner their name in a normal voice. Can they hear each other?
- Move the pairs backwards, still facing each other until they are about 7-10 metres apart. Using the same level of voice they say their names again, Can they hear each other now? Is it the same volume they hear as it was the first time?
- Move pairs back to the extreme edge of the space and repeat the exercise. Same volume. Can they hear each other now? Is it the same volume as the first or second time?
- Staying at the edge of the space, turn away from the partner and repeat the exercise and questions.
- *To achieve a comparative study, this whole exercise can be repeated with the pairs of children shouting their names at each other.*

The findings of this experiment can be recorded by the children for future reference and making further comparisons.

Explanation

Just like the ripples disturbing the smooth water, sound waves travel through and disturb or vibrate the smooth air.

The nearer we are to the 'sound source', the greater the sound wave or vibration in the air is and the sound we hear is louder.

The further away from the sound source we are the smaller the sound wave in the air is; and the sound we hear gets quieter until the wave does not reach us and we don't hear it at all.

If the sound source is directed away from us, the sound wave is even more difficult to hear.

1d Activity 4: Tunnel Sound

Enlarging Sounds, Making Echoes and Muffling Sounds

(a) Amplification (Enlargement) of Sound

- Use a rolled up piece of card or a length of plastic plumbing pipe (about 15cms x 75cms will do)
- Ask the class for their reaction to the volume of sound created as you make a sound and it comes down the tube. It will be 'amplified'
- Go through the process of increasing the distance between you and the children again and again. Ask them to note the difference in effect
- Make echoes in a nearby sub-way, a metal dustbin, 'wheelie' bin or other similar hard-sided enclosed space large enough to produce an echo

Practice learning and singing Charles Wesley's hymns ready to compare the difference in sound of singing in the classroom, in the playground and underground in Killhope Lead Mine.

Two of Charles Wesley's hymns are included below.

Explanation

- This amplification happens because the sound waves are contained within the solid sides of the tube. They literally bounce off either side and are carried forward in a condensed way until they leave or escape from the pipe. Inside the pipe the sound waves can't escape and travel away and therefore will stay strong and carry further.
- This is also where the notion of an 'echo' comes from. The same sound wave bounces back off the hard surfaces in a contained space. It cannot escape.

Inside Killhope Lead Mine

- This 'sound bouncing' effect is exactly what happens when the sound bounces off the floor, walls and low ceilings inside Killhope Lead Mine – no matter how big or small the sound may be!
- Observe how singing quietly or loudly and at different pitches in different places underground in Killhope Lead Mine changes the echo. The singing vibrates the air more or less depending on the size of the sound. Louder sounds will travel further and produce a larger echo. Quieter sounds will travel less far and produce a smaller echo.
- The size and shape of the enclosed space will make a difference to the pitch of the echo. The vibration of air from hymn singing in a low, narrow underground tunnel will create a high pitch echo. The same hymn singing in a large, wide, high underground cavern will create a low pitched echo.

(b) Reduction (Lessening) of Sound – ‘Muffling’ the Sound

Set up a ‘Fair Test’ to see how sound travels through solids and liquids using different materials and different thickness of materials (solids) or volume of materials (liquids).

You will need

- Waterproof shower radio on a string(one or more)
- Bubble –wrap
- Fleece jacket
- Plastic box
- Room where you can go outside easily (bricks & glass)
- School pond or tank of water

Working in Groups - ask the children to

- Plan a test to measure or observe how well different materials muffle sound and consider how they will record their findings.
- Consider the ‘loudness’ or ‘softness’ of the sound compared to the ‘type’ of material and ‘thickness/ layers’ or ‘area/ volume’ of material.
- Repeat the exercise starting during your visit to Killhope Lead Mine and completing it afterwards in the classroom using
 - The same waterproof shower radio on a string
 - Spaces inside/ outside the Mine Shop (stone and glass)
 - Spaces inside the Lead Mine
 - Water on the Lead Mine Floor
 - Wooden Box
 - Woollen cloth

Collecting the ‘real’ sounds made in Killhope underground lead mine

At Killhope Lead Mine you will be asked to listen to and to collect the ‘real’ sounds made in the underground lead mine.

