

Bulk minerals, mineral resources, Northern Ireland

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Bulk minerals



Internal view of an adit in the Palaeogene Interbasaltic Formation at Parkmore, Co. Antrim. (P948058)



Underground crushing and screening plant

in the Kilroot Salt Mine, Carrickfergus, Co. Antrim. (Published with the kind permission of the Irish Salt Mining and Exploration Co. Ltd.). (P948059)

Iron ore was extensively worked in Co. Antrim from at least the 18th Century up to the 1920s. GSNI has records of 780 shafts and adits associated with iron ores. Five types of deposits are known.

Lateritic iron ores

Lateritic Iron Ores were formed by hydrothermal alteration and chemical weathering of basalt lava of the Palaeogene Antrim Lava Group in a tropical climate directly following lava extrusion ([see Mantle plumes, ocean spreading and the North Atlantic Igneous Province, Palaeogene extrusive igneous rocks article](#)). The main iron ore and bauxite bed is in the Interbasaltic Formation, which formed as the result of a prolonged period of weathering between the eruption of the Lower Basalt and Upper Basalt formations. A comprehensive survey, published in 1912, was the first to recognise the lateritic origin of these iron ores and bauxite ^[1].

The lateritic iron ores formed when the aluminosilicate lattice of pyroxene, olivine and feldspar broke down to produce clay minerals and iron and aluminium oxides. At ambient temperatures above 20°C, silica passes into solution and is leached out of the soil profile. In general, if rainfall is uniformly high (greater than 1.5 m/year), a lateritic clay results from desilication. However, with distinct seasons, minerals concentrate in layers at redox boundaries in the weathering profile. Leaching of silica proceeds with maximum effect during the dry season, while alumina and iron oxides are mobilised during the wet season. The Co. Antrim occurrences are unlike lateritic beds elsewhere in that the iron ore is deposited above bauxite. The term 'lithomarge' is used to describe the purple and red altered basalt spotted and streaked with white kaolin minerals. ^[1]

Iron ores

Iron ore beds are subhorizontal, commonly with a thin (c. 30 cm) higher-grade layer, the 'Pisolitic Ore', overlying a thicker and lower grade 'pavement' (up to 2 m). The higher grade ore is 30–60% total iron oxides, while the lower grade ore is about 25% iron oxides. The deposits were worked in open-cast or room-and-pillar underground operations ([P948058](#)) and it is recorded that 5 000 000t were extracted ^[2]. Such ores could not continue to be economic beyond the 1950s, when the giant supergene-enriched banded iron formation ores of America, Australia and Brazil began to dominate world markets.

Although iron ore occurrences are widely scattered over the Antrim Plateau the main mining districts were around Glenravel [D 166 196], Parkmore [D 184 205], Newtowncrommelin [D 140 186], Cargan [D 167 179] and Glenariff [D 213 195] in mid-Co. Antrim and at Lyle's Hill [J 247 829] in south Co. Antrim.

Blackband ironstone was worked at Carrickmore [D 165 426], Co. Antrim, within the Ballycastle coalfield. These ores grade about 30% Fe, are up to 75cm thick and lie within a succession of mudstone and coals, passing laterally into coal. They were worked between 1854 and 1879 and calcined on-site.

Cherty ironstone or jasper occurs within the Tyrone Volcanic Group varying in thickness from a few cm up to 2m at Bonnetty Bush [H 726 888] and Beaghbeg [H 674 828], Co. Tyrone.

Haematite, in narrow vertical veins crosscutting the boundary between the Silurian greywacke and

slate of the Southern Uplands-Down-Longford Terrane and the Newry Igneous Complex, was worked at Dechommet [J 255 435], Co. Down, in the 19th Century.

Bog Iron was extensively worked in Co. Londonderry in the last century ^[3]. It forms when acid water leaches iron oxides from the boulder clay and deposits iron as a thin crust at the redox interface of the B-soil horizon. The process is mediated by bacteria.

Bauxite

Bauxite was formed along with iron ore by lateritisation of basalt lava of the Palaeogene Antrim Lava Group. The Antrim bauxite is a residual clay deposit comprising a mixture of clay minerals of the kaolinite group, together with aluminium hydroxide, gibbsite and boehmite, with variable proportions of quartz, goethite and minor amounts of residual titanium minerals, especially anatase.

