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Geology of Connecticut

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The curriculum unit that I am writing has to do with the geology of Connecticut. This includes; plate tectonics,volcanic activity, glaciation, earthquakes, mineral and fossil formation through time. Along with this, "life" in Connecticut through history will be included, and relationships between the topics discussed.

This unit is intended for use in an 8th or 9th grade science classroom. It is assumed that the students will have already covered these topics in a global format. Students are fascinated with earthquake and volcanic events that happen all over the world. When these can be "brought home," and shown to occur in Connecticut, earth science concepts become more relevant and interesting.

Included within this unit is a discussion of animals that have roamed Connecticut in the past, including dinosaurs, the most popular creatures that have ever roamed our planet. Students still talk about the movie "Jurassic Park," and when they find out about dinosaurs such as Eubrontes, their interests peaks.

Also, children are fascinated by rocks and minerals. They usually end up with a collection. When rocks and fossils can be studied, tested and discussed in a classroom, students tend to learn and retain more information. In addition, when fossils such as dinosaur bones, footprints and fern imprints are held and looked at up close, they help to fuel a child's imagination.

The geologic history of Connecticut is a long and still active one. We have survived plate collisions, while both losing and gaining land. Earthquakes, though minor are still occurring in our area. Due to geologic activity, the Appalachian Mountains, Sleeping Giant, East Rock and West Rock formed.

The aforementioned activity has resulted in mineral/ ore deposits of traprock, marble, granite, gneiss etc. have been found. Gemstones have also been found in our state.

Glaciers have also affected our landscape, creating lakes and helping to create Long Island Sound. They have shaped and reshaped our landscape. These glaciers will be back again—how long from now, and how far they will go is a subject of debate.

Lastly, not only will past and present geologic history be presented, but future possibilities will be included as well. Will we have more earthquakes and Moodus noises, will a volcano sprout up in someone's backyard? Within this unit , the curriculum includes labs and field trips to provide hands—on learning experiences which make the concepts and principles easier and more interesting.

PLATE TECTONICS

When discussing the plate tectonics of Connecticut, it is vital for students to have a bedrock map of Connecticut. This can be obtained from the Department of Environmental's publication and map division. This map comes in a variety of sizes (postcard size on up). It shows the different terranes, bedrocks and faults. It is color coded for easier interpretation.

Our history can be summed up in two words—"crunch and crack." At one time, Connecticut was somewhere between 500 -3000 miles across, but today Connecticut is only about 100 miles across. This is due to the formation of the giant supercontinent called Pangaea. (Bell, 1985)

Prior to the formation of Pangaea, the Atlantic Ocean did not exist. Instead, another water body called the Iapetos Ocean existed between the land masses of Proto—North America and Avalonia. (DEP,1990)

From 450 to 250 million years ago, during the Paleozoic Era, several plates collided (crunch) to form the giant supercontinent called Pangaea. Connecticut was located in the middle of this and was vastly changed. Aside from the previously mentioned reduction in size, the Appalachian Mountains formed. At one time they were the world's largest. It is estimated that they were between 20,000 to 30,000 feet high.(Bell, 1985)

During this episode of plate collision, Avalonia, a continent believed to be part of the African plate collided with the continent of Proto-North America. This action closed up the Iapetos Ocean and its subduction zone. This big "crunch" initiated processes of deformation and metamorphism, thus creating schists, gneisses and granites which are exposed today in our state. (DEP, 1990)

Further evidence for this continental collision comes from the analysis of the terranes that make up Connecticut.Also, the rocks within these terranes provide even more conclusions. The marble found in the "marble valley'of connecticut (an area in the north-western part) is evidence of the former Iapetos Ocean. Marble forms from the metamorphism of limestone and limestone forms when beds of shells, corals and lime-rich muds become cemented together. A large shelf called a carbonate bank forms from this in tropical ocean waters. Due to this marble it is thought that the carbonate bank found along the eastern edge of the Proto—North America terrane formed in this manner. (Bell, 1985)