You will be able to listen to and observe how the different sounds are made, how the sounds travel through the mine, what materials they travel through and what materials stop the sound travelling through them and why.

Hymns to Sing Underground in Killhope Lead Mine

Charles Wesley (1707 - 1788)

Charles Wesley wrote over 6,000 hymns. He was the younger brother of John Wesley whose work led to the establishment of a new form of Christian worship called Methodism.

There was a strong tradition of Methodism in the Weardale Valley. Killhope lead miners found support from their faith in God and the simple hymns they sang in chapel. Here are two well known examples.

Hark! the Herald Angels Sing

Hark! the herald angels sing,
"Glory to the new born King,
peace on earth, and mercy mild,
God and sinners reconciled!"
Joyful, all ye nations rise,
join the triumph of the skies;
with th' angelic host proclaim,
"Christ is born in Bethlehem!"
Hark! the herald angels sing,
"Glory to the new born King!"

2.

Christ, by highest heaven adored;
Christ, the everlasting Lord;
late in time behold him come,
offspring of a virgin's womb.
Veiled in flesh the Godhead see;
hail th' incarnate Deity,
pleased with us in flesh to dwell,
Jesus, our Emmanuel.
Hark! the herald angels sing,
"Glory to the new born King!"

3.

Hail the heaven-born Prince of Peace!
Hail the Sun of Righteousness!
Light and life to all he brings,
risen with healing in his wings.
Mild he lays his glory by,
born that we no more may die,
born to raise us from the earth,
born to give us second birth.
Hark! the herald angels sing,

"Glory to the new born King!"

Christ the Lord Is Risen Today

1.

**Christ the Lord is risen today, Alleluia!
Earth and heaven in chorus say, Alleluia!
Raise your joys and triumphs high, Alleluia!
Sing, ye heavens, and earth reply, Alleluia!**

2.

**Love's redeeming work is done, Alleluia!
Fought the fight, the battle won, Alleluia!
Death in vain forbids him rise, Alleluia!
Christ has opened paradise, Alleluia!**

3.

**Lives again our glorious King, Alleluia!
Where, O death, is now thy sting? Alleluia!
Once he died our souls to save, Alleluia!
Where's thy victory, boasting grave? Alleluia!**

4.

**Soar we now where Christ has led, Alleluia!
Following our exalted Head, Alleluia!
Made like him, like him we rise, Alleluia!
Ours the cross, the grave, the skies, Alleluia!**

5.

**Hail the Lord of earth and heaven, Alleluia!
Praise to thee by both be given, Alleluia!
Thee we greet triumphant now, Alleluia!
Hail the Resurrection, thou, Alleluia!**

6.

**King of glory, soul of bliss, Alleluia!
Everlasting life is this, Alleluia!
Thee to know, thy power to prove, Alleluia!
Thus to sing, and thus to love, Alleluia!**

1e Activity 5: An 'Overground' Sound Story for Killhope

What is this Place?

KILLHOPE SOUND STORY - 'HEALTH WARNING'

A few ideas that may help to make Story Telling successful in engaging the pupils' creative imagination

1. Children in groups will respond far more readily to the story teller if the 'form' or 'style' of what they are engaged in is appealing to them. There should be a balance between form and content that supports the educational objective.
2. Effective vocal and physical techniques are very simply the techniques that allow the delivery of most creative teaching material to succeed or fail and this can be measured according to the 'contact' that is made with the children. It is this that will fundamentally engage their creative imagination.
3. This material will only be as water-tight as the delivery is absorbing. To be absorbing therefore, is the key driver to effectiveness. One of the most common reasons for non effectiveness is that this real contact has not been made or nurtured.
4. The rhythm and pace of both the separate parts as well as the whole Story is critical. To move through the whole story from one part to another at 'mono-speed' would be a mistake. The sound story has a built in rhythm and tone.

