CONSULTANT'S REPORT

PERLITE MARKET STUDY FOR BRITISH COLUMBIA

Prepared by:

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McNeal & Associates Consultants Ltd.

March, 1994

British Columbia
Ministry of Energy, Mines and Petroleum Resources

Geological Survey Branch
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PERLITE MARKET STUDY

Prepared for:

The Governments of Canada and British Columbia
with Funding From
The Canada-British Columbia Agreement on Mineral Development
through
National Resources Canada

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APPENDICES

1.0 INTRODUCTION

This study has been prepared in order to supplement the industrial mineral resource data base of the Geological Survey Branch of the Ministry of Rnergy, Mines & Petroleum Resources of the Province of British Columbia, which has identified a 'number of potentially economic deposits of perlite within the Province. (White, G.V.)

Funding for this project was provided by the Canada-British Columbia Agreement on Mineral Development (M.D.A.) through National Resources Canada.

The Terms of Reference provided called for a broad literature review, a listing of relevant processing patents, a thorough domestic (B.C.) market survey, and an analysis of the potential viability of a new local perlite operation utilizing B.C. ore. The existing demand is currently being met by imported products, or domestically expanded goods that rely on imported raw perlite.

2.0 AUTHORITIES

The Contracting Authority for this project was Dale White of Supply & Services Canada in Winnipeg, Manitoba. The Project Authority was Peter Coolen of Natural Resources Canada in Saskatoon, Saskatchewan; the Scientific Authority was Dan Hora of the B.C. Geological Survey Branch in Victoria, B.C., all of whom have been most helpful in the conduct of this study. Mr. Hora has been consulted numerous times during the project and has provided valued resource data and guidance in the preparation of a' complete and thorough review of the subject.

3.0 THE STUDY TEAM

The study was conducted by Donald Gunning, P. Eng., of Delta, B.C., an industrial minerals consultant with twenty years of experience in the field in B.C., and by Wayne McNeal of Richmond, B.C., an Economist specialising in resource development, marketing, and transportation analysis. Vital overview and input was providedby John Chapman, P. Eng., of Chapman Mining Services, previously President of Aunm Mines Ltd., a company that mined and processed perlite in B.C. during the mid-1980's.

4.0 BACKGROUND

4.1 The Mineral Perlite

The industrial mineral perlite is a hydrated, rhyolitic, volcanic glass, commonly having a pearly, vitreous lustre, and characteristic concentric or arcuate "onion-skin" fractures. It has a relatively high combined water content of two to five percent that distinguishes it from other hydrous volcanic glasses such as obsidian, hydrated volcanic ash, and pumicite.

It is this "chemical" water held within the perlite glass 'structure that expands, or "pops", on heating to create a cellular material of extremely low bulk-density that caters to numerous application demands. Raw perlite in fact may expand up to twenty times its volume when aushed and heated to its softening temperature, usually in the range of 900°C to 1100°C.

Chemically, perlite is an amorphous aluminum silicate; a typical analysis would be as follows:

72 - 74 %	SiO_2
12 - 13 %	Al_2O_3
Approx 1%	Fe_2O_3
3 - 4 %	Na_2O
4 - 5 %	K_2O
3 - 4 %	H_2O

Perlite is metastable, and eventually with age it will, like any glass, devitrify into microcrystalline quartz and feldspar. Due to this instability, most occurrences are generally of Tertiary or Quaternary Age (less than 50 million years old).

Perlite is chemically inert and exhibits a pH of about 7 in water. Its density ranges between 140 and 150 lbs/cu. ft. (2,242 - 2,403 kgm/cu. m.), and it has a Moh's hardness of between 5.5 and 7.0. Its colour can vary from light grey to black, transforming to greyish-white to snowy white on expansion. Breese and Barker present a thorough discussion of the composition and geological origin of perlite in their contribution to the new edition of "Industrial Minerals and Rocks," including an extensive bibliography Which forms the framework of the one set out in Appendix A of this report.

4.2 Mining and Processing

Thanks to the massive surficial lava flow nature of most deposits, perlite is usually mineable by open-pit methods, at or near the surface, over broad areas. The brittleness of the ore and its fractured texture generally permits the use of mobile ripping equipment to harvest the rock, thus minimizing drilling and blasting expenses and keeping the overall cost of mining quite low. Production rates are nonetheless modest by most standards, given the relatively low level of demand for the commodity (well under one million tonnes annually in all of North America).

The as-mined ore, in most cases, undergoes crushing and screening at or near the mine, prior to shipment to expansion plants. Sizing is critical, as it determines which end uses, in expanded form, can be met. The normal range of raw product sizing is 8 mesh to 30 mesh. Figure 1 shows a typical comminution flow sheet.

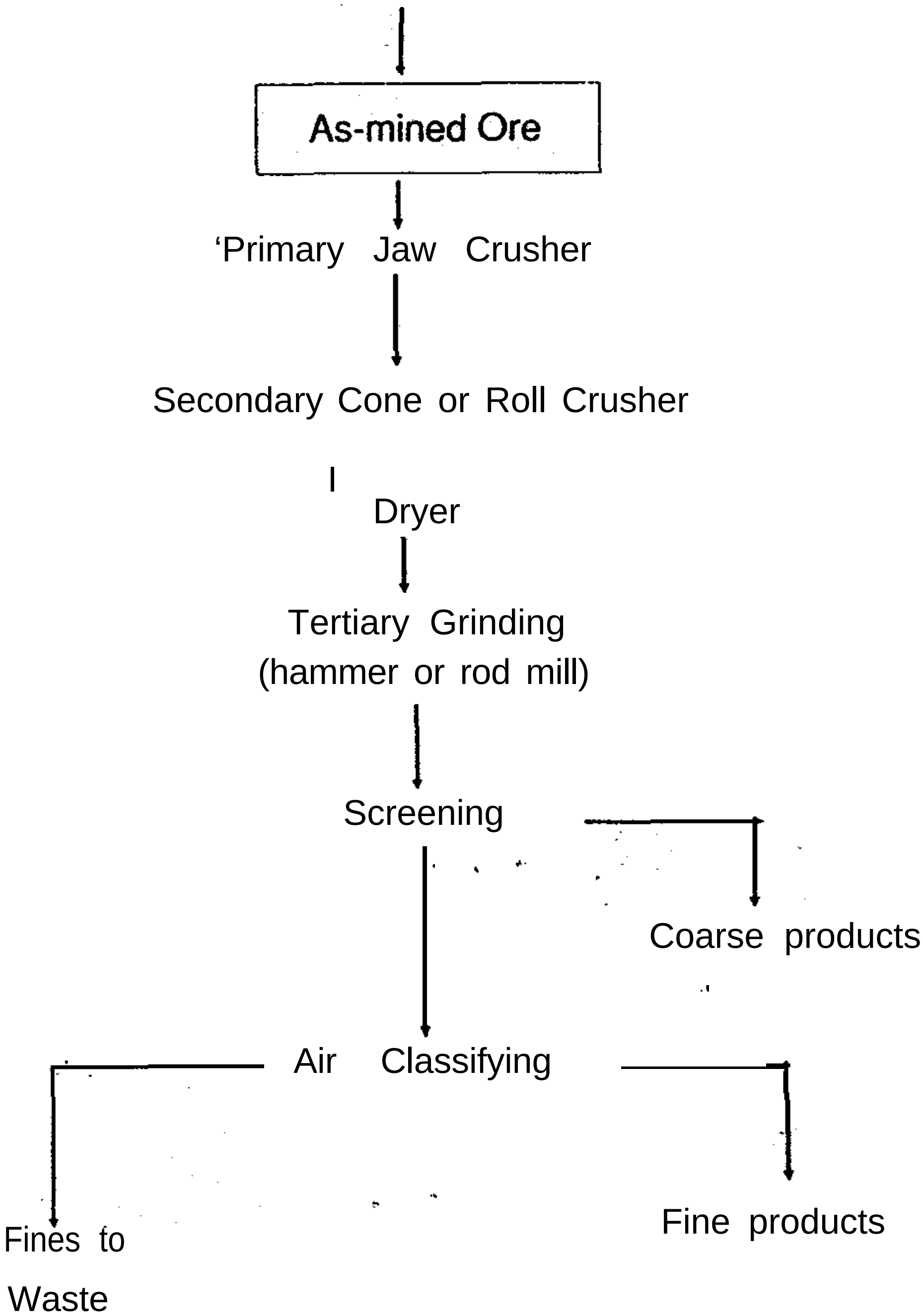
Since perlite is quite friable, large quantities of dust and excessively fine material are generated during mining and processing that cannot ordinarily be sold; they are typically disposed of as waste, and hence contribute significantly to the cost of the finished product.

The basic mill-size grades of raw perlite are usually siloed prior to shipment; some blending .may be done to meet specific product gradation requirements. From this point on, the perlite must be kept dry, in preparation for expansion, a factor that has substantial impact on transportation considerations and costs.

Expansion is normally carried out at a facility remote from the mine, but central to'target markets, the goal being to keep shipping costs of the bulky, low density expanded product as low as possible. There are several different expansion furnace designs in use, all involving considerable levels of technical expertise.

Figure 1

TYPICAL COMMUNUTION FLOW.



The sized perlite (a different feed size for each expanded product specification) is typically preheated to about 400°C and then subjected to very rapid heating to its softening temperature, usually in a rotary horizontal or stationary vertical furnace. As the combined water in the perlite boils, the resultant steam forms bubbles within the softened rock to produce a very low-density cellular structure. The water content of the ore, together with the heating cycle, will determine the final bulk density of the expanded product. Close process control is required to minimize the incidence of particle explosion, which causes excessive waste fines to be generated.

The very light expanded grains are withdrawn from the furnace by means of suction fans, cooled with entrained air, sometimes heat treated to improve strength and absorption resistance, and finally collected in cyclones and air-classified into the desired size ranges, all the way from 4 mesh to 200 mesh. Baghouses and electrostatic precipitators collect ultra-fine particles to ensure clean-air discharge from the processing facility.

Expanded perlite is in some instances subjected to further size reduction in various types of mills to produce sub 100 mesh gradations for use as filter aids and filers. Very fine unmilled particles (microspheres) can be silicone coated to provide water repellency for use in lightweight joint cement compounds. Silane coatings have also been used on microspheres for polarity modification for filler applications in plastics.

A complete listing of relevant patents may be found in Appendix B. These include both process and product inventions; the large number of patents registered gives an indication of the very technical nature of the production and application of expanded perlite.

4.3 Marketing

4.3.1 Testing

The evaluation of perlite sources involves a series -of tests to establish the suitability of, the ore for the various categories of expanded products, usually subdivided into four main groupings:

Horticulture.
Construction
Filter aids
Fillers - Extenders

To'maintain quality and performance standards, the Perlite Institute (P.I.) and the American Society for Testing and Materials (A.S.T.M.) have published a number of tests and specifications that apply to expanded perlite products. During exploration, the key parameters of evaluation include chemical analysis (particularly water content), expandability, and crystalline silicacontent (must be less than 0.1% to avoid carcinogenic classification).

The P.I. tests and A.S.T.M. standards are too numerous to set out completely; a brief sampling of them are listed in Table I.

Table I

PERLITE INSTITUTE TESTS

PI 109-77	Sampling Sized Perlite Ore from Hopper Cars
PI 113-77	Sieve-Analysis of Fine Materials
PI 116-77	Fractional Density of Expanded Periite
PI 118-77	Determination of Free and Combined Moisture
PI 202-77	Test for pH Value of Expanded Perlite~
PI 305-77	Yield Test for Perlite Aggregate
PI 307-77	Perlite Ore Expansibility Test
PI 501433	Determination of Unit Density and Relative Water Permeability of Powder Type Filter Aids

A.S.T.M. TESTS

c 29-78	Unit Weights & Voids in Aggregate
C 332-82	Lightweight Aggregates for Insulating Concrete
C 549-81	Perlite Loose Fill Insulation
C 11-81	Wire-Cloth Sieves for Testing Purposes

Physical tests that would normally be performed in establishing expanded perlite product quality would include:

- Expanded bulk density
- 'Furnace yield
- Compacted density
- Compaction resistance
- Percent non-expandable ("sinkers")
- Dry brightness
- Sieve analysis

43.2 Specifications

Perlite product specifications generally include some maximum and minimum chemical and physical property values, depending upon the demands of the user and his or her application(s). Uses can be grouped according to the expanded product grain size and bulk density, as shown in Table II and Table III.

Table II

TYPICAL BULK DENSITIES OF SOME EXPANDED PERLITE PRODUCTS

Application	Density in lb/cu. ft
Concrete aggregate	28 - 55
Portland cement aggregate	20 - 40
Loose fill insulation	7.5 - 15
Fillers and filter media	7 - 12
Plaster aggregate	7.5 - 8.5
Horticultural aggregate	6 - 8
Roof insulation board and formed products	3.5 - 4
Cryogenic insulation	2 - 4
Cleansers and scouring agents	2 - 4

Note: (lb/cu ft) x 16.018 = (kg/cu m)

Table III

GRADATION CLASSIFICATIONS OF EXPANDED PERLITE

	Celite Grade							
	PA4000	PA3000	PA-1000	PA-116	PA-130	PA220	PA-420	PA-610
	Application							
U.S. Standard Sieve Size	Silica Source Micro Bubbles		Plastic and Resin Filler	Cryogenics & Acoustreal Tile	Roofinsulation Board & Filter Aid	Plaster Aggregate	Concrete Aggregate Masonry, & Loose Fill	Horticulture & Foundry Slag
+8							0.2	10-25
8-16							22-30	
8-12								40-60
12-16								25-42
+20						7-16		
16-20								0-8
+30				Trace	0-9			
16-30							53-65	
20-30						26-35		
-20								0-4
30-50				4-12	48-75	40-52	10-21	
60-100				45-75	20-12	6-13		
-50							0-4	
-100					0-6	0-4		
+100		0-1	0-8					
100-200	0-15	0-15	20-47	20-10				
200	80-100	85-100	50-75	0-10				

Source: Manville Bulletin FF 391, September, 1988 from Breese and Barker

Note: Sieve size conversions are shown in Appendix D.

The gradation classifications in Table III are very broad, and most products overlap two or more categories. Moreover, the applications vary considerably from one jurisdiction to another, particularly between Europe and North America.

An important additional classification is a superfine (minus 100 mesh) class of expanded perlite that is coated to prevent water absorption, generally referred to as micro-balloons or microspheres; the coating can be a silicone, hence the use of the term "siliconized" in some instances. This perlite product is widely used in the manufacture of lightweight joint cement compounds. The manufacture of these coated microspheres is technically complex; only three or fourexpanders in the U.S. produce them and they command a premium price.

4.3.3 Applications

The uses for perlite are myriad and varied, generally exploiting the expanded mineral's properties of extremely low bulk density, high brightness, chemical inertness, high absorption (water retention), low conductivity (both thermal and acoustical), and non-flammability. The absence of any apparent health hazard is also a positive marketing characteristic. The demand for perlite has fluctuated significantly over time, however, as technological change within user industry sectors and the promotion of substitutes impact on the consumers' needs and preferences. There is also a high degree of price sensitivity which can drive substitutions and make locational factors very significant because of the high delivery costs of these low-density materials.

Hence there are wide variations in usage across national and continental boundaries, and from one decade to the next within single jurisdictions. The discussion of uses that follows must be read in this context; a particular application, dominant in one locale at a given time, may well not be available in some other circumstances. For ease of presentation, perlite 'markets will be subdivided here into three groupings that seem to have been adopted in North America - Construction, Horticultural, and Industrial.

4.3.3.1 Construction Markets

Expanded perlite is generally used in construction applications to impart properties of thermal or acoustic insulation, light weight, or fire resistance. A partial list of such uses would include:

- Acoustic tiles and wallboard
- Lightweight concrete aggregate
- Caulking compounds
- cryogenic vessel coatings
- Loose fill insulation
- Pipe insulation coatings
- Plaster aggregate & texturing
- Refractory products
- Insulating roofing compounds
- Fireproofing coatings
- Lightweight joint cement filler

In the USA., the term "insulation board is used to describe all fibre, perlite, and perlite-gypsum "formed" board used in roofing, walls, door cores and ceilings. These products constitute the largest single market for perlite in the country. At least two of the major U.S. perlite producers manufacture fireproof boards, mixing expanded perlite with fibres and bonding' and waterproofing agents prior to forming. Several varieties of gypsum plaster insulation board using perlite as an aggregate are also marketed, offering reduced thermal conductivity and greater ease of installation. Continuously cast gypsum fibreboard, a product developed in Europe, contains perlite and could well displace standard gypsum wallboard in North America in the future.

Perlite for plaster aggregate faces falling demand because of the steady decline in the use of interior plaster, replaced by prefabricated boards. Lightweight concrete aggregate and loose fill insulation are competitive markets subject to substitution and price pressure, chiefly from chemical air-entraining agents in the case of concrete that do not involve as much strength loss as does perlite.

Exfoliated vermiculite, expanded clay or shale, pumice, mineral wool and fibreglass all compete for many of these construction markets; each has specific advantages and / or shortcomings in different product areas. Expanded perlite generally prevails where it has a price advantage and some particularly desirable properties to offer.

Two cementitious products that utilize large quantities of perlite, particularly in the Pacific Northwest, are lightweight joint cement and to a lesser degree spray-on ceiling and wall textures. These carefully formulated mixes are used to finish-coat gypsum wallboard. Lightweight joint cement (as opposed to regular grades) is heavily filled with very fine coated perlite microspheres. The silicone coating repels water permitting the minus 100 mesh particles to retain their cellular voids and dramatically reduce the weight of the applied coating.

In spray-on textures, expanded perlite aggregate is a bulking additive that provides a coarse textured surface, very popular for residential ceilings. Styrofoam may be substituted for perlite in these coatings.

Finally, in the manufacture of cast concrete blocks, light weight products containing pumice, or expanded perlite or clay, are offered at a premium price, but with only modest response. Apparently, the reduction of placement costs (labour) and related expenses does not offset the price premium.

4.3.3.2 Horticultural Markets

Expanded perlite is an important component of soil mixes used for growing a broad range of plants, shrubs and flowers. Greenhouse and outdoor growers consume large quantities of ‘peat moss-based blends utilizing expanded perlite, pumice, or chopped Styrofoam as a lofting agent, reducing compaction and facilitating greater aeration, water drainage and moisture retention. Some growers blend their own mixes on site, others buy premixed product from commercial blenders in bags or in bulk. Light weight in an important quality.

There is also a considerable garden shop retail demand for such blends packaged in small plastic bags. Many’wholesale blenders are catering to this demand by setting up automated small bag packaging lines. There is a similar retail demand for small bags of expanded perlite for the home gardener which has stimulated the installation of repackaging facilities by several perlite distributors.

A fairly coarse perlite aggregate is used in these applications, typically in the 4 to 20 mesh sire range. It’s high brightness (whiteness) is a desirable property; furthermore, it doesn’t discolour over time in the peat mix to the extent that pumice does. Its chemical inertness is ‘of course an essential characteristic.

