Regional Geologist: Smithers
Date Approved: 1999.01.07
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Property Name: Skonun Marine Diatomite
Location:
- NAD 27: Latitude: 53°32'45"
- NAD 83: Latitude: 53°32'44"
- NTS: 103F09E
Camp: 048 Graham Island Gold Belt
Claim(s): Drillskid Road 1
Operator(s): Homegold Resources Ltd.
Author(s): Shearer, Johan T.
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General Work Categories: PROS

Work Done: Prospecting
Keywords: Diatomite, Sandstones, Shales, Skonun Formation
Statement Nos.: 3121016

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Related Reports:
PROSPECTING ASSESSMENT REPORT

on the

SKONUN MARINE DIATOMITE DEPOSIT

YAKOUN RIVER AREA
QUEEN CHARLOTTE ISLANDS
(Central Graham Island)

Longitude 132°08'30"W/Latitude 53°32'45"N
NTS 103F/9E

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HOMEGOLD RESOURCES LTD.
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January 30, 1998

GEOLOGICAL SURVEY BRANCH

Fieldwork completed between July 15, 16 & 17, 1997

25 676
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(App.III)
SUMMARY

1. The Drillskid Road #1 (20 units) Mineral Claim covers the only reported marine diatomite occurrence in British Columbia.

2. The claim is located along the west side of the Yakoun River, 7 km southwest of the community of Port Clements, northern Graham Island, Queen Charlotte Islands.

3. Access is via all weather logging road along the West Yakoun Mainline, a distance of 15 km by road from Port Clements.

4. The claim is underlain by Upper Skonun Formation sandstone and shale which has been dated at approximately 10 million years B.P. It is possible that the diatomite concentrations in the upper Skonun Fm may be related to the nearby, major and long lived paleohotspring which formed the Specogna Gold Deposit hosted by Lower Skonun Formation.

5. Diatomite is a siliceous sedimentary rock consisting principally of the fossilized skeletons of the diatom, a unicellular aquatic plant.

6. Due to the qualities of low bulk density, low cake density, chemical stability and extremely high surface area, diatomite is used as a filtration medium, filler in paper, fine abrasives-polishes and industrial absorbents. Some diatomites can absorb up to 2.5 times their weight of water.

7. The initial absorption tests on diatomaceous clay from the Drillskid Road #1 Claim are up to 0.81ml/g of water.

8. Initial reconnaissance petrographic examination of diatomaceous clay collected from the area confirms that diatoms similar to Arachnoidiscus ornatus (from Lompoc, California) are present in the sediments.

9. Future work should focus on the systematically (at a 3m sample spacing) sampling Skonun Formation exposures on the claim and examine all specimens for diatom content in order to define commercial diatomite concentrations.

Respectfully submitted,

[Signature]

J. T. (Jo) Shearer, M.Sc., P.Geo.
January 30, 1998
INTRODUCTION

The Drillskid Road #1 Mineral Claim was acquired under a balanced strategy of evaluating existing industrial mineral operations and also conducting grassroots exploration in under explored areas in close proximity to tidewater. The marine diatomite occurrences on the Yakoun river (Southerland-Brown, 1968) have not been reported to have been investigated to any significant extent since they were identified by S. Davidson, working for Shell Oil.

Diatomite is a siliceous, sedimentary rock consisting principally of the fossilized skeletal remains of diatoms, a unicellular aquatic plant related to algae. It is formed by the induration of diatomaceous ooze, and consists mainly of diatomaceous silica, a variety of opal which is first formed in the cell walls of the living diatom. Diatomaceous silica is not generally regarded as a synonym or the equivalent for diatomite, although it has been so used at various times. Accurately, diatomaceous silica is the preferred name for the principal mineral component of which the rock, diatomite, is composed. The terms diatomaceous earth and kieselguhr are synonymous with diatomite. The designation diatomite is reserved for those accumulations of diatomaceous silica that are of sufficient quality, size and minability to be considered of potential commercial value.

Processed diatomite possesses an unusual particulate structure and chemical stability that lends itself to applications not filled by any other form of silica. Foremost among these applications is its use as a filter aid, which accounts for over half of its current consumption. Its unique diatom structure, low bulk density, high absorption capacity, high surface area and relatively low abrasion are attributes responsible for its utility as a functional filler and as an extender in paint, paper, rubber, and in plastics; and as an anti-caking agent; thermal insulating material; catalyst carrier; industrial absorbent, polish, abrasive, and pesticide extender to name a few representative applications. (Kadey, 1972).

There are major differences between diatomite deposits depending on if they are marine or freshwater in origin. Diatom assemblages are specific to individual locations. Because of the structural differences related to origin, diatomites have a range of properties and produce a range of effects depending on the specific assemblage. Although lacustrine deposits are more numerous, generally those of marine origin tend to be larger in size.
LOCATION and ACCESS

The Skonun Diatomite Property is located along the west side of the Yakoun River south of Port Clements on Graham Island, Queen Charlotte Islands, British Columbia. The Centre of the claim group is at 53°32'45"N, 132°08'30"W (103F/9E).

The property is just east of the Sandspit Fault, a crustal structure of regional extent striking approximately 325° Az. A pronounced scarp 60 metres (250 ft) high marks the fault line. East of the fault, topography is flat to the sea and overburden is variable. West of the fault, low rounded hills reach a maximum elevation of 120 metres (400 ft). The property is covered by recent clear-cuts with some second growth hemlock and cedar. The area along the Yakoun River was logged many years ago and is now completely revegetated by large spruce.

The claim area is outside of any area currently being considered for preservation as a national or provincial park. The proposed South Moresby Park is 100 km (60 miles) to the south.

A good gravel road west from Port Clements (Port Clements - Juskatla road) turning south onto the West Yakoun Mainline provides ready access onto the claims. Overland walking is sometimes difficult due to dense undergrowth of alder and salal and thick second growth hemlock and cedar trees.

Sandspit, with a population of 600, is a distribution centre and staging point for the Queen Charlotte Islands. It has scheduled daily jet service from Vancouver, good hotel/motel accommodations, heavy equipment contractors and adequate service and supply outlets. Port Clements is a small community (population 200) which has a Motel, restaurants, store and Government Wharf-Marina on the south side of Masset Inlet. A small sawmill is located a short distance to the north of Port Clements which has a barge loading facility.
CLAIM STATUS

The principal area of interest is covered by the Drillskid Road #1 mineral claim staked under the modified grid system and registered in the name of J.T. Shearer. Figure 3 shows the recorded claim block. The claim is located within the Skeena Mining Division.