An 'Overground' Sound Story for Killhope

The 'Overground' Sound Story for Killhope is a story designed to kindle children's imagination, expectations and/ or memories of Killhope Lead Mining Museum, written by Peter Ross

What is this Place?

Today I went for a walk. Today I went for a walk and found a place that I'd never seen before. My walk took me away from the town and out into the countryside. Out away from the houses and shops and on into a long valley, a long valley with nothing in it but scattered rocks, green grass, a few sheep and a little stream running along it. It was a lovely day, the sun was shining, there were a few clouds in the blue sky and the little stream was gurgling as it ran along over little rocks and waterfalls.

As I walked along I noticed something new. A noise. A strange noise I'd never heard before coming from around the corner in front of me. As I walked along I seemed to be getting nearer to this strange sound, it got louder and louder. I didn't recognise the noise; it was a noise made from many different unfamiliar sounds jumbled together, sounds I had not heard before today.

As I came round the corner I saw where the noise was coming from. In front of me was a small collection of buildings, a great wheel fixed in a frame on the side of the hill turning slowly and in the valley beneath close to the stream there were lots and lots of people.

People of all ages were there from young to old. These people seemed to be busy, very busy. Lots of people were working. Lots of people were busy doing different jobs with different tools; and it was they who were making most of this strange noise.

When I stood some distance away from the people the noise was not very loud. When I moved forward closer to them, the noise seemed to get louder and louder and louder.

I moved even closer, listened carefully and worked out that what seemed from a distance like one noise coming from one place wasn't that at all. The strange noise I had discovered was made up of lots of different noises all mixed together. It was almost like music from a live band with different musical instruments - but not really. Each of the noises I heard was odd and unusual; but when these different

noises came together they made one extraordinary sound. I'd never heard anything like it before.

I moved nearer still. In the hillside I could see there was a big black hole. Was this a cave? I wasn't sure at first. Out of the black hole came a faint squeaking, screeching sound. Gradually the squeaking and screeching got louder and louder and louder. Then out from the big black hole camea railway truck. The railway truck was full of rocks, big heavy rocks.

The heavy truck was being pushed by a man wearing a funny brown woollen hat caked in mud. Little by little the heavy iron truck moved along the iron rails as the man pushed it. Squeak...screech, screech, screech – it was the wheels of the truck moving forward on the rails that made the squeaking and screeching sounds.

Below me in this busy place were a lot more people - young and old - doing different jobs with different tools. One group of men used metal spades to shovel pieces of rock from one place to another. They scraped their spades along the ground as they pick up pieces of rock and made a rasping grating sound. When they all did this together it

gave me a shuddering feeling and made my teeth go on edge. Then they carried their spades full of rocks over to a small stream where they dropped the rocks with a thud.

At this place was another unexpected sight. Lots of young boys, maybe no more than eleven or twelve years old, were standing or bending over the piles of rocks. A small stream of water ran over the piles and, as it did so, the boys dragged the rocks forwards and backwards, to and fro, with long handled rakes. Whereas the water made a quiet gurgling, rippling sound as it tumbled over the rocks, the raking action by the young boys made another quite different crunching noise... scrunch... scrunch... scrunch.

Together these noises added to the general din.

Two other groups of people were working close by. Their work created other strange sounds. One group of men had what looked like big baskets on the end of long handles. The baskets were full of small pieces of rock. As I watch, the men shook or jiggled the baskets up and down quite quickly ... up and down... up and down... up and down. As the stones were shaken and jiggled together they made

another unfamiliar noise. The sound was more like the sound of the sea moving backwards and forwards across the stony sea-shore – but faster – and different from anything I had ever heard before in the countryside.

The last group made the loudest noise of all. A large group of men and boys stood around a low stone table. They each held a hammer and they all banged the hammers down loudly, not together but all at different times. Their job was to break up large pieces of rock into smaller pieces. Each time a hammer came down on a big rock there was a big bang and thump... thump... thump... until the rock broke apart. Then there were lots of tiny tapping noises – tap...tap...tap - as they broke up the smaller pieces of rock into even smaller ones.