Along with this is the fact that Pangaea and thus Connecticut was located far south from its current condition. Located closer to the equator with a climate similar to Central America. This created a tropical paradise in Connecticut. (Bell, 1985) At the time that Pangaea formed, the oceans supported most of the plants and animals. Our crust is forever shifting and even though plates may move on the average only one inch per year, this is a constant process. About 200 million years after Pangaea formed, the tectonic processes reversed and Pangaea began splitting apart (Connecticut geologists refer to this as the "Great Crack"). This occurred during the Mesozoic Era. This breakup divided the Appalachians into a series of flat-bottomed rift valleys and high mountain ranges. (Bell, 1985)

At the time of the breakup of Pangaea, Connecticut had forests, dinosaurs and mammals. Fossil life will be discussed more in detail later on. Also, the Atlantic Ocean formed and is still growing today.(Little, 1986)

THE TERRANES OF CONNECTICUT

Terranes are geologic regions reflecting the role of plate tectonics in Connecticut's history. The name of each plate reflects its ancestral origins. There are four major terranes in Connecticut. (DEP, 1990)

Proto—North America Terrane consists of the original edge of North America before the formation of Pangaea. This matches the northwest highlands of Connecticut and contains the aforementioned carbonate shelf. (Bell, 1985)

Iapetos Terrane is split into two due to the Newark terrane (formed from the great crack or the splitting apart of Pangaea. It underlies the southwest hills of the western uplands and the Windham hills of the eastern uplands. It is comprised of the remnants of the Iapetos Ocean. (Bell, 1985)

The Avalonian Terrane is a remnant left over when the African continent collided with us during the formation of Pangaea. This corresponds to the Mohegan Range of the eastern uplands of our state. (Bell, 1985)

The above three terranes are called collision terranes because they formed due to the formation of Pangaea.. The fourth terrane called the Newark Terrane formed due to the splitting up of Pangaea. The formation of this terrane was similar to a door opening up into the Earth. Due to this "crack," the region was put under alot of stress. This is where the central valley of Connecticut is located. (Bell, 1985)

From west to east in Connecticut, our terranes go as follows: Proto-North America, Iapetos, Newark, Iapetos, Avalonia. Though today these terranes are hard to recognize from the surface due to erosion and glaciation changing our landscape. Evidence of our geologic past can still be found in the stone walls that abound in Connecticut. (Bell, 1985)

EARTHQUAKES/ FAULTS

With plates colliding and breaking apart, numerous faults and earthquakes are inevitable. One of the most famous faults in Connecticut is the eastern border fault which begins south of New Haven (the exact origin is under water) and extends for 130 miles north to Keene, New Hampshire. Though inactive for 140 million years, it helped to create the Connecticut Valley. Prior to this sporadic earthquakes along this fault lowered the valley and raised the eastern hills. The Eastern Border Fault is further evidenced in the tilt of the valley outcrops—easily seen in the numerous roadcuts. The tilt of rock strata dips toward the east at about 15-25 degrees. This tilting has directly affected our mineral industry. Wherever erosion has caused a tipped basalt layer to jut out of the ground, a traprock ridge has formed. (Bell, 1985) (Little, 1986)

Wherever you are in Connecticut, an old inactive fault is no more than five miles away. Earthquakes can also strike in these area, far away from plate boundaries, and though the potential is there, Connecticut is at low risk for earthquakes to occur, until tectonic movements again interfere. (Johnston, Kanter, 1990)

From 1568—1989, 1214 earthquakes were recorded within New England. As far back as 1558, the native indians reported of quakes hitting Connecticut. In 1638, an earthquake frightened the pilgrims. In 1727, an earthquake was felt from Maine to Delaware. (NESEC, 1993)

The most famous area in Connecticut when it comes to earthquakes is Moodus. This is the only active region in our state today. The indians heard noises caused by swarms of quakes and created much folklore around them. Beginning in 1980, swarms of a few hundred quakes have occurred here, but these were mostly detected only by seismic instruments. (Little, 1985)

If an earthquake does hit Connecticut, the results will be somewhat different then that of a California quake. Our bedrock is harder and transmits seismic waves over an area from four to forty times greater than that of California. Also, more people will be at risk here due to lack of protective building codes. (Mass. Emergency Management Agency, 1994)

