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MINES BRANCH,
DEPARTMENT OF MINES, OTTAWA, CANADA.

Mineral Resources of Canada.

Memorandum Series, May 1922. No.5.

Dept. Energy, Mines & Resources
MINES BRANCH
AUG 1 1969 ✓
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OTTAWA, CANADA.

POTTERY CLAYS IN CANADA.

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Different kinds of Pottery.

Pottery includes many varieties of ware made from different kinds of clay. The common flowerpot of the gardener is the simplest kind of pottery made in quantity; and the unglazed pottery of the European and Asiatic peasant, and Indian pottery, are examples of simple ware made for every day use, very often from the commonest brick clays. Porcelain, or china, is at the other extreme in the ceramic scale, and this class of pottery is made from the finest white burning kaolin, with which other ingredients are mixed.

There are several types of pottery between these extremes, but in a general way they can be grouped into two classes - those which have a vitrified, or non-absorbent body, and those having a soft body which is more or less porous. The latter require to be covered with a glaze, or enamel, in order to render them watertight, but vessels of the first type may be left unglazed and still hold water. Modern pottery, however, is nearly always finished with a glaze, or enamel, whether the body is porous, or vitreous.

Stoneware Pottery: Articles for domestic use, like crocks, jugs, mixing bowls, teapots, etc., are generally made from stoneware clay, which burns to a dense body of extreme hardness, varying in colour from nearly white, to dark grey. A great deal of the so called art pottery is made from stoneware clays.

White Earthenware: The heavier kind of tableware, known by various trade names, as white earthenware, ironstone china, and white granite-ware, are made from mixtures of white burning clay and finely ground quartz and feldspar, burned to a fairly dense but porous body and covered with a clear glaze.

A great variety of ornamental pottery is made of the white earthenware body covered with coloured glazes.

Coloured Earthenware: There is a great variety of pottery made from natural impure clays, which burn to colours ranging from light buff to deep red. Most of these clays soften and lose their shape if burned to too high a temperature, consequently the body remains porous after firing, and is then covered with glazes and enamels, and refired.

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POTTERY CLAYS.

Potter's clays are any clayey materials suitable for the manufacture of pottery, though the term is generally understood to exclude those materials which can only be used for the lowest grade of ware.

Good plasticity and tensile strength in the raw state is essential for making pottery on the potter's wheel, but clays that are short in texture and weak can often be cast in plaster of Paris pottery moulds when they cannot be worked by the plastic process.

Common Brick and Tile Clays: Glacial lake and estuarine clays are widely distributed throughout Canada and are used at various localities for the manufacture of common brick and field drain tile. Most of these impure clays carry too much fine rock particles, or sand, and few of them are smooth enough to use for pottery in the condition in which they are dug from the bank.

It is necessary to mix them with an excess of water and screen the clay water, or slip, as this mixture is called, to remove the grit.

The common clays burn to a variety of colours, varying from light buff to dark red, and as they will stand high temperatures they are easily overfired and distorted when made up into pottery forms.

Marls: The term marl, or malm, is used in England locally, to denote brick clays containing much carbonate of lime. Sagger marls are a variety of fireclay used for making cases (saggers) in which pottery is fired.

In Canada the term marl is applied only to whitish friable deposits of lime carbonate often found on the bottoms of small lakes.

Stoneware Clays: Stoneware clays are sparingly distributed in Canada and are accessible for present use in only two provinces, Nova Scotia and Saskatchewan. This type of clay is generally very smooth and plastic in the natural state, and the colour ranges from dark grey to almost white. Some deposits have a mottled pink and white colour. Stoneware clay is used largely in the raw state by sculptors, and for teaching modelling in schools.

It will stand a high temperature in firing, and burns to a dense hard body, and will make a good, strong porous body for pottery, even when burned at a comparatively low temperature.

Stoneware clays are sometimes highly refractory and can be used as fireclays.

Ball Clay: Ball clays are highly plastic, fine-grained clays which burn to a white colour, but in the raw state they are dark coloured, sometimes approaching black. It is one of the ingredients used in compounding bodies for making white earthenware, white wall tile, electric porcelain, etc., and imparts plasticity to a body mainly composed of non-plastic, or feebly plastic materials.

There is a great variety in composition in the different ball clays, but none are found in Canada, except among the great variety of white clays in southern Saskatchewan, where some of the beds may be found suitable.

Blue Clay: This appears to be a name given by English potters to a variety of ball clay. The name is often used in Canada in describing certain clays which are of a lead grey colour, but the name is meaningless and has no significance, as a host of clays of widely different properties have a lead grey, or bluish colour, in the raw state.

Pipe Clay: Pipe clays are those suitable for making tobacco pipes, but the term is also used for any white clay of no definite value.

Kaolin, (China Clay): Commercial kaolins are residual clays derived from a rock composed mostly of feldspar, or containing little or no iron oxide. Crude kaolin is prepared for the pottery industry by washing, in order to free it from impurities, generally quartz grains. The washed kaolin is known by the name, china clay.