<table>
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* with application of assessment work documented in this report.

Under the present status of mineral claims in British Columbia, the consideration of industrial minerals requires careful designation of the product's end use. An industrial mineral is a rock or naturally occurring substance that can be mined and processed for its unique qualities and used for industrial purposes (as defined in the Mineral Tenure Act). It does not include "Quarry Resources". Quarry Resources includes earth, soil, marl, peat, sand and gravel, and rock, rip-rap and stone products that are used for construction purposes (as defined in the Land Act). Construction means the use of rock or other natural substances for roads, buildings, berms, breakwaters, runways, rip-rap and fills and includes crushed rock. Dimension stone means any rock or stone product that is cut or split on two or more sides, but does not include crushed rock. The apparent expected end use of the Diatomite resource (that of supporting the manufacturing of industrial products) from the Skonun Diatomite comes within the Industrial Use definition and therefore can be considered under the Mineral Tenure Act. Claims require $100 of assessment work per unit (or cash-in-lieu) each of the first three years and $200 per unit each year after.
HISTORY

Although the presence of marine diatomites in the Skonun Formation along the Yakoun River was reported in Bulletin 54 (1968) prepared by A. Sutherland-Brown, there are no recorded instances of the potential for commercial diatomite being investigated.

A nearby gold property along the Sandspit Fault is the Harmony Gold Project of Misty Mountain Gold Limited. During 1996 Misty Mountain Gold Limited significantly advanced its 100% owned Harmony Gold Project towards the goal of having sound environmental stewardship lead to successful permitting of substantial gold mine development. This was achieved through exploration and pre-development expenditures totalling $5.84 million on a systematic core drilling program of the Specogna Deposit and the advancement of a wide spectrum of scoping study options to define the Harmony Gold Project. Positive program results are indicating that in the months ahead an economically attractive gold mine proposal can be advanced for the Specogna Deposit which will mitigate environmental risks and maximize benefits for communities in the region. The Drillskid Road #1 is immediately to the north and east of the Harmony Claims.

Forestry is the main industry on the islands and the largest operators are MacMillan Bloedel (Graham Island) and TimberWest Products (Moresby Island). Fishing is important to commercial and recreational operators and is a significant traditional activity of the Haida. Government and tourism services account for the other main business activities. Recently, the forestry, mining and fishing industries on Graham Island have declined. At the same time, the former largest employer on the Islands, the Canadian Department of Defense, has closed down its operations with a loss of 500 jobs.

The Harmony Gold Property encompasses a 440 square kilometre mineral claim holding covering one of the world’s premier epithermal (Hotspring type) gold systems. The Project includes the Specogna Deposit which is central to the property and contains a geological resource of over three million ounces of gold. The Specogna Deposit is hosted by highly altered lower Skonun Formation.

Since the discovery of the Specogna Deposit in 1970 over $40 million has been spent by former operators. Their work included trenching, drilling, underground bulk sampling, pilot mill testing, environmental programs and feasibility studies. This work led to a proposal in 1987 by City Resources (Canada) Limited to the British Columbia government to establish a 5,800 tonnes per day (2.1 million tonnes per year) processing facility involving pre-treatment of 31 million tonnes of open pit ore by nitric acid leaching (Arseno Process) followed by cyanidation and production of gold bullion.

In 1988, although City Resources (Canada) Limited was in the final stages of project certification, it decided not to continue with its proposal for financial reasons and permitting proceedings were suspended.
In 1993, Misty Mountain Gold Limited initiated further planning of the Project after examining the extensive project data base and determining that excellent potential for the development of an economically and environmentally sound gold mine existed. In 1995, Romulus Resources Ltd., an affiliate of British Columbia based Hunter Dickinson Inc., joint ventured the Harmony Gold Project, and then merged with Misty Mountain Gold Limited. The merger brought together a multi-disciplinary team of professionals with an excellent record of environmentally responsible mine development.

In 1995, Misty commenced a comprehensive, staged program to explore and develop the project. This included a review of voluminous historical, technical and environmental data, and the completion of regionally extensive geochemical and airborne geophysical surveys. Late in 1995, a systematic diamond drilling program of the Specogna Deposit commenced, utilizing large diameter core holes spaced on a 20 metre by 290 metre grid pattern, oriented to the southeast and drilled at an angle of minus 45 degrees. In December 1996 this program was completed with a total of 34,627 metres drilled in 147 holes. The extensive data base generated from this detailed drill program provides a solid foundation for continuing mine development studies.

Current and historical drilling of the Specogna Deposit now totals 79,766 metres in 538 holes with 4,127 gold assays completed. The geological resources of the Specogna Deposit is 59 million tonnes with an average grade of 1.66 grams gold per tonne. It is still open to the northwest and to depth with excellent potential to develop additional reserves in these prime areas.

The Specogna Deposit represents the mid to upper levels of an epithermal hotspring-type precious metals system. Gold is distributed throughout a hydrothermal breccia unit that parallels the northwest striking Specogna Fault for at least 700 metres and also throughout stockwork quartz veining and pervasively silicified sediments which extend laterally from the hydrothermal breccia for up to 210 metres. The Deposit dips moderately northeast for over 3,000 metres and forms a mushroom-shaped cross section perpendicular to the Specogna Fault. Approximately three percent sulfides, mainly pyrite and marcasite, are found disseminated throughout the Deposit. In addition to the relatively evenly distributed gold, bonanza gold shoots occur scattered throughout the Deposit. Examples of these high grade shoots include drill intercepts of 42 metres averaging 14 grams gold per tonne and 46 metres averaging 40 grams gold per tonne.

Currently, two exploration targets are being prepared for drill testing. The first target is potential bonanza gold deposits which may have developed at depths of more than 200 metres below the currently known Specogna Deposit. Plans for exploration drilling into this deeper, throttled portion of the epithermal system are being guided by careful structural analysis of the current data base. The second exciting target, located eight kilometres south of the Specogna Deposit, is contained in a topographic high with a gold-in-soil anomaly and an airborne geophysical response of the same magnitude and size as those of the Specogna Deposit. Coincidentally, commercial logging is now underway in the area of this target and will facilitate exploration activities being completed by Misty for the summer season in 1997. Apparently, from conversations with Misty geologists, preliminary results of the 1997 program in this area by Misty were not encouraging.