VOLCANISM

During the Triassic and Jurassic Periods, Pangaea began to break apart. This led to the formation of the Atlantic Ocean and a new mid-ocean ridge, along which much volcanic activity occurred. (Raymo, 1989)

Volcanism greatly changed the Connecticut Valley. Basalt flows and intrusions helped to form prominent landscape ridges, which directly impacted life in our state. Lava flows created dams, lakes and streams became larger and more plentiful. Connecticut's environment became more friendly. (Little, 1986) The faults zones formed from Pangaea breaking up, created pathways for magma to seep toward the surface for 25 million years (between 171-196 million years ago). These lava flows (which would harden into basalts) oozed from the faults, allowing many animals time to escape their effects. (Little, 1986)

There were three major lava flows that covered the valley during Mesozoic times. These flows were between 150—320 feet thick. Between these lava flows, sediments eroded and piled on top of them. (Little, 1986)

One of the state's major monuments to prior volcanic activity is the Holyoke Range. It is comprised of a series of flows, ash, layers of sediments. Its base consists of two basalt flows (320 and 255 feet thick). Pillow lavas and vesicular basalts, further evidence of volcanism can also be seen in our valley.(LIttle, 1990)

Three major pieces of volcanic activity—intrusions can be found close by. East and West Rocks in New Haven and Sleeping Giant in Hamden. All of these are quite familiar to New Haven students. This makes geology easier to teach and a field trip to one of these areas is quite worthwhile.

Sleeping Giant is a type of intrusive dike called a stock. this is the main line of a lava flow's plumbing system. (Bell, 1985) It is exposed for three miles at its surface today. Sleeping Giant form when Pangaea broke apart. Magma had gotten trapped below the surface and pushed up through cracks and seams insedimentary rock. The magma hardened into traprock and when the Connecticut valley tilted east, so did the Giant. Millions of years went by and during this time erosion wore away the softer sedimentary rock around this intrusion, leaving it in the shape of a sleeping giant. (Wetherell, 1992)

East Rock, another intrusion when acquired by the city of New Haven has an interesting sideline. The owner of the rock 'I had to be dispossessed against his will. He wasn't too friendly to visitors and anticipatlng-a great-flood, had:built—a large open boat on top of the rock. (Longwell, Dana, 1932)

East and West Rocks are intrusive ridges, created by molten rock, that like with Sleeping Giant, pushed up into underground cracks and hardened into traprock. Erosion of the softer sedimentary rock around the basalt,

helped to expose them. (Wetherell, 1992)

Both East and West Rocks formed from the same magma surge. West Rock starts out as an intrusive dike, but extends underground as a sill to East Rock. (Bell, 1985)

All this volcanic activity, has helped in shaping the life and landscape of Connecticut today. A field trip to one of the above mentioned intrusions came show this relationship to the students. In addition, glacial history can be shown and discussed, in part at one of these sites. The impact of the Ice Age in our state will be discussed later on.

FOSSILS AND PAST CLIMATE

Throughout history, the climate of Connecticut and the life it has supported have changed. This is quite evident in the types of fossils found here.

Most of the bedrock in Connecticut is either igneous or metamorphic in origin, except for the valley. When Pangaea was breaking up and our state was drifting toward its present position, a rift valley formed at the breaking point. Upon this valley, sand and other sediments washed down from the highlands. These sediments became the sandstones and shales, collectively known as the New Haven arkose and are the oldest fossil-bearing rocks in Connecticut. (Farrand, 1990)

Dinosaurs exited around the time this arkose was forming (Triassic Period), but none have been found in this rock. What has been found was a fossil reptile called *Rutiodon* , which resembled a crocodile. Its bones have been found in Simsbury, showing that it attained a length of ten or more feet. *Rutiodon* was a carnivore, feeding on fishes and other aquatic animals found in the swamps where it lived. (Farrand, 1990)

Stegomus , another Triassic reptile has been found near the Quinnipiac River in Fair Haven. It was covered with armor plates and looked similar to an armadillo. (Farrand, 1990)