China clays are less plastic than stoneware clays and generally burn to a white porous mass. They are mixed with finely ground quartz and feldspar for the manufacture of porcelain, and ball clay is added for white earthenware bodies.

Kaolin has been found in commercial quantities at only one locality in Canada, as far as known at present. This deposit is mentioned under the resources of Quebec. The English china clay is imported into Canada for the manufacture of sanitary porcelain, electric porcelain, etc.

Shales: Shales are hardened clays, usually laminated in structure, but develop plasticity when ground and moistened.

Outcrops of shale are often weathered to plastic clays, some of which can be used for pottery making. Weathered shale occurs in many parts of the Maritime provinces, and in Ontario, at Hamilton and Niagara.

ACCESSORY MINERALS USED IN THE POTTERY INDUSTRY.

Flint or Quartz: Potter's flint is made from flint nodules which occur in the chalk in the southeast of England. The nodules are washed and calcined and then finely ground. Potter's flint in America is produced by grinding quartz sand, which is nominally composed of pure silica (SiO_2).

Some of the white sandstones in Eastern Canada are pure enough to be used in pottery.

Flint is one of the ingredients used in mixing white earthenware and porcelain bodies. It is also added to some of the inferior clays to reduce their shrinkage, and it generally enters into the composition of glazes and enamels.

Feldspar: Finely ground feldspar is largely used in the pottery industry, in bodies for whiteware and in glazes.

Canada has large feldspar resources, and all grades from soda spar to high potash spar can be procured in any quantity.

Fireclay and Sagger Clay: Fireclay is used in the pottery industry for making sagers, the cases in which pottery is placed for setting in open-fire kilns, and for making shelves and supports for muffle kilns.

Good sagger clay can be made by combining the semi-refractory shale obtained at the coal mines at Westville, Nova Scotia, with the stoneware clay obtained at other localities in the same province. True fireclays are of rare occurrence in Eastern Canada.

Plaster of Paris: The making of moulds in potteries consumes large quantities of plaster of Paris, which is produced from the mineral gypsum. There are immense deposits of gypsum in the Maritime provinces, and also in Ontario and Manitoba. Plants manufacturing plaster of Paris are situated on all the large deposits in these provinces.

Oxides: Metallic oxides are used principally as the colouring agents in glazes and enamels. The oxides of iron, lead, cobalt, and nickel are prepared in Canada, also lead carbonate, or white lead. All other oxides, or carbonates, are imported.

DISTRIBUTION OF CLAYS.

As already stated, the clays that occur most widespread in Canada are of glacial origin, hence they are more or less impure, and occasionally they are found smooth enough to be used on the potter's wheel without treatment, but generally they must be prepared by washing and screening. In any case they can only be used for low-fired wares, but these can be covered with coloured glazes and sold for ornamental pottery. Stoneware clays, fireclays, and kaolin are of rare occurrence as far as we know at present.

Nova Scotia.

Deposits of red brick and tile clay occur at Avonport, Middleton, Bridgetown, and Annapolis, in the Annapolis valley. Samples of this clay, tested at the Mines Branch laboratories, gave good results on the wheel and for built pottery, and glazes were applied with excellent effect. The clay was used as it came from the bank without any preparation.

Similar clays occur at Shubenacadie and Elmsdale on the railway line between Halifax and Truro.

Mottled pink, white, and grey stoneware clays occur at Middle Musquodoboit and at Shubenacadie. The Musquodoboit clay gave best results when some flint and feldspar was added. High fire matt glazes, as well as bright glazes, can be used.

New Brunswick.

Red brick clays which are smooth and plastic are found in the vicinity of the city of St. John, Albert Mines, Bathurst, and other points, and are suitable for making coloured earthenware pottery without much preparation. A good plastic clay that burns to a buff colour can be obtained along the railway line west of Campbellton. This clay has a rather high lime content and contains some grit, and would have to be prepared for pottery making by washing.

Certain beds of clay in the coal measure rocks in the Grand Lakes district are plastic enough to use for making stoneware pottery and sagers.

Prince Edward Island.

A red clay found at Richmond is exceptionally plastic, and parts of the deposit are very smooth. It is a good clay for wheel work, built pottery, or for casting. It burns to a hard body of fine red colour and takes glazes well.

Quebec.

The surface clays used for making brick and tile in the province of Quebec are not, as a rule, adapted to the manufacture of pottery, but flowerpots and some heavy household pottery have been made in past times in some localities. Occasional small patches of clay, which are better than the average surface clay, may be found suitable for making cheap coloured pottery.

The only white burning kaolin so far found in Canada occurs at St. Remi d'Amherst, in Argenteuil county. It is prepared for the market by the Canadian China Clay Company, of Huberdeau. There is a great deal of kaolin discoloured by iron oxides as well as white kaolin. The coloured variety can be used as a fireclay in the crude state, or when washed would be suitable in a mixture for making coloured pottery.

Ontario.

Common brick and tile clays are widely distributed in Ontario. Some of them have the requisite properties for making pottery on the wheel, but all of them require to be washed before using.