Logging by MacMillan-Bloedel from its operation centre in Juskatla is scheduled to reach the east side of the Lower Yakoun River in the near future.
REGIONAL GEOLOGY

The major geological feature (Figure 4) within the region is the Sandspit Fault, a dominant crustal structure that cuts diagonally to the west of the Skonun Diatomite property at about 325° Az and continues northwest and southeast for many miles. Parallel strands and subparallel splays are apparent on air photos.

The fault marks a distinct break in both physiography and bedrock lithology. Stream beds commonly dogleg when crossing the fault line indicating it is the locus of very recent movement. To the west, the land sharply rises up and forms low hills and mountains; eastward the topography is flat and swampy.

According to Sutherland-Brown (1968) "Rocks exposed in the west block are invariably older than those exposed on the east-Yakoun Formation and Sandspit Plutons in the west, Masset and Skonun Formations in the east. The Sandspit Plutons are apparently aligned along the fault trace but are cut by the faults and seem to have supplied detritus to the Skonun Formation. The east block has dropped many thousands of feet relative to the west; however latest movement appears to have been east block up. This structure was most likely active in the Cretaceous, and although some strands have not been active since the Pleistocene, others most certainly have."

Several gold deposits and prospects in the region are mineralized along the Sandspit Fault and splay structures occurring as veins, siliceous breccias, and silica replacement zones. The fault provided permeability for the circulation of mineralizing fluids and hot spring development.

Generally, the Skonun Formation comprises the bulk of the Tertiary Queen Charlotte Basin which has recently been revised (Higgs, 1991) to include the Masset Volcanics in the lower basin fill based on partial Skonun-Masset age-equivalence and probable interfinger ing.

Since the Skonun Formation is very recessive in nature, much of the knowledge of the sequence is based on deep wells, both onshore and offshore, drilled during petroleum exploration. However, the current abundance of Skonun exposure now available in road cuts along the West Yakoun Mainline and associated branch roads were not available prior to the 1990's.

The largest gold deposit in the region is the Harmony Deposit of Misty Mountain Gold Ltd. containing over 3 million ounces of gold reserves located 5 km west of the Diatomite property. Structure, lithologies and hot spring development are important ore controls. The Sandspit Fault is adjacent to the deposit on the east side. A secondary splay structure known as the Specogna Fault was a major control or channel for the movement of mineralizing fluids. The Specogna Fault runs immediately west of the deposit dipping 45-50°E. Mineralization occurs in quartz veins, siliceous breccia and replacement zones within silicified conglomerate of the Skonun Formation. Haida shales form the footwall of the Specogna Fault and may have been a secondary control on the localization of mineralization by creating an impermeable boundary on the west side of the deposit.
Modified after Sutherland-Brown, 1968.
The gold is very fine and occurs in association with widespread disseminated sulfides. Previously announced open pit ore reserves are 7-9 million tons of 0.1 ounces per ton gold, contained within an area 300 by 700 metres (City Resources, News Release, June 19, 1987, Vancouver Stockwatch). Recently Misty Mountain announced that metallurgical tests yielded greater than 90 percent gold recovery enabling the cut off grade to be lowered to 0.035 oz bold per ton and thereby increasing the mining reserve to 28 million tones averaging 0.061 oz gold per ton. Other lesser gold showings in somewhat similar geological environments are known (Southeaster, STO, Bella, Marino and Sandspit Gold).
STRATIGRAPHY and SEDIMENTOLOGY

The Drillskid Road #1 Claim is underlain by recessive, very poorly indurated, sandstones and shales of the Skonun Formation. Well-log correlations from just north of the claim (Higgs, 1991) reveal a bipartite basin fill. Higgs (1991) summarized the Major units as follows:

"The upper unit, Unit II, is a Miocene-Recent sedimentary blanket covering the offshore area, but absent onshore except for northeast Graham Island. Characterizing Unit II on well logs are coarsening-up shale-sand sequences of regional extent, 10-30m thick, interpreted as allogenic regressive cycles. Underlying Unit II, Unit I, lacks basinwide correlations and comprises Eocene to Miocene volcanics (including the Masset Formation) and intercalated sediments.

Facies analysis of cores and small exposures shows that Unit I includes alluvial fan, fan delta and fluvial facies. Unit II strata exposed in northeast Graham Island are of the Miocene age and include three facies associations; (1) delta-plain mudstone, sandstone and coal; (2) Tidal-shelf cross-stratified sandstone; and (3) amalgamated shelf storm beds. The outcrop data suggest that the regressive cycles recognized on well logs comprise shelf deposits shallowing up into delta-plain deposits.

The bipartite basin fill is interpreted in terms of an extensional basin with a McKenzie-type, two-stage subsidence history. Unit I is interpreted as a “rift” succession, based on the volcanics, local conglomerates, and lack of correlations; deposition was in half-grabens in an extensional, block-faulting regime. Subsequently, Unit II was deposited under “post-rift” regional (thermal?) subsidence. Seismic profiles support the proposed two-stage evolution."

The coarsening-up sequences, either singly or in groups, can be correlated laterally for at least 175 km (from Sockeye to Osprey). Their regional extent implies that sequences are transgressive-regressive cycles of allogenic (eustatic or tectonic) origin, rather than local, autogenic cycles. The probable coarsening-up nature of the sequences suggests that they are regressive (i.e. shallowing-up), separated by surfaces of abrupt regional transgression representing time lines (Higgs, 1991).

