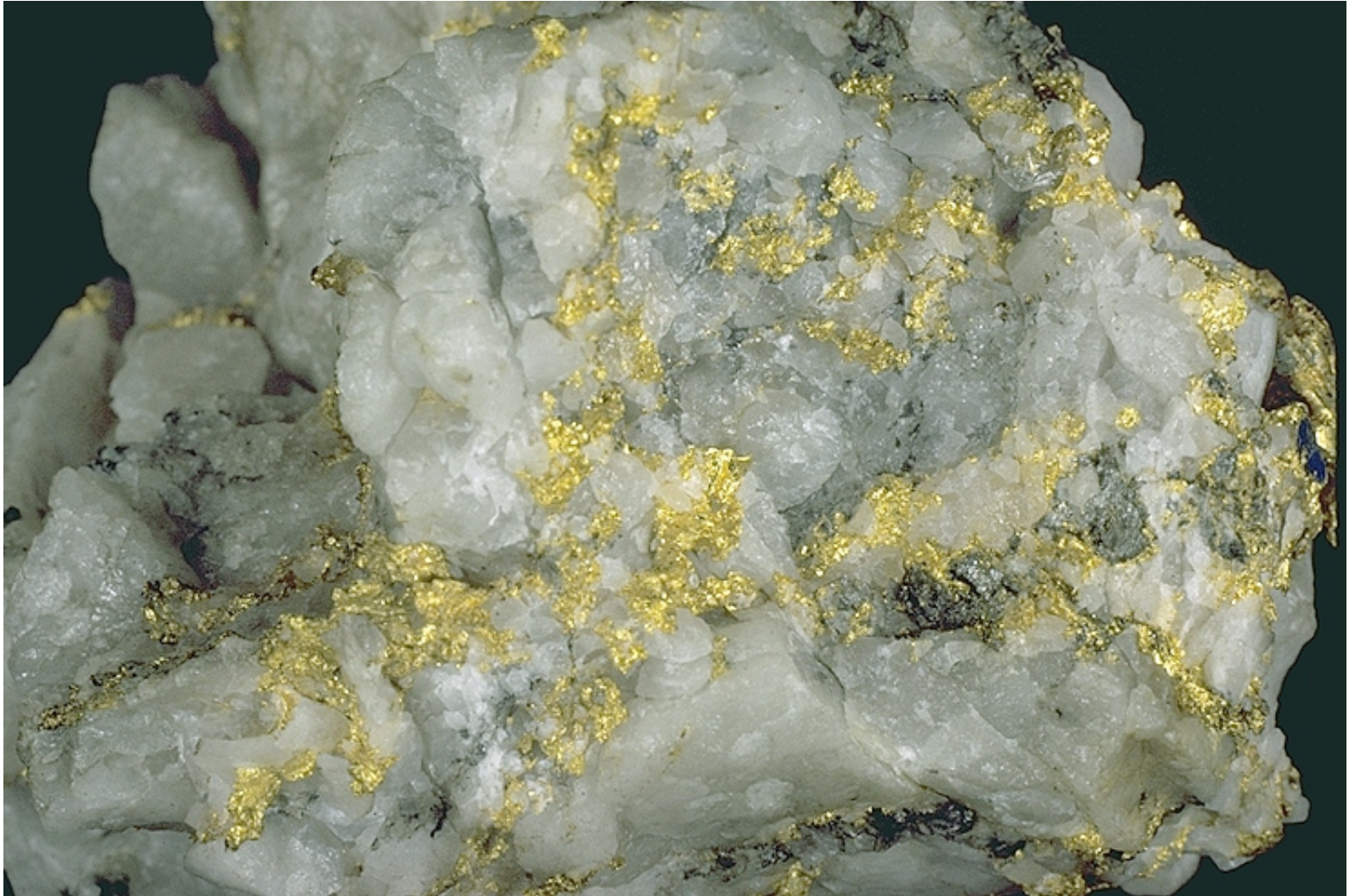


# **Maritime Minerals**



**GOLD -- Au**

# GOLD

**Crystal system:** isometric

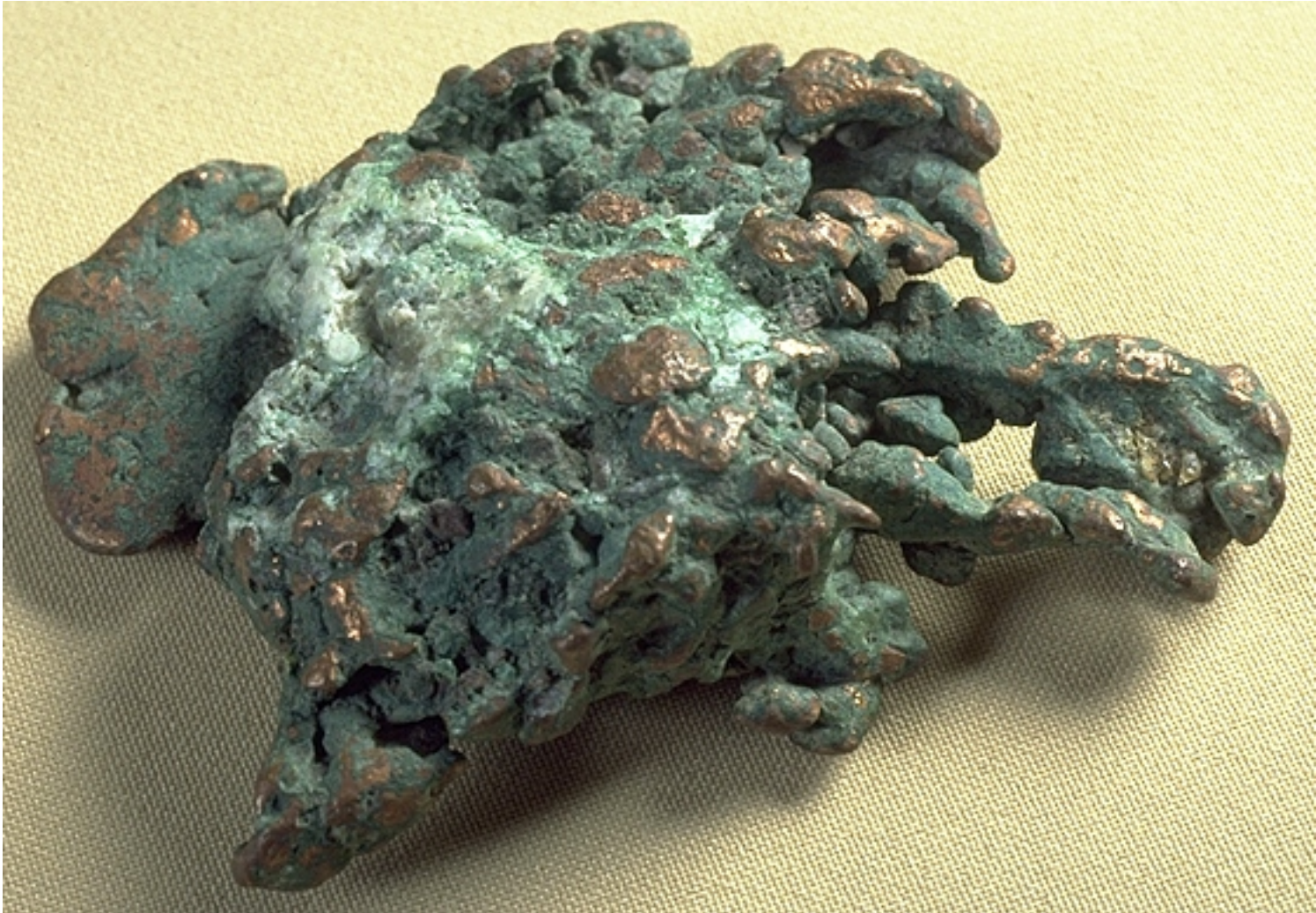
**Physical properties:** fairly soft (2.5-3), very dense, ductile, and malleable. Excellent conductor of heat and electricity. Opaque with metallic lustre.