A man came walking towards me, hidden under a layer of dust, dust from the rocks he had been breaking up.

‘Excuse me Sir’ I said,

What is this place?

‘This place’ he said, ‘is the Lead Mine at Killhope’.

Overground Underground Sound

Section 2: On-site Activities: Sound at Killhope

Introduction

Ideally the children will have carried out a series of Killhope focussed pre-visit Creative Science Sound Activities in the classroom.

See Section 1: Pre-visit Activities – Sound Communication Experiments & a Sound Story

The pre-visit activities have been designed to be reinforced through hands-on and experiential learning on-site in different situations with the support of the Killhope Information Assistants.

Alternatively, if the visit to Killhope is used as a starting point for a programme of work, some of the activities - the *Splash* activity, for example – are also ideal for use in follow up sessions at school.

On-site Organisation

- The class will be divided into groups each led by a specially trained Killhope Information Assistant. Each group will visit the Underground Lead Mine (over 4's only), the Washing Floor, Jigger House and Woodland area.
- Below is a briefing on some of the on-site activities that you can expect. It is not exclusive and neither is it meant to be so.
- The Information Assistants are extremely skilled. They are trained to work interactively with children and will take account of the range of ages of the children on your school visit to Killhope and your school's specific creative science curriculum requirements in relation to the Killhope site and planned purpose of the visit relating to *Creative Science – Sound at Killhope*.

2a Activity 1: More Sound Bites (mainly KS1)

A tour of the Killhope Site to listen to, 'collect', identify and discuss sounds made by

- Birds, animals and insects
- Wind and water
- Machines – the Wheel in particular
- People

Children may wish to use their collection of sounds to finish their Sound Journey when they return to the classroom.

2b Activity 2: A Greater Splash

Instead of using a tank or small pond as they did at school, each group of children repeats the tests in a larger arena. They stand on the wooden jetty jutting out over the large reservoir in the woods above Park Level Mill. Each child in turn

- Drops a small stone into the water and observes the small ripples travelling away from the splash.
- Drops a larger stone into the water and observes the larger ripples travelling away from the splash.
- Notes that different sized pebbles give different sized ripples that represent louder or quieter sound waves.

**Activity 3: Overground Sound Story at Killhope
What is This Place?**

Killhope Information Assistants lead a 'sound' interactive session with their group on the Washing Rake (Washing Floor) using references to the imaginative story provided in *Section 1: What is this Place?*

Particular sounds heard here and in the story *What is this Place?* are

- banging
- tapping
- gurgling
- scrunching
- screeching
- scraping

The Washing Rake provides key sounds for the *Killhope Orchestra* follow up activity.

The teacher can use the creative medium of home-made and improvised percussion instruments to replicate the sounds heard on the Washing Floor to both accompany the story a *What is this Place?* and to continue to reinforce the development of an understanding of the concepts of nearer/ further, and sound being louder and softer as well as the scientific concept of travelling sound.

2d Activity 4: Underground Sound at Killhope Mysterious Cavernous Cacophony

This activity provides reinforcement of the learning contained in the pre-visit activities – **Tell Me Your Name & Tunnel Sound** - and preparation for post-visit activities.

Note: Since it is extremely dark underground there is ‘sensory deprivation’. Hearing becomes more important and more sensitive. This is a particularly important asset for Killhope in terms of the Science of Sound.

Outside the Mine

- A short informal session on how ‘sound waves’ travel through the air away from the source (in this case the Information Assistant’s mouth!), and with nothing to stop them, they will travel away, getting smaller all the time.
- The Information Assistant will experiment increasing the distance between her/ himself and the children still using the same conversational strength of voice. The children will be asked to note how easily they can hear the Information Assistant’s voice i.e. how far the sound waves travel.
- Then the Information Assistant will speak to the children through either a rolled up piece of card or a length of plastic plumbing pipe and ask the group of children for their reaction to the volume of sound created as it comes down the tube.

