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MINING, METALLURGICAL AND CHEMICAL BRANCH
OTTAWA - CANADA

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SAND AND GRAVEL, 1933.

Sand and gravel production in Canada during 1933 amounted to 11,738,823 tons valued at $4,464,285 as compared with 14,469,942 tons at $4,480,596 in 1932, according to finally revised statistics just issued by the Mining, Metallurgical and Chemical Branch of the Dominion Bureau of Statistics at Ottawa.

Imports of sand and gravel into Canada in 1933 totalled 89,017 tons valued at $72,480 compared with 36,387 tons worth $48,677 in 1932. Silica sand for glass and carborundum manufacture and for use in steel foundries, filtration plants and sand blasting was imported to the value of $160,131 and totalled in quantity 64,114 tons compared with $162,869 and 59,176 tons in the preceding year.

During 1933 the sand and gravel industry in Canada furnished employment to 2,726 persons whose earnings totalled $1,169,079. Excluding statistics regarding the sand and gravel operations of railway companies, the fixed and current assets of the operators in this industry amounted to $6,203,113. Fuel and electricity used in 1933 cost $129,410.

The sand blast now touches almost every phase of metal finishing. It enters into the production of bath tubs, beer barrels, crank shafts, small tools, and hundreds of other products. Telephones, the minute drills used by dentists, automobiles and railroad cars, all may find applications of the sand blast in some process of their manufacture. The type of finish desired governs the selection of abrasives to some extent. Ordinary bank or building sands are of little value. Ocean sands are much used, but carefully selected and prepared white silica sand has greater resistance to disintegration, creates less dust, and enables faster cleaning. Most sands used for sand blasting weigh approximately 97 pounds per cubic foot. (1)

Moulding aand may be separated into two general classes, with and without natural bond. Sand of the first class, when removed from the pit contains sufficient clay, loam, or other foreign material to bond it when tamped into place around the pattern. Sand of the second class does not contain sufficient natural bonding material and some such substance as refractory clay or organic binder must be mixed with it. Sand with little or no natural bond is often termed "silica sand" or steel moulding sand; for steel moulding the material should contain more than 96 per cent of silica before the addition of artificial bond. Naturally-bonded sand is sometimes called "foundry sand", "iron-moulding sand" or simply "moulding sand" to distinguish it from "silica sand." The general properties that determine the value of a sand for foundry purposes are: (1) bond or cohesiveness; (2) permeability; (3) grain size; (4) refractoriness; and (5) durability. Sand is also used to line furnace bottoms and walls, especially in furnaces for making acid open-hearth steel; it is also largely used in forming the bottoms of copper refining furnaces and reverberatory copper smelting furnaces; at the more important producing centres soft sandstone of high silica content is used, as in the crushed form it contains enough bonding material to meet the

specifications of the steel industry. Good filter sand must be fairly uniform and fall within limiting sizes. It must, moreover, be free from clay and organic matter and of high chemical purity, specifications generally stating that not more than 2 per cent shall be soluble in hot hydrochloric acid. Other specifications require that the combined lime and magnesia, calculated as carbonates, shall not exceed 2 per cent. With regard to grain size, specifications usually state that no grains shall be larger than a certain mesh and limit the percentage that will pass a 100 mesh sieve. Sand in sand-lime brick has a two-fold function. Most of it acts merely as an aggregate making up the body of the brick, which is bound together by a cementing material, the remainder supplies silica for the formation of the mono-calcium silicate bond. Extreme chemical purity is not essential, but the sand should be reasonably clean and free from organic substances. Most of the sand used for glass making contains more than 99 per cent silica; quality depends largely on the kind and quality of glass being made. (2)

Silica sand is generally prepared from a friable sandstone; in Manitoba a high grade natural silica sand is produced from loosely consolidated deposits on Black Island, while it is reported that near Bruno de Guiges in Quebec, a large deposit of free running, high grade silica sand is under development; this property is equipped with a one hundred ton mill. Various grades of the high quality silica sands are also being produced in Canadian mills from quartz or other silica rock; silex is the washed sand or pure quartz crushed or ground in some form of ball mill, then either air or water-floated to recover the fine flour. The ceramic industry requires 150 mesh or finer while the paint trade required air-floated material of 250 mesh or finer. (3)

(1) "Iron Age" - (2) "The Chemical Age" - (3) Department of Mines, Ottawa.

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PRODUCTION IN CANADA, IMPORTS AND EXPORTS OF SAND AND GRAVEL, 1933.