**Major occurrences:** South Africa, California, Canada, Australia, Brazil, and the former Soviet Union.

**Local examples:** found in over 60 districts of Nova Scotia including The Ovens, Tangier, Clam Harbour, Mount Uniacke, Gold River, Ecum Secum, Renfrew, Rawdon, Cranberry Head, Kemptville, Blockhouse, Lawrencetown, Isaacs Harbour, Country Harbour, and Gays River.

**Uses:** monetary standard, jewelry, dental fillings, electronic components (computers, stereos, scientific instruments, etc.), and electroplating.

Photograph by Alex Wilson, Nova Scotia Museum of Natural History



**COPPER -- Cu**

## **COPPER**

**Crystal system:** isometric

**Physical properties:** fairly soft (2.5-3), hackly fracture, very dense, ductile, and malleable. Excellent conductor of heat and electricity. Opaque with metallic lustre.

**Major occurrences:** Zaire, Zimbabwe, Chile, Canada, U.S.A., and former Soviet Union.

**Local examples:** Cape d'Or, Coxheath Hills

**Uses:** Along with iron, copper is a very important metal in the history of human development. Modern uses include electrical equipment (wires, cables, switches, heating, etc.), alloy metals (brass and bronze), jewelry, coins, plumbing, corrosion resistant couplings and fasteners, ammunition, bearings, clocks, roofing material, air conditioners, clutch disks, glass molds, golf clubs, musical instruments, and electroplating.

Photograph by Heinz Wiele, Bedford Institute of Oceanography; specimen courtesy of the Nova Scotia Museum of Natural History.



**QUARTZ --  $\text{SiO}_2$**

## QUARTZ

**Crystal system:** hexagonal

**Physical properties:** very hard (7), conchoidal fracture, no cleavage, low density, transparent to translucent with a vitreous lustre.

**Major occurrences:** One of the most abundant minerals in the Earth's crust (~12% by volume).

**Local examples:** Numerous quartz crystal varieties (amethyst, agate, jasper, etc.) are commonly collected along the shores of the Bay of Fundy. Particularly good localities include Morden, Baxten Harbour, Ross Creek, Scots Bay, and Cape Split.

**Uses:** piezoelectric instruments (digital clocks, pressure gauges, oscillators, resonators, etc.), optical equipment (polarizing lenses, prisms, heat-ray lamps, etc.), glass, paint, abrasives, semi-precious gemstones, and carvings.

Photograph by Heinz Wiele, Bedford Institute of Oceanography; specimen courtesy of the Nova Scotia Museum of Natural History.



# **AGGREGATE sand & gravel**



## **AGGREGATE (sand and gravel)**

**Physical properties:** composed of many rock fragments. Best aggregates contain durable lithologies (slate, granite, limestone, etc.), and few clay particles. Grain size and sorting control the compactability and the permeability of the aggregate which, in turn, governs its end use.

**Major occurrences:** mined nearly everywhere in the world. Most economically obtained from surficial glacial deposits on land or the seafloor but also quarried from bedrock where this is the only option or when special physical properties are required.

**Local examples:** glacial deposits throughout the province. Quarries at Auld's Cove and Folly Lake. Large quantities are present on the continental shelf offshore Nova Scotia.

**Uses:** fill (roads, dams, landscaping, etc.), ballast, retaining walls, breakwaters, concrete and asphalt.



**GOETHITE --  $\text{FeO}(\text{OH})$**

## GOETHITE

**Crystal system:** orthorhombic

**Physical properties:** hard (5-5.5), high density, perfect cleavage, silky lustre, opaque (translucent when in thin sheets), brownish-yellow streak, feels greasy.

**Major occurrences:** Australia, Brazil, China, the former Soviet Union, Cuba, France, Germany, Canada.

**Local examples:** Londonderry, Cobequid Highlands.

**Uses:** Goethite is an important iron ore, which is a very significant metal in history of human development. Today iron is used to make steel, magnets, catalysts, chemical tracers for scientific research, fertilizer, enamel finishes, polishing compounds, electronic components, and pigments (ink, eye shadow, paper, plastic, paint, etc.). The uses for iron are too numerous to list.

Photograph by Heinz Wiele, Bedford Institute of Oceanography; specimen courtesy of the Nova Scotia Museum of Natural History.