The Tour of Killhope Lead Mine

- During the tour of the Lead Mine the children in the group are invited to keep a mental record of the different and changing sounds that can be identified as they get further into the mine.
You may also want to take a tape recorder to record sounds for follow up work.
 - What is making them?
 - Are they big or small sounds?
 - Are they in a big or small space?
 - Are the sounds carrying along the tunnels?
 - Can you see what is making the sound or just hear the sound being carried along the contained interior of the tunnel? (Just like your speech through the plumbing pipe).

- Are the sounds travelling through 'barriers'? If so what are they?
- Sound can travel through other things as well as air - we can hear sounds through the water and through the walls and doors in the mine. Sound travels through solids, liquids and gases. What effect do the 'obstacles' in the mine have on the sounds?
- At the furthest point of the tour within the mine, the Information Assistant will take a few minutes to identify exactly what sounds the children can still hear from their journey so far and which ones have disappeared. They will ask the group to 'recall' their walk in the mine so far and identify which sounds came in which order, which sounds changed along the route, how and why.
- During the rest of the tour the Information Assistant will make reference to stories containing particular sound effects e.g. the echoing sound of a stranded man shouting for help. There is the true story of the miner who was stuck underground for three days because of a rock fall and who passed some of the time by working through Charles Wesley's hymns.
If your class has learnt a hymn, the children will sing one of his hymns underground to see what it sounds like.
- The Information Assistants will also talk about the constant and sometimes continuous noises - the endless dripping of water, the constant grinding of the pump engine, the fall of ponies hooves, the occasional deafening sound of an explosion etc. etc.

Back at the surface

- When the children return to the surface they will be asked to recall and re-create the entire journey they made, step by step, identifying the particular sounds they heard and identified in sequence as they went around on their tour.
- The group will re-create a 'sound story' of the whole underground tour with the Information Assistant as the narrator and the children making the sound effects. At the end of this session, the children will be encouraged to re-tell this story to other groups when they get back to their school.

2e Activity 5: Collecting and Recollecting Killhope Sounds Evidence for Classroom Activities

Post-visit follow up: 'Killhope Orchestra', Sound Sculpture, Sound Pictures & Sound Poems

Throughout the visit to Killhope there will be an emphasis on listening to and describing different sounds in words for both KS1 & KS2 children. These different sounds will need to be remembered and recorded by the teacher/ helper or indeed the children themselves for future reference.

Killhope words and phrases

For some teachers/ pupils the sounds/ meanings of the words used by the miners at Killhope may be a rich resource for poetry and music. They often illustrate the sound of the action e.g. '**Hotching Tub**' – a sieve suspended from a long pole that was jerked up and down by the washer boy to separate waste rock from the lead ore '**Galena**'.

Other words your class may want to listen out for on your visit to Killhope and use later in the classroom in different ways - even adding them to the Story '**What is this Place?**' - are listed below.

Jumper	long iron chisel for drilling holes in the rock underground ready to be packed with gunpowder
Windy Billies	Large fans turned by young boys providing ventilation inside the mine
T'Owd Man	(The Old Man) - old unrecorded forgotten workings that miners sometimes found underground
Bouse	Lead ore mixed with rock and other waste materials
Teems	Rows of storage bays for the <i>bouse</i> waiting to be separated
Bouse Teems	The two words are often used together
Deads or Dead Heaps	Rock and waste material from the mine that did not contain lead ore
Washing or Dressing	Process of removing as much waste as possible to produce clean Galena for the smelting mills
Buddle	Sloping board used in the separation process on the washing floor
Bucker	Flat hammer used on the washing floor to break up lumps of rock and Galena
Washing Rake	The place where the separation of lead ore from waste rock and other minerals took place
Washing Floor	The two separation processes were carried out side by side, at first hand operated, later mechanised
Hotching and Buddling	The large 19 th century waterwheel
Killhope Wheel Jig (Jigging)	A refined Hotching tub worked mechanically and not by hand, designed to separate lead ore from other waste materials
Jigger House	The building at Killhope Lead Mine where there are 7 Jigs
Slimes - Slime washers	The specialist job of digging out and washing the settling tanks (slimes) to recover small particles of lead ore
Brangled	Lead ore that was too mixed up with Fluorspar and other minerals to be separated successfully on the washing floor
Hush - Hushings	Deep gorges on the hillside formed by the hushing process - an early simple form of lead mining