Other related applications of less significance include soil conditioning, fertilizer and pesticide and herbicide extension (inert carrier), seedling propagation, bulb storage, and drainage beds. The abrasiveness of expanded perlite is said to be a deleterious property for evergreen seedling growth, and may decrease its use for that purpose over time., Perlite's very light weight and propensity to "float to the top" in soil mixes subjected to very wet environments can be disadvantageous in some (few) circumstances.

Nonetheless, these varied horticultural applications will doubtless continue to be extremely important markets for perlite for many years.

4.3.3.3 Industrial Markets

The remaining markets for expanded perlite can be lumped together in the industrial category. Some of the more significant of these are as follows:

- Abrasives (polishing compounds)
- Hand and fabric cleaners
- Charcoal barbecue base
- Filter Aids (foods, beverages and industrial products)
- Foundry ladle insulation
- Foundry sand additive
- Oil absorbent
- Filler in paint, coatings, plastics, and paper
- Oil and gas drilling fluids additive
- Packaging material
- Hazardous liquid viscosity modifier

Some of these historical uses are diminishing in importance, particularly in paint and drilling fluids. Filter aids have long represented a substantial end-use for milled expanded perlite, in a market that is generally dominated by diatomaceous earth.

Traditional filtering applications include:

- water purification
- sugar and syrup processing
- beer and wine production
- vegetable and animal oils and fats processing
- industrial oil refinement
- industrial effluent treatment
- fruit juice filtration

The foundry applications are aggressively sought by vermiculite producers; the total foundry market for perlite is quite small.

Some specially treated grades of perlite mixed with cellulose and other minerals have been formulated to absorb ocean and industrial oil-spills with some success. Other types of spills can also be mitigated with perlite - calcium chloride blends..

A more recent proposed application of perlite is in the synthesis of zeolites. Research conducted in Italy by Giordano et al. indicates that natural mineral ah&no-silicates, such as pumice, perlite, and volcanic tuff can be economically zeolitized.

4.4 Supply and Demand History

Most international trade in perlite is in its raw unexpanded form; for the obvious transportation cost reasons. Greece is the largest exporter of perlite ore in the world, mainly from the island of Milos in the Aegean Sea where reserves are estimated to be 250 million tonnes. The U.S. probably processes more perlite than any other country, but exports less than 10% of its production (chiefly to Canada). It imports some ore from Greece, but could easily be self-sufficient if necessary.

Its own resources are estimated to exceed 50 million tonnes. Total world production of perlite is something less than two million tonnes per year. Published figures vary considerably, and uncertainty exists as to China's Statistics - an annual Chinese production tonnage of over 0.5 million tonnes was postulated in 1986. World figures reported by M.J. Allen are higher than those given by Breese & Barker for the years 1981 to 1989, largely because of a much higher output attributed to Greece. Table IV below has been extracted from these two sources (USSR figures are suspect).

Table IV

WORLD RAW PERLITE PRODUCTION ('OOO TONNES)

Country	1972	1976	1980	1984	1988	1990 est.
Czechoslovakia	10	10	40	45	4 4	44
Greece	124	167	198	178	209	160
Hungary	64	96	99	94	121	110
Italy	100	95	91	80	7 0	71
Japan	60	65	77	75	75	7 7
Mexico	13	22	46	3 2	39	36
USSR	300	330	363	599	599	545
Turkey	30	24	25	61	154	145
USA	589	660	579	452	523	580
TOTAL	1,294	1,475	1,527	1,634	1,845	1,778

(including others)
(excluding China)

The indicated rate of increase in world production over this 18 year period is less than two percent per year.

W.P. Bolen of the U.S. Bureau of Mines reported statistics for the last two years as follows. (Mineral commodity summaries - 1994).

Table V

PROCESSED PERLITE PRODUCTION ('000 TONNES)

	1992	1993
Greece	250	250
U.S.A.	541	548
other countries	606	650
TOTAL	1,397	1,448

U.S.A. PERLITE VOLUMES ('000 TONNES)

	1989	1990	1991	1992	1993 est.
Sold production	545	576	514	541	548
Purchased imports (Greek)	59	59	54	65	45
Exports (mainly to Canada)	45	32	29	29	30
Apparent consumption	559	603	540	577	563
Ave Price, f.o.b. mine ($US/tonne)	$29.90	$31.43	$29.33	$30.32	$30.49

Clearly, domestic perlite demand in the U.S. has been relatively stable over time. There did appear to be a significant up-turn in the late 1970's, but current consumption is back down to 1970 levels.

Greek imports to, the eastern U.S. arise out of the western location (mainly New Mexico) of US mines, causing unfavourably high delivered costs of domestic ore on the east coast. U.S. exports of raw perlite to Canada substantially offset the Greek imports.

Bolen also gives a breakdown of U.S. domestic consumption by market segment, as show in Figure 2.

In the 1991 Bureau of Mines Minerals Yearbook, Bolen reported U.S. sales in short tons by end-use, as shown in Table VI (short ton x 0.907 = metric tonne).

Table, VI

U.S. PERLITE SALES IN SHORT TONS

Use or Application	1990	1991
Concrete Aggregate	11,600	14,500
Fillers	26,600	32,100
Filter Aids	233,400	76,400
Formed Construction Product	292,400	291,200
Horticultural aggregate	49,600	53,300
Low-temp insulation	4,900	5,700
Masonry + loose fill insulation	13,300	10,400
Plaster aggregate	10,100	7,300
Other	34,700	7,100
TOTAL (rounded)	527,000	498,000

1993 U.S. EXPANDED PERLITE CONSUMPTION

By Market Segment

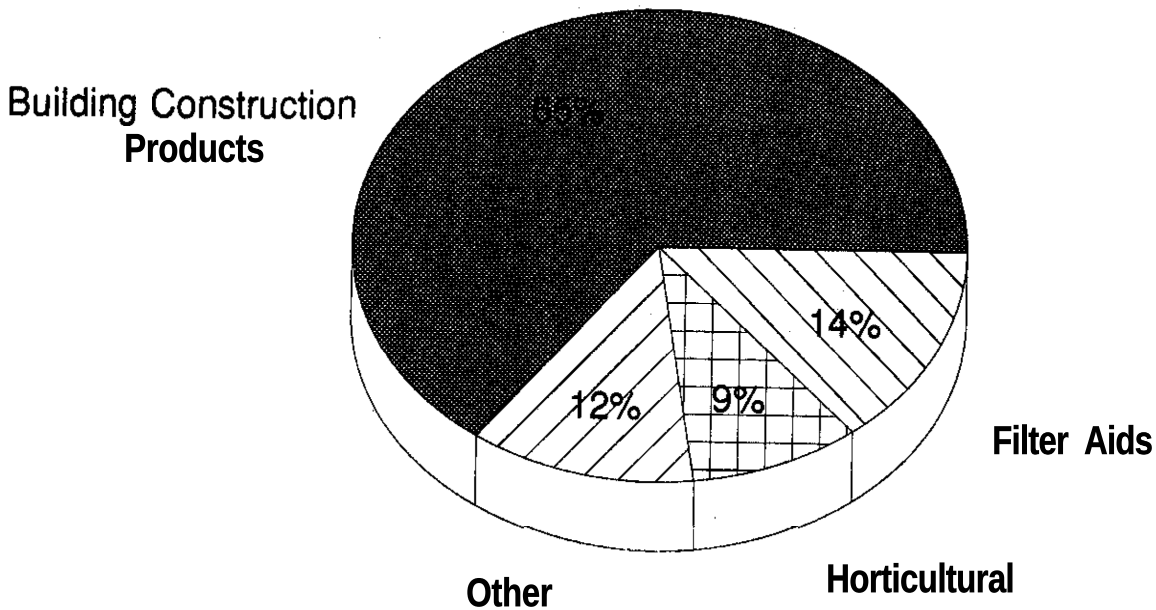


Figure 2

The importance of formed products such as acoustical ceiling tile, pipe insulation, and roof insulation boards to the U.S. perlite industry can clearly be seen in these figures. This does not necessarily apply regionally, however.

Greece's emergence as an export force is significant - production commenced there in 1958. The western U.S. States are richly endowed with perlite resources; enough to last for at least a century. Clearly, world supply is capable of meeting demands for the foreseeable future, as manifested in the rather flat price trend shown earlier - increasing from U.S. $29.90 per tonne to only $30.49 per tonne over four years (f.o.b. mine); only about 0.5 percent per year.

In the U.S. Mineral Commodities Summaries for 1994, Bolen reports that seven companies operated nine perlite mines in the Western States, New Mexico having the greatest production. Expansion plants were said to number 68, covering 34 states, underlining the market-driven nature of locational decisions. Breese and Barker plotted mine' and plant locations as shown in Figure 3.

It should be noted that the expanded perlite industry is very young, having been born commercially at the end of the Second World War, after a decade of research and development in the United States. The Perlite Institute Inc. of Staten Island, New York, was founded in 1949 to coordinate the development of specifications and the publication of technical and application information re expanded perlite products. It continues to effectively meet these needs.

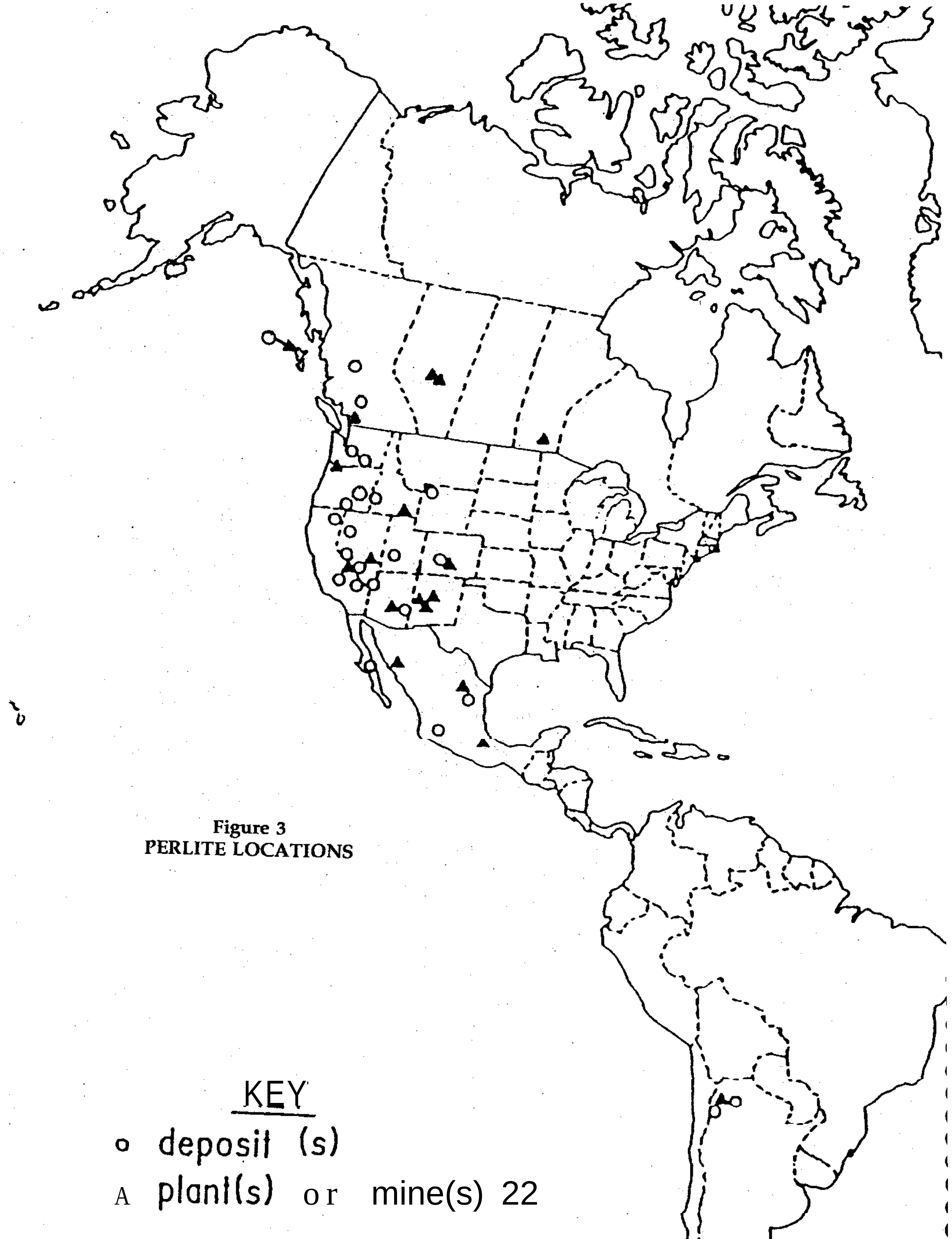


Figure 3
PERLITE LOCATIONS

With regard to Canadian Statistics, the 1992 Canadian Minerals Yearbook reports the following data:

Table VII

CANADIAN PERLITE IMPORTS

Perlite Imports	1990 Tonnes	1990 CDN Value	1991 Tonnes	1991 CDN Value
Raw ore from the U.S.A.	22,000	$2.8 million	28,000	$3.3 million
Raw Ore from Greece	8,400	$0.6 million	6,300~	$0.5 million
Expanded from the U.S.A.	3,400	$1.8 million	3,400	$1.6 million

Greek imports to eastern Canada are considerably cheaper than ore purchased in Western Canada from the Southwestern U.S. States, mainly New Mexico and Colorado, as a result of long overland transportation routes in the latter case. There is currently no raw perlite production in Canada.

The volume of expanded perlite products manufactured in Canada for domestic consumption appears to be in the neighbourhood of 30,000 tonnes annually, with apparent consumption somewhat higher by virtue of the import of U.S. finished goods. If the orthodox per capita relationships are valid, one might therefore expect an apparent annual consumption of expanded perlite in B.C. of about 3,000 tonnes, which is in fact somewhat greater than the maximum annual sales volume achieved by Aurun Mines Ltd. in the mid-1980‘s.

4.5 Substitution Factors

In concluding thii background section, some general comments regarding product substitution are perhaps appropriate. In virtually all of the market segments discussed in Section 4.3.3, expanded perlite competes with some other material(s) for market share on the basis of both properties and price. This competition is particularly severe in the construction product area. One exception might be the use of coated microspheres in lightweight joint cement where no other natural product appears to be capable of displacing' perlite.

A summary of substitute materials by product group can be listed as follows:

Construction	exfoliated vermiculite pumice expanded clay, shale, or slag volcanic cinders foamed concrete air-entraining agents
Insulation	fibreglass mineral wool diatomite asbestos cellulose polystyrene beads plastic foam exfoliated vermiculite

Filtration	diatomaceous earth
	mineral sands
	organic fibres
Fillers	mica
	talc
	silica sand. + fumed silica
	clays
	diatomite
	chalk
	ground and precipitated calcium carbonate
Horticulture	exfoliated vermiculite
	peat
	sawdust
	pumice
	chopped styrofoam

While perlite has significant application advantages over most of its competitors in many of these markets, demand remains extremely price sensitive, frequently resulting in substitutions being made based strictly on cost, despite some sacrifice in product quality. One example would be the use of chopped Styrofoam instead of perlite in some potting soil mixes for retail sales, where quality discrimination by the end users is not significant.

In 1985, Meisinger concluded that 'No significant technological or supply problems exist in the industry" but "the market for expanded perlite is certainly threatened by alternate lightweight mineral materials."

Bolen, this year, comments that "Alternate materials can be substituted for all uses of perlite, if necessary". In the 1991 Minerals Yearbook, he stated that "increased (perlite) demand is expected as the economy recovers, but large, sustained growth in perlite consumption is unlikely."

While all of these conclusions are probably valid in the global or continental sense, distinct regional considerations override them in determining <u>local</u> supply, demand and competitive factors that would lead to the development of a perlite mine in, any single jurisdiction. Transportation factors are paramount in making production decisions of this sort.

5.0 BRITISH COLUMBIA RESOURCES

There are no active perlite producers anywhere in Canada. British Columbia claimed the only operating mine in recent history, located about 60 km northwest of Clinton. This deposit, "the Frenier", was quarried by Aurun Mines Ltd. of Vancouver from 1983 through 1985. The ore was shipped by truck to Aurun's crushing, screening and expansion plant in Surrey, B.C.

The B.C. Geological Survey Branch lists 18 perlite occurrences in the province in its MINFILE database compilation, as shown in Appendix E, some located near tidewater, but without road access.

During 1989, G.V. White of the B.C. Geological Survey Branch carried out an investigation and evaluation of six volcanic glass deposits in B.C. Their locations are shown on the map in Figure 4, taken from his paper, The four perlite occurrences are the Frenier, the Francois Lake and Uncha Lake deposits near Burns Lake, west of Prince George in the geographic centre of the Province, and the Port Clements showings at the north end of the Queen Charlotte Islands. The sites visited by White were limited to those accessible by road. The Frenier, Francois and Uncha Lake, and Blackwater Creek (Port Clements) deposits were all reported by White to contain expandable perlite.