**CALCITE --  $\text{CaCO}_3$**

## CALCITE

**Crystal system:** hexagonal

**Physical properties:** semi-hard (3), low density, perfect rhombohedral cleavage, vitreous to pearly lustre, white streak, soluble in dilute hydrochloric acid.

**Major occurrences:** large (1 m) crystals occur in some famous localities around the world such as Iceland, Germany, Missouri, Colorado, and Oklahoma. Calcite is the major constituent of limestone, which is widespread in many areas of the world.

**Local examples:** Calcite crystals may be collected at numerous sites including Rainy Cove, Horseshoe Cove, Partridge Island, Cheverie, Stronach Brook, Stirling, and Port Hood. Large limestone quarries exist at Brookfield and Irish Cove.

**Uses:** numerous construction uses (building stone, cement, aggregate), flux, fertilizer, polishing compounds, fillers (rubber, paint, paper, etc.).

Photograph by Heinz Wiele, Bedford Institute of Oceanography; specimen courtesy of the Nova Scotia Museum of Natural History.



**MICA --  $KAl_2(AlSi_3)O(OH)_2$**

## MICA

The specimen shown is a type of mica called muscovite.

**Crystal system:** monoclinic

**Physical properties:** soft (2-2.25), insoluble, low density, perfect basal cleavage into thin sheets which are flexible and elastic.

**Major occurrences:** very common mineral, but especially prevalent in plutonic igneous and metamorphic rocks. Enormous crystals (50 sq. metres) occur in Ontario, New Hampshire, India, and Brazil.

**Local examples:** Widespread within the granites of Nova Scotia. Good examples are found at East Kemptville, Halifax, Moose River, Black Point, and Port Mouton.

**Uses:** electrical and heat insulators, paper, rubber, fireproof paint, porcelain, dry lubricants, cement, roofing, welding rods, and drilling muds.

Photograph by Heinz Wiele, Bedford Institute of Oceanography.



**ZEOLITE --  $\text{NaCa}_2(\text{Al}_5\text{Si}_{13})\text{O}_{36}14\text{H}_2\text{O}$**



## ZEOLITE

The specimen shown is a type of zeolite known as stilbite.

**Crystal system:** monoclinic

**Physical properties:** semi-hard (3.5-4), soluble in hydrochloric acid, low density, perfect cleavage, white streak.

**Major occurrences:** New Jersey, Ilse of Skye, Nova Scotia, Iceland, Italy, and India.

**Local examples:** The Bay of Fundy is a famous area for collecting zeolites. Good locations include Swans Creek, Cape d'Or, Wasson Bluff, Amethyst Cove, Black Rock, Chipman Brook, Morden, Deep Cove, and Williams Brook. Away from the Bay of Fundy, zeolites are also found in Iona and Dingwall.

**Uses:** water softener, filter (aquaculture, treatment of nuclear reactor effluent, water treatment), odor control (cat litter, pig deodorant), catalyst, absorbent (oilspill cleanup).

Photograph by Heinz Wiele, Bedford Institute of Oceanography. Specimen courtesy of Gordon Oakey.



**GYPSUM --  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$**

## GYPSUM

**Crystal system:** monoclinic

**Physical properties:** soft (2), light, perfect cleavage, white streak, soluble in hydrochloric acid and hot water.

**Major occurrences:** Deposits of gypsum and anhydrite (gypsum without additional water molecules) are found on all continents with the possible exception of Antarctica.

**Local examples:** Gypsum and anhydrite outcrops are extensive in the entire northern half of the province including Cape Breton Island. Nova Scotia is one of the most productive gypsum mining regions in the world.

**Uses:** cement, agriculture (soil conditioner), toothpaste, filler (bread, paper, crayons), plaster, ornamental stone, sulfuric acid.



**WOLFRAMITE --  $(\text{Fe}, \text{Mn})\text{WO}_4$**

## **WOLFRAMITE**

**Crystal system:** monoclinic

**Physical properties:** colour -brownish-black to iron-black, streak -reddish-brown to brownish black, one perfect cleavage, high density, semi-hard (4-4.5), crystals commonly short prismatic, faces commonly striated.