Overground Underground Sound

Section 3: Post-visit Follow Up Activities: Sound Creation

3a Activity 1: Sound Story Drama Workshop

Immediately after re-telling the Sound Story – *What is this Place?* – There are a number of options and a choice of activity.

Vocalising sounds to create a story

Follow the simple routine of questioning:

- What particular sounds do you remember from the story?
- What activity made the particular sounds?
- What type of sound were they e.g. banging, scraping, screeching.....

Lead the discussion so as to include all the sounds

Encourage children (individuals are best) to:

- Re-create a particular sound by 'voicing' the noise
- Re-create all the remembered sounds from the story around the class
- Select children in small groups to re-produce particular sounds on cue
- Let them rehearse this first all together then in individual groups to share with the class.

Re-introduce the story and co-ordinate/orchestrate the use of sounds during the narrative. This will culminate in a cacophony of all the sounds together.

You can play with moving nearer and farther away from the sound for them to 'modulate' the loudness.

The Television Programme

The Television Programme activity is most successful with a complete confidence from you- the teacher - that the 'mimed television' actually exists. If you don't 'play the game' – the children won't either.

This activity is very particular to reinforce the children's association with the content of the story. You can stretch this activity to include every child in the class. They will not get bored if you keep it moving. You can ask questions whenever you like of any child's vision to amplify the specific activity for the others.

- First draw an imaginary television and tell the children exactly what you are doing as you are doing it. Describe the screen and the remote control you have in your hand to alter the volume.
- You must look into the screen first and start to describe what you can see of the Killhope image from the story.
- Invite one child at a time to come and look at the television programme and tell you/the class what they see and what they can hear. It is this 'telling' that will reinforce the children's involvement. If a child's noise 're-creation' is quiet, tell them you are raising the volume with your remote control.
- You may keep this activity going as long as you like, inviting the children to look more carefully at what they can see (or you wish them to focus on). For example, what people are wearing, colours of the valley, the rocks. In fact any minutia you wish to examine and to any depth.

3b Activity 2: The 'Killhope Orchestra' Making Different Types of Sound

The Killhope Orchestra - Making Different Types of Sound- activity is specifically designed to link back to the sounds heard on the Washing Rake (Washing Floor) made by the miners' and boys' physical exertion in using hand tools to separate the Galena from the waste rock and mud.

But it can be used in a more general, less focused way to include all the Killhope sounds including the visit underground, the woods and Jigger House.

You can even create a symphony with different movements, moods, rhythms and levels of sound.

Once again in this activity the science learning is creatively reinforced.

The Activity

Make instruments that produce different types of sound.

- **Drums** - using different types of containers, shapes, sizes and textures
- **Drum sticks** – using different materials to make different heads e.g. hard, soft, big, small
- **Rattles and shakers** – using different types of containers filled with different types of pellets
- **Scraping or rubbing different materials together** – metal on metal, wood on metal, metal on stone etc. etc.
- **Air blowing** – over the tops of different sized bottles or containers

Experiment with

Hard and soft applications on all instruments.

Make a pre-activity quiz with the different drum sticks. Which will make (a) the biggest noise. (b) the softest noise?

Rattles & Scrapers - Experiment with higher and lower energy use.

Air blowing. - Which will make (a) the highest pitched noise. (b) the lowest noise?

Comparisons can be made, discussed and recorded for all your home made instruments. Perhaps even create a 'conversation' between the sounds instead of words or tell a 'sound story' without words.

