

1. ALASKITE - donated by Unimin Corporation,
The Hawkins Mine, Spruce Pine (Mitchell County)



Alaskite is an extremely light colored variety of granite composed primarily of three minerals. Over one-half is white feldspar of two types, plagioclase and microcline; the rest is light gray quartz and silvery muscovite mica. Some alaskite may contain garnet or beryl as well. The alaskite bodies in Mitchell County are 320-390 million years old and occur along the eastern edge of the Blue Ridge. Spruce Pine is a major mining district with over 700 mines having been operated. One hundred percent of all the world's high purity quartz comes from mines in the Spruce Pine area; the quartz is used in the production of high-tech silicon (semiconductors) and high temperature lighting (bulbs) products. The feldspar is used to make glass, ceramics, pottery and enamelware. It is used as filler in cleansers, soaps, abrasives, textiles, papers, paint, plastics, cements and concrete. Ground mica is used in paints and plastics manufacture, plasterboard and as sheetrock joint cement. It is also used as filler in roofing, rubber, cosmetics and cement.

2. ANDESITE TUFF - donated by Luck Stone Corporation,
Pittsboro Quarry – Moncure, NC (Chatham County)



This rock comes from the Carolina Slate belt, a region in central North Carolina that, about 540 – 600 million years ago, was a chain of volcanic islands on the other side of an ocean that no longer exists. Very much like the volcanoes of Japan, the Aleutians, or Indonesia of today, these volcanoes occurred along an active plate boundary known as a subduction zone. Eruptions were pyroclastic in nature, with violent explosions shooting different-sized material into the air. When this material accumulated on the ground, it hardened into the volcanic rock known as tuff. If you look closely, you may be able to see the fragmental texture that records this history. Andesite (named for the Andes) is a common rock in such volcanoes, and has a color that is intermediate between dark and light. In the Carolina Slate belt, many such rocks are greenish ("greenstone") owing to later metamorphism that produced chlorite, epidote, and actinolite – all green minerals. In some samples you may see tiny crystals of quartz or feldspar that grew in the magma just before an eruption, or you may detect evidence of the later metamorphic episode that affected the rocks of the Carolina Slate belt. This rock is a source of crushed stone used in the construction industry, largely in the production of concrete and asphalt. Larger chunks, called rip-rap, are used for soil erosion control.

3. BIOTITE HORNBLENDE TONALITE – donated by Wake Stone Corporation
Nash Quarry – Battleboro, NC (Nash County)



This sample is from the Rocky Mount batholith at the eastern edge of the exposed portion of the Eastern Carolina Slate Belt. The batholith is covered with zero to seventy meters of soil to the southeast, and exposure is limited to outcrops near the western edge of the intrusion along the Tar River and Swift Creek. Three intrusions comprise the batholith, one is represented by medium-grained microcline megacrystic hornblende biotite granodiorite. Medium-grained white granites comprise the second intrusion that contact gray granitoids. A third intrusion, biotite hornblend tonalite, is found in the northern portions of the batholith. Prismatic crystals of Hornblende minerals are medium to coarse-grained in nature, subhedral in shape. Light green to dirty olive green color is the characteristic features of the hornblende in the tonalite. This rock is a source of durable stone for the construction industry, used primarily in the production of concrete and asphalt pavements.

4. CRETACEOUS SAND - donated by Hedrick Industries,
Lilesville Pit (Anson County)



MATERIAL SALES COMPANY, INC.

An Affiliate of HEDRICK INDUSTRIES
CRUSHED STONE | SAND | GRAVEL

This sample from the Sandhills region of North Carolina consists of quartz grains deposited during the Cretaceous period some 60 million years ago. The sediment was carried by an ancient river and deposited as part of a huge delta complex where the river emptied into the Atlantic Ocean - at a time when the coastline was much farther west than now. Most of these quartz grains are angular to subrounded in shape and range in size from fine gravel to medium sand. Such deposits of sand and gravel provide much of the material used as aggregate in the production of concrete and asphalt, in construction of roads as a base layer, and are also used commonly as fill material in construction projects. Relatively pure deposits of quartz sand are used in the glass-making industry.

5. DIABASE - donated by Carolina Sunrock Corporation,
Butner Quarry - Butner (Granville County)



Diabase is an igneous rock rich in calcium, iron, and magnesium. The gray, rectangular-shaped crystals are plagioclase feldspar, and the dark minerals are pyroxene, olivine, ilmenite, and magnetite. (Diabase is magnetic – test it with a small magnet on a string.) The rifting formed cracks down to magma in the earth’s lower crust. Diabase is a type of basalt – the fine-grained, dark colored igneous rock that makes up the sea floor and most volcanic islands. This diabase formed about 200 million years ago as the supercontinent Pangaea split apart and the Atlantic Ocean began to form. Hundreds of diabase dikes and sheets are intruded into the Triassic basins and Piedmont area of North Carolina. Diabase is mined and made into crushed stone for construction, concrete, asphalt, and building roads.