**Major occurrences:** Southern China; Colorado; Portugal; Cornwall, England; Bolivia, Malaysia, Burma and Germany.

**Local examples:** Locally found in greisen (altered granite), quartz-rich veins or pegmatite veins, all associated with granite. Found in contact areas between granite and sedimentary rocks along the Eastern Shore (Ship Harbour, Sheet Harbour), in the granite in Tangier Grand Lake and Lake Charlotte areas, and within and at contact areas of the granite body (South Mountain Batholith) which stretches from Halifax to Yarmouth.

**Uses:** used for source of tungsten; tungsten used as tungsten carbide for wear-resistant materials used by the metalworking, mining, and construction industries. Tungsten metal wires, electrodes, and/or contacts are used in lighting, light bulbs, electronic, electrical, heating, welding and high-temperature applications. Tungsten also used to make heavy metal alloys, and tungsten bronzes and other tungsten compounds are used in paints.



**COAL -- C**

## COAL

Coal is a general term encompassing the following organic sedimentary rock types, listed in order of increasing alteration due to burial and heat: lignite, bituminous coal, and anthracite.

**Physical properties:** brown or black, earthy to vitreous lustre depending upon degree of alteration, composed of decayed and compressed plant fragments.

**Major occurrences:** United Kingdom, Germany, central China, eastern and western North America, northern India.

**Local examples:** Coal underlies much of the northern half of Nova Scotia including Cape Breton Island and has been mined commercially in this province since 1720.

**Uses:** over half of the electricity produced in the world comes from coal. Also used in steel production.

Photograph by Rob Fensome, Geological Survey of Canada.



**KAOLINITE--  $\text{Al}_2\text{Si}_2\text{O}_5(\text{OH})_4$**



## KAOLINITE

**Physical properties:** soft (2-2.5), very light, perfect basal cleavage, loses water between 390 and 450° C, plastic and easy to mold when mixed with water.

**Major occurrences:** large deposits in China, Germany, England, France, the former Soviet Union, and the United States.

**Local examples:** Shelburne Barrens, East Kemptville, Walton, Shubenacadie Valley.

**Uses:** Economically, one of the most important industrial minerals in North America (over 11 million tonnes produced in 1999). Used as pigment for paper, filler (paper, paint, adhesives, sealants, rubber, and plastics), and in ceramics.



**HALITE -- NaCl**

## HALITE

**Crystal system:** isometric

**Physical properties:** soft (2.5), very light, ductile, perfect cubic cleavage, transparent to translucent with vitreous lustre, white streak. Dissolves readily in water, excellent heat conductor.

**Major occurrences:** Germany, Poland, Spain, Austria.

**Local examples:** Salt has been mined in Nova Scotia since 1918 from extensive deposits found within Carboniferous sediments in the northern half of the province including Cape Breton Island. Today, room and pillar salt mining occurs at Pugwash and solution mining occurs at Nappan near Amherst.

**Uses:** food seasoning and preservation, soda, hydrochloric acid, chlorine, sodium, ceramic glazes, mineral water, curing of hides, soap, water treatment, de-icing, photography, nuclear reactors, herbicides, nuclear power generation, optics, mouthwash.



**PETROLEUM -- (oil & gas)**

## **PETROLEUM**

**Physical properties:** Petroleum, also sometimes called crude oil, refers to all naturally occurring gaseous, liquid, or solid hydrocarbons.

**Major occurrences:** majority of conventional oil and gas resources have been discovered in the Middle East, North Africa, and the former Soviet Union. However, significant petroleum resources have been found on every inhabited continent of the world (also suspected to exist on Antarctica).

**Local examples:** hydrocarbon seeps near Lake Ainslie, NS; Stoney Creek, NB; Albertville, NB (solid bitumen known as Albertite); offshore Nova Scotia.

**Uses:** more applications than perhaps any single other non-renewable resource in the world today. Supplies 60-70% of the energy consumed in North America. Other uses include plastics, rubber, lubricants, asphalt, explosives, biocides, fertilizers, paint, fibres, and pharmaceuticals.

Photograph by the Nova Scotia Department of Natural Resources.