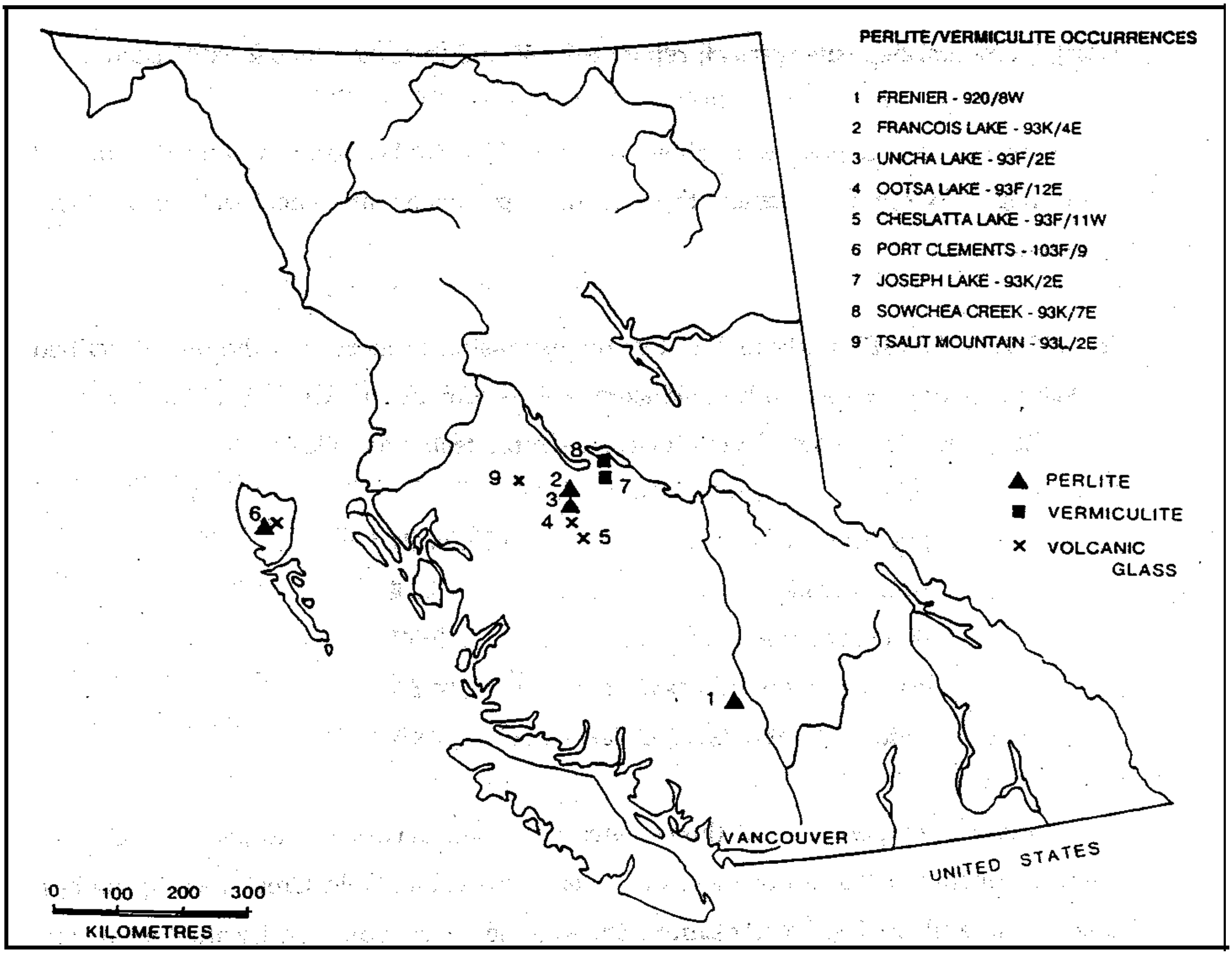
The Francois Lake deposit was mined briefly in 1953 by Western Gypsum Products of Winnipeg. Except for Frenier, there is little published analytical data from these deposits.

In 1990-91, CANMET undertook to test the expansion properties of the ores described by White. Morin and Lamothe published their results in B.C. Geological Fieldwork in 1990. They. reported weight losses for each sample tested as follows:

'Frenier	316%
Uncha Lake	3.2%
Francois Lake	3.0%
Port Clements - Blackwater Creek	4.3%
Port Clements - Gold Creek	7.9%

The softening temperatures of these materials varied between 1240 and 1290°C. The authors concluded that all of these ores were expansible, Gold Creek having the best potential as a filler. The Frenier sample showed the lowest bulk density after expansion.

Figure 4



Locations of perlite/vermiculite occurrences in British Columbia

Geological Fieldwork 1989. Paper 1990-1

There is a great deal of information available on the Frenier perlite; it is of proven quality, having been successfully expanded and marketed on a commercial scale. All customers contacted commented very favourably on the suitability of the Aurun products for their applications John Chapman described the property in his unpublished 1984 C.I.M. Annual General Meeting paper. A typical chemical analysis of Frenier expanded perlite published by Aunm is as follows (dry basis).

SiO_2	77.37%
Al_2O_3	12.44%
K_2O	4.84%
Na_2O	1.86%
Fe_2O_3	1.11%
CaO	0.71%

The only variances between this analysis and those from 'typical" U.S. and Greek ores are slightly higher silica and lower sodium contents. The Aurun reported pH of 8.3 is a little higher than that claimed as "normal" (approx 7.0).

Adding to the credibility of the Frenier material is research done by Giles and Poling at the University of B.C., wherein they determined optimum parameters for the manufacture of commercial filter aid grades of expanded perlite at Aurun, concluding that competitive products could readily be produced.

'To summarize then, there are several potentially economic sources of perlite in B.C., including the proven Frenier deposit near Clinton, the previously mined occurrence and others near Bums Lake, and showings near Port Clements on the Queen Charlotte Islands. These latter occurrences have only been very tentatively investigated. Further exploration might well identify additional reserves in the same area. Preliminary expansion tests suggest that all of these deposits contain commercially expansible perlite.

The target markets for these ores would presumably be existing expanders on the prairies, in Vancouver, and in Northwest Oregon. The interior deposits should be within reach of the western Prairie markets (certainly closer than Colorado or New Mexico), and the Queen Charlotte sites would present an opportunity to take advantage of very cost-effective barge transport to west coast consumers. None of the expansion plants in question are irrevocably committed to their current perlite ore suppliers, according to recent interviews. Further, with a lower-priced ore available, some of these processors might conceivably replace some of the finished (expanded) grades of perlite currently being imported into the region from the U.S.A.

6.0 B.C. SUPPLY - PAST AND PRESENT

For many years, B.C. expanded perlite consumers had very few purchasing options. The closest source of expanded products was W.R. Grace in Edmonton who had to import their ore from as far away as New Mexico. The only option was to buy from U.S. expanders in Southeastern Idaho, Oregon, Colorado, California, Arizona, New Mexico and elsewhere - all a long way away, entailing extremely high freight costs.

The establishment of Aurun Mines Ltd. in the B.C. lower mainland in about 1983 provided a welcome local source of product. Aurun very quickly gained a dominant market share in the region, particularly in construction and horticultural sectors, attaining an ultimate production level of about 2700 annual tonnes. Since the untimely and regrettable closure of Aurun's operation in 1990, there has been one notable change (improvement) in the supply-side; W.R. Grace has commissioned a perlite expansion facility adjacent to their vermiculite exfoliation plant in Vancouver, providing local supply to supplement traditional shipments into this market from Edmonton. Grace clearly dominates the B.C. market given its locational advantage. Neither Grace nor Aurun have produced coated microspheres, which continue to be imported from mid-west and southwest United States.

W.R. Grace & Co. operate perlite expanders in Ajax, Ontario (2 furnaces), in Winnipeg, Edmonton, and now Vancouver. They also have a plant in Florida that processes imported perlite from Greece. Their Canadian plants all rely on U.S. ore; the source for their western expanders had been National Perlite Products Co. in Malad City, Idaho, which has been shut down for over a year, forking Grace to go further south for supply.

The only other substantive participant in the B.C. market is the Supreme Perlite Company of Portland, Oregon; Supreme has been in business for forty years using ore from the Southwestern States. Their products are generally well received in B.C., and they have captured a significant market share. Supreme have a perlite deposit in Baker County, in Eastern Oregon, that they hope to develop into a complete ore source; in the meantime they continue to purchase some of their ore from New Mexico.

It should be noted that there have been several other perlite deposits identified in Washington and Oregon that could conceivably attract development in the future.

7.0 PACIFIC NORTHWEST MARKETS

The -'estimates of perlite consumption put forward in this Section and in the CONCLUSIONS to follow are based on interview responses from users and distributors and the experience of the Consultants. Sales figures from producers within the region were not made available. The writers are very grateful to all those perlite consumers who responded so cooperatively to this survey.

7.1 Alberta

Numerous industry sectors were surveyed in Alberta regarding their current purchases of expanded perlite products Companies were selected on the basis of known past usage or their involvement in an industry with some history of perlite consumption. Alberta would be a significant market for any emerging B.C. perlite producer.

Of the Alberta filter aid users contacted, none are purchasing perlite; all of them use diatomaceous earth for this purpose. The largest consumer is a vegetable oil plant that requires about 350 tonnes per year. One reason given for perlite's unpopularity was its plugging or clogging characteristic in the filter, probably due to excessive fines.

With regard to the oil and gas drilling business, there again appears to be no perlite used. One well-established distributor contacted numerous drilling companies and fluid formulators and was advised that perlite was not in use anywhere within the industry. One respondent said that at one time it had been used as a lightener in some plugging cements, but had been replaced by an Australian "ceramic sphere" product. A major drilling fluid manufacturer interviewed confirmed the absence of any perlite applications, as did the Province's major barite producer.

A pipe production company that had once bought expanded perlite for use in an insulating pipe coating application for heavy oil extraction (coating the steam pipes) reported that there has been no call for this product since 1989 with the demise of the heavy oil exploration business. There may be some minor pipe insulation demand.in other sectors.

The horticultural industry is the major consumer of expanded perlite in Alberta, particularly in the production of peat moss based soil mixes. The largest single consumer is located near Edmonton. They installed their own perlite expanders several years ago, previously having purchased expanded product from W.R. Grace in Edmonton. They use up to 40 percent by volume of perlite in their soil mixes, consuming approximately 2300 tonnes per year of raw perlite from

Colorado. They had utilized ore from National Perlite in Malad City, Idaho; until that facility shutdown. They obviously represent an extremely important market for any would-be B.C. perlite mine. The same company report consuming almost twice as much perlite in their Winnipeg plant - about 4500 tonnes annually. These would together account for perhaps twenty percent of the total Canadian perlite consumption.

The expansion plant of W.R. Grace in Edmonton consumes substantial tonnages of imported perlite ore; precise figures are not available. Products from this plant are widely distributed throughout Western Canada. Grace also supplies a second large peat moss soil blender in Winnipeg, who sells product throughout the west, and who indicates an annual perlite consumption of about 1100 tonnes per year. They use a like amount of vermiculite in their mixes which they also acquire from Grace. They have a second plant in Quebec where they operate their own perlite expanders, using imported ore from abroad (South Africa was the indicated source). They have achieved higher yields of expanded perlite at Winnipeg by transporting the-product (from Edmonton) in pneumatic tank trucks, blowing the product into storage silos thus creating less fines (waste), than with the traditional plastic bag packaging that allows-substantial abrasion dusting during handling.

Two other soil blenders were interviewed in southern Alberta. One of them buys about 140 tonnes per year of expanded product from Grace for both the production of peat moss soil blends and for redistribution to a wide network of nurseries and garden shops. The other company consumes a similar tonnage (140-180 per year) for its own blending facility and for repackaging into small bags for retail outlets. Their source of supply is a U.S. producer in Colorado. Freight makes up almost 20 percent of the delivered perlite cost. One of these companies is considering pumice (from Oregon) as a substitute. Brightness is an important characteristic for both of them.

While a thorough review of concrete aggregate markets in Alberta was not possible, it was noted that one' major concrete producer is using a locally expanded shale for lightweight applications. As will be discussed under B.C. markets, this industry does not appear to be a potentially large consumer of perlite.

The other substantial user of perlite in Alberta is the joint cement industry. Plants in Edmonton and Calgary use perhaps 1300 tonnes per year between them of coated microspheres, imported from two or three different U.S. sources, for the manufacture of lightweight joint cement. Perlite aggregate has been used for stippled ceiling textures, but this has now been in part replaced by Styrofoam beads.

Clearly, Alberta does represent an important market for raw perlite and expanded perlite, products. W.R. Grace and the peat moss blenders obviously account for a very large proportion of the total demand; they should all be attracted to a closer source of raw material. Similarly, the joint cement producers would doubtless welcome a cheaper (closer) alternative supplier of microspheres.

7.2 Washineton State

The consumption of expanded perlite in Washington State is similar in character to that in B.C.; the demands flow from many different applications, but typically in relatively small quantities. This description of the market will include some reference to a few important situations in Oregon.

In the, horticultural sector, there is stiff competition among blenders of soil products (peat moss-based) that use expanded perlite. At least one large B.C. producer and several others from the Portland, Oregon area compete aggressively with the Washington entities for both grower and retail (packaged) business.

The three largest Washington blenders were all interviewed. Their total consumption of perhte is between 350 and 4.50 tonnes annually. They all produce various blends for both grower and retail markets. One of them is a national company that formulates their mixes quite scientifically; they use a mixture of peat moss, vermiculite, pumice, and expanded perlite in each product, varying the proportions to suit customer needs, horticultural specifications, and changes in raw material characteristics. They buy their perlite and vermiculite from an Arizona producer who supplies all of the Company's blending facilities throughout the Western States. The perlite is shipped in 4 cu. ft. (110 litres) bags, by truck, in combination with vermiculite. The Seattle plant in question uses up to fifty cu. yds. (38 cu. m.) of pumice per week, bought in bulk from Oregon, but in this case the pumice is complimentary to the perlite, not a substitute.

The other two Washington soil blenders buy their material from Supreme Perlite of Portland; one of them uses 60 cu. ft. (1,700 litres) reusable mini-bulk" bags. One did purchase perlite from Aurun Mines Ltd. when they were in business. They both sell their soil products in bulk and various sires of plastic bags, including numerous "house-brand" labels. One of them uses perlite in preference to pumice because of its higher brightness. The larger of these two processors is. closing its plant in June, which will present considerable growth opportunities to the remaining two and their out-of-state competitors.

With regard to filter aids, little or no perlite seems to be sold for this purpose in Washington. One major chemical distributor reports substantial sales of diatomaceous earth for filtration purposes, but no demand for perlite, which they also carry. Interviews with breweries and wineries in the State confirmed this report; they all use diatomaceous earth and no perlite in their filter aid applications. Similarly, there is virtually no demand for perlite from paint and coatings manufacturers in the area.

Regarding stucco and plaster additives, one substantive industrial building supply distributor and concrete ready-mix company was interviewed. Their only sales of expanded perlite are to plasterers for textured plaster admix. Their total annual consumption is less than ten tons, which they purchase from Supreme Periite in Portland the quality and packaging is said to be very good. It would appear that the overall usage of perlite in the concrete, plaster, and masonry fields in Washington is very limited, as is the case in B.C. and Alberta.

A very significant outlet for perlite in Washington is in the manufacture of lightweight joint cement. There are three companies in the Sea-Tat area making joint compound, one of which is very small. The other two enjoy over 95 percent of the market, and consume approximately 900 tonnes per year of coated perlite microspheres between them, from three different 'Midwest and Southwest U.S. producers, all delivered in large bags via railroad boxcars. Little or no textured plaster is made, hence there is not much consumption of coarser aggregates of uncoated expanded perlite.

The manufacture of fireproof door cores, a major application for expanded perlite in the US. generally, appears to be now centred in the midwest states. Georgia Pacific Ltd. (G.P.) at one time produced these in Portland, but relocated the business eastward some time ago. G.P. reports this to be their only other perlite consuming product, besides joint cement, which they manufacture in other regions of the U.S.

Another substantial use of perlite, the production of formed acoustic ceiling tiles, is evident in the Pacific Northwest, in Oregon. One company in the northeastern part of the State produces a wood fibre tile (amongst 300 other products), but uses no perlite whatsoever in the formulation.' The other Oregon tile producer, located on the Columbia River, north of Portland, makes a mineral-based product, consisting essentially of slag-wool, perlite and binders. They have their own perlite expanding furnaces and bring in raw ore from Colorado in bulk rail cars. Then annual perlite consumption totals about 26,000 tonnes, almost as much as is used per year in all of Canada. The company's ore purchases are arm's length in nature and they are therefore very open to alternate (cheaper) potential sources of this vital raw material. They have other similar plant facilities in the Eastern and Southeastern States. They expand their perlite to a relatively fine sire gradation, thus requiring a fine ore feed size, which doubtless endears them to their suppliers, since the ore fines are typically difficult to dispose of.

7.3 British Columbia

British Columbia represents a broad and sizable market for a wide range of expanded perlite products, particularly in the lower Fraser Valley and Greater Vancouver areas. The only expander of perlite in the region, however, is W.R. Grace and Co. of Canada Ltd., in Vancouver, who have dominated the market since the departure of Aurun Mines. Consumption or production figures for Grace's operation are not available, but they do produce a full range of expanded products (excluding microspheres, coated or otherwise), as can be seen in Table VIII, extracted from their published' data sheet.

7.3.1 Horticultural

The blending of peat moss-based soils is an important industry in Southwestern B.C., despite the absence of any local peat moss source and the competitive presence of blended product from the large prairie producers.

Table VIII

W.R. GRACE & Co. EXPANDED PERLITE PRODUCTS

Grace. Product	Typical Bulk Dens.	% Retained - U.S. Sieve Size 8 mesh	16 mesh	30 mesh	100 mesh
Cryogenic	3.0 lb/ft^3		1.0	23.0	88.9
Industrial ALW	4.0 "	1.7	43.0	76.7	93.6
Industrial AMW	4.8 "	0.7	31.7	71.8	93.3
Industrial AHW	7.0 "	0.2	17.2	64.8	90.9
Industrial K	8.3 "	0.8	36.9	75.3	96.5
Industrial H	6.0 "	50.9	83.4	91.5	N.A.

Note: See Appendix D for micron equivalents.

In Greater Vancouver, there is one major bulk blender serving wholesale plant growers in Southwestern B.C. and in Washington State. Once a customer of Aurun, this company currently buys expanded perlite from Oregon, in 50 cu. ft. (1,400 litres) reusable mini-bulk bags, most of it coarse aggregate with a small proportion of medium size for seedling mixes. Substantial quantities of pumice are also used by this blender for certain plant mixes.

There are several other commercial blenders in the area, three of whom were interviewed. They all specialize in packaged blended products for retail customers and purchase their perlite in 4 cu. ft. (110 litres) plastic bags from W.R. Grace. Two of them use Oregon pumice as a partial substitute, and as a preferred agent in some cases. It is cheaper than expanded perlite and doesn't "float to the top" in wet environments as perlite does, but it is not as white. One of these three uses some Styrofoam as a substitute in low-price products. All three do extensive 'house brand' bagging for chain stores and nurseries, and also re-package perlite in small plastic bags for retailers. Some also redistribute smaller bags of Grace perlite directly to their customers.

The total annual consumption of expanded perlite by all four of these blenders is in the neighbourhood of 450 tonnes. Anticipated growth rates are optimistic as the horticultural and landscaping industries seem to keep well ahead of the rest of the economy.

At least two major garden supply distributors handle, re-package and re-sell W.R. Graceperlite in the B.C. lower mainland (and on Vancouver Island). This activity adds a further 90 tonnes or so per year of volume to the above-noted 450 tonnes.

Several commercial greenhouse owners were interviewed, some of whom do their own soil blending, buying perlite directly form Grace or from one of Grace's distributors. 'Consumptions vary all the way from 5 to 200 tonnes per year. One substantial operator purchases his soil requirements in blended form from one of the large prairie peat moss companies. These businesses account for a total perlite consumption of about 400 tonnes per year.

The total of all of these Greater Vancouver horticultural demands is about 1000 tonnes per year, nearly all in the coarse aggregate size range.

7.3.2 Industrial

As'in the other jurisdictions surveyed, the use of expanded perlite for filter aids in B.C. seems to be extremely limited. Of the breweries, sugar and fat refineries, and fruit juice processors interviewed, none used any perlite, expressing strong preference for diatomaceous earth. Consumptions vary from 20 to 500 tonnes per ineffective in bacteria filtration. The Vancouver Aquarium and numerous municipality. swimming pools did at one time use Aurun products for water filtration.

A major chemical distributor confirmed this trend. They distribute both perlite and diatomaceous earth filter aids and report no demand for the former, despite compelling evidence of satisfactory performance in other locales.