6. GNEISS (Henderson augen gneiss) - donated by Vulcan Materials Company,
Hendersonville Quarry - Hendersonville (Henderson County)



Gneiss is a metamorphic rock consisting of bands and streaks of alternating darker and lighter color minerals. The Henderson augen gneiss is a meta-igneous rock. It was originally granite, with large rectangular crystals of orthoclase feldspar, along with plagioclase feldspar, quartz, and micas. Later, as a result of being subjected to squeezing at high temperatures deep in the earth, the granite was metamorphosed. The metamorphism caused the banding to form, and also modified the rectangular feldspars into augen (German for “eye”) shaped grains. Recent geological research suggests that the original granite crystallized from molten magma about 490 million years ago, and that the granite was transformed to gneiss about 350 million years ago. The Henderson gneiss occurs in a wide area in the western Piedmont in North Carolina, including Chimney Rock. The rock is an excellent source of crushed stone used in producing asphalt and concrete, as well as other construction materials.

7. GRANITE - donated by NC Granite Corporation,
Mount Airy Quarry, Mount Airy (Surry County)



Mount Airy granite is a medium-grained, equigranular igneous rock composed of quartz, plagioclase, orthoclase, biotite and accessory minerals (magnetite, monazite, apatite, and sphene). It formed as a pluton about 335 million years ago, as a large pocket of magma cooled deep within the earth’s crust. Later, erosion gradually removed the thick insulating layers of rock above, allowing the granite to be exposed at the surface as seen today. This mine is the largest open-face granite quarry in the world. Mount Airy granite is quarried as dimension stone - cut into slabs and blocks, and used widely for lobby floors or walls of buildings, for curbstones, monuments and tombstones. The deposit has a color and texture that are remarkably uniform throughout, permitting the repair of damaged monuments even though they were crafted decades earlier. Granite is North Carolina’s state rock.

8. LIGHT WEIGHT AGGREGATES - donated by Vulcan Materials Company,
Gold Hill Quarry (Cabarrus County)



This rock is mined from the Floyd Church Formation, which is comprised of argillite and meta-tuff. Both of these rock types make a quality aggregate. In addition, Carolina Stalite purchases the argillite from Vulcan and heats it in large kilns (ovens) to 2100 degrees Fahrenheit. The excessive heat bloats the rock resulting with a much lighter rock that is used in concrete for high-rise buildings and lightweight cinder block. The bloated rock is reduced in specific gravity from approximately 2.7 to 1.4 or less. Some rock will actually float on water. The Floyd Church Formation must be selectively mined in order to separate the argillite that is used for lightweight aggregate. The chemistry of this deposit is unique and is what causes the bloating characteristics of this deposit.

9. LIMESTONE - donated by Martin Marietta Aggregates,
Rocky Point Quarry - (Pender County)



Limestone is a sedimentary rock made of the mineral calcite (CaCO₃). Calcite fizzes in acid, a property demonstrated by dropping vinegar or a 5-percent solution of hydrochloric acid on the specimen. The rock also contains small amounts of quartz sand and clay. The limestone formed more than 40 million years ago when layers of seashells and lime mud accumulated in a tropical ocean. Teeth and bones of giant sharks and other marine creatures were also incorporated. Pressure from overlying layers, and minerals in the seawater, cemented the layers into limestone. Over time, as the seas retreated to their present position, the limestone was exposed as rock on land. Groundwater traveling through the limestone dissolved away the fossils forming its current “holey” texture. Limestone is a versatile and valuable earth material made into aggregate rock crushed into various sizes. This limestone is also an important aquifer in the southern Coastal Plain.



10. MARBLE (Murphy Marble) - donated by Nantahala Talc and Limestone Company, Hewitt Quarry (Swain County)

A fine grained metamorphic rock derived from limestone. Marble can be several colors including white, pink, and green. This rock will effervesce (bubble) when a drop of weak hydrochloric acid (HCl) touches it. Marble is used for building stone, both as rough stone and as polished slabs. Also used by sculptors to carve statues and as construction aggregate.



11. METAVOLCANIC DACITE – donated by Hanson Aggregates, Rougemont Quarry (Durham and Orange Counties)

Dacite is a very fine-grained igneous rock of volcanic origin. Igneous rocks are classified by the percentages of key minerals, and dacite consists of a high percentage of plagioclase feldspar (65%) and a relatively high percentage of quartz (25%). This rock is part of the Carolina Slate Belt, a geological region in central North Carolina that consists of various types of rocks from volcanic activity 500-570 million years ago (Cambrian Period). This volcanic dacite deposit was metamorphosed approximately 400 million years ago (Devonian Period). The metamorphism produced the minerals chlorite, epidote, and sericite, all of which give the rock a slightly green color. This rock is mined and crushed for use in construction aggregates.