The Queen Charlotte Basin is divisible into two stratigraphic units. The lower unit, Unit I, lacks correlations and comprises intercalated sediments and volcanics. In contrast, Unit II lacks volcanics and contains laterally correlatable sequences. Unit I is buried beneath Unit II in Queen Charlotte Sound, Hecate Strait and northeast Graham Island, but Unit I shallows toward the north and west, ultimately occurring at surface in the Tow Hill and Port Louis wells, which are entirely Unit I; between these wells, Unit I crops out extensively in western Graham Island as the Masset Formation (volcanics with subordinate sediments; Hickson, 1991). Graham Island thus consists essentially of Unit I Masset Volcanics in the west and, in the east, Unit II (Skonun) sediments overlying Unit I sediments and volcanics. This east-younging outcrop pattern is attributed to ongoing uplift of Graham Island being faster in the west than in the east causing exhumation of Unit I in the west.
The twin Naden wells were drilled entirely in Unit I volcanics. The Tow Hill exposure is attributed to Unit I because it includes the volcanic Tow Hill sills (Sutherland-Brown, 1968), which also occur in the Tow Hill well. Bore hole cuttings indicated that sediments in Unit I include sandstone, shale and coal. In addition, there are conglomerate-dominated intervals more than 500m thick, for example in the Tow Hill well (Higgs, 1991). Thick conglomerates also occur at the Specogna Gold Deposit, which is therefore assigned to Unit I. Intervals of intercalated sediments and volcanics attributed to Unit I can exceed 1 km. Some wells penetrated more than 1 km of Unit I sediments before penetrating volcanics. The thickness of Unit I is uncertain because few wells reach pre-Tertiary basement. However, Cretaceous palynomorphs were reported in the basal sediments of Tyee and Sockeye E-66 but these could be reworked specimens. From the bottom of Sockeye B-10, unreliable late Cretaceous radiometric ages were obtained on basalt cuttings and on altered basalt from a sidewall core. Only the Tyee well, which bottomed in pre-Tertiary intrusives, reached unequivocal basement rocks underlying the Queen Charlotte Basin. This well penetrated 2.7 km of Unit I, more than any other well, providing a minimum thickness for the unit. Tyee penetrated no volcanics, proving that the Masset Formation is not a basinwide blanket.

Deposition of Unit I sediments and volcanics began at 45-40 Ma (middle Eocene) and continued until 15-10 Ma (middle to late Miocene) based on K-Ar ages of Masset Formation Volcanics (Hickson, 1989). Fossils in Unit I sediments at the Specogna Gold Deposit are Lower to Middle Miocene (Champigny et al., 1981). Palynomorphs indicate that Unit I sediments in the Port Louis well are within the range of early Eocene to early Oligocene, and in the Tow Hill well are Miocene to possibly as old as late Oligocene (White, 1991).

Unit II, the upper stratigraphic unit, is characterized by correlatable sequences and absence of volcanics. The maximum thickness of Unit II in the offshore wells is 2 km. The age of Unit II, based on forams in the Murelet, Harlequin and Osprey wells (Patterson, 1988, 1989) is early Miocene through Quaternary. Skonun Formation strata along Masset Sound are assigned to Unit II because they are near wells in which Unit II occurs at surface (Higgs, 1991). Rocks at Skonun Point, Yakan Point and Yakoun River are likewise assigned to Unit II because fossils indicate that they are late Miocene age. The Miller Creek section is assigned to Unit II based on facies similarities with Yakan Point and Yakoun River. Late Miocene (Wishkahm) age for the beds at Yakan Point and Skonun Point was estimated as 13-11 Ma by Champigny et al. (1981); hence, deposition of Unit II began no later than 11 Ma on Graham Island. However, eruption of underlying Unit I volcanics persisted until 15-10 Ma (Hickson, 1989). This deposition of Unit II on Graham Island began at some time in the interval 15-11 Ma, or middle to late Miocene time, in Queen Charlotte Sound. This suggests that Unit II is diachronous, with its base younging northward.

An important lateral facies change occurs in Unit II. In the southernmost two wells (Harlequin and Osprey), cuttings suggest that Unit II is entirely marine, since it lacks coal and contains foraminifera (Shouldice, 1971). In contrast, correlative strata to the north include both marine intervals and coal-bearing continental intervals, as shown by well cuttings (Sutherland-Brown, 1968, Shouldice, 1971). In the north, on Graham Island, Unit II facies include delta-plain muds, sands and coals, and tidal-shelf sands. Offshore in the south, the three available cores indicate a storm-dominated shelf environment. The absence of continental facies in Unit II in the southern two wells, indicated by the presence of forams and the absence of coal in cuttings (Shouldice, 1970), suggests that during each regressive episode the shoreline failed to prograde as far as the southern area.
Unit I strata at the Specogna Gold Deposit and Tasu are conglomerate, interpreted respectively as fan delta and braided stream deposits. Unit II facies are entirely different. Exposed Miocene strata comprise three facies associations: (1) delta-plain muds with coal beds (Skonun Point and Miller Creek); (2) tidal-shelf cross-stratified sand with ice-rafted dropstones (Skonun Point, Miller Creek, Yakoun River and Collision Point); and (3) storm-dominated shelf deposits with dropstones (Skonun Point). Minor conglomerates are associated with the tidal sands; these are interpreted as dropstone "condensation layers" formed by slow accumulation of ice-rafted dropstones under high tidal current velocities. These are thought to be the first known tidal deposits in the Tertiary of Canada south of latitude 60°N. Furthermore, the dropstones are possibly the first known evidence for pre-Quaternary (Miocene) glaciers in western Canada.

An aggregate quarry near the Specogna Gold Deposit operated by the logging company for road surfaces is located 1 km west of the claim. The dominant lithology was silicified matrix-supported conglomerate, referred to informally as the "Upper Debris Flow". This unit has also been recognized in core at Specogna and is 20-25m thick. The conglomerate matrix is unstratified and consists of poorly sorted, muddy, very fine sand. Clasts include volcanic, plutonic and sedimentary rock types, ranging from angular to rounded, and from granule to cobble grade.

The "Upper Debris Flow" is interpreted as the deposit of a cohesive debris flow, based on its massive texture, poor sorting and muddy matrix (Higgs, 1991). The association of this mass-flow conglomerate with bivalves is consistent with deposition on a deepwater fan delta.

Several Skonun Formation exposures occur in cliffs along the Yakoun River and in a nearby sand pit and roadcuts on the Drillskid Road Claims. Horizontal or near horizontal strata occur in three cliff exposures along a 1.5 km stretch of the River.