This same distributor, who is very active in the supply of wet and dry chemicals and industrial minerals to local paint companies, reported that there was also zero demand for perlite as a filler in paint and coatings; nor were they aware of any' usage in the plastics sector.

There is some demand for expanded perlite in the manufacture of castable refractory products, although a depressed oil and gas exploration business in the west generally has diminished this market. Currently, only about 30 tonnes per year are required in B.C. for this application (once as high as 100 tonnes per year).

7.3.3 Construction

Two major concrete block manufacturers in Southwestern B.C. were interviewed; neither use any perlite. Lightweight block of 34 or 29 lb. versus the standard 40 lb (18 kg) comprises less than ten percent of total block sales, reportedly. because of the 15 percent price premium. Expanded clay or shale is the preferred lightweight aggregate when required. High fire-rating wall-block calls for perlite aggregate, but orders for this product are said to be rare.

With regard to poured concrete, 60 to 70 percent of which is pumped in thii market, virtually no perlite is used, largely because it can't be pumped as a result of its high water absorption under pressure. Difficulty in obtaining high cured strength levels is also an impediment to use. One operator suggested that low density back fill projects (minimal cement contents) might be a potential market for expanded perlite. A very dry mix is used, and volumes tend to be very sizable. Insulated roof topping (not pumped) is another possible application, but such jobs apparently arise very infrequently.

A popular construction product once thought to have contained perlite is spray-on insulation (eg: Grace's "Monocoat"). The filler of choice is now, reportedly, chopped styrofoam. Perlite was too abrasive and caused troublesome levels of erosion of spray nozzles. Vermiculate has also apparently been rejected for this application, because of concerns over asbestos contents. A competitive product once made in eastern Canada (now just in the U.S.) is a fire-proof plaster-perlite-cellulose formulation, which, if it were to be manufactured here, could represent a significant market for expanded perlite.

One major roofing compound manufacturer was interviewed - no perlite is used in their mineral filled, tar-based formulations.'

In the plaster and stucco field, interviews with building supply dealers revealed a small demand for perlite for a few special applications, including lightweight stucco, hollow door admix, and mortar sand replacement for difficult access cement jobs. No loose-fill insulation usages were mentioned. The total demand in this sector appears to be in the range of 50 tonnes per year.

The largest market for perlite in this category is in the manufacture of lightweight dry wall joint cement and ceiling textures. The latter products utilize expanded perlite aggregate, as noted earlier. Significant quantities are involved in B.C., well in excess of 500 tonnes per year. Lightweight joint cement production in the Province accounts for imports of U.S. coated miaospheres in even greater volumes. An estimate of total microsphere usage in Alberta, B.C., and Washington is given in the Conclusion section of this report.

8.0', TRANSPORTATION, DISTRIBUTION, AND PRICES

As noted many times in this review, the extremely low bulk density of expanded perlite makes it very expensive to transport, hence the strong economic bii towards locating "poppers" (expanders) close to finished product markets, even to the extent of "captive" facilities tied to a single user, such as have been constructed at the ceiling tile plant in Oregon, and the peat moss-based soil blender in Edmonton. With a twenty-to-one expansion ratio, economics strongly favour the transport of ore as opposed to expanded product wherever possible. Another important factor is the considerable friability of expanded perlite that gives rise to significant abrasion (dust) losses of product during handling and transport. Fiiy; bulk handling of expanded perlite must be carried out carefully, so as to avoid any exposure to water.

Concerning means of trade, perlite products 'in the region seem typically to be sold directly from the manufacturer to the customer, except where purchase quantities are small or where the source and consumer are far apart, in which cases distributors are often utilized. Wholesale customers of course often become distributors, as has been noted, through a process of repackaging into smaller retail units for resale through various garden shops or chain store outlets.

There are few if any political barriers to perlite trade in North America - no duties apply to cross border (Canada-US.) shipments.

Finally, the pricing of these products seems to be stable within the region, reflecting a reasonably competitive situation The standard 110 litre (4 cubic feet) bag of medium and coarse gradations sells for about $6.00 to $6.50, f.o.b. supplier's plant in Canada, or approximately $4.00 U.S. from American producer plants, making the latter price competitive here after allowing for freight and exchange. Prices may be marginally lower in Alberta. A $6.00 bag price converts to about $215.00 per tonne, but virtually no one in this industry think in terms of weight - all measures are volumetrically based.

By contrast, the price of coated microspheres is very high - in the order of U.S. 25 to 30 cents per pound, f.o.b. plant (Midwest or Southwest State). Freight and exchange brings this up to almost Cdn 50 cents per pound, or $900 per tonne, delivered to B.C. With only three or four sources of this product in the entire U.S., severe price competition would not normally be anticipated.

9.0 CONCLUSIONS

- Existing markets for expanded perlite in Western Canada and the Pacific Northwest States seem to be relatively stable and to a large extent within industry sectors exhibiting better-than-average mid-term growth prospects.

- There is a potentially strong regional demand for high quality raw perlite ore sourced within B.C. Combining probable consumptions in Northwest Oregon, Vancouver, and Edmonton, the total market would approach 35,000 tonnes per year. Almost 75 percent of this is vested in one U.S. consumer.

- At least one known B.C. perlite deposit is of proven commercial quality, and several others appear to have commercial potential.

- High value-added coated perlite microspheres represent a substantial dollar volume of business. The total regional consumption is likely in excess of 2,700 tonnes annually (Alberta, B.C., and Washington), which has a delivered value of Cdn$ 2.5 million or more.

Table IX

SUMMARY OF MARKETS

(B.C., Alberta, Washington, N. W. Oregon)

Perlite Form	Annual Tonnes	Approx. Cdn $ Value
sized ore	35,000	$1.4 million
Expanded Perlite (excluding microspheres and captive markets)	7,000	$1.5 million
Coated Microspheres	2,700	$2.5 million

Appendix A

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Appendix B

Perlite Patents

CODES FOR COUNTRIES AND FOR KINDS OF PATENTS

KINDS OF PATENTS

COUNTRY CODE	COUNTRY	KIND	TYPE OF PUBLICATION
AR	Argentina	A	Examined granted patent
AT	Austria	A	Examined accepted specification
AU	Australia	A	OPI application
BE	Belgium	A	Unexamined granted patent
		A	BIS distinguishes 2 applns. with same no.
		T	Transfer to nat. patent from European appln.
BR	Brazil	A	OPI Application
CA	Canada	A	Examined granted patent
CH	Switzerland	A	Granted unexp. patent or exd. application
		B	Examined granted patent
CN	China	A	Unexamined application
CS	Czechoslovakia	A	Examined accepted specification
DD	East Germany	A	Examined granted patent
		B	Re-examined after grant
DE	West Germany	A	OPI appln. and excd. accd. specs pre-1974
		B	Exd. accepted spec. from 1975
		C	Granted patent from 1981 week 8138
		G	Granted EP assigned DE number
		T	PCT transfer to West Germany
DK	Denmark	A	OPI application
EP	European Patent	A	OPI application
		B	Examined granted specification
ES	Spain	A	Unexamined granted patent
FI	Finland	A	OPI application
FR	France	A	OPI appln. and other first publn.
		E	Addition
		M	Medicaments
		M	Medicaments addition
GB	United Kingdom	A	Ex. accepted, now granted (below 2000000)
		A	OPI application
		B	Exd. granted spec. publication number
HU	Hungary	A	Examined accepted specification
		A	Exd. accepted spec. (before 1980)
		A	OPI application (deferred examination)
IL	Israel	A	Examined accepted specification
IT	Italy	B	Unexamined granted patent
JP	Japan	A	OPI application (Kokai)
		B	Examined accepted specification
		W	PCT transfer (orig. abroad)
		X	PCT transfer (orig. Japan)
		Y	PCT transfer to U.M. (orig. abroad)
		Z	PCT transfer to U.M. (orig. Japan)
KR	Korea	B	Accepted specification
LU	Luxembourg	A	Unexamined granted patent
NL	Netherlands	A	OPI application
		B	Examined accepted specification
NO	Norway	A	OPI application
PT	Portugal	A	Examined accepted specification
RD	Research Disclosure	A	Scientific literature
RO	Rumania	A	Examined granted patent
SE	Sweden	A	OPI application
		B	Examined accepted specification
SU	Soviet Union	A	Examined granted patent
		B	Reissued Patent
TP	Int Technology Disclosure	A	Scientific literature
US	United States	A	Examined granted patent
		A	Trial voluntary protest
		A	NTIS invention application
		B	Reexamination certificate
		E	Reissue
		H	Defensive publication
WO	PCT	A	OPI application
ZA	So. Africa	A	Unexamined accepted specification

OPI — "Open for publication inspection"

EXPANSION PROCESSES FOR PERLITE.
TITLES AND NUMBERS FOR PATENTS REGISTERED IN THE U.S. OR CANADA.
(NANY OF THESE ARE ALSO REGISTERED IN OTRRR COUNTRIES)

Expanding perlite granules using heavy liquid fuel - by mixing liquid fuel with preheated air before feeding to burner nozzle

Patent Family:

CC	Number	Kind	Date	Week	
us	4290749	A	810922	8141	
CA	1121557	A	820413	8218	
GB	2033375	A	800521	8023	(Basic)
GB	2033375	B	830302	8309	
FR	2439759	A	800627	80[illegible]2	

Controlling density of expanded perlite - by passing prod. through conduit, applying radiation from one side, and detecting amt. of non-absorbed radiation on the other side

Patent Family:

CC	Number	Kind	Date	Week	
US	4186306	A	800129	8006	(Basic)

In situ bonded expanded perlite - by reacting perlite with sodium and/or potassium silicate

Patent Family:

CC	Number	Kind	Date	Week	
US	3658564	A	000000	7220	(Basic)
CA	949259	A	740618	7427	

Expanded perlite - contains alkali metal cpd additive

cc	Number	Kind	Date	Week	
CAWADIAW	888079	A	000000	7151	(Basic)

Perlite expansion method

c c	Number	Kind	Date	Week	
CAWADIAW	835822	A '	000000	7010	(Basic)

Expanded mineral particles esp. perlite having non-porous surfaces - obtd. by slow expansion at controlled temp. to avoid cracking

Patent Family:

CC	Number	Kind	Date	Week	
EP	353860	A	900207	9006	(Basic)
AU	8936484	A	900215	9013	
ZA	8904413	A	900425	9021	
US	5002696	A	910326	9129	

Perlite expansion process including improved heat recovery with improved yield

us	4347155	A	820831	8237	(Basic)

Fluid treatment apparatus. - with two concentric annular treatment regions in each of which circumferential fluid flow is established

Patent Family:

CC	Number	Kind	Date	Week	
EP	293103	A	881130	8848	(Basic)
GB	2205049	A	881130	8848	
AU	8816154	A	881201	8904	
JP	63319044	A	881227	8906	
NO	8802352	A	881227	8906	
ZA	8803470	A	890125	8911	
GB	2205049	B	910515	9120	
US	5075981	A	911231	9204	
CA	1303334	C	920616	9230	
EP	293103	B1	921111	9246	
DE	3875801	G	921217	9252	

Expanded and coated perlite production by expanding perlite ore in hot gas stream and coating the hot expanded particles e.g. with a polydi;methyl siloxane! emulsion

Patent Family:

CC	Number	Kind	Date	Week	
US	4525388	A	850625	8528	(Basic)
GB	2151508	A	850724	8530	
CA	1220903	A	870428	8721	
GB	2151508	B	870603	8722	

Expansion furnace for granular materials employs upflow fluid bed furnace with solids injection at base of 'flame

Patent Family:

CC	Number	Kind	Date	Week	
BE	895435	A	830415	8319	(Basic)
DE	3151164	A	830630	8327	
FR	2518727	A	830624	8330	
GB	2112770	A	830727	8330	
NL	8204975	A	830718	8332	
DE	3151164	C	850207	8507	
US	4512736	A	850423	8519	
GB	2112770	B	850724	8530	
AT	8204543	A	860515	8623	

Vertical tube furnace for expanding perlite for vermiculite with coaxial preheater chamber contg. baffles around tube

US	4318691	A	820309	8212	(Basic)

Expanded perlite coated with emulsion of organo-silicon cpd. - dried and heated to particles resistant to attrition

US	4183980	A	800115	8004	(Basic)
US	4255489	A	810310	8113	

Furnace for expanding perlite employing burner firing downwards with perlite injection into flaiue at top of combustion chamber

Patent Family:-

CC	Number	Kind	Date	Week	
BE	894791	A	830214	8309	(Basic)
DE	3238974	A	830728	8331	
GB	2113669	A	830810	8332	
FR	2520099	A	830722	8334	
NL	8204559	A	830816	8336	
JP	58130155	A	830803	8337	
ZA	8206192	A	830714	8343	
ES	8403164	A	840601	8429	
CA	1180854	A	850115	8508	
GB	2113669	B	850417	8516	
US	4521182	A	850604	8525	
JP	85046051	B	851014	8545	
DE	3238974	C	860109	8603	
IT	1152899	B	870114	8851	

Preparing fine perlite dust for expansion by mixing with boric acid agglomerant and-heating

Patent Family:

CC	Number	Kind	Date	Week	
BE	889679	A	820120	8205	(Basic)
GB	2080282	A	820203	8205	
FR	2486929	A	820122	8208	
GB	2080282	B	831123	8347	
CA	~1165513	A	840417	8420	
US	4557883	A	851210	8601	

Free-flowing, compaction resistant expanded perlite particles - coated with self-crosslinking acrylic! polymer, used as heat insulator

Patent Family:

CC	Number	Kind	Date	Week	
BE	873974	A	790529	7923	(Basic)
NL	7900905	A	790808	7934	
DE	2904412	A	790906	7937	
FR	2416208	A	791005	7946	
US	4212755	A	800715	8031	
DE	2904412	B	810122	8105	

Bonding fine dust fractions of expanded perlite - by spraying with paraffin hydrocarbon after cooling

CC	Number	Kind	Date	Week	
GB	2003463	A	790314	7911	(Basic)
DE	2739375	A	790315	7912	
US	4148941~	A	790410	7917	
DE	2739375	B	808604	8024	
GB	2003463	B	820519	8220	

Expanded perlite coated with emulsion of organo-silicon cpd. - dried and heated to particles resistant to attrition

Patent Family:

CC	Number	Kind	Date	Week	
US	4183980	A	800115	8004	(Basic)
US	4255489	A	810310	8113	

Bonding fine dust fractions of expanded perlite - by spraying with paraffin hydrocarbon after cooling

Patent Family:

CC	Number	Kind	Date	Week	
GB	2003463	A	790314	7911	(Basic)
DE	2739375	A	790315	7912	
US	4148941	A	790410	7917	
DE	2739375	B	800604	8024	
GB	2003463	B	820519	8220	

Expanded perlite made for use in filtration processes.- where oxygen added to burner flame improves yield and quality

Patent Family:

CC	Number	Kind	Date	Week	
BE	848149	A	770509	7719	(Basic)
NL	7712324	A	780511	7821	
DE	2749100	A	780518	7821	
NO	7703813	A	780605	7826	
JP	530608~84	A	780531	7827	
FR	2370008	A	780707	7831	
BR	7707463	A	780822	7836	
GB	1556832	A	791128	7948	
US	4179264	A	791218	8001	
DE	2749100'	B	810312	8112	
CA	1107911	A	810901	8141	
JP	83046468	B	831017	8345	
IT	1087430	B	850604	8624	

Hydrophobic expanded perlite compositions. - contain buffered aq. silane emulsion additives

Patent Family:

CC	Number	Kind	Date	Week	
US	4889747	A	891226~	9008	(Basic)

Expanded perlite fillers coated with polysiloxane and heated to improve resistance to attrition

Patent Family:

CC	Number	Kind	'Date	Week	
US	4255489	A	810310	8113	(Basic)

EXPANDED PBRLITE - PRODUCT APPLICATIONS

Battery separator material - comprising expanded perlite glass fibres and opt. plastics fibres

Patent Family:

CC	Number	Kind	Date	Week	
BE	882183	A	800911	8039	(Basic)
WO	8001969	A	800918	8040	
FI	8000768	A	801031	8048	
us	4233379	A	801111	8048	
NO	8003114	A	801208	8102	
EP	25060	A	810318	8113	
BR	8008178	A	810331	8116	
DK	8004643	A	810713	8132	
JP	56500110	W	810205	8149	
CA	1133984	A	821019	8248	
EP	25060	B	841024	8443	
DE	3069482	G	841129	8449	
IT.	1143120	B	861022	8830	

Non-digestible expanded perlite granules as pig feed additive'- allows addition of vitamin(s) and oligo-elements, gives an improved carcass and allows excrement to form excellent manure (OE 15.5.79)

Patent Family:

CC	Number	Kind	Date	Week	
BE	877260	A	791015	7944	(Basic)
AT	7804659	A	790515	7922	
GB	2023993	. A	800109	8002	
DE	2924416	A	800110	8003	
NL	7904889	A	800102	8004	
NO	7902121	A	800121	8007	
DK	7902691	A	800204	8009	
SE	7905505	A	800317	8014	
FR	2429564	A	800229	8015	
US	4310552	A	820112	8204	
GB	2023993	B	820922	8238	
CH	641647	A	840315	8416	

Asbestos-free bituminous compsn. for roofing - contg. expanded perlite filler and high-structure carbon black

Patent Family:

CC	Number	Kind	Date	Week	
US	4168179	A	790918	7939	(Basic)
CA	1119354'	A	820309	8214	

Ignition coating for charcoal briquettes - contains alcohol, gum cellulose binder and wicking material, esp. particulate expanded perlite

Patent Family:

CC	Number	Kind	Date	Week	
US	4165968	A	790828	7937	(Basic)
CA	1122408	A	82042 7	8220	

Fire door core of high compressive strength and low density - made from expanded perlite, gypsum, cementand organic binder and pref. unexpanded vermiculite

Patent Family:

CC	Number	Kind	Date	Week	
us	4159302	A	790626	7928	(Basic)

Free-flowing, compaction resistant expanded perlite p mer, used as heat insulator

Patent Family:

CC	Number	Kind	Date	Week	
BE	873974	A	790529	7923	(Basic)
NL	7900905	A	790808	7934	
DE	2904412	A	790906	7937	
FR	2416208	A	791005	7946	
US	4212755	A	800715	8031	
DE	2904412	B	810122	8105	

Plaster moulding compsns. for low m.pt. metal casting - are fibre-free and include fine expanded perlite and non-fibrous fillers

Patent Family:

CC	Number	Kind	Date	Week	
US	4148660	A	790410	7917	(Basic)
CA	1113655	A	811208	8202	

Oil-adsorbing compsn. for removal of oil from water - comprising expanded perlite, cellulosic fibre and asphalt sizing

Patent Family:

CC	Number	Kind	Date	Week	
US	4142969	A	790306	7911	(Basic)

Fire resistant, insulating or acoustical board compsn. - comprising expanded ~perlite, wollastonite, mineral and vegetable fibres, colloidal clay and paraffin wax

Patent Family:

CC	Number	Kind	Date	Week	
CA	1043053	A	781128	7850	(Basic)

Fibre-reinforced expanded perlite insulation board - having starch included in binder for improved mechanical properties

Patent Family:

CC	Number	Kind	Date	Week	
US	4126512	A	781121	7848	(Basic)

Rigid inorganically bonded thermal insulator - comprising expanded nerlite: alkali metal silicate: zinc oxide: sodium hexafluorosilicate and fibrous material, e.g. mineral wool

Patent Family:

CC	Number	Kind	Date	Week	
DE	2813745	A	781019	7843	(Basic)
FR	2385654	A	781201	7902	
US	4138268	A	790206	7907	
BR	7802008	A	790403	7916	
JP	54039433	A	790326	7918	
CA	1104593	A	810707	8136	
GB	1602403	A	811111	8146	
US	4298554	A	811103	8147	

Cellular high temp. insulation composite - comprising moulded cured mixt. of expanded perlite, aluminate cement, clay, wollastonite and resin

Patent Family:

CC	Number	Kind	Date	Week	
us	4100115	A	780711	7837	(Basic)

Compsn. for treatment of spilt liq. caustic base - by neutralisation and absorption contains citric acid, expanded perlite, flour, colloidal silica pH indicator and water

Patent Family:

CC	Number	Kind	Date	Wesk	
BE	863460	A	780516	7823	(Basic)
DE.	2803812	A	780810	7833	
SE	7801218	A	780828	7837	
JP	53097973	A	780826	7839	
FR	2379593	A	781006	7845	
US	4105576	A	780808	7851	
ZA	7800152,	A	781102	7905	
GB	1545754	A	790516	7920	
CA	1103404	A	810623	8130	
DE	2803812	B	810730	8132	
CH	638993	A	831031	8346	
JP	86032050	B	860724	8634	
IT	1105285	B	851028	8714	

Plaster moulding compsns. for low m.pt. metal casting - in which conventional fibrous talc is replaced by non-toxic expanded perlite and fibrous wollastonite

Patent Family:

CC	Number	Kind	Date	Week	
US	4081283	A	780328	7820	(Basic)
CA	1074954	A	800408	8017	

Compression moulded hardened composite articles - contg. expanded perlite and urea! melamine formaldehyde resin modified with Gp.-1VB metal

Patent Family:

CC	Number	Kind	Date	Week	
DE	2735418	A	780209	7807	(Basic)
JP	53021251	A	780227	7815	
US	4128524	A	781205	7850	
DE	2735418	B	790517	7921	

Household abrasive cleanser compsn. - contg. expanded perlite abrasive, colloid-forming clay e.g. smectite as suspending agent and surfactant

Patent Family:

CC	Number	Kind	Date	Week	
US	4051056	A	770927	7740	(Basic)
GB	1511026	A	780517	7820	
CA	1051311	A	790327	7914	
IT	1042384	B	800130	8018	

Extra lightweight expanded perlite cement concrete block - contains additive of triethanolamine salt of p-dodecyl benzene sulphonic acid

Patent Family:

CC	Number	Kind	Date	Week	
US	4042406	A	770816	7734	(Basic)
GB	1583106	A	810121	8104	

Oil Spillage hydrocarbons sepn. from water - absorbed in floating mixt. of expanded perlite, asphalt, fibrous filler and pref. clay

Patent Family:

CC	Number	Kind	Date	Week	
us	4011175	A	770308	7711	(Basic)

Thermal and acoustic insulation - made from expanded perlite or vermiculite with an aq. acid and a waterglass soln.

Patent Family:

CC	Number	Kind	Date	Week	
US	4000241	A	761228	770.2	(Basic)

Heat insulating calcium silicate bound structural material - is produced from lime expanded perlite and reinforcing fibres

Patent Family:

CC	Number	Kind	Date	Week	
DE	2627823	A	761230	7702	(Basic)
ZA	7603425	A	770331	7726	
US	4033783	A	770705	7728	
JP	52128919	A	771028	7749	
DE	2627823	B	780622	7826	
GB	1546243	A	790523	7921	
CA	1058475	A	790717	7932	

Expanded perlite board contg. gypsum and organic fibre - by forming mat from aq. slurry

Patent Family:

CC	Number	Kind	Date	Week	
US	3988199	A	761026	'7645	(Basic)
CA	1065350	A	791030	7946	

Insulating/protective structure for frozen substrates - comprising expanded perlite coated with chemically-combined bituminous material

Patent Family:

CC	Number	Kind	Date	Week	
US	3903706	A	750909	7538	(Basic)
CA	1061031	A	790821	7936	

Perlite board continuous prodn., for insulation - by mixing expanded perlite and aq. slurry contg. binder, using less water

Patent Family:

CC	Number	Kind	Date	Week	
US	3888962	A	750610	7525	(Basic)

Hydrocarbon septd. from mixts. with water - using absorbent made from expanded perlite,, asphalt cellulose fibres

Patent Family:

CC	Number	Kind	Date	Week	
US	3855152	A	741217	7501	(Basic)
BE	824~559	A	750515	7524	
NL	7416148	A	760615	7627	
DE	2459378	A	760624	7627	
GB	1468420	A	770323	7712	
CA	1043759	A	781205	7851	
IT	1037096	B	791110	8808	

Structural plate with light core.- contg expanded perlite, fibrous material and binder

Patent Family:

CC	Number	Kind	Date	Week	
DE	2336400	A	740214	7408	(Basic)
JP	49092106	A	740903	7445	
GB	1446014	A	760811	7633	
CA	1007006	A	770322	7714	

Decorating wet core wallboard - using porous pigmented composition containing expanded perlite

Patent Family:

CC	Number	Kind	Date	Week	
CA	930500	A	000000	7331	(Basic)
GB	1359935	A	740717	7429	
US	3984596	A	761005	7642	

Expanded perlite insulation jacket - for cryogenic fluid supply lines, perm-anently evacuated when transporting liq gas

Patent Family:

CC	Number	Kind	Date	Week	
DE	2333933	A	740124.	7405	(Basic)
FE	2191061	A	740308	7413	
US	3812886	A	740528	7423'	
JP	49058451	A	740606	7432	
GB	1425614	A	760218	7608	
CA	983374	A	760210	7609	
JP	77007597	B	770303	7713	
DE	2333933	C	830317	8312	

Oxidn catalyst - for methacrolein prepn consisting of metal eg iron-molvbdenum oxides on expanded perlite support

Patent Family:

CC	Number	Kind	Date	Week	
BE	784262	A	000000	7251	(Basic)
DE	2226475	A	000000	7304	
FR	2140166	A	000000	7313	
US	3839227	A	741001	7441	
GB	1385104	A	750226	7509	
CA	969557	A	750617	7527	
DE	2226475	B	760812	7634	
US	4078004	A	780307	7813	

Insulating compsn for.underground conduits - of mixt of asphalt and asphalt-coated expanded perlite

Patent Family:

CC	Number	Kind	Date	Week	
US	3655564	A	000000	7218	(Basic)

Expanded perlite with silicate binder insulation - - protecting austenitic stainless steels from stress corrosion

Patent Family:.

CC	Number	Kind	Date	Week	
US	3639276	A	000000	7210	(Basic)
JP	47008841	A	000000	7219	
JP	79036332	B	791108	7949	

Insulation panels of expanded perlite

Patent Family:

CC	Number	Kind	Date	Week	
US	3522067	A	000000	7030	(Basic)

A moulded insulating material tha contains (1) 60-75% wt. cellular 'expanded perlite, (2) 8-12% bentonite clay as a mineral binder, (3) 5-8% water dispersible

US	3408316	A	000000	6800	(Basic)
JP	69022195	B	000000	6801	

Strong low density mineral wool structural panels - obtd. by dewatering frothed mixt. contg. mineral wool, polyvinylacetate latex, expanded perlite and cationic amine-based surfactant, using

Patent Family:

CC	Number	Kind	Date	Week	
us	5047120	A	910910	9139	(Basic)

Explosive water-in-oil emulsion compsn. - contains hydrocarbon, emulsifier, aq. soln. of oxidising salt, and expanded perlite with density below 0.6 G per cubic cm as void-former-

Patent Family:

CC	Number	Kind	Date	Week	
DE	4001917	A	910725	9131	(Basic)
CA	2007348	A	910709	9138	
FR	2659322	A	910913	9147	
JP	4042884	A	920213	9213	

Precast, prestressed concrete - has smooth, expanded perlite in wet mix' with pozzolan comprising diatomaceous clay and micro-silica, water and aggregate

Patent Family:

CC	Number	Kind	Date	Week	
WO	9014319	A	901129	9050	(Basic)
AU	9058111	A	901218	9113	
EP	431112	A	910612	9124	
JP	4500065	W	920109	9208	
US	5114617	A	920519	9223	

Cement for relining and re-sizing chimneys - contg. Portland cement, volcanic glass which is pref. expanded perlite, micro-silica, air entraining agent and plasticiser

Patent Family:

CC	Number	Kind	Date	Week	
US	4963191	A	901016	9044	(Basic)

Emulsion explosive having continuous phase of fuel and emulsifier - and dispersed aqueous oxidiser salt contains expanded perlite as void providing agent

Patent Family:

CC	Number	Kind	Date	Week	
us	4940497	A	900710	9030	(Basic)
AU	9048932	A	900712	9036	
GB	2232975	A	910102	9101	
ZA	9001580	A	901228	9105	
ES	2019522	A	910616	9129	
NO	9000886	A	910826	9143	
PT	93640	A	911031	9148	
NL	9001011	A	911118	9149	
GB	2232975	B	921216	9251	
AU	643196	B	931111	9401	

Adsorbent mfr. from calcium sulphate hemi-hydrate and expanded perlite : - involves adding water and calcining, esp. for adsorbing animal excretion

Patent Family:

CC	Number	Kind	Date	Week	
DE	3713742	A	881103	8845	(Basic)
DK	8802001	A	881025	8903	
EP	303760	A	890222	8908	
DE	3713742	C	890608	8923	
US	4925826	A	900515	9024	
EP	303760	B1	920603	9223	
DE	3871651	G	920709	9229	
CA	1312063	C	921229	9306	

Roofing system using expanded perlite board - has perforations into which partially molten bitumen coating flows

Patent Family:

CC	Number	Kind	Date	Week	
US	4766024	A	880823	8836	(Basic)

Lightweight fire resistant core for fire door - comprises expanded perlite and gelatinised starch adhesive

Patent Family:

CC	Number	Kind	Date	Week	
US	4695494	A	850922	8740	(Basic)
CA	1275159	C	901016	9047	

Lightweight insulating polymer concrete esp. for LNG storage areas - comprising epoxy! resin binder, hydrated flame retardant, and one or both of aluminium silicate hollow spheres and expanded perlite

CC	Number	Kind	Date	Weak	
US	4689358	A	870825	8736	(Basic)

Lightweight joint cpd. for gypsum wallboards - having improved uniformity with the adjacent board when painted, contains water-imuervious expanded perlite of specified particle size

Patent Family:

CC	Number	Kind	Date	Week	
US	4686253	A	870811	8734	(Basic)
GB	2186817	A	870826	8734	
WO	8705008	A	870827	8735	
AU	8770837	A	870909	8747	
NO	8704348	A	871207	8803	
EP	258384	A	880309	8810	
FI	8704591	A	871.019	8831	
JP	63502425	W	880914	8843	
DK	8705443	A	871214	8912	
GB	2~186817	B	891108	8945	
KR	9000137	B	900120	904%	
EP	258384	B	910925	9 1 3 9	
DE	3773305	G	911031	9145	
NO	172933	B	930621	9330	

Fireproof insulation using aluminium dihydrogen phosphate as binder obtd. from expanded perlite or blowing agent e.g. dolomite, alumina or magnesia powder and e.g. bentonite, used on structural members

Patent Family:

CC	Number	Kind	Date	Week	
GB	2180231	A	870325	8712	(Basic)
EP	217569	A	870408	8714	
AU	8662515	A	870312	8717	
JP	62070276	A	870331	8718	
NO	8603611	A	870406	8720	
PT	83353	A	870506	8722	
FI	8603658	A	870311	8723	
DK	8604328	A	870311	8724	
BR	8604324	A	870512	8725	
CN	86106831	A	870311	8822	
ES	2002308	A	880801	8926	
GB	2180231	B	890906	8936	
CA	1275423	C	901023	9048	

Expanded perlite treated with amino functional silicon cpd. and use in joint compound for wallboard joints

Patent Family:

CC	Number	Kind	Date	Week	
GB	2178340	A	870211	8706	(Basic)
EP	211522	A	870225	8708	
AU	8659716	A	870108	8714	
US	4657594	A	870414	8717	
CA	1244170	A	881101	8848	
GB	2178340	B	890712	8928	

Insulating surface of mass of molten steel using an expanded perlite-and fibre-contg. board

Patent Family:

CC	Number	Kind	Date	Week	
WO	8403460	A	840913	8438	(Basic)
SE	8301244	A	841008	8443	
PT	78182	A	841130	8503	
EP	140900	A	850515	8520	
ES	8505274	A	850901	8602	
US	4600560	A	860715	8631	
EP	140900	B	880511	8819	
DE	3471026	G	880616	8825	

Roofing panel having e.g. polyurethane foam contg. reinforcing structure and sandwiched between thin expanded perlite-based plate

Patent Family:

CC	Number	Kind	Date	Week	
BE	898912	A	840816	8435	(Basic)
EP	153291	A	850828	8535	
US	4572857	A	860225	8611	
ES	8603007	A	860316	8620	
EP	153291	B	891206	8949	
DE	3574608	G	900111	9004	

Lightweight compsn. for finishing joints between wallboards comprises filler, binder, treated expanded perlite, non-levelling agent and thickener

Patent Family:

CC	Number	Kind	Date	Week	
US	4454267	A	840612	8426	(Basic)
GB	2132185	A	840704	8427	
WO	8402531	A	840705	8428	
AU	8322026	A	840717	8440	
NO	8403291	A	841029	8450	
EP	128157	A	~841219	8451	
JP	60500134	W	850131	8511	
FI	8403006	A	840727	8523	
DK	8403948	A	840817	8526	
CA	1190342	A	850709	8532	
GB	2132185	B	860910	8637	
ES	8605017	A	860801	8644	
KR	8601881	B	861024	8718	
EP	128157	B	'870708	8727	
DE	3372373	G	870813	8733	
JP	92080958	B	921221	9303	

Expanded perlite-silicate insulation material contg. kaolin and fibres has good heat stability and impact resistance; low density and thermal conductivity

Patent Family:

CC	Number	Kind	Date	Week	
EP	106246	A	840425	8418	(Basic)
ZA	8307326	A	840426	8431	
US	4446040	A	840501	8420	
EP	106246	B	861217	8651	
DE	3368404	G	870129	8705	

Flowable thermosettable resin surfacing compsn. contg. diatomite, expanded perlite and glass fibres used to form impact resistant, watertight layers on wooden boat hulls

CC	Number	Kind	Date	Week	
US	4378402	A	830329	8315	(Basic)

Building material for mouldings or mortar with very low density made by mixing expanded perlite with silicate binder and foaming agent

Patent Family:

CC	Number	Kind	Date	Week					
EP	71897	A	830216	8308	(Basic)				
DE	3131548	A	830224	8309					
NO	8202669	A	830307	8316					
DK	8203407	A	830502	8324					
JP	58088155	A	830526	8327					
ZA	8205694	A	830518	8336					
US	4462835	A	840731	8433					
ES	8400075	A	848101	8414					
HU	T32772	A	840928	8443					
CA	1182608	A	850219	8512					
EP	71897	B	851016	8542	DE	3266946	G	851121	8548

Fire door comprising core and edge banding each made from expanded perlite, gypsum and aq. binder, or similar compsn.

Patent Family:

CC	Number	Kind	Date	Week	
US	4343127	A	820810	8234	(Basic)

Composite insulation with enhanced capacity has polyurethane foam between silicate coated expanded perlite ceramic layers

Patent Family:

CC	Number	Kind	Date	Week	
US	4324834	A	820413	8217	(Basic)

High strength coherent insulating material contg. expanded perlite, sodium or potassium silicate, water, and phosphate to provide high transverse strength

Patent Family:

CC	Number	Kind	Date	Week	
EP	48570	A	820331	8214	(Basic)
US	4336068	A	820622	8227	
JP	57090807'	A	820605	8228	

Combustible blocks prepd. by dispersing expanded perlite in gelled liq.-fuel

Patent-Family:

CC	Number	Kind	Date	Week	
EP	47124	A	820310	8211	(Basic)
GB	2083074	A	820317	8211	
DK	8103847	A	820413	8218	
DK	8103848	A .	820413	8218	
GB	2087925	A	820603	8222	
ZA	8105938	A	820707	8239	
ZA	8105939	A	820707	8239	
CA	1162741	A	840228	8413	
CA	1173649	A	840904	8440	
EP	47124	B	860102	8602	
DE	3173367	G	860213	8608	
DE	3173368	G	860213	8608	

Expanded perlite board comprising tacky binder which is permanently tacky when dry

Patent Family:

CC	Number	Kind	Date	Week	
us	4313997	A	820202	8207	(Basic)

Fire retarding sprayable insulating compsn. contains expanded perlite and portland cement and cures rapidly at ambient temp.

Patent Family:

CC	Number	Kind	Date	Week	
us	4303450	A	811201	8151	(Basic)
WO	8300042	A	830106	8302	
AU	8173794	A	830118	8319	

Mineral board mfr. from expanded perlite and resin binder by pressing to crush perlite after shaping for high strength prod.