Explanation

- Each of these sound sources will create different 'sound waves' or 'vibrations' through the air
- Some will be hard, some soft, some high pitched, some low pitched
- Greater energy used will create bigger vibrations therefore bigger sounds
- Gentler energy used will create smaller vibrations therefore smaller sounds
- With percussion, different types of drum stick will create different sounds

The amount of air space in a container will affect the amount and the tone of the noise it makes.

3c Activity 3: ICT dimensions to Sound at Killhope

'Good Vibrations'

You will need access to

- the 'Sound Recorder Programme' found in Microsoft Windows
- a microphone
- a sound card installed in the computer

As part of the follow up activities following the visit to Killhope, children can each record a Killhope sound with the musical instrument they have made. They can see the sound vibration line on the screen and observe how this changes when the sound is louder or softer. They can edit the recording by increasing and decreasing the volume, speed and also by adding an 'echo'.

Mind Map

Create a class Mind Map of the Sounds of Killhope – using ICT and clip art.

3d Activity 4: Developing Creative Thinking Skills

Divide the class into 2/4 groups.

Group 1 & 2: Loud Sounds

Encourage children in this group to discuss what loud sounds they heard at Killhope, where they came from and what made the sounds loud e.g. large size of container or machine; types of materials/ elements that moving together make large, loud sounds (metal, stone, water), the action of the worker/s, the closeness of the sound.

Group 2 & 3: Quiet Sounds

Encourage children in this group to discuss what quiet sounds they heard at Killhope, where they came from and what made the sounds quiet and soft e.g. size of container or machine; types of materials/ elements that moving together make quiet sounds (wood, water, mud), the action of the worker/s, the distance of the sound.

All Groups

1. Consider how their conclusions can be recorded and carry out a recording exercise
2. Develop and carry out a fair test using the musical instruments they have made
3. Share the results with each other
4. Write sound poems using 'words' for the noises they heard at Killhope and the new words learnt at Killhope linked to the lead mining process. Develop rhythms.

3e Activity 5: Breaking the Sound Barrier: Art & Science Literacy, Poetry, Sculpture & Art

Literacy & Poetry

- Divide an A4 sheet into six sections
- Draw a descriptive picture of a Killhope sound source in each
- Discussion to decide how to spell the onomatopoeic words – thus using phonemes, letter blends etc.
- Use this activity as a basis for writing poetry on ‘The Sounds at Killhope’ and placing them into the ‘Shapes of Killhope’

Poetry & Sculpture

- Take the sounds again and create sound sculptures
- Follow the example of Bruce Nauman a renowned 21st century artist.
- In the exhibition ‘*Raw Materials*’ (Tate Gallery London - 2004) his focus was on the spoken word repeated many times over with a different emphasis and rhythm each time. For example OK, OK, OK... This simple one word approach was interspersed with repetitive rhythmical poems and prose recorded and played on separate machines. Each different recording was placed next to another one in a circle. They are all played at the same time. His concern is that human beings either communicate or fail to communicate.
- Taking the onomatopoeic sounds/ words from Killhope either ask the class to write new poems or use the ones they have already written.
- Make repeated recordings of the same poem for one complete

tape/ computer recording; repeat the process with a different poem on a different tape recorder/ computer etc.

- Place the set of recording machines well spaced in a large circle on the edges of the room. Play them continuously at the same time on repeat.
- Ask the children to walk around discussing what they hear.
- Their talking becomes part of the sculpture
- Discuss the reactions of the class to making and participating in their own sound sculpture

Sound Sculpture, Physical Sculpture & Colour

- Create the 'Landscape of Killhope'
- Add 2D and 3D art work to the Sound Sculpture
- Encourage different groups
 - to create abstract paintings with different colours for different sounds
 - to look at sound patterns (see ICT dimensions) and use collage techniques to recreate the different patterns (imagined or real) created by sound waves
 - to use Plasticine or other modelling clay to mould sounds into shapes suggested by the sounds

Finally mount an Exhibition. Use ICT as well if you like.

'[The Sound Landscape of Killhope](#)' But probably the Killhope Creative Science Investigators can come up with a better idea.....`

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