The southernmost cliff is about 150m long and exposes about 12m of tabular-cross-bedded medium sandstone overlain by about 3m of pale grey, massive mudstone containing whole, disarticulated bivalves and gastropods. Sandstone cross-sets are 30-100 cm thick, and foresets dip north. Only in one set was the true (three dimensional) attitude of the foresets visible, yielding a dip direction of 335°. The top few decimetres of each set contain vertical Ophiomorpha burrows, sufficiently crowded in some cases to obliterate the cross stratification. Dispersed within the sets are "floating" pebbles up to 3 cm across. About 1 m above river level, the sandstone contains a layer of angular to rounded pebbles and cobbles, on clast thick; a few clasts are in contact with their neighbours. One angular volcanic clast is 50 cm long.

The mudstone is inaccessible at the cliff top, but talus at the base of the cliff was examined petrographically (Appendix IV). Mollusks recovered from the Talus are upper Miocene and include the bivalve Acila empiricensis, which has previously been described from the Skonun Formation.

The presence of Ophiomorpha suggests that a marine environment is most likely for the sandstone. Similarly, the mudstone mollusc fauna is marine, and indicates an inner or middle shelf setting. The floating clasts are interpreted as ice-rafted dropstones, while the discrete layer of clasts is interpreted as either a dropstone condensation layer or a winnowed lag. The presence of dropstones supports the mollusc evidence for an offshore shelf environment, rather than an estuary or lagoon.
The cross stratification was produced by bedforms migrating across the sea floor under the influence of a strong current. The current was probably tidal, based on the evidence for tidal currents at other Skonun Formation exposures (especially Yakan Point above and Yakoun sand pit, Higgs, 1991). The thickness and tabular geometry of the cross-sets suggest that the parent bedforms were straight-crested sandwaves up to at least 1m high. The consistent northward dip of the foresets indicates that the dominant tidal flow at this locality was northward. The apparent lack of clay laminae draping the foresets suggests that slack water never occurred, presumably due to a supplementary (wind driven?) current.

The upward transition from shallow-marine sandstone to shallow-marine mudstone presumably reflects a sudden decrease of tidal current velocity, possibly due to a tectonically or glacially induced change in basin configuration, causing tidal currents to diminish, or tidal flow paths to shift laterally. The absence of dropstones in the mudstone suggest that icebergs were kept away, possibly by entrainment in tidal current pathways. Nevertheless, glaciers may have continued to influence deposition; the lack of structure in the mudstone is typical of glaciomarine muds and may reflect continuous rainout from sediment-rich overflows fed by glacial meltwater.

The central cliff exposes about 2m of apparently massive (burrowed?) sandstone, overlain by about 2m of tabular cross-stratified sandstone. The two units are separated by a string, one clast thick, of pebbles and cobbles. The crossbedded sandstone comprises two sets each about 2m thick, with opposed foreset dips (southward in the lower set and northward in the upper set) forming a herringbone pattern.

The herringbone cross-stratification is strongly suggestive of tidal currents and the pebble-cobble layer may represent dropstones. The inferred depositional environment is glacially influenced tidal shelf, as for the previous cliff exposures.

The northernmost cliff consists of about 30m of tabular cross-stratified sandstone, massive sandstone and massive mudstone, interbedded in units 2-5m thick. Individual cross-sets are up to about 1m thick, and all foresets dip northward. The massive sandstone interval contains a bedding-parallel stringer of pebbles and/or cobbles.

The facies resemble those at other Skonun Formation exposures and are likewise interpreted in terms of a glacially influenced, tide-dominated shallow marine environment (Higgs, 1991).

The sand pit south of the LCP, about 600m west of the Yakoun River, exposes friable Skonun Formation Sandstone extracted to pave logging roads. About 10m of subhorizontal, tabular cross-stratified sandstone are exposed. This is capped by 1-3m of gravel and cross-stratified pebbly sand, with an irregular, compound-channeled base with up to 2m of relief and with locally subvertical channel walls. No fossils were found in the sand pit deposits, so their age is unknown. However, the gravelly capping is tentatively interpreted as Quaternary fluvioglacial outwash. The underlying sandstone is very similar to late Miocene facies which occur less than 1 km away along the Yakoun River in strata which are likewise subhorizontal.
The cross-stratified sandstone is fine to medium grained and contains sparse, floating pebbles up to 2.5 cm across. Sets are essentially tabular and are 30-150 cm thick. Set boundaries are planar, but successive pairs of set boundaries are commonly not quite parallel, diverging by up to 20°. The foresets in every cross-set dip northward.

Foresets are arranged such that groups of concave foresets (with contiguous bottomsets) alternate on a decimetre scale with groups of planar foresets. Bottomsets are moderately to strongly burrowed in places, forming burrowed intervals 5-15 cm thick. The burrows are 1-2 mm in diameter, vertical to horizontal and include a branching ichnogenus (Chondrites?) and possible U-tubes. Foresets contain sparse Ophiomorpha burrows, measuring 1-3 cm in diameter and up to 50 cm long, which descend vertically from upper set boundaries (Higgs, 1991).

Locally, two sets are separated by a thin (1-2 cm) layer of massive, pale grey mudstone. There are also rare mud drapes within cross-sets, intercalated in the foreset lamination. The mud drapes occur as doublets enclosing a millimetre-thick sand lamina: the thickness of this "sandwich" is up to 3.5 cm (Higgs, 1991).

In some cross-sets, a bundle of foresets is deformed into decimetre-scale folds. The deformed bundle is up to about 1 m thick, measured perpendicular to the foresets. The bundle is bounded laterally by undeformed foresets, and is either truncated at the top by the overlying cross-set or else the deformation affects the overlying set as well. The folds consist of sharp anticlines separated by broad, rounded synclines, it is not known how far the anticlines extend in the third dimension, or indeed if they are domal. Anticlines become sharper upward within a deformed bundle, culminating in a diapir-like fold. Anticline axes are vertical and the axial zone is commonly a structureless pillar a few centimetres across. In one folded foreset bundle, the foresets are offset by a downward verging thrust.