CC	Number	Kind	Date	Week	
us	4297311	A	811027	8146	(Basic)

Weather resistant roofing or siding panel having good thermal insulation is made from fibre; binder and expanded perlite

CC	Number	Kind	Date	Week	
US	4288959	A	810915	8140	(Basic)

Water-resistant bonded perlite structural material obtd. by curing moulded mixt. of expanded perlite and aq. alkali silicate under controlled conditions of temp. and humidity

CC	Number	Kind	Date	Week	
US	4288253	A	810908	8139	(Basic)

Fireproof heat-insulating compsn. contg. cellulose fibres and expanded perlite particles, opt. resin-coated

Patent Family:

CC	Number	Kind	Date	Week	
BE	887620	A	810615	8127	(Basic)
GB	2070089	A	810903	8136	
FR	2476637	A	810828	8140	
NL	8100869	A	810916	8142	
JP	56134582	A	811021	8148	
US	4302344	A	811124	8150	
DE	3106370	A	820204	8206	
CA	1155287	A	831018	8346	

Firelighters comprising fuel and water in resin matrix contg. expanded perlite for longer burning

Patent Family:

CC	Number	Kind	Date	Week	
EP	23829	A	810211	8108	(Basic)
NO	8002301	A	810302	8113	
DK	8003286	A	810316	8115	
FI	8002396	A	810331	8117	
ZA	8004649	A	810616	8139	
us	4293313	A	811006	8143	
CA	1141543	A	830222	8312	
EP	23829	B	830525	8322	
DE	3063482	G	830707	8328	

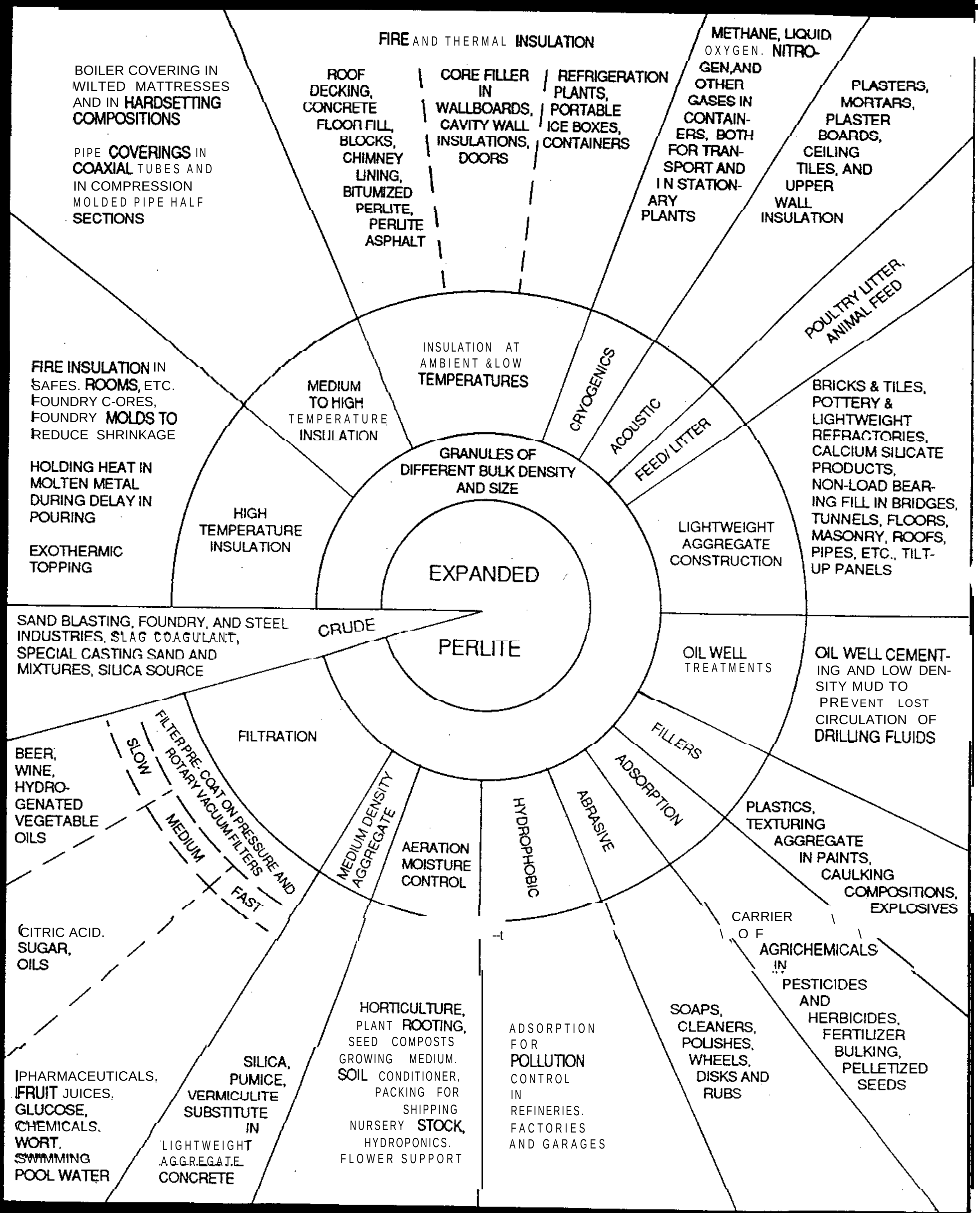
Insulating panel for roof renovation or reconstruction is made from expanded perlite with grid of grooves and rebated side edges

CC	Number	Kind	Date	Week	
FR	2465042	A	810417	8123	(Basic)
CA	1146330	A	830517	8322	

Appendix C

Perlite Institute,
Use & Applications Chart

Applications for perlite...



Appendix D

Size Conversions Chart

Appendix D

SIEVE SIZE CONVERSIONS

Inches	Millimeters	Microns	SIEVE NO. (MESH)	
			U.S. Std.	Tyler Eq.
0.0029	0.0737	73.7	200	200
0.003	0.0762	76.2		
0.0032	0.0813	81.3		
0.00325	0.0826	82.6		
0.0035	0.0889	88.9	170	170
0.0036	0.0914	91.4		
0.00375	0.0953	95.3		
0.004	0.1016	101.6		
0.0041	0.1041	104.1	140	150
0.0049	0.1250	125.0	120	115
0.0059	0.1490	149.0	100	100
0.0070	0.1770	177.0	80	80
0.0083	0.2100	210.0	70	65
0.0098	0.2500	250.0	60	60
0.0117	0.2970	297.0	50	48
0.0138	0.3500	350.0	45	42
0.0165	0.4200	420.0	40	35
0.0197	0.5000	500.0	35	32
0.0232	0.5900	590.0	30	28
0.0280	0.7100	710.0	25	24
0.0331	0.8400	840.0	20	20
0.0394	1.0000	1000.0	18	16
0.0469	1.1900	1190.0	16	14
0.0555	1.4100	1410.0	14	12
0.0625	1.5875	1588		
0.0661	1.6800	1680	12	10
0.0787	2.0000	2000	10	9
0.0937	2.3800	2380	8	8
0.1110	2.8300	2830	7	7
0.1250	3.1750	3175		
0.1320	3.3600	3360	6	6
0.1570	4.0000	4000	5	5
0.1875	4.760	4760	4	4

Appendix E

"MINFILE" Listing of B.C. Perlite Occurrences

MINFILE NUMBER: 092ISW082 **NATIONAL MINERAL INVENTORY:**

NAME(S): PROSPECT CREEK, PEARL

STATUS: Showing
NTS MAP: 092I03E
LATITUDE: 50 00 48
LONGITUDE: 121 04 00
ELEVATION: 760 Metres
LOCATION ACCURACY: Within 500M
COMMENTS: Perlite Layer on the vest bank of Prospect Creek, approximately 0.8 kilometres from its confluence with Spius Creek (Assessment Report 13336).

MINING DIVISION: Nicola
UTM ZONE: 10
NORTHING: 5541620
EASTING: 637900

COMMODITIES: Perlite

MINERALS
SIGNIFICANT: Perlite
MINERALIZATION AGE: Cretaceous

DEPOSIT
CHARACTER: Massive
CLASSIFICATION: Volcanogenic Industrial Min.
SHAPE: Tabular
DIMENSION: 6 x 3 Metres **STRIKE/DIP:** 030/40E TREND/PLUNGE: ,

HOST ROCK
DOMINANT HOST ROCK: Volcanic

STRATIGRAPHIC AGE	GROUP	FORMATION	IGNEOUS/METAMORPHIC/OTHER
Cretaceous	Spences Bridge	Spius Creek	

LITHOLOGY: Perlite
Rhyolite
Andesite
Basalt

GEOLOGICAL SETTING
TECTONIC BELT: Intermontane
TERRANE: Overlap Assemblage
PHYSIOGRAPHIC AREA: Thompson Plateau

CAPSULE GEOLOGY

The Prospect Creek showing is located on the west bank of Prospect Creek. approximately 0.8 kilometres from its confluence with Spius Creek.

The area is underlain by Riddle and Upper Cretaceous Kingsvale Group mafic volcanics (redefined to the Spius Creek Formation of the Spences Bridge Group; Geological Survey of Canada Map 42-1989). Rocks close to the showing comprise volcanic breccia and aphanitic, amygdaloidal, vesicular, porphyritic and spherulitic andesites and basalts.

Two parallel amber to brown perlite layers are exposed over 6 by 3 metres and separated by spherulitic, glassy rhyolite (possibly dykes or chilled contact zones) striking 030 degrees and dipping 40 to 60 degrees southeast (Assessment Report 13336). Another two metre wide perlite layer is exposed30 metres to the south (upslope). Perlite layers are terminated by flat-lying andesite.

Perlite displays pitchy lustre and contains scattered feldspar and quartz crystals and spherules.

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EMPR AR 1954-A185
EMPR EXPL 1983-270; 1984-203
EMPR ASS RPT 11852, '13336
GSC OF 980
GSC WE" 262
GSC P 46-8; 47-10; 81-1A, pp. 185-189; 85-1A, pp. 349-358

BIBLIOGRAPHY

GSC MAP 1010A; 1386A; *42-1989

DATE CODED: 870331 CODED BY: AFW FIELD CHECK: N
DATE REVISRD: 910207 REVISED BY: SNB FIELD CHECK: N

MINFILE NUMBER: 092ISW082

MINFILE NUMBER: 0920 OR

NATIONAL MINERAL INVENTORY:

NAME(S): FRENIER, EMPIRE VALLEY

STATUS: Past Producer Open Pit
NTS MAP: 092008W
LATITUDE: 51 20 43
LONGITUDE: 122 21 01
ELEVATION: 1295 Metres
LOCATION ACCURACY: Yithin 500M

MINING DIVISION: Clinton
UTM ZONE: 10
NORTNING: 5688200
EASTING: 545255

COMMENTS: Open pit, 9 kilometres east of Black Dome Mountain and 7 kilometres west of the Fraser River, just north of Higginbottom Creek, GO kilometres north-northwest from Lillooet (Fieldwork 1988).

COMMODITIES: Perlite

MINERALS
SIGNIFICANT: Perlite
COMMENTS: Silica is cherty and nodular.
ASSOCIATED: Silica
MINERALIZATION AGE: Eocene

DEPOSIT
CNARACTER: Massive Stratabound
CLASSIFICATION: Volcanogenic Syngenetic Industrial Min.
SHAPE: Tabular
DIMENSION: 3 0 Metres STRIKE/DIP: TREND/PLUNGE:
COMMENTS: The deposit consists of a flat-lying flow of volcanic glass up to 30 metres thick.

HOST ROCK
DOMINANT HOST ROCK: Volcanic

STRATIGRAPHIC AGE	GRCUP	FORMATION	IGNEOUS/METAMORPHIC/OTHER
Eocene	Kamloops	Undefined Formation	

LITHOLOGY: Perlite
Rhyolite Tuff
Rhyolite Flow
Rhyolite Crystal luff
Volcanic Breccia
Pitchstone

GEOLOGICAL SETTING
TECTONIC BELT: Intermontane
TERRANE: Overlap Assemblage
PHYSIOGRAPHIC AREA: Chilcotin Plateau

RESERVES

ORE ZONE: FRENIER

CATEGORY: Inferred Ore
YEAR: 1991
QUANTITY: 3BOOooo Tonnes

COMMODITY	GRADE
Perlite	100.0000 Per cent

COMMENTS: Reserves based on an average thickness of 30 metres and a specific gravity of 2.3.
REFERENCE: Fieldwork 1989, page 483; Open File 1992-l.

CAPSULE GEOLOGY

Locally, volcanic and sedimentary rocks of the Eocene Kamloops Group unconformably overlie Middle and Upper Lower Cretaceous Spences Bridge Group volcanics west of the Fraser River end Fraser fault system.

Volcanic rocks at the Frenier open pit site are correlated with the Kamloops Group and consist of devitrified rhyolite tuff, vesicular rhyolite flows, rhyolite crystal tuff, perlite and volcanic breccia with clasts of varied composition. The lowest unit is a

MINFILE NUMBER: 0920 072

CAPSULE GEOLOGY

white to grey devitrified rhyolite tuff, approximately 20 metres thick. that contains abundant siliceous veinlets and layers of waxy, green volcanic glass (pitchstone). This tuff is overlain by 15 metres of grey, pink to purple vesicular rhyolite flows. Above the flows, and directly below the perlite, is a unit of pink to grey rhyolite crystal tuff approximately 50 metres thick which contains quartz phenocrysts up to 0.5 centimetre in size. Perlfte flows, approximately 25 metres thick, overlie the previously mentioned units in the vicinity of the open pit; h-, immediately south of the pit, in Higginbottom Creek, it crosscuts the underlying lithologies. In outcrop the perlite is a hang-, light grey, glassy rock, crosscut by veins of opaline silica and pitchstone. Fine fractures are visible in hard sample which impart an onion skin texture to the perlite. A volcanic breccia, containing clasts of various composition and sire in 8 light green. siliceous rhyolitic matrix; overlies the perlite and grades laterally and vertically into a welded pink rhyolite tuff.

The deposit consists of a flat-lying flow of volcanic glass uith occasional shards of glass welded together to form tuff. Flow direction has not been established but the deposit is massive, appears domed, and exhibits perlitic (onion skin) textures. When heated using a hand-held propane torch, crushed perlite expands rapidly to many times the original size.

The deposit has been divided into "coarse" and "fine" perlite with inferred reserves calculated by Aurun Mines Limited of 3.8 million tomes, using an average thickness of 30 metres and a specific gravity of 2.3 (Fieldwork 1989, page 483; Open File 1992-1). The same perlite horizon is reported to occur on the area of high relief about 1.5 kilometres to the east-northeast. These outcropping are separated from the pit area by a south-flowing creek.

Six thousand tonnes of crude perlite was shipped by truck from 1983 through 1985. The mine has been inactive since 1986 because of transportation difficulties resulting from an old, Lou-capacity bridge across the Fraser River.

BIBLIOGRAPHY

EMPR ASS RPT 7009, "11077, '12636
EMPR AR 1949-A261,A262
EMPR EKPL 197%E289
EMPR OF 1989-27; 1991-23; 1992-1; 1992-9
EMPR FIELDWORK '1988, pp. 519-523; '1989. PP. 481-483
EMPR PF (Aurun Mines Ltd., Annual Report, 1986)
EMPR MAP 65. 1989
GSC MAP 29-1963; r-1972; 1292A
GSC OF 534; 2207
GSC P 67-54
CJES Vol.21, pp. 1132-1444
W MINER Apr/1984
N MINER Feb.2, Mar.22, Sept.6, 1984; Aug.25, 1986
PR REL Aurun Mines Ltd. Oct.30, 1987
NW PROSP Sept/Oct, 1986
IPDM March/April 1984
EMPR MINING 1981-1985 p. 67-68; 1986-1987 p. 93-94; 1988 p. 92
EWPR ENG INSP Annual Report 1990

DATE CMED: 850724 CODED BY: GSB FIELD CHECK: N
DATE REVISED: 901012 REVISED BY: GO FIELD CHECK: Y

MINFILE NUMBER: 0920 072 NAME: FRENIER STATUS: Past Producer

Production Year	Tonnes Mined	Tonnes Milled	Commodity	Grams Recovered	Kilograms Recovered
1987	2,500		Perlite		2,500,000
1985	2,000		Partite		2,000,000
1984	1,000		Perlite		1,000,000
1983	1,000		Perlite		1,000,000

SUMMARY TOTALS: 0920 072 NAME: FRENIER

		Metric		Imperial	
	Mined:	6,500	tonnes	7,165	tons
	Milled:		tonnes		tons
Recovery:	Perlftc:	6,500,000	kilograms	14,330,043	Dounds

Comments:

1987: Production for 1986 and 1987.

MINFILE NUMBER: 0920 083 NATIONAL MINERAL INVENTORY:

NAME(S): EMPIRE VALLEY

STATUS: Showing
NTS NAP: 092008W
LATITUDE: 51 23 17
LONGITUDE: 122 16 43
ELEVATION: 1000 Metres
LOCATION ACCURACY: Within 5 KM
COMMENTS: Located in the vicinity of the Empire Valley Ranch Western Homes and Living, October 1961 • Industrial Minerals File).

MINING DIVISION: Clinton
UTM ZONE: 10
NORTHING: 5693000
EASTING: 550200

COMMODITIES: Agate Perlite Gemstones

MINERALS
SIGNIFICANT: Agate Opal Jasper Perlite
MINERALIZATION AGE: Unknown

DEPOSIT
CHARACTER: Unknown
CLASSIFICATION: Industrial Min.

HOST ROCK
DOMINANT HOST ROCK: Volcanic

STRATIGRAPHIC AGE	GROUP	FORMATION	IGNEOUS/METAMORPHIC/OTHER
Eocene	Unnamed/Unknown Group	Unnamed/Unknown Formation	
Oligocene	Unnamed/Unknown Group	Unnamed/Unknown Formation	

LITHOLOGY: Volcanic Mafic Porphyry
Basalt
Andesite
Tuff
Breccia

GEOLOGICAL SETTING
TECTONIC BELT: Intermontane
TERRANE: Overlap Assemblage

PHYSIOGRAPHIC AREA: Chilcotin Plateau

CAPSULE GEOLOGY

The area of the Empire showing is underlain mainly by Eocene and younger volcanics comprising rhyolitic and dacitic tuff, breccia and flows, and minor andesite and basalt. Also occurring in the area are Oligocene and Lower Miocene porphyritic and amygdaloidal andesite and basalt tuff, breccia and flows.

Agate. "thundereggs" end perlite occur on the property of Empire Valley ranch and beyond. Stringers and nodules of chalcedony are contained in a mafic volcanic porphyry underlying the perlite. The quality is apparently goad. Opal and jasper are also reported to occur.

BIBLIOGRAPHY

EMPR IND MIN File (Western Homes & Living, Oct. 1961)
GSC P *72-53, pp. 27,28
OPEN FILE 534; 2207

DATE CODED: 850724 CODED BY: GSS FIELD CHECK: N
DATE REVISED: 911029 REVISED BY: GJP FIELD CHECK: N

MINFILE NUMBER: 092O 103

NATIONAL MINERAL INVENTORY:

NAME(S): MOORE LAKE

STATUS: Showing
NTS MAP: 092O01E
LATITUDE: 51 09 43
LONGITUDE: 122 12 02
ELEVATION: 1554 Metres
LOCATION ACCURACY: Within 500M
COMMENTS: The location given is centrallv located relative to three outcrops of volcanic glass at EM0556000mE, EM5667550mN; EM0555800mE, EM5668400mN; and EM0555850mE, EM5668300mN (Open File 1988-29).

MINING DIVISION: Lillooet
UTM ZONE: ID
NORTHING: 5667925
EASTING: 555900

COMMODITIES: Perlite Volcanic Glass

MINERALS
SIGNIFICANT: Perlite Volcanic Glass
ASSOCIATED: Plagioclase Biotite
MINERALIZATION AGE: Eocene

DEPOSIT
CNARACTER: Stratiform
CLASSIFICATION: Volcanogenic Industrial Min.
SHAPE: Tabular
DINENSIDN: 2000 X 1000 X 10 Metres **STRIKE/DIP:'** **TREND/PLUNGE:**
COMMENTS: Probably in the core of a northwesterly trending syncline.