The clays of the Ottawa valley are generally unsuitable for pottery, as their tensile strength in the raw state is low, and they are liable to tear and sag on the wheel, furthermore, their drying qualities are poor. Small deposits of buff burning brick clay which are workable on the wheel occur near Lake Ontario between Port Hope and Toronto. Clay of this kind is made into jardineres, window boxes, and flower vases at Bowmanville in an experimental way.

The red burning brick clay in the Don Valley Brick Company pit can be thrown on the wheel or cast for cheap coloured pottery, and possibly some of the plastic buff burning brick clays on the outskirts of Toronto can also be used.

Fairly good buff and red burning brick clays can be obtained in the vicinity of Hamilton. These would have to be washed before using as they contain much grit, and sometimes pebbles. A mixture of equal parts of the two clays gives good results for coloured pottery bodies, which can be glazed. Small deposits of plastic clays occur between Grimsby and Niagara.

There is a great abundance of buff burning tile clay on the shore of Lake Erie. It is a plastic, tough clay, which fires to a strong porous body, but it carries occasional limestone particles and consequently must be washed. The porous body could be covered with coloured tin enamels for the Majolica type of pottery.

Fine-grained red burning clay occurs at Roslyn, four miles west of Fort William; and farther west, near Finmark, larger deposits of similar clay occur on the Canadian Pacific railway.

The only known deposits of stoneware and fireclay occur in the northern part of the province beyond the reach of transportation.

Manitoba.

Some of the brick clays used at Winnipeg, Morris, Portage la Prairie, Gilbert Plains, etc., are plastic enough to be used for pottery making, but no experiments have been made on them for this purpose. They burn to dense buff coloured bodies, and with the addition of flint they could be brought to resemble a low-grade stoneware clay.

Stoneware clay of the sandy type is found near Swan river, overlain by very fine quartz sand. These materials could be used for making ornamental tiles, or for mixing with the calcareous brick clays, or for making saggars.

Saskatchewan.

Southern Saskatchewan is the only region in Canada where valuable clays occur in abundance. There is a variety of white and grey clays over a large area, varying from low-grade stoneware clays to fireclays. They are mined at two localities, East End and Willows, and shipped to a pottery and a sewerpipe plant at Medicine Hat, Alberta.

These clays will be found suitable for the manufacture of various kinds of pottery, including heavy tableware called white granite, or ironstone china.

Common red burning surface clays are also widely distributed in Saskatchewan, but these are not recommended for pottery as they for the most part crack in drying and have a very high shrinkage. Some red and buff burning clays near the coal seam at Estevan were found to produce very good heavy coloured pottery.

Alberta.

Common red burning surface clays occur abundantly over large areas in Alberta. Most of them have defects, such as poor drying qualities, high shrinkage, and scumming.

Some of the better surface clays are worked for brick and tile, and these if prepared, may be suitable for pottery making, but they were not tested.

Stoneware clays suitable for pottery making occur in the northern part of the province, but so far they are not within the range of transportation facilities.

British Columbia.

The surface clays of this province, as far as known, are not adapted to making pottery, as they are too silty and not plastic enough, except at one locality. Surface clays occur at Terrace and Lakelse, on the railway line 90 miles east of Prince Rupert, which are suitable for making red ware.

Some of the brick clays near Victoria, Vancouver Island, may also be used for this purpose.

White gritty clay mixed with stony particles occurs near William's lake, which can be ground in a ball mill and used for the manufacture of whiteware. White burning plastic clay of the stoneware type occurs at Quesnel.

POTTERY INDUSTRY.

Clay Wares made in Canada.

Stoneware and other heavy domestic pottery, such as teapots, kitchen bowls, jugs, etc., are made at four plants in Canada; at St. John, N.B.; Iberville, Que.; Hamilton, Ont.; and Medicine Hat, Alta.

Sanitary porcelain is made at St. Johns, Que., and electric porcelain is made at Peterboro and Hamilton, Ont.

White and coloured vitrified floor tile is made at Kingston, and heavy red floor tile, and roof tile, are made at Mimico, Ont.

The pottery at St. John, N.B., uses the Nova Scotia stoneware clays, and the pottery at Medicine Hat uses clays from Saskatchewan, but all the others import the clays from England and the United States, except that the floor tile made at Mimico is of ground shale, a local material.

Clay Wares not made in Canada.

White tableware of any kind.

Stoneware or white earthenware ornamental pottery.

Ornamental tiles, for walls, mantels, or teapot stands.

Jardineres, window boxes, garden urns.

Water coolers, iceless refrigerators.

Architectural terra cotta.

Majolica or fancy ware, novelty ware, souvenir pottery, etc.

The principal sources of the wares imported into Canada are, England, Japan, United States, France, Czecho Slovakia.

Some souvenir pottery made in England with the names of provinces, or towns in Canada, is of a very poor class, and made with clays not as good as some of our common brick clays.

Mines Branch,
Department of Mines,
O t t a w a,
May 1, 1922.

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