An unrecorded, but presumably small, amount of bauxite was extracted along with the iron ore from the Co. Antrim mines until about 1934, when the work ceased. Extraction resumed during the Second World War, when 244 000t were mined. The major mining areas were Newtowncrommelin [D 140 186] and Ballylig [D 180 094] in mid-Co. Antrim, and Lyle's Hill [J 247 829] in south Co. Antrim. Regional surveys have been carried out ^{[4][2]} and bulk samples were collected from Agnew's Hill [D 330 010] and Clenagh and Salmon's Drift [D 154 202]. ^[2]

No production records of run-of-mine grades are available, although individual samples show that the Co. Antrim bauxite is very variable in composition and some very high grades are recorded. Samples of gibbsite and boehmite with over 62% Al₂O₃ and low silica and iron oxides are clearly of metallurgical grade. A wide range of sub-ore grade samples is also recorded. Locally named varieties are lithomarge (kaolinised basalt), ferruginous red bauxite with 30% Fe₂O₃, and siliceous grey bauxite with more than 20% SiO₂. ^[2]

Given the abundance of low cost, high-grade bauxite from Australia, West Africa, Jamaica and South America, the Co. Antrim deposits are not competitive. However, ceramic and other properties have not been fully explored. Tests on calcining bauxite were carried out in the 1960s. A small quantity of bauxite is extracted at Clinty, [D 102 075] near Ballymena, Co. Antrim, as feed-stock for ferrous aluminium sulphate water purification material.

Industrial minerals

Northern Ireland has a remarkable variety of non-metallic industrial minerals. While the occurrence of many is of little more than historical interest, others are present in workable amounts and contribute to the economy. There is scope for the expansion of industrial mineral production in Northern Ireland.

Rock salt (halite)

Rock Salt (halite) forms beds of variable thickness within the Triassic Mercia Mudstone Group ([see Triassic article](#)) and is restricted to the southeast corner of Co. Antrim. Beds formed by the evaporation of seawater which was trapped in restricted basins on a shallow marine shelf. Salt extraction in the Carrickfergus [J 393 895] and Eden [J 430 895] salt fields commenced in the mid-19th Century ([P948059](#)) at several mines but is now being worked at only the Kilroot Mine ^[5]. Access to the Kilroot Mine [J 451 891] is by decline and mining is by the room-and-pillar method. In the abandoned salt mines, uncontrolled brining was often employed after extraction by room-and-pillar mining had ceased and this led to flooding of some of the mine workings. Most of these mines,

including those at French Park [J 392 895], Carrickfergus/International [J 428 896] and Maidenmount [J 390 901] ceased operations in the 1950s. In the salt fields the halite beds vary in thickness from 9 to 27 m. However, in the Larne No. 2 borehole, 15 km to the north, the salt beds are 400 m thick and are divided into three seam groups representing the Ballyboley (41 m), Carnduff (180 m) and Larne (179 m) halites. A bed of halite 113 m thick is also recorded in this borehole in the Permian Upper Marls at a depth of over 1700 m ^[6].

Gypsum and anhydrite

Gypsum and anhydrite, the raw materials of building plaster, occur as thin seams and cement in the Mercia Mudstone Group in the Lagan Valley. Historically, anhydrite nodules were hand picked in the Parkview brick pits ^[7]. Massive anhydrite with fibrous gypsum and granular carbonate was found at 111m below surface in a 4.8m thick bed in the Late Permian Connswater Marl Formation (Permian Upper Marls) just above the Magnesian Limestone in the Avoniel borehole in east Belfast. Stratabound beds of gypsum and anhydrite in possibly economic quantities have been intersected in mineral exploration boreholes drilled in the Carboniferous Clogher Valley Formation ([see Carboniferous article](#)) near Fivemiletown [H 445 479].

Perlite

Perlite, the industrial name for volcanic glass, occurs at Sandy Braes [J 320 396] southeast of Ballymena, Co. Antrim where it forms part of the Palaeogene Tardree Rhyolite Complex ([see Palaeogene intrusive igneous rocks article](#)). A nearby occurrence at Loonburn [J 322 395] is a sinuous lenticular deposit formed from an ash flow. The perlite, when fused, froths up and forms an inert, lightweight and porous granular product with a wide range of uses in the construction, insulation, packaging and agricultural industries.

Diatomite

Diatomite, also known locally as Bann Clay, occurs in a deposit up to 0.9 m thick in the valley of the River Bann between Toome [H 990 907] and Portglenone [C 980 039]. It was deposited in freshwater lakes during early post-glacial times and consists of the microscopic siliceous skeletons of diatoms. When dry, it is a friable, white, chemically inert powder that can be used as a filler in paint, plastic and rubber manufacture, but also as an absorbent in animal litter, an abrasive for metal polish, an insulant, and as a filtration agent in the food and pharmaceutical industries. Diatomite was extracted manually on a small scale until the late 1960s but is no longer worked.