HOST ROCK
DOMINANT HOST ROCK: Volcanic

STRATIGRAPHIC AGE	GROUP	FORMATION	IGNEOUS/METAMORPHIC/OTHER
Eocene	Unnamed/Unknown Group	Unnamed/Unknown Formation	

LITHOLOGY: Flow Banded Rhyolite

GEOLOGICAL SETTING
TECTONIC BELT: Intermontane **PHYSIOGRAPHIC AREA:** Chilcotin Plateau
TERRAWE: Methow Overlap Assemblage

CAPSULE GEOLOGY

Within Eocene volcanic rocks on the eastern margin of the Chilcotin Plateau, equivalent to the Kamloops Group volcanics to the east, are deposits of volcanic glass which, in both hand specimen and thin section, have the characteristics of perlite.

The Moore Lake showing consists of flow banded, slightly porphyritic (plagioclase, hornblende, biotite) flows containing about 9 per cent water but not expandable upon heating. Farther to the northwest along the sample zone one of the samples collected is expandable upon heating to about 50 per cent of that of Aurun Mines perlite deposit near Empire Valley (Open File 1988-29).

BIBLIOGRAPHY

ENPR FIELDWORK ● 1987, pp. 411-415
EMPR OF ● 1988-29
GSC OF 534; 2207

DATE CODED: 880324 **CODED BY:** PBR **FIELD CHECK:** Y
DATE REVISE?: 910301 **REVISED BY:** DGS **FIELD CHECK:** N

MINFILE NUMBER: 0920 106 NATIONAL MINERAL INVENTORY:

NAME(S): FRENCH BAR CREEK

STATUS: Showing MINING DIVISION: Lillooet
NTS MAP: 092001E UTM ZONE: 10
LATITUDE: 51 10 33 NORTHING: 5669450
LONGITUDE: 122 13 11 EASTING: 554550
ELEVATION: 1593 Metres
LOCATION ACCURACY: Within 500M
COMMENTS: On the ridge crest overlooking South French Bar Creek and Moore Lake.

COMMODITIES: Perlite

MINERALS
SIGNIFICANT: Perlite
ASSOCIATED: giotite Hornblende Plagioclase
MINERALIZATION AGE: Eocene

DEPOSIT
CHARACTER: Stratiform
CLASSIFICATION: Volcanogenic Industrial Min.
SNAPE: Tabular
DIMENSION: 50 X 30 X 10 Metres STRIKE/DIP: 315/32E TREND/PLUNGE:

HOST ROCK
DOMINANT HOST ROCK: Volcanic

STRATIGRAPHIC AGE	GROUP	FORMATION	IGNEOUS/METAMORPHIC/OTHER
Eocene	Unnamed/Unknown Group	Unnamed/Unknown Formation	

LITHOLOGY: Porphyritic Flow Banded Dacite
Volcanic Glass

HOST ROCK COMMENTS: These rocks are probably correlative with the Kamloops Group east of the Fraser River.

GEOLOGICAL SETTING
TECTONIC BELT: Intermontane PHYSIOGRAPHIC AREA: Chilcotin Plateau
TERRANE: Methow Overlap Assemblage

CAPSULE GEOLOGY

Within Eocene volcanic rocks on the eastern margin of the Chilcotin Plateau are glassy volcanic flows in which the glass, both in hand specimen and thin section, has characteristics of perlite. These rocks are probably equivalent to the Eocene Kamloops Group to the east of the Fraser River.

Whereas most of the occurrences of volcanic glass do not expand upon heating and, hence, are not strictly perlite, the French Bar Creek showing contains about 9 per cent water and upon heating expands to about 50 per cent of the perlite mined by Aurun Mines near Empire Valley. The French Bar Creek showing is a single large outcrop of porphyritic flow banded dacite.

BIBLIOGRAPHY

EWPR FIELDWORK '1987, pp. 411-415
EMPR OF 1988-29
GSC OF 534; 2207

DATE CODED: 880324 CODED BY: PBR FIELD CHECK: Y
DATE REVISED: 910302 REVISED BY: DGB FIELD CHECK: N

MINFILE NUMBER: 093C 010 **NATIONAL MINERAL** INVEGTORY:

NAME(S): ANAHIM PEAK, TSITWTL PEAK

STATUS: Showing
NTS MAP: 093C13E
LATITUDE: 52 45 30
LONGITUDE: 125 38 00
LOCATION ACCURACY: Within 1 KM

MINING DIVISION: Cariboo
UTM ZONE: 10
NORTHING: 5848421
EASTING: 322301

COMMODITIES: Perlite

MINERALS
SIGNIFICANT: Perlite
MINERALIZATION AGE: Unknown

DEPOSIT
CHARACTER: Stratiform
CLASSIFICATION: Volcanogenic Industrial Win.

HOST ROCK
DOMINANT HOST ROCK: Volcanic

STRATIGRAPHIC AGE	GROUP	FORMATION	IGNEOUS/METAMORPHIC/OTHER
Tertiary	Ootsa Lake	Undefined Formation	

LITHOLOGY: Obsidian
Rhyolite
Dacite
Basalt
Sediment/Sedimentary

GEOLOGICAL SETTING
TECTOGIC BELT: Intermontane
TERRANE: Overlap Assemblage
COMMENTS: Suspect Terrane overlap.
PHYSIOGRAPHIC AREA: Nechako Plateau

CAPSULE GEOLOGY

The Anahim Peak perlite showing occurs in an area underlain by Tertiary volcanic rocks of the Ootsa Lake Group and Miocene basalt. The Ootsa Lake Group consists mainly of rhyolite and dacite with minor amounts of basalt and andesite. Epiclastic sedimentary rocks also occur within the Group.

Although little information is available on this perlite occurrence. it is assumed that the perlite has formed from obsidian of the Ootsa Lake Group.

BIBLIOGRAPHY

EMPR FIELDWORK 1992, pp. 475-481
GSC AR 1876-1877, p. 79
GSC MAP 1424A; 1202A; lo-1957

DATE **CODED:** 850724 CODED **BY:** GSS FIELD CHECK: N
DATE REVISED: 890127 REVISED BY: DGB FIELD CHECK: N

MINFILE NUMBER: 0930 017 **NATIONAL MINERAL** INVENTORY:

NAME(S): LAGOON BAY

STATUS: **Showing** WINING DIVISION: **Skeena**
NTS **MAP: 093D04W** **UTM** ZONE: 09
LATITUDE: 52 **04** 00 NORTNING: 5768828
LONGITUDE: 127 52 42 EASTING: 576890
LOCATION ACCURACY: Uithin 1 KN
COMMENTS: Near the southwest **corner** of King Island.

COMMODITIES: Perlite

MINERALS
SIGNIFICANT: Perlite
MINERALIZATION AGE: **Unknown**

DEPOSIT
CHARACTER: **Stratiform**
CLASSIFICATION: **Volcanogenic** Industrial **Min.**

HOST ROCK
DOMINANT HOST ROCK: Volcanic

STRATIGRAPHIC AGE	GRCUP	**FORMATION**	**IGNEOUS/METAMORPHIC/OTHER**
Unknown			**Unnamed/Unknown** Informal

LITHOLOGY: Glass
Granodiorite
Para Gneiss
Andesitic Volcanic

HOST ROCK **COMMENTS: Perlite** is probably derived **from** Tertiary **Bella Bella** Formation **volcanics.**

GEOLOGICAL SETTING
TECTONIC BELT: Coast Crystalline **PHYSIOGRAPHIC** AREA: Fiord Ranges (Northern)
TERRANE: **Plutonic** Rocks **Alexander**

CAPSULE GEOLOGY

The region is **underlain** by the Coast **Plutonic Complex, consist**ine of ore- to wst-kinematic **quartz** dicrite **to granodiorite** batholiths **intruded into Paleozoic to Mesozoic metasedimentary** and **meta**volcanic rocks. **Younger supracrustal assemblages** overlying **deformed** rocks include the **(?)Cretaceous Gambier Group** and Tertiary **Bella Bella Formation volcanic** rocks.

The **Lagoon** Say **perlite** showing **occurs** in an area mapped as dominantly foliated **granodiorite** and **paragneiss.** On the west side of Fisher **Channel, west** of the showing. is em area underlain **by** andesitic volcanic rocks of the Bells **Bella Formation. While** no volcanic rocks have **been mapped** in the **area** of the showing, it is likely that **Bella Bella volcanics** have been deposited here and that the **perlite** is derived from these rocks.

BIBLIOGRAPHY

EMPR AR 1961-A67
GSC **MEM** 372, p. 106
GSC **MAP 1327A; 1424A**

DATE COOED: 850724 **CODED** BY: GSS **FIELD** CHECK: N
DATE REVISED: 890127 REVISED **BY: DGB** **FIELD** CHECK: N

MINFILE NUMBER: 093F 026 NATIONAL MINERAL INVENTORY: **93F13 Prl2**

NAME(S): UNCHA LAKE

STATUS: Showing
NTS HAP: 093F13E
LATITUDE: 53 51 15
LONGITUDE: 125 38 10
LOCATION ACCURACY: Within I KM
COMMENTS: North side of Dayeezcha Mountain.

MINING DIVISIDN: Omineca
UTM ZONE: IO
NORTHING: 5970301
EASTING: 326613

COMMODITIES: Perlite

MINERALS
SIGNIFICANT: Perlite
MINERALIZATION AGE: Unknown

DEPOSIT
CHARACTER: Stratabound
CLASSIFICATION: Volcanogenic Industrial Min.
DIMENSION: 0023 Metres **STRIKE/DIP:** TREND/PLUNGE:
COMMENTS: Perlite beds are 7.6 to 23 metres thick and dip 10 to 30 degrees south.

HOST RDCK
DOMINANT HOST ROCK: Volcanic

STRATIGRAPHIC AGE	GROUP	FORMATION	IGNEOUS/METAMORPHIC/OTHER
Cretaceous-Tertiary	Ootsa Lake	Undefined Formation	

LITNOLOGY: Porphyritic Rhyolite
Felsic Volcanic
Epiclastic

GEOLOGICAL SETTING
TECTONIC BELT: Intermontane
TERRANE: Stikine
PHYSIOGRAPHIC AREA: Nechako Plateau

CAPSULE GEOLOGY

The region in which the Uncha Lake showing occurs is within the Intermontane Belt, underlain dominantly by Lover to Middle Jurassic volcanic and sedimentary rocks of the Hazelton Group. These as-s&lag& are overlain by the Upper Cretaceous to Lower Tertiary Ootsa Lake Group and Miocene plateau basalt. Intruding Lower Jurassic rocks of the Hazelton Group in the northeastern part of the map sheet is a belt of granodiorite, diorite and quartz diorite plutons of the Lover Jurassic Topley intrusive suite. Felsic plutons of probable Cretaceous age intrude both Lower and Middle Jurassic Hazelton strata.

The Ootsa Lake Group of Upper Cretaceous to Lower Tertiary age comprises mainly felsic volcanic rocks and their epiclastic derivatives. The Uncha Lake perlite showing occurs within rhyolite of this group on Dayeezcha Mountain. The perlite dips IO to 30 degrees south and is 7.6 to 23.0 metres thick. The perlite is inter-bedded within light to dark grey porphyritic rhyolite layers 2.0 to 9.0 metres thick. The perlite is light grey to pale greenish-grey, some perlitic glass occurrences in the area are resinous brown.

BIBLIOGRAPHY

EMPR EKPL 1976-E206; 1977-E253; 1978-E289
EMPR AR *1953-194; 1955-97
EMPR FIELDWORK 1992, pp. 475-481
EMPR PF (Monthly Report, Smithers Office, Feb. 1979)
GSC MAP 1131A; 1424A
GSC MEM 324, p. 54
GCNL #231, 1979

BIBLIOGRAPHY

DATE CODED: 850724
DATE REVISED: 890127

CODED BY: GSN
REVISED BY: DGB

FIELD CHECK: N
FIELD CHECK: N

MINFILE NUMBER: 093F 026

NINFILE NUMBER: 093F 027

NATIONAL MINERAL INVENTORY: 93F11 Prl1

NAME(S): CHESLATTA LAKE

STATUS: Showing
NTS MAP: 093F11W
LATITUDE: 125 53 42 27 30 27

MINING DIVISION: Omineca
UTM ZONE: 10
NORTHING: 5953659
EASTING: 337797

LOCATION ACCURACY: Within 1 KM
COMMENTS: Location on Geological Survey of Canada Map 113111.

COMMODITIES: Peclite

MINERALS
SIGNIFICANT: Perlite
MINERALIZATION AGE: Unknown

DEPOSIT
CHARACTER: Stratabound
CLASSIFICATION: Volcanogenic Industrial Nin.

HOST ROCK
DOMINANT HOST ROCK: Volcanic

STRATIGRAPHIC AGE	GROUP	FORMATION	IGNEOUS/METAMORPHIC/OTHER
Cretaceous-Tertiary	Ootsa Lake	Undefined Formation	

LITHOLOGY: Rhyolite
Felsic Volcanic
Epiclastic

GEOLOGICAL SETTING
TECTONIC GEL,: Intermontane
TERRANE: Stikine

PHYSIOGRAPHIC AREA: Nechako Plateau

CAPSULE GEOLOGY

The region in which the Cheslatta Lake showing occurs is within the Intermontane Belt, underlain dominantly by Lower to Middle Jurassic volcanic and sedimentary rocks of the Hazelton Group. These assemblages are overlain by the Upper Cretaceous to Lower Tertiary Ootsa Lake Group and Miocene plateau basalt. Intruding Lower Jurassic rocks of the Hazelton Group in the northeastern part of the map sheet is a belt of granodiorite, diorite and quartz diorite plutons of the Lower Jurassic Topley intrusive suite. Felsic plutons of probable Cretaceous age intrude both Lower end Middle Jurassic Hazelton strata.

The Ootsa Lake Group of Upper Cretaceous to Lower Tertiary age comprises mainly felsic volcanic rocks and their epiclastic derivatives. The Cheslatta Lake perlite showing occurs within a rhyolitic sequence of this group.

BIBLIOGRAPHY

EMPR FIELDWORK 1992, pp. 475-481
GSC NEN 324, p. 54
GSC MAP 1131A; 1424A

DATE CODED: 850724
DATE REVISED: 890127

CODED BY: GSS
REVISED BY: DGB

FIELD CHECK: N
FIELD CHECK: N

MINFILE NUMBER: 093F 028

NATIONAL MINERAL INVENTORY: 93F12 Prl1

NAME(S): HENSON HILLS, OOTSA LAKE

STATUS: Showing
NTS MAP: 093F12E
LATITUDE: 53 36 25
LONGITUDE: 125 39 19
LOCATION ACCURACY: Within 1 KM
COMMENTS: Location on Geological Survey of Canada Map 1131A.

MINING DIVISION: Omineca
UTM ZONE: 10
NORTHING: 5942852
EASTING: 324324

COMMODITIES: Perlite

MINERALS
SIGNIFICANT: Perlite
MINERALIZATION AGE: Unknown

DEPOSIT
CHARACTER: Stratabound
CLASSIFICATION: Volcanogenic Industrial Min.

HOST ROCK
DOMINANT HOST ROCK: Volcanic

STRATIGRAPHIC AGE	GROUP	FORMATION	IGNEOUS/METAMORPHIC/OTHER
Cretaceous-Tertiary	Ootsa Lake	Undefined Formation	

LITHOLOGY: Rhyolite
Felsic Volcanic
Epiclastic

GEOLOGICAL SETTING
TECTONIC BELT: Intermontane
TERRANE: Stikine

PHYSIOGRAPHIC AREA: Nechako Plateau

CAPSULE GEOLOGY

The region in which the showing occurs is within the Intermontane Belt, underlain dominantly by Lower to Middle Jurassic volcanic and sedimentary rocks of the Hazelton Group. These assemblages are overlain by the Upper Cretaceous to Lower Tertiary Ootsa Lake Group and Miocene plateau basalt. Intruding Lower Jurassic rocks of the Hazelton Group in the northeastern part of the map sheet is a belt of granodiorite, diorite and quartz diorite plutons of the Lower Jurassic Topley intrusive suite. Felsic plutons of probable Cretaceous age intrude both Lower and Middle Jurassic Hazelton strata.

The Ootsa Lake Group of Upper Cretaceous to Lower Tertiary age comprises mainly felsic volcanic rocks and their epiclastic derivatives. The Henson Hills perlite showing occurs within a rhyolitic sequence of this group.

BIBLIOGRAPHY

EMPR FIELDWORK 1992, pp. 475-481
GSC MEM 324, p. 54
GSC MAP 1131A; 1424A

DATE CODED: 850724
DATE REVISED: 890127

CODED BY: GSB
REVISED BY: DGB

FIELD CHECK: N
FIELD CHECK: N

MINFILE NUMBER: 093K 001 NATIONAL MINERAL INVENTOR": 093K4 Prl1

NAME(S): FRANCOIS, MA, LOT 6946

STATUS: Past Producer Open Pit WINING DIVISION: Omineca
NTS MAP: 093K04E UTM ZONE: 10
LATITUDE: 54 02 33 NORTHING: 5991282
LONGITUDE: 125 38 59 E&STING: 326501
ELEVATION: 0792 Metres
LOCATION ACCURACY: Within 500M
COMMENTS: Approximate centre of Lot 6946(Fieldwork, 1989).

COMMODITIES: Perlite

MINERALS
SIGNIFICANT: Perlite
MINERALIZATION AGE: Tertiary

DEPOSIT
CHARACTER: Massive
CLASSIFICATION: Volcanogenic Industrial Rin.
DIMENSION: 15x 2 Metres STRIKE/DIP: 040/30W TREND/PLUNGE:
COMMENTS: Perlite bed at the quarry.

HOST ROCK
DOMINANT HOST ROCK: Volcanic

STRATIGRAPHIC AGE	GROUP	FORMATION	IGNEOUS/METAMORPHIC/OTHER
Cretaceous-Tertiary	Ootsa Lake	Undefined Formation	

LITHOLOGY: Rhyolite
Tuff
Rhyolite Breccia
Banded Rhyolite

HOST ROCK COMMENTS: The Ootsa Lake Group is Upper Cretaceous to Lower Tertiary in age.

GEOLOGICAL SETTING
TECTONIC BELT: Intermontane PHYSIOGRAPHIC AREA: Nechako Plateau
TERRANE: Overlap Assemblage
COMMENTS: Suspect Terrane overlap.

CAPSULE GEOLOGY

Perlite was quarried on the north shore of Francois Lake, 22 kilometres south of the town of Gums Lake.

The deposit is underlain mainly by Upper Cretaceous to Lower Tertiary rocks correlated with the Ootsa Lake Group. These comprise shallow to medium dipping, devitrified (in part), banded rhyolites, rhyolite breccias, spherulitic rhyolites and tuffs. This series of rocks has a general strike of 040 degrees and an average dip of 30 degrees to the northwest.

The quarry on the Lake shore exposes a 2-metre thick bed of dark grey to black, medium grey weathering perlite over a distance of 15 metres in sharp contact above and below with cherty rhyolite. The bed strikes northeast and dips 15 to 35 degrees northwest. The rock exhibits typical onion-skin texture with radiating fractures perpendicular to strike. In places it is brecciated end siliceous with pronounced flow Wing.