Fossils also give clues to past climates. The New Haven arkose contains imprints of leaves, bark and wood that tells us that in Mesozoic times, Connecticut had a tropical climate. Plants found included; conifers, horsetails, giant club mosses and cycads. (Farrand, 1990)

Students may not have heard of these plants and pictures do not do them justice. Horsetails and club mosses, while not as large as their ancestors are still native to Connecticut. They are interesting plants and should be shown in the classroom. If you can not find them growing in the wild, then a local garden shop or florist may be helpful. Horsetails (aka. *Equisetum*) are sometimes used as greenery in floral arrangements. Around the december holiday season, a roping called Princess Pine is sold. This is really a club moss. Cycads, are native to places such as Florida, but three species are sold as houseplants. They are called; the cardboard palm, sago palm or just cycads. Cycads are very unusual plants and I would recommend them highly for classroom use. They also make very hardy houseplants.

Further climatic evidence can be found pollen and spores preserved in Mesozoic lake sediments. By dissolving the 180 million year old shale in acid, these microscopic structures can be studied. From these, twenty-seven genera have been found, showing conifers as the major plants. This also shows that our climate at the time consisted of wet and dry seasons, with between 4-20 inches of rainfall per year. Further climatic evidence,

was our location during the Mesozoic—ten degrees north of the equator. (Little, 1986) While dinosaurs roamed Connecticut, fewer then one hundred bones have been found, due to oxidation and decay. (Little, 1986) During the Jurassic Period, the Connecticut Valley contained many shallow and temporary lakes, with alot of mudflats. This is where the main evidence for dinosaurs is found—footprints. In 1966, a bulldozer accidentally uncovered the largest dinosaur trackway ever found in North America, in Rocky Hill, Connecticut. More than 2000 footprints, around 185 million years old were uncovered. (Farrand, 1990)

This trackway has become part of Dinosaur State Park, The park has on display about five hundred of these footprints. It is undergoing a renovation and by next spring will have an expanded display area, included within this will be other life that existed in Connecticut as well. In addition, the park will become more handicap accessible. (Brescia, 1995)

These tracks come from a dinosaur named *Eubrontes* , most likely related to Tyrannosaurus. Its tracks range from about eight inches to three feet. *Eubrontes* is thought to be from 10 to 50 feet in length. It is thought that *Eubrontes* could swim and may have hunted in groups. Dr. John Ostrom, of Yale University tracked 19 pairs of *Eubrontes* footprints. These footprints were all heading in the same direction, across a sandstone layer near the Connecticut River. (Little, 1985)

In Durham, Connecticut I have found a couple of *Eubrontes* footprints in an old stream bed. My students are fascinated by them and it takes close to an hour for them to be passed around the room. I have also found fish fossils at two different sites in the Connecticut Valley, in shale beds. These fossils have been carbonized and are somewhat unusual.

Other fossils found in our state include fish coprolites (fossil feces) and invertebrate trails and burrows. (Little, 1986)

GLACIAL HISTORY

The Earth’s climate began cooling around 35 million years ago (Cenozoic Era), but glaciation in the northern hemisphere began only 3-5 million years ago. During this time, Connecticut has been covered by ice at least two times, maybe more. (Bell, 1985)

The last of the glacial advances (the Wisconsinan) at its thickest:was 6000-7000 feet thick. (Bell, 1985) In New Haven it was 1800 feet thick and in Hartford it was 2500 feet thick. (Patton, Kent, 1 992)

About 14,000 years ago a lake formed called Glacial Lake Hitchcock. It began at a natural dam in Rocky Hill and extended 150 miles northward. At its widest point it was 20 miles across. (Patton, Kent, 199 2)

Glaciation or rather deglaciation was an important factor in shaping and creating Connecticut’s coastline. The ice cap that covered one half of North America captured alot of water. As a consequence, sea level dropped more than 250 feet, thus turning continental shelf into dry land. Rivers stretched across this new land, cutting deep valleys into the shelf. When deglaciation began about 18,000 years ago,melting icewater headed back into the ocean. (Bell, 1985)