Barytes

Barytes, the industrial name for the mineral barite (barium sulphate) is commonly found as gangue associated with lead and zinc veins in Dalradian rocks of the Sperrin Mountains and Ordovician and Silurian greywacke of the Southern Uplands-Down-Longford Terrane. It is also recorded as cement in sandstones and in veins in Carboniferous rocks near Draperstown and in the Clogher Valley. At both locations the barite is associated with major faults that may have acted as the channel for hydrothermal fluids.

Glass sand

Glass sand with a silica content of 95-99.8% is known at two localities in Northern Ireland. Carboniferous quartz sandstones were worked in the 18th Century for glass at Ballycastle in north Co. Antrim. Other quartz sandstones that could be beneficiated to achieve the appropriate specifications were explored in the 1970s at Kildress [H 805 768] near Cookstown in Co. Tyrone.

Moulding sand

Moulding Sand, for use in foundries has been obtained from the Triassic Sherwood Sandstone Group in the Lagan Valley, southwest of Belfast and from deposits of Pleistocene fluvio-glacial sand.

Feldspar

Feldspar, which occurs in pegmatite veins intruding the Moinian Lough Derg Group in west Co. Fermanagh was worked near Castlecaldwell and used in the making of glaze at the Belleek Pottery.

Fireclay

Fireclay from the Carboniferous coalfields at Coalisland in Co. Tyrone and Ballycastle in Co. Antrim was an important by-product of that industry and was used in the manufacture of refractory bricks.

Ball clay

Ball clay occurs in the Oligocene Lough Neagh Group ([see Late Palaeogene \(Oligocene\) sedimentary basins article](#)) and was used in the manufacture of sanitary pipes at Coalisland and on the east side of Lough Neagh near Portmore, Co. Antrim.

Dolomite

Dolomite is found as dolomitic limestone at several localities in Northern Ireland. It can be used as a flux in blast furnaces and in paper making. It may be calcined and used as an abrasive, or crushed and applied directly to farmland to counter magnesium deficiency in livestock. Extensive secondary dolomitisation of the Carboniferous Knockmore Limestone Member near Belcoo [H 085 387] in Co. Fermanagh is associated with faulting ^[8]. Analyses of the dolomite showed a high degree of purity (39.5% MgCO₃) and it is now worked on a small scale for agricultural purposes. Elsewhere in Northern Ireland, a 5m thick dolomite bed is found in the Carboniferous Derryloran Grit Formation ([see Carboniferous article](#)) near Cookstown, Co. Tyrone.

Chalk

Chalk from the Cretaceous Ulster White Limestone Formation ([see Cretaceous article](#)) has been worked for many years by Eglinton Quarries at Glenarm, Co. Antrim [D 314 153] and has applications as a whitener, or filler and for agricultural lime.

Construction minerals

Northern Ireland has abundant sources of minerals and rocks for use in the construction industries.

Aggregate

Aggregate in Northern Ireland is derived from a variety of bedrock types and superficial deposits which are capable of yielding high quality, high specification products. The GSNI inventory of quarries lists some 262 quarries and pits widely distributed throughout the country and describes their products ^[9]. Production in 2002 of hard rock aggregate and sand and gravel was 23.5 million tonnes. Categories listed include limestone, basalt, sandstone and sand and gravel. Aggregate production is dominated by basalt, derived mostly from the Palaeogene Antrim Lava Group, closely followed by fluvio-glacial sand and gravel. The sandstone category includes the Silurian greywacke

(or gritstone) of Counties Armagh and Down which has high polished stone and aggregate abrasion values, making them a particularly good source of wearing course aggregate.

Brickclay

Brickclay was used in the manufacture of bricks at small brickfields in the Lagan Valley and used in the construction of many of the imposing late Victorian buildings in the greater Belfast area in the late 19th Century up to the mid-20th Century. These are stone-free, red, plastic clays derived from the Triassic Mercia Mudstone Group with re-deposition in Pleistocene times ^[10]. Brick clays are also worked from the Carboniferous Rossmore Mudstone Formation in the Dungannon area of Co. Tyrone.

Dimension stone

Dimension Stone includes almost every common type of hard rock in Northern Ireland which has been used in the past as a building stone and a few which were quarried as decorative stone. There are no active decorative or dimension stone quarries active at present, although Northern Ireland has a number of well known varieties of decorative stone. The Mourne granites were widely exported and stone cutting is still a significant craft industry in south Co. Down. Some Carboniferous limestones were once also quarried, e.g. the Armagh Red Marble.

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