North of the Lake, 300 metres, a similar perlite bed, 15 metres thick, striking northeast and dipping 30 degrees northwest, is exposed intermittently for 110 metres along an access road. At the north end of the roadcut, fresh perlite is exposed continuously for 50 metres. The bed is underlain by coarse grey tuff.

Perlite from both sites expanded a similar amount to that tested at the Frenier deposit (0930 072), when heated by a hand- held propane torch (Fieldwork 1989, p. 483). A sample of perlite tested by CANMET exhibited the following characteristics (Fieldwork 1990, pages 265 to 267):

CAPSULE GEOLOGY

Per cent water loss when heated to 800 degrees Celsius:	3.0
Softing temperature (degrees Celsius):	1250-1270

During the period 1949 to 1953 Western Gypsum Products Ltd. of Winnipeg mined approximately 1587 t of perlite.

BIBLIOGRAPHY

EMPR AR *1949-258-261; 1952-261; 1953-194
EMPR EXPL 1978-290; 1979-334
EMPR FIELDWORK *1989, pp. 481-487; 1990, pp. 265-268; 1992, pp, 475-481
EMPR ASS RPY 7446
GSC MEM 252, pp. 198-199
GSC MAP 631A; 907A; 1424A

DATE CODED: 850724 CODED BY: GSG FIELD CHECK: N
DATE REVISED: 910329 REVISED BY: PSF FIELD CHECK: N

MINFILE NUMBER: 093K 001 NAME: **FRANCOIS** STATUS: **Past Producer**

Production Year	Tonnes Mined	Tonnes Milled	Commodity	Grams Recovered	Kilograms Recovered
1953	1,587		Perlite		1,587,000

SUMMARY TOTALS: 093K 001 NAME: **FRANCOIS**

		Metric		Imperial	
	Mined:	1,587	tomes	1,749	tons
	Milled:		tomes		tons
Recovery:	Perlite:	1,587,000	kilograms	3,498,735	pounds

Comments:

1953: For period 1949-1953.

MINFILE NUMBER: 093L 258

NATIONAL MINERAL INVENTORY:

NAME(S): TSALIT MOUNTAIN

STATUS: Showing
NTS MAP: 093L02W
LATITUDE: 54 09 30
LONGITUDE: 126 56 40
ELEVATION: 1035 Metres
LOCATION ACCURACY: Within 1 KM
COMMENTS: Located &the northwest slope of Tsalit Mountain, along Fenton Creek.

MINING DIVISION: Omineca
UTM ZONE: 09
NORTHING: 6002874
EASTING: 634224

COMMODITIES: Perlite

MINERALS
SIGNIFICANT: Perlite
MINERALIZATION AGE: Unknown

DEPOSIT
CHARACTER: Massive
CLASSIFICATION: Volcanogenic Industrial Min.

HOST ROCK
DOMINANT HOST ROCK: Volcanic

STRATIGRAPHIC AGE	GROUP	FORMATION	IGNEOUS/METAMORPHIC/OTHER
Tertiary	Ootsa Lake	Undefined Formation	

LITNDLOGY: Rhyolite Flow
Dacite Flow
Volcanic Breccia
Tuff
Perlite
Porphyritic Feldspar Trachyte
Quartz Porphyritic Rhyolite

GEOLOGICAL SETTING
TECTONIC BELT: Intermontane
TERRANE: Stikine

PHYSIOGRAPHIC AREA: Nechako Plateau

CAPSULE GEOLOGY

The area is underlain by Tertiary Ootsa Lake Group volcanics comprised mainly of rhyolitic to dacitic flows, tuffs, and breccia. The youngest formation in the area, tentatively named "Fenton Creek volcanic rocks', are found mainly in a 2.4 by 4.0 kilometre laterally elongated zone on the northwest slope of Tsalit Mountain. This unit consists of volcanic breccies, lava, tuff, end dikes which are thought to be post-Miocene in age. I" places, especially east of Fenton Creek, this unit is comprised mainly of cream coloured glassy rhyolitic lava (perlite) and breccia. Immediately to the northwest this volcanic complex changes to predominantly feldspar porphyry trachyte and to the south to quartz porphyry rhyolite.

BIBLIOGRAPHY

EMPR GEM *1972-373-379,*Fig. 40
EWPR MAP 69-1
GSC OF 351

DATE CODED: 850724
DATE REVISED: 880807

CODED BY: GSB ,
REVISED ST: LLD

FIELD CHECK: N
FIELD CHECK: N

MINFILE NUMBER: 103A 005 **NATIONAL MINERAL INVENTORY:**

NAME(S): PENNY ISLAND

STATUS: Showing
NTS MAP: 103A01E
LATITUDE: 52 09 36
LONGITUDE: 128 06 42
LOCATION ACCURACY: Within 1 KM
COMMENTS: Located near Bella Bella.

MINING DIVISION: Skeena
UTM ZONE: 09
NORTHING: 5778988
EASTING: 560768

COMMODITIES: Perlite

MINERALS
SIGNIFICANT: Perlite
MINERALIZATION AGE: Unknown
ISOTOPIC AGE: DATING **METHOD:** Unknown **MATERIAL** DATED:

DEPOSIT
CHARACTER: Vein
CLASSIFICATION: Magmatic Industrial Min.
DIMENSION: Metres **STRIKE/DIP:** 160190s **TREND/PLUNGE:**
COMMENTS: Dykes strike between 145 and 175 degrees and have near vertical dips.

"OS, ROCK
DOMINANT HOST **ROCK:** Plutonic

STRATIGRAPHIC AGE	GROUP	FORMATION	IGNEOUS/METAMORPHIC/OTHER
Triassic			Unnamed/Unknown Informal
Tertiary			Unnamed/Unknown Informal

LITHOLOGY: Glass Dike
Intrusive

HOST ROCK **COMMENTS:** Amorphous dykes most likely associated with andesitic rocks of the Bells Bella Formation.

GEOLOGICAL SETTING
TECTONIC BELT: Coast Crystalline
TERRANE: Alexander
PHYSIOGRAPHIC AREA: Milbanke Strandflat

CAPSULE GEOLOGY

Black, highly fractured, amorphous glass dykes are part of a group of numerous dykes in the area that cut batholithic rocks. The dykes strike 145 degrees to 175 degrees and have a vertical dip.

BIBLIOGRAPHY

GSC SUM RPT 1921, Part A, p. 27A
GSC MEM 372, p. 79
GSC MAP 9-1966; 1328A; 1385A
GSC P 66-25

DATE CWED: 860414 **CODED** BY: GRF FIELD CHECK: N
DATE REVISED: 881125 REVISED **BY:** JNR FIELD CHECK: N

MINFILE NUMBER: 103F 019 NATIONAL MINERAL INVENTORY: 103F10 Prl3

NAME(S): IRONSIDE MOUNTAIN

STATUS: Showing
NTS MAP: 103F10W
LATITUDE: 53 42 50
LONGITUDE: 132 53 45
ELEVATION: 0300 Metres
LOCATION ACCURACY: Within 500M
COMMENTS: Symbol, Figure 34 (Bulletin 54). Iron Side Mountain is located north-east of Port Louis on Graham Island.

MINING DIVISION: Skeena
UTN ZONE: 08
NORTHING: 5953528
EASTING: 638866

COMMODITIES: Perlite Volcanic Glass

MINERALS
SIGNIFICANT: Perlite
ALTERATION: Pyrite Silica
CCWENTS: Gossanous area; alteration minerals are not indicated in text.
ALTERATION TYPE: Argillic Silicific'n Pyrite Oxidation
MINERALIZATION AGE: Unknown
ISOTOPIC AGE: DATING METHOD: Unknown MATERIAL DATED:

DEPOSIT
CHARACTER: Massive Stratiform
CLASSIFICATION: Volcanogenic Syngenetic Industrial Min.
SHAPE: Irregular

HOST ROCK
DOMINANT HOST ROCK: Volcanic

STRATIGRAPHIC AGE	GROUP	FORMATION	IGNEOUS/METAMORPHIC/OTHER
Tertiary	Undefined Group	Masset	

LITHOLOGY: Basaltic Flow
Basaltic Breccia
Rhyolite Flow
Rhyolite

HOST ROCK COMMENTS: Tart" Member

GEOLOGICAL SETTING
TECTONIC BELT: Insular
TERRANE: Wrangell
PHYSIOGRAPHIC AREA: Queen Charlotte Ranges

CAPSULE GEOLOGY

The area is underlain by a series of Tertiary sub-aerial basaltic flows and breccias and rhyolite ash flows of the Masset Formation, which form a plateau volcanic sequence up to 5 kilometres thick dipping gently to the east.

Perlite occurs as a flow-like mass in rhyolite units of the Tartu Facies.

A large gossanous area has zones of argillic alteration, silicification, and pyritization which may reflect the presence of a subvolcanic intrusive. The area was staked in 1986 by City Resources as the Virgo claims and prospected in 1987. No economic mineralization or significant assays were reported (Assessment Report 17053).

BIBLIOGRAPHY

EMPR BULL *54, pp. 115,175
EMPR EXPL 1979-250.251; 1980-540
EHPR ASS RPT 17053
GSC P 86-20; 88-1E; 89-1H
GSC MAP 13851

DATE CODED: 860604 CODED BY: LDJ FIELD CHECK: N
DATE REVISED: 890215 REVISED BY: GJP FIELD CHECK: N

MINFILE NUMBER: 103F 019

MINFILE NUMBER: 103F 020

NATIONAL **MINERAL** INVENTORY: **103F10 Prl2**

NAME(S): COATES CREEK, **SEAVIEW**

STATUS: Showing
NTS MAP: 103F10W
LATITUDE: 53 42 20.
LONGITUDE: 132 47 10
ELEVATION: 0450 Metres
LOCATION **ACCURACY:** Within 500M
COMMENTS: Figure 3 (Assessment Report 6926).

MINING DIVISION: Skeena
"TN **ZONE:** 08
NORTHING: 5952821
EASTING: 646135

COMMODITIES: Perlite   Volcanic Glass

MINERALS
SIGNIFICANT: Perlite
MINERALIZATION AGE: Unknown
ISOTOPIC AGE: **DATING METHOD:** Unknown   MATERIAL DATED:

DEPOSIT
CHARACTER: Stratiform   Massive
CLASSIFICATION: Volcanogenic   Syngenetic   Industrial Win.
SHAPE: Regular
DIMENSION: 0400 x 0100 x 0050 Metres   STRIKE/DIP: **TREND/PLUNGE:**
COMMENTS: Southern body.

HOST ROCK
DOMINANT HOST ROCK: Volcanic

STRATIGRAPHIC AGE	**GROUP**	FORMATION	**IGNEOUS/METAMORPHIC/OTHER**
Tertiary	Undefined Group	Masset	

LITHOLOGY: Basaltic Flow
Basaltic Breccia
Rhyolite Flow
Rhyolite

HOST ROCK **COMMENTS:** Tart" Member

GEOLOGICAL SETTING
TECTONIC BELT: Insular
TERRANE: Wrangell

PHYSIOGRAPHIC AREA: Queen Charlotte Ranges

CAPSULE GEOLOGY

The area is underlain by a series of Tertiary sub-aerial basaltic flows and breccias and rhyolite ash flows of the Masset Formation, which form a plateau volcanic sequence up to 5 kilometres thick dipping gently to the east.

Perlite occurs as a flow-like mass in rhyolite units of the Tartu Facies. The perlite is a "pearly" lustered acidic to sub-acidic volcanic glass with a deep blue "serpentinitic" appearance on fresh surface and grey to brown-black on weathered surface.

The perlite forms two possibly unconnected bodies., The southern body strikes north-south for 400 metres and is 100 metres thick and 50 metres wide. The northern body, 250 metres Long, 100 metres wide, and about 100 metres thick, strikes east-west.

BIBLIOGRAPHY

EMPR ASS RPT *6926
EMPR BULL 54, pp. 115,175
GSC P 86-20; 88-1E; 89-1H
GSC MAP 1385A

DATE COOED: 860604   CODED **BY:** LDJ   FIELD CHECK: N
DATE REVISED: 881202   REVISED **BY:** JNR   FIELD CHECK: N

MINFILE NUMBER: 103F 020

MINFILE NUMBER: 103F 021

NATIONAL MINERAL INVENTORY:

NAME(S): SKELU SAY

STATUS: Showing
NTS MAP: 103F10W
LATITUDE: 53 32 10
LONGITUDE: 132 51 50
ELEVATION: 0600 Metres
LOCATION ACCURACY: Within 500M
COMMENTS: Symbol, Figure 34 (Bulletin 54). Located north of Skela Say, Graham Island.

MINING DIVISION: Skeena
UTM ZONE: 08
NORTHING: 5933817
EASTING: 641568

COMMODITIES: Perlite Volcanic Glass

MINERALS
SIGNIFICANT: Perlite
MINERALIZATION AGE: Unknown
ISOTOPIC AGE: DATING METHOD: Unknown MATERIAL DATED:

DEPOSIT
CHARACTER: Stratiform Massive
CLASSIFICATION: Volcanogenic Syngenetic Industrial Min.
SHAPE: Irregular

HOST ROCK
DOMINANT HOST ROCK: Volcanic

STRATIGRAPHIC AGE	GROUP	FORMATION	IGNEOUS/METAMORPHIC/OTHER
Tertiary	Undefined Group	Masset	

LITNOLOGY: Basaltic Flow
Basaltic Breccia
Rhyolite Flow
Rhyolite

HOST ROCK COMMENTS: Tartu Member

GEOLOGICAL SETTING
TECTONIC BELT: Insular
TERRANE: Wrangell

PHYSIOGRAPHIC AREA: Queen Charlotte Ranges

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CAPSULE GEOLOGY

The area is underlain by a series of Tertiary sub-aerial basaltic flows and breccias and rhyolite ash flows of the Masset Formation, which form a plateau volcanic sequence up to 5 kilometres thick dipping gently to the north-east.

Perlite occurs as a flow-like mass in rhyolite units of the Tartu Facies.

BIBLIOGRAPHY

EMPR BULL 54. pp. 115.175
GSC P 86-20; 88-1E; 89-1H
GSC MAP 1385A

DATE CODED: 860604 CODED BY: LDJ FIELD CHECK: N
DATE REVISED: 881202 REVISED SY: JNR FIELD CHECK: N

MINFILE NUMBER: 103F 022 NATIONAL MINERAL INVENTORY: 103F9 Prl1

NAME(S): BLACKWATER PERLITE, BLACKWATER CREEK

STATUS: Showing
NTS MAP: 103F09W
LATITUDE: 53 3405
LONGITUDE: 132 21 50
ELEVATION: 0150 Metres
LOCATION ACCURACY: Within 500M
COMMENTS: Symbol, Figure 34 (Bulletin 54).

MINING DIVISION: Skeena
UTM ZONE: 08
NORTHING: 5938480
EASTING: 474567

COMMODITIES: Perlite Volcanic Glass

MINERALS
SIGNIFICANT: Perlite
MINERALIZATION AGE: Unknown
ISOTOPIC AGE: DATING METHOD: Unknown MATERIAL DATED:

DEPOSIT
CNARACTER: Stratiform Massive
CLASSIFICATION: Volcanogenic Syngenetic Industrial Min.
SHAPE: Irregular

HOST ROCK
DOMINANT HOST ROCK: Volcanic

STRATIGRAPHIC AGE	GROUP	FORMATION	IGNEOUS/METAMORPHIC/OTHER
Tertiary	Undefined Group	Masset	

LITNOLOGY: Basaltic Flow
Basaltic Breccia
Rhyolite Flow
Rhyolite

HOST ROCK COMMENTS: Tartu Member

GEOLOGICAL SETTING
TECTONIC BELT: Insular PHYSIOGRAPHIC AREA: Queen Charlotte Ranges
TERRANE: Wrangell

CAPSULE GEOLOGY

The area is underlain by a series of Tertiary sub-aerial basaltic flour and breccias and rhyolite ash flows of the Masset Formation, which form a plateau volcanic sequence dipping gently to the north-west.

Perlite occurs as a flow-like mass in rhyolite units of the Tartu Facies (Bulletin 54).

The area was staked in 1986 by City Resources as the Linda claims, and was prospected in 1987. No economic mineralization or significant assays were reported (Assessment Report 17083).

BIBLIOGRAPHY

EHPR BULL *54, p. 175
EMPR ASS RPT 17083
GSC P 86-20; 88-1E; 89-1H
GSC MAP 1385A

DATE COOED: 860604 CODED BY: LDJ FIELD CHECK: N
DATE REVISED: 890215 REVISED BY: GJP FIELD CHECK: N

MINFILE NUMBER: 103F 023 NATIONAL MINERAL INVENTDRY: 103F9 Prl2

NAME(S): CANOE CREEK

STATUS: Showing
NTS MAP: 103F09W
LATITUDE: 53 30 30
LONGITUDE: 132 15 20
ELEVATION: 0150 Metres
LOCATION ACCURACY: Within 500M
COMMENTS: Symbol, Figure 34 and Figure 5, Sheet C (Bulletin 54). Located east of Maria Lake, Graham Island.

MINING DIVISION: Skeena
UTM ZONE: 08
NORTHING: 5932109
EASTING: 681996

COMMODITIES: Perlite Volcanic Glass

MINERALS
SIGNIFICANT: Perlite
MINERALIZATION AGE: Unknown
ISOTOPIC AGE: DATING METHOD: Unknown MATERIAL DATED:

DEPOSIT
CHARACTER: Stratiform Massive
CLASSIFICATION: Volcanogenic Syngenetic Industrial Min.
SHAPE: Irregular

HOST ROCK
DOMINANT HOST ROCK: Volcanic

STRATIGRAPHIC AGE	GROUP	FORMATION	IGNEOUS/METAMORPHIC/OTHER
Tertiary	Undefined Group	Masset	

LITHOLOGY: Basaltic Flow
Basaltic Breccia
Rhyolite Flow
Rhyolite

HOST ROCK COMMENTS: Tartu Member

GEOLOGICAL SETTING
TECTONIC BELT.: Insular
TERRANE: Wrangell
PHYSIOGRAPHIC AREA: Gwen Charlotte Ranges

CAPSULE GEOLOGY

The area is underlain by a series of Tertiary sub-aerial basaltic flows and breccias and rhyolite ash flows of the Masset Formation, which form a plateau Volcanic sequence dipping gently to the north.

Perlite occurs as a flow-like mass in rhyolite units of the Tartu Facies.

BIBLIOGRAPHY

EMPR BULL 54. p. 175
EMPR ASS RPT 14540
EMPR EXPL 1985-C364
GSC P 86-20; 88-1E; 89-1H
GSC MAP 1385A

DATE CODED: 860604 CODED BY: LDJ FIELD CHECK: N
DATE REVISED: 881202 REVISED BY: JNR FIELD CHECK: N