Today sea level is back up to about the same height as in preglacial times, but has also flooded the lower areas of many valleys. This gives Connecticut a “drowned coastline.” (Bell,1985)

Glaciation is also partly responsible for the modern day version of LOng Island Sound (it used to be a freshwater lake). Within it is part of a terminal moraine, which is a mark of the maximum advance of a glacier. Along the same line, recessional moraines are responsible for the creation of many islands off our coast. These mark a brief standstill in glacial retreat. (Bell, 1985)

In 1825, Peter Dobson of Vernon,Connecticut became puzzled by round boulders randomly mixed in with sand and clay, that his workmen kept digging up. He proposed that the only thing that could account for this was being carried by ice. Since he wasn't a scientist, his ideas were given little notice.(Bell, 1985)

New England hills are covered with an average of ten feet of glacial till. Examples of this till can be seen in the many stone walls found in our state. (Little, 1990) Glacial drift covers most likely 99 percent of Connecticut's bedrock. Glaciers have flattened the Connecticut Valley and made farming easier. Because brownstone, a sedimentary rock erodes easily, the Central Valley is almost totally free of boulders that the glaciers have famously dumped elsewhere. (Bell, 1985)

In addition, brownstone was easily dug into by glaciers and carved out many lakes. Lake Saltonstall in Branford, is an example of this.Evidence of glaciation can also be seen in the gouged out rocks the glaciers used to cover-ex. at East Rock. (Bell, 1985)

Connecticut is still recovering from the last ice age. Glacial ponds are filling into swamps. Swamps are filling into wet forests. Erratic boulders are tumbling down from ridges. Rivers and streams still carry glacial sediments to the ocean and sea level is still rising. (Bell, 1985)

The Wisconsin Glacier advanced north to south, so it built drumlins and scoured hills of bedrock along a north-south route. Without glacial deposition our coastal recreational areas would be nonexistent. (Patton, Kent, 1992)

In many places, the varves of silt and clay laid down by the Central Valley's glacial lakes has been used to make bricks. (Bell, 1985)

Right now we are in an interglacial period, but scientists expected another ice age to return in 500-7000 years. (Bell, 1985)

MINERALS OF CONNECTICUT

As magma seeped along faults and through sedimentary rock, ores of such minerals as lead and copper precipitated out. (Little, 1986. Pangaeic collision created the schists, gneisses and granite exposed in Connecticut. (DEP,1990)

Connecticut has an interesting history when it comes to mining and quarrying. During the 1800's, barite was mined in Cheshire. Barite is a heavy white mineral composed of barium and sulphate. Today it is used in paint, glazes and as and additive to fluids used in drilling oil wells. During the 1800's, it was sometimes used to adulterate flour. It's white color allowed someone to mix several unnoticed cupfuls into a big bag of flour, to increase its weight and thus the price. (Bell, 1985)

In the Connecticut Uplands, old mines and quarries extracted such minerals as: nickel, tungsten, cobalt,

bismuth, arsenic, quartz, feldspar, mica, marble, garnet, clay, natural cement and gemstones. Most of these operations did not yield enough to be profitable and went bankrupt. (Bell, 1985)

Some open-pit marble mines operated from 1734-1923. These yielded limonite from large pockets in the surrounding marble. Limonite is chemically similar to rust and was easy to convert to pure iron.(Bell, 1985)

Another mining operation in Roxbury attempted to extract iron from the ore siderite, but it was hard to refine and this operation only lasted from 1867-1872. (Bell, 1985) This is a great field trip though, as its blast furnace still exists. Also, one can collect siderite, quartz crystals and garnets (our state mineral) from the area and it is an enjoyable hike. The mining operations for iron, due to the charcoal needed for the blast furnace severely defoliated the area, though today it has recovered. (Bell, 1985)

In the past, one of the most popular building stones in Connecticut was brownstone was quarried from the Portland formation located in the Newark Terrane of the Central Valley. This rock in reality is ferruginous sandstone. (U.S.Dept. of the Interior,1994)