The floating clasts are interpreted, like those at other Skonun Formation localities, as iceberg dropstones, implying an offshore environment. The double mud drapes are proof of a subaqueous tidal environment, lending support to the tidal interpretation already inferred for similar facies at other Skonun Formation exposures (Higgs, 1996). The cross-sets were produced by migration of relatively straight-crested sandwaves up to at least 1.5 m high, as shown by the relatively tabular set geometry and by the thickness of sets. The double mud drapes represent deposition between two dominant tides, with the mud laminae reflecting slack water and the intervening sand lamina the subordinate tide. The scarcity of mud drapes suggests that slack water seldom occurred, presumably due to a supplementary (wind-driven?) current. The alternating groups of concave and planar foresets lend further support to a subaqueous tidal environment.

The Ophiomorpha burrows reflect burrowing on the stoss sides of the sandwaves. The observed sparse burrow density may not reflect the actual population density because stoss sides may have been deeply eroded by current-scour ahead of the next (advancing) sandwave.

The cross-strata are of fair-weather, not storm-tidal origin based on the presence of mud drapes and neap-spring foreset groups. Where a 1-2 cm mud layer separates two sets, this may reflect a temporary decrease in the tidal current velocity, perhaps due to a temporary diversion of the tidal current flow path.
The folded forest bundles are thought to reflect dewatering, the anticlines forming by upward expulsion of pore water along discrete channels corresponding to anticline axes: this would explain why axes are vertical and why the axial sediment is commonly structureless. Individual anticlines sharpen upward because positions progressively higher up the axis are flushed by increasing amounts of escaping water. The inferred dewatering implies that the deformed bundle underwent liquefaction, possibly triggered by an earthquake. Liquefaction was contemporaneous with deposition and took place at or near the sea floor, as shown by one set in which the deformed bundle is truncated by the overlying (undeformed) cross-set. The fact that the fold axes are vertical rather than inclined implies that dewatering was not accompanied by downslope sliding of the deforming bundle. In the one definite instance where such sliding took place, deformation was accommodated by thrusting (Higgs, 1991).

Several roadcuts occur along logging roads between the 7.0-8.5 km road signs exposing Skonun Formation strata. The roadcut at 8 km exposes horizontal strata dominated by 4.5m unit of massive, pale grey mudstone. There is also an interval of millimetre-scale interlaminated mudstone and very fine sandstone containing vertical sandfilled Ophiomorpha burrows. Another roadcut at 8.5 km exposes what is possibly the same 4-5m massive mudstone unit, underlain by about 5m of fine sandstone which is thoroughly bioturbated by Ophiomorpha and therefore has a mud matrix. Beneath the muddy sandstone is about 3m of tabular cross stratified, fine to medium sandstone with foresets dipping approximately northward. The few decimetres of the upper cross-set contain closely spaced, vertical Ophiomorpha burrows up to 1 cm in diameter; burrow density decreases downward due to shallower burrows. A stringer of disconnected pebbles, on clast thick, follows the upper contact of the crossbedded sandstone and another occurs within the overlying muddy sandstone unit. The clasts include an angular volcanic clast about 15 cm across and an angular granitoid clast about 8 cm across (Higgs, 1991).

All except the interlaminated sand-mud facies have been described and interpreted at other Skonun Formation localities and are indicative of a shallow glacially-influenced tidal sea floor. The interlaminated sand-mud facies may reflect either daily tidal-current fluctuations or seasonal fluctuations in the velocity thence competence of meltwater plumes (Higgs, 1991).

Iceberg dropstones appear to be common in Unit II shelf sediments. The inferred icebergs may have been calving along the coast of mainland British Columbia, where the ancestral (late Miocene) Coast Mountains may have been sufficiently high to produce glaciers capable of reaching the sea (Higgs, 1991). It seems likely that at least some of the icebergs were calved from glaciers in the mountains of ancestral (Miocene) Moresby Island. In apparent contradiction of this evidence for nearby glaciers, molluscs in the Skonun Formation indicate that the local shallow-water climate in late Miocene time was temperate and "probably somewhat warmer that that which occurs on the coast today" (Higgs, 1991). Similarly, microflora in the Skonun Formation indicates that the climate was "relatively humid, and probably somewhat more temperate than...Today" (Martin and Rouse, 1966). Thus the dropstones probably do not reflect a cold regional climate. Instead, the dropstones may reflect a combination of high elevations and heavy precipitation in the ancestral Moresby mountains, such that glaciers were sufficiently nourished to reach the sea, despite the mild climate which prevailed at sea level.

It is possible, that the diatomite concentrations in the Upper Skonun Formation are directly related to the nearby major and long lived hotspring which is genetically related to the Specogna Gold Deposit hosted by lower Skonun Formation.
DIATOMITE RESOURCE and ABSORPTION RESULTS

Diatomaceous silica qualifies as a mineral of organic origin in much the same way that aragonite and collophane do. The silica of the fossilized diatom skeleton closely resembles opal or hydrous silica in composition (SiO₂•nH₂O). The silica is of acute biological significance, not only for the cell wall component, but also for the basic life between 3.5 and 8%, the siliceous skeleton may also contain, in solid solution, or as part of the SiO₂ complex small amounts of associated inorganic components - alumina, principally - and lesser amounts of iron, alkaline earths, alkali metals and other minor constituents. Boron is reported to be an essential element for diatom growth. Since diatomaceous silica is not pure hydrous silica but contains other intimately associated elements, there is good reason to consider it a distinct type or variety. Associated with the diatomaceous silica and integrated as part of the diatomite, may be variable amounts of organic matter, soluble salts, and particles of rock-forming minerals that were syngenerically deposited or precipitated with the diatom frustules. Sand, clay, carbonate and volcanic ash are typical common contaminants. Other contaminating minerals may be present, such as feldspar, mica, amphiboles, pyroxenes, rutile, zircon - the result of weathering, then transporting and subsequent redisposition of surrounding land masses. Commercial diatomite may also contain fragments and particles of other such organisms as silico-flagellates, radiolaria and siliceous sponges.