12. PHOSPHATE “Rejects” - donated by PotashCorp-Aurora, Aurora (Beaufort County)

Phosphate comes from pelletized phosphorites, marine sedimentary rock associated with limestone. Phosphate ore is present mainly as a calcium phosphate variety known as francolite (the black pellets) and was deposited on the ocean floor during the Miocene epoch, about 15 million years ago. It formed in an unusually nutrient-rich marine environment, and is accompanied by abundant fossils of marine invertebrates and vertebrates, including sharks and whales. Once separated from limestone and quartz sand, phosphate is processed to make fertilizers, industrial chemical compounds, and additives for foods and toothpaste. The quartz sands are used in soil and land reclamation. The material you have here is the shell, limestone, and fossil debris separated from the phosphate ore and commonly called “rejects.” It is used mainly as construction aggregate. This material is actually younger in geologic age than the phosphate ore.

13. PORPHYRITIC GRANITE (Lilesville granite) - donated by Vulcan Materials Company, Rockingham Quarry - Rockingham (Richmond County)



Lilesville granite is a coarse-grained, porphyritic igneous rock containing large pinkish crystals of orthoclase surrounded by smaller grains of quartz, plagioclase, and biotite and sparse accessory minerals including sphene and magnetite. This body of granite formed in a manner similar to the Mount Airy pluton described above, and is of similar age. The larger grain size and especially the large orthoclase crystals indicate that the cooling was very slow. Both Mount Airy and Lilesville plutons belong to a large group of granite bodies that formed during late Paleozoic geologic time (325 million years ago) as the supercontinent Pangaea was created by collisions between continental plates. Lilesville granite is a source of crushed stone used in concrete, asphalt, and other applications. In highways, look for the glint of light reflecting off cleavage planes of feldspar crystals to identify asphalt that uses Lilesville or similar granite.

14. PYROPHYLLITE ORE - donated by Standard Mineral Company, Robbins (Moore County)



Pyrophyllite is a soft, micaceous mineral found in metamorphic rock. Similar in appearance to talc, it was named from the Greek words “fire” and “rock” since its early use was for hearthstones that surround fireplaces. Pyrophyllite concentrate is used in refractories, rubber, ceramics, insecticides, plastics, paint and roofing.

15. QUARTZ GRAVEL - donated by Hedrick Industries, Lilesville Pit (Anson County)



MATERIAL SALES COMPANY, INC.
An Affiliate of HEDRICK INDUSTRIES
CRUSHED STONE | SAND | GRAVEL

This gravel consists mostly of quartz. The gravel was carried to this (alluvial) deposit during the flooding of the PeeDee River years ago. The gravel is rounded by the abrasive action of the river in the same way a rock tumbler rounds pieces of rock. This rock is used for road aggregate and as a building material. The material is 99.9% quartz and is also used in the chemical and metal industry. The high purity quartz is used in silicon chips and silicon gel while the low purity quartz is used in the automobile industry.



NORTH CAROLINA
**AGGREGATES
ASSOCIATION**

A Special Thank You for our Sponsors and Volunteers

ROCK SPONSORS



MATERIAL SALES COMPANY, INC.
An Affiliate of HEDRICK INDUSTRIES
CRUSHED STONE | SAND | GRAVEL



BAG SPONSORS



Enviro-Equipment, Inc.
"When it has to work"
www.enviroequipment.com



Individual Bag Sponsors:

John Bryant, Martin Marietta Materials
CENTRAL NC MINERAL CLUB
Brian North, Martin Marietta Materials

Diane Weems, NC Aggregates Association
Charles Welby
Nuwan Wijesuriya, Martin Marietta Materials

VOLUNTEERS

Bechtel, Randy, NC Geological Society
Bryant, John, Martin Marietta Materials
Cecile, Ron - Martin Marietta Materials
Coe, Jeff - Martin Marietta Materials
Conner, Jason - Hedrick Industries, Inc.
Ferguson, Butch - Caterpillar, Inc.
Goode, David
Hartwig, Trevia - Vulcan Materials Company
Hicks, Ron - Foothills Correctional Institute
Hobson, Jill
Jennings, Casey - Vibra Tech, Inc.
Jones, Larry - Vulcan Materials Company
LaPoint, Paula - Central NC Mineral Club
Lawler, Chip - Hanson Aggregates
Martin, Paula - Vulcan Materials Company

Moore, Carol - Catawba Schools
Moore, Mike - Hanson Aggregates
Myers, Terry - Austin Powder Company
North, Brian - Martin Marietta Materials
Pennewill, Timmy, Martin Marietta Materials
Rogers, Gary - Schnabel Engineering
Stem, Jay - NC Aggregates Association
Wales, Dan - Vulcan Materials Company
Weems, Alara
Weems, Caitlyn
Weems, Diane - NC Aggregates Association
Wijesuriya, Nuwan - Martin Marietta Materials
Willis, Diane, Central NC Mineral Club
Willson, Horace - Martin Marietta Materials