The brownstone industry at its peak in 1880, employed more than 1500 workers and shipped the stone to New York, New Jersey and as far away as California. Brownstone is only minimally quarried today. (U.S. Dept. of the Interior, 1994)

At Lantern HIll Mine in North Stonington, quartz is still actively mined. It is used for building stone aggregate, gravel roofs, pool filters and aquarium gravel. Also, feldspar is still quarried in the Middletown/ Portland area. This mineral is used in making glass, ceramics and part of a wallboard compound. (Bell,1985)

Marble from Connecticut makes up the mantel in the East Room of the White House. Stony Creek granite is shipped all over the country. (Little, 1989) Connecticut's most valuable mineral today is traprock (basalt). It is prominently seen along I-91 between New Haven and Hartford. (Skinner, 1980)

Traprock is turned into crushed stone. It is primarily used in construction and the in the bedding of roads. (Bell,1985)

Sand and gravel from glacial till is the second most profitable quarried rock. They are used as fill, in concrete, leach fields or for road sand.(Little, 1989) The mineral industry in Connecticut as of 1993, employed 650 workers.(U.S.Dept. of the Interior, 1994)

Gemstones such as amethyst, aquamarine, topaz and emerald are periodically found in our state too. While looking in old rock dumps for tailings can be a haven for collectors, the best finds are usually due to construction and blasting. As previously mentioned, the dinosaur trackway was uncovered during bulldozing. Footprints were recently found at a construction site near Lake Saltonstall in Branford.

A construction site in Trumbull has in the past three years yielded the following mineral: fluorites, pyrite, quartz (both crystalline and massive), topaz,scheelite, beryl and many other minerals. Some specimens have been gem quality. I have taken the Science Club here, but an easier site would be Old Mine Park, which was an area that used to be mined for tunsten. The par!c has most of the minerals found at the construction site in the old mine dumps. The construction site will be covered over with asphalt within the next year.

If you would like to build up a school's collection one suggestion would be to join your local mineral club. They obtain access to many unknown or restricted sites. Another resource would be a building stone supplier, where you can get minerals such as pumice or limestone for under 35 cents a pound. I know a professor who

takes elementary school groups there for a field trip.

The geology of Connecticut can be a fun and exciting subject for students to learn about. It is an ongoing process, with erosion still changing the landscape, continental plates moving, the future possibility of glacial returns and the discovery of more and unusual minerals being found. My lessons plans attempt to be a mixture of the geologic processes that have shaped and will shape Connecticut's landscape. Also, included are some hands-on activities to demonstrate certain geological principles. As previously mentioned, this unit is meant to be taught after general geology has been covered, so certain assumptions have been made as to the student's level of knowledge.

LESSON PLANS

Unit Objectives-

As a result of this unit, students will be able to see the interrelationships between plate tectonics,earthquakes, vulcanism, the Earth's interior, mineral and rock formation.

-Students will be able to relate the above topics to the geological history of Connecticut.
-Student's will be able to demonstrate their understanding of how geology has affected and shaped their landscape in the past, present and future.
-Students will further their skills in laboratory techniques, graphing and chart interpretation as they relate to Connecticut geology.
-Students will demonstrate their understanding of how various geological forces have affected the organisms that have lived in their own state throughout time.
-Students will be able to understand how glaciers have shaped and affected our landscape.
-Students will be able to relate local landforms and their formation to geology.
-Students will be able to understand the importance of mining to Connecticut's economy and learn some general techniques related to this.

LESSON PLANS

Day I

-Place students in groups of 3-4 and have them draw. This is a good way to see how much

students remember from past geology lessons. Have a time limit of no more than 15 minutes.
-Group presentations and explanations of their drawings.
-Class discussion—more details on the formation of Sleeping Giant
-Class discussion on the formation of East and West Rocks. Most students have hiked up and around the areas of these three formations. (optional-have a field trip to one of these area)
-Homework: assiyn the following questions. What would you think if you found whale fossils in Lake Saltonstall? What conclusions could you make if shell fossils were found in the Appalachian Mountains? What would you think if you found palm tree fossils in the Arctic?