In a commercial diatomite, silica makes up the bulk of the chemical composition; usually over 86% and as high as 94%. Alumina and iron generally are at least 1.5 and 0.2%, respectively. This includes not only that believed to be incorporated as part of the skeleton but iron and alumina associated with may of the contaminants. Lesser amounts of other elements, a small part of which may be secreted in the diatom skeleton, comprise the balance of the total chemical composition. The manner in which many of these elements are associated is not presently known. Although diatoms appear amorphous under the light microscope, X-ray studies show untreated diatomite to have a broad halo in the region of the principal cristobalite peak, this it has been referred to as “micro-amorphous”. The main X-ray line is an approximation and not identical with α-cristobalite. Some researchers have reported β-cristobalite to be prevalent. The crystalline impurities produce their own X-ray lines; hence they furnish an identification of their nature, to a greater or lesser degree, depending on the amounts present. The ultimate hardness of the diatom skeleton is between 4.5 and 5 on the Mohs’ scale. After calcination or flux calcination, the Mohs’ hardness is increased to 5.5 to 6. The friability, or the propensity of the skeleton to break down rather than to abrade, renders a measurement of hardness meaningless without also a consideration of the particle size. The specific gravity ranges from 1.95 to 2.3. In calculating settling velocities, bulking values, etc., and apparent specific gravity of 2.0 for natural milled powders and of 2.3 for flux calcined powders is generally used. Refractive index is variable between about 1.40 and 1.46 for natural earth, and increases to 1.49 for flux calcined diatomite.

Taxonomically diatoms are divided into two broad categories: Centricae (discoid) and Pennatae (elongate to filiform). The study of the various intricate shapes and structural patterns of individual siliceous skeletons is as old as the use of the light microscope itself. Each form consists of two valves that are bound together by a connecting band or girdle. In the living diatom, these encase the cell contents.
Each siliceous valve is punctated by a system or pattern of openings that are arranged in a consistent and orderly design. Furthermore, each valve appears to consist of an inner and an outer platelike surface, separated by ribs that result in a chambered interior. The structure of each surface is different in that the nature of the openings from each surface into the chamber is not necessarily the same. It is on the basis of the valve structure that diatoms are classified. The openings in the skeleton are divided into primary, secondary and in some species, tertiary structures and are believed to simply support the membrane of the living diatom through which the nutrients pass by the process of osmosis. The valves vary between approximately 5 and 1000μ in diameter, or maximum dimension, depending on the genus. Most species fall within the range of 50 to 150μ.

Figure 7
Micrograph of Marine Diatom assemblage from Lompoc, California, (from Kadey, 1972).
COST ESTIMATE for FUTURE WORK

Phase I & II: Geological mapping, petrographic examination, trenching, definition of diatomite stratigraphy.

Phase I:

Detail stratigraphic sampling, 3m samples and examined in field

8 man days @ $350 per day $ 2,800.00
Room & Board 350.00
Transportation 200.00
Airfare 460.00
Analytical 2,000.00
Preparation 1,000.00

Subtotal $ 6,800.00

Phase II:

1) Grid preparation, surveying & line cutting $ 3,000.00
2) Geological mapping, 12 man days @ $350/md 4,200.00
3) Field Microscopy, 4 man days 1,400.00
4) Absorption tests, 15 test @ $70 per test 1,050.00
5) Analytical 600.00
6) Support Costs 1,600.00
- room and board, 32 md @ 50/md 749.00
- vehicle, 14 days @ $53.50 per day 920.00
- fuel 650.00
- airfares, 2 x $460 200.00
7) Drafting, Report preparation 2,500.00

Subtotal $16,869.00

Total - Phase I & II $23,669.00
CONCLUSIONS and RECOMMENDATIONS

The Drillskid Road #1 covers the only reported marine diatomite occurrence in British Columbia. The area is located southwest of the community of Port Clements along the west side of the Yakoun River. All weather logging roads provide access and road-cut exposures throughout the area.

The diatomite is hosted by the Upper Skonun Formation (Unit II) of Late Miocene through to Quaternary (less than 10 million years B.P.). The rocks are characterized by very friable crossbedded sandstones and recessive shales-mudstones which formed in a tidal (marine) shelf in a warm, temperate, relatively humid environment.

The claim is at a very preliminary stage of evaluation, however, marine diatoms were observed in several samples. Additional follow-up work is recommended to define more concentrated diatomite horizons by a series of 3m samples across stratigraphy and immediately examined under a high powered microscope.

Respectfully submitted,

J.T. (Jo) Shearer, M.Sc., P.Geo.
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APPENDIX I

STATEMENT OF QUALIFICATIONS


January 30, 1998
APPENDIX I

STATEMENT OF QUALIFICATIONS

I, JOHAN T. SHEARER, of 1817 Greenmount Avenue, in the City of Port Coquitlam, in the Province of British Columbia, do hereby certify:

1. I am a graduate of the University of British Columbia (B.Sc., 1973) in Honours Geology, and the University of London, Imperial College (M.Sc., 1977).

2. I have over 25 years of experience in exploration for base and precious metals and industrial mineral commodities in the Cordillera of Western North America with such companies as McIntyre Mines Ltd., J. C. Stephen Explorations Ltd., Carolin Mines Ltd. and TRM Engineering Ltd.

3. I am a fellow in good standing of the Geological Association of Canada (Fellow No. F439) and I am a member in good standing with the Association of Professional Engineers and Geoscientists of British Columbia (Member No. 19,279).

4. I am an independent consulting geologist employed since December 1986 by Homegold Resources Ltd. Unit #5-2330 Tyner Street, Port Coquitlam, British Columbia.


6. I have visited the property in July 15, 16 & 17, 1997 and carried out geological mapping, sample collection and trail cutting. I am familiar with the regional geology and geology of nearby properties. I am not aware of any of the previous work conducted on the Skonun Diatomite property.

7. I own an interest in the property.

Dated at Port Coquitlam, British Columbia, the 30th day of January, 1998.

APPENDIX II

STATEMENT OF COSTS

January 30, 1998
APPENDIX II  
Statement of Costs  
Selesse 1997

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
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<td>J.T. Shearer, M.Sc., P.Geo.</td>
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<td>3 days at $325 per day July 15, 16 &amp; 17, 1997</td>
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APPENDIX III

WATER/OIL ABSORPTION RESULTS

January 30, 1998
Table 1

Water/Oil Absorption Results

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<th>Sample</th>
<th>Water Absorption (ml/g)</th>
<th>Oil Absorption (ml/g)</th>
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<tr>
<td>Skonun #1</td>
<td>0.81</td>
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</tr>
<tr>
<td>Skonun #2</td>
<td>0.60</td>
<td>-</td>
</tr>
<tr>
<td>Skonun #3</td>
<td>0.52</td>
<td>0.55</td>
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Tape a 1.00 mm (No. 18) copper screen over one end of a glass tube measuring 225 mm in length and 30 mm inside diameter. Pour 50 g of sample into the open end of the glass tube held in a vertical position. Collect and return to the top of the tube any fine particles that pass through the screen.