	Washed or screened	Bank or pit-run	TOTAL VALUE
	Tons	Tons	$
PRODUCTION -			
SAND -			
Moulding sand	3,444	4,273	9,635
Building sand and sand for concrete, roadwork, etc.	347,410	428,002	218,559
Core sand	325	...	325
Other sand (including blast sands, engine sands, etc.)	216	33,177	6,086
SAND AND GRAVEL -			
Sand and gravel for railway ballast	72,338	489,200	110,449
Sand and gravel for concrete, road-building, etc.	6,367,489	3,590,343	3,907,911
Crushed gravel	359,395	43,211	211,320
TOTAL	7,150,617	4,588,206	4,464,285
IMPORTS -	Tons		$
Sand, silica, for glass and carborundum manufacture, etc.	64,114		150,131
Sand and gravel, n.o.p.	89,017		72,480
Silex or crystallized quartz, ground or unground	4,370		82,823
TOTAL	...		315,434
EXPORTS -			
Sand and gravel	102,174		15,801

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PRODUCTION(x) OF SAND AND GRAVEL IN CANADA, 1924-1933.

Year	Tons	$
1924	11,603,500	3,181,083
1925	11,018,647	3,220,410
1926	17,112,798	4,941,434
1927	22,952,819	6,055,601
1928	28,102,917	5,809,431
1929	27,846,945	7,317,814
1930	28,547,511	8,344,913
1931	21,748,586	6,651,165
1932	14,469,942	4,480,596
1933	11,738,823	4,464,285

(x) Does not include production of natural silica sand or of silica sand manufactured from quartz or silica rock; production of these are recorded under quartz.

PRINCIPAL STATISTICS OF THE SAND AND GRAVEL INDUSTRY IN CANADA, 1932-1933.

	1932	1933
Number of firms	686	696
Capital employed $	9,542,446	6,203,113
Number of employees - On salary	92	61
On wages	1,651	2,665
Total	1,743	2,726
Salaries and wages - Salaries $	165,218	106,761
Wages $	1,156,983	1,062,318
Total $	1,322,201	1,169,079
Cost of fuel and electricity $	190,477	129,410
Selling value of sand and gravel produced by railway companies $	343,957	122,620
Selling value of sand and gravel produced by other operators $	4,136,639	4,341,665
Total selling value of sand and gravel produced $	4,480,596	4,464,285

AVERAGE NUMBER OF WAGE-EARNERS, BY MONTHS, 1932 and 1933.

Month	1932	1933
January	310	112
February	306	108
March	301	131
April	771	402
May	3,150	5,646
June	3,713	6,172
July	3,737	6,275
August	3,816	6,381
September	3,388	3,087
October	715	762
November	500	586
December	329	363

FUEL AND ELECTRICITY USED, 1932 and 1933.

	Unit of measure	1932 Quantity	1932 Value	1933 Quantity	1933 Value
			$		$
Anthracite coal	short ton	...	...	2	35
Bituminous coal - Canadian	short ton	8,689	50,319	10,454	51,484
Foreign	short ton	7,484	45,102	694	4,508
Lignite coal - Canadian	short ton	134	540	...	...
Coke	short ton	29	166	9	88
Gasoline (exclusive of motor vehicles)	Imp. gal.	63,309	12,709	81,157	17,923
Kerosene	Imp. gal.	570	98	151	28
Fuel oil	Imp. gal.	357,306	13,267	265,770	10,024
Wood	cord	25	111	....	...
Natural gas	M cu.ft.	3	12	98	39
Other fuel	xxx	...	...	...	907
Electricity purchased	K.W.H.	3,579,086	68,153	1,990,397	44,374
TOTAL	xxx	...	190,477	...	129,410
Electricity generated for own use	K.W.H.	...	...	150,000	...

POWER EQUIPMENT INSTALLED, 1933.

	Number of units	Horse power
Steam engines and steam turbines	14	574
Diesel engines	...	...
Gasoline, gas and oil engines (other)	51	1,894
Hydraulic turbines or water wheels	8	260
Electric motors operated by purchased power	201	6,960
Electric motors operated by establishments' power	2	45
Boilers	7	555

SILICA AND SAND CONSUMED IN SPECIFIED CANADIAN INDUSTRIES, 1932 and 1933.

Industry	Item	1932 Tons	1932 $	1933 Tons	1933 $
Glass Industry	Silica sand	59,143	290,854	52,585	272,689
Acids, Alkalies and Salts	Silica	6,342	20,921	5,800	21,714
Artificial Abrasives	Silica sand	5,207	27,588	13,574	68,186
Products from Imported Clay	Flint	1,136	18,277	752	10,457
Castings and Forgings	Moulding sand	31,162	157,995	22,920	93,975
Primary Iron and Steel	Moulding sand	6,372	41,045	8,960	56,607
Other iron and steel industries	Moulding sand	11,411	46,426	12,973	46,932
Brass and Copper Industry	Moulding sand	2,183	12,149	1,788	10,307