Day 2

-Go over homework and relate how fossils help to give a clue on the path of plates.
-Class discussion on Connecticut plate tectonics.
-Demonstrate/pass around Connecticut fossils. Go over the history and characteristics of each.
-Discuss and pass around examples of “living fossils,” such as cycads, horsetails or club moss.
-Homework: Have students write an essay on what life might have been like in Mesozoic Connecticut. Provide them with copies of plate locations at various times in the past.

Day 3

-Peabody Museum field trip. The geology presentation that they provide lasts about an hour. The staff provides an overview of Connecticut geology using exhibits, specimens, questioning techniques and activities. Prior to visiting the museum, provide the students with a worksheet that must be filled out and turned in back at school. Note this trip can be placed anywhere in this curriculum.

Day 4

-Review with the students what they learned at the Peabody Museum.
-Go over the student’s essays on past life in Connecticut.
-Class discussion on Connecticut/New England earthquakes and their impact on Connecticut.

-Demonstrate the feel on an earthquake by passing around " Earthquake in a Can." This is a can that vibrates like a strong quake. In a workshop that I attended, it was one of the highlights and everyone was fascinated by it. Ordering instructions can he found on the Teacher Resource page.
-Homework: study for a quiz.

Day 5

-Quiz on days 1-4.
-Class discussion on Connecticut terranes, bedrock, their formation and impact. The department of Environmental Protection has some great maps to show this.Information on these will be provided on the resource page. Emphasize information on the Connecticut Valley/ New Haven.

Day 6

-Pass back and go over quiz.
-Demonstration and discussion of Connecticut rocks and minerals. Have them run identification tests on some of the samples (streak, hardness, etc.).
-Demonstrate the fluorescent properties of some of our minerals. For example, fluorite, calcite and scheelite show some nice coloration.
-Chlorophane, a type of fluorite that can be found in Trumbull, glows green under a black light, but turns blue when heated.
-An optional activity would be to plan a field trip to collect specimens either in Trumbull or Roxbury.
-Extra credit can be given to students who bring rocks that they have collected.

Day 7

-Class discussion on the mineral industry of Connecticut.
-Discussion on the impact of glaciers on Connecticut, how they have changed our landscape,

including the formation of Long Island Sound and other recreational areas.
-Also talk about the usefulness of glacial till.
-Discuss Connecticut's geologic future and the continuing impact of erosion on our landscape.
-Make up oral and written questions pertaining to this class.

Day 8

-Show a video on Connecticut geology.
-Class review (Jeopardy or Quizzard) of information from this unit.

Day 9

-Test on Connecticut Geology.

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TEACHER RESOURCES

Canned Alaskan Earthquake. Call Earthquake Experience in Anchorage (907) 694-5926 or write to Dynmoco, P.O.Box 771971, Eagle River, Alas]ca 99577

Seismo-WatCh Newsletter. Advanced Geologic Exploration, P.O.Box 18012, Reno, Nevada 89511

Federal Emergency Management Agency (FEMA), P.O.Box 70274, Washington, D.C. 20424

* Through the above, you can also obtain an 800 number or internet address to get daily earthquake information to plot on a world map.

* Many great geology references can be gotten at the Department of Environmental's Publications and Map Room located at 79 Elm Street in Hartford

U.S. Geological Survey (USGS), Branch of Distribution, P.O.Box 25286, Denver, Colorado 80225

A booklet titled, *Connecticut Rocks* , prepared by Pranoti Asher and Wayne Bugden. Department of Geology and Geophysics. University of Connecticut in Storrs.

Museums with great collections:

Peabody Museum in New Haven, CT

The Bruce Museum in Greenwich, CT

The Boston Museum of Science in

Boston, MA.

The American Museum of Natural History in New York City, N.Y.

Before taking a field trip to Old Mine Park in Trumbull, CT. you must obtain a free permit from the town, Also get a copy of *Teaching Trails* —a booklet about the park written by Brennan Mahoney and published by Learning Without Borders Publishing Company (North Salem, N.Y.)

***Join your local mineral club, they are a wealth of information.

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