Set the glass tube at an angle of 60° to the horizontal, above a 100 mL graduate, and pour 75 mL of lubricating oil into the open end. This oil is absorbed by the sample compound until the saturation point is reached, at which time the surplus oil drains into a receiving graduate. Allow a draining period of 5 h beginning with the first drop in the receiving graduate.

Compute results by subtracting the volume of oil collected in the receiving graduate from the volume placed in the glass tube, and dividing the difference by the mass of sample used, giving mL of oil absorbed per gram of sample.

Follow the same procedure using water in place of lubricating oil and inclining the tube at 30° to the horizontal. Add the water to the tube by means of a 75 mL pipette that has a 3.2 mm opening. Allow a draining period of 30 min beginning with the first drop received in the graduate.

Perform all tests in duplicate and report the average result.
--- PETROGRAPHIC DESCRIPTION ---

HANDSPECMEN DESCRIPTION: 8 km (At 8 km on Main Road, Road Exposure)

Dark to light brown, Medium grey, Fine grained to abundant gritty appearance, Non calcareous, Extremely porous, Well indurated but soft.

FIELD NAME: Skonun Formation Silty Shale

MICROSCOPIC DESCRIPTION:

Yellow sheets of crumpled algae common up to 0.1mm in length. Round bluish rods or needles occur up to 3.5mm in length.

Minor green mineral grains (perhaps chlorite).

Most of section opaque.

Many small fragments of diatoms exhibiting a mesh (or ballbearing) pattern up to 0.06mm in length.

Ragged flakes very common - probably diagenetic clay minerals

Silt sized quartz grains common, minor detrital mica. Minor general carbonaceous material.
-- PETROGRAPHIC DESCRIPTION --

HANDSPECIMEN DESCRIPTION: 3B (from the cliff exposure on the Yakoun River)
Slightly rusty weathering along fractures, Breaks into large angular chunks, Relatively well indurated but soft, Light medium grey, Very fine grained, Traces of slightly larger muscovite flakes, Slight gritty texture, Non calcareous, Very porous.

FIELD NAME: Skonun Formation Shale

MICROSCOPIC DESCRIPTION:
Crumbled sheets of algae common. Rare diatoms. Rounded pellets very common throughout.
Fragments of diatoms up to 0.03mm very common (sheets of circles) or mesh pattern.
HANDSPECIMEN DESCRIPTION: 7.75 km  (At 7.75 km on Main Road, Road Exposure)

Dark to light brown weathering on fracture surfaces, Medium grey, Relatively fine grained with a considerable silt sized fraction - gritty, Non calcareous, Very porous, Minor sand sized quartz grains.

FIELD NAME: Skonun Formation Sandy-silty Shale

MICROSCOPIC DESCRIPTION:
Whole (spheroidal) diatom at 31.1x56.8 (on point count grid of microscope). The diatom is 0.07mm in diameter.
Square to rectangle plant segments 0.01mm.
Brownish tinge to whole section.
Rounded pelletoidal grains common, perhaps fecal origin.
Numerous diatom fragments composed of angular mesh pattern.
HANDSPECIMEN DESCRIPTION: 3B (from the cliff exposure on the Yakoun River)

Slightly rusty weathering along fractures, Breaks into large angular chunks, Relatively well indurated but soft, Light medium grey, Very fine grained, Traces of slightly larger muscovite flakes, Slight gritty texture, Non calcareous, Very porous.

FIELD NAME: Skonun Formation Shale

MICROSCOPIC DESCRIPTION:

Crumbled sheets of algae common. Rare diatoms. Rounded pellets very common throughout.

Fragments of diatoms up to 0.03mm very common (sheets of circles) or mesh pattern.
-- PETROGRAPHIC DESCRIPTION --

HANDSPECIMEN DESCRIPTION: 4.7 km (At 4.7 km on Branch Yak 1200) (4A)

Dark brownish weathering on fracture surfaces, Slightly yellowish grey, Fine grained, Rare quartz and micaceous grains throughout, Gritty, Non calcareous, Less porous than other specimens, Well indurated, Hairline fractures common.

FIELD NAME: Skonun Gritty Shale

MICROSCOPIC DESCRIPTION:

Rounded pollen (?) grains, clear, up to 0.1mm in diameter common. Larger angular lithic grains up to 0.3mm in length.
Curved spine-like or needle-like elements occur frequently up to 0.4mm in length.
Numerous rounded quartz grains averaging about 0.1mm in diameter.
Also clear rectangular features up to 0.12m by 2.1mm and crumpled tiny fragments of sheet-like algae.
Most of section opaque.
Traces of diatom fragments exhibiting mesh texture.
-- PETROGRAPHIC DESCRIPTION --

HANDSPECIMEN DESCRIPTION:  "Upper" (from the cliff exposure on the Yakoun River)

Yellowish brown to rusty weathering, Relatively gritty, Non calcareous, Medium grey, Fine grained, relatively well indurated, Very porous, Breaks off into large chunks, Relatively massive.

FIELD NAME: Rusty Weathering Skonun Shale

MICROSCOPIC DESCRIPTION:

Very fine grained. Spine-like needles particularly abundant.
Rounded pelletoid grains common throughout.
Rare diatoms and diatom fragments composed of mesh fragments.
-- PETROGRAPHIC DESCRIPTION --

HANDSPECMEN DESCRIPTION:  3A (from the cliff exposure on the Yakoun River)

Red to brown staining on fracture surfaces, Light grey coloured chunks have a "ring" to them, Almost concoidal rock fracture, Fine grained except for silt sized quartz and mica, Massive in handspecimen, Non calcareous, Very porous, Well indurated but soft.

FIELD NAME:  Skonun Formation Grey Gritty Shale

MICROSCOPIC DESCRIPTION:

Crumpled sack-like sheet of algae or one called animal common up to 0.4mm in length. Pelletoidal grains up to 0.05mm throughout densely packed. Traces of diatom fragments, angular composed mainly of mesh pattern.