Report to:

**VICTORY NICKEL INC.**


0751331000-REP-L0003-03
Report to:

VICTORY NICKEL INC.

MINAGO FRAC SAND NATIONAL INSTRUMENT 43-101 COMPLIANT TECHNICAL REPORT

AUGUST 2009

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## UNITS OF MEASURE

<table>
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<tbody>
<tr>
<td>Centimetre</td>
<td>cm</td>
</tr>
<tr>
<td>Cubic centimetre</td>
<td>cm³</td>
</tr>
<tr>
<td>Degrees Celsius</td>
<td>°C</td>
</tr>
<tr>
<td>Dollar (American)</td>
<td>US$</td>
</tr>
<tr>
<td>Dollar (Canadian)</td>
<td>Cdn$</td>
</tr>
<tr>
<td>Formazin Turbidity Unit</td>
<td>FTU</td>
</tr>
<tr>
<td>Gram</td>
<td>g</td>
</tr>
<tr>
<td>Grams per Cubic Centimetre</td>
<td>g/cm³</td>
</tr>
<tr>
<td>Hectare (10,000 m²)</td>
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</tr>
<tr>
<td>Kilometre</td>
<td>km</td>
</tr>
<tr>
<td>Kilovolt</td>
<td>kV</td>
</tr>
<tr>
<td>Metre</td>
<td>m</td>
</tr>
<tr>
<td>Millimetre</td>
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</tr>
<tr>
<td>Specific gravity</td>
<td>SG</td>
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## ACRONYMS AND ABBREVIATIONS

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<td>QL</td>
</tr>
<tr>
<td>Mineral Lease</td>
<td>ML</td>
</tr>
<tr>
<td>North</td>
<td>N</td>
</tr>
<tr>
<td>East</td>
<td>E</td>
</tr>
<tr>
<td>South</td>
<td>S</td>
</tr>
<tr>
<td>West</td>
<td>W</td>
</tr>
<tr>
<td>Silica</td>
<td>SiO₂</td>
</tr>
<tr>
<td>Aluminum Oxide</td>
<td>Al₂O₃</td>
</tr>
<tr>
<td>Calcium Oxide</td>
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<tr>
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<td>K₂O</td>
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<tr>
<td>Iron Oxide</td>
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<tr>
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<td>MgO</td>
</tr>
<tr>
<td>Titanium Oxide</td>
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1.0 SUMMARY

The Minago Property (Property) is located near the northern edge of the Western Canada Sedimentary Basin, overlying Manitoba’s Thompson Nickel belt, approximately 225 km south of Thompson, Manitoba, Canada.

Victory Nickel Inc. (Victory Nickel) owns 100% of the quarry lease on the Property; four additional adjacent quarry leases are pending. Victory Nickel retained Wardrop Engineering Inc. (Wardrop) to provide a National Instrument (NI) 43-101 compliant resource estimate on the Property. This document required the organization of the historic project data to enable the estimation of a resource that conforms to the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Mineral Resource and Mineral Reserves definitions, referred to in NI 43-101, Standards of Disclosure of Mineral Projects.

Wardrop conducted a mineral resource estimate of the Paleozoic Winnipeg Formation sandstone unit that unconformably overlies the nickel sulphide mineralization at Victory Nickel’s Minago deposit. The estimation was completed for quantity and continuity of the sandstone at the Minago deposit using data from historic and recent drilling. Wardrop estimates that the sandstone overlying the Minago deposit, within the proposed pit shell of the nickel, contains an indicated resource of 15 Mt. Of this, 13% will report to the 20/40 size fraction, and 71% will report to the 40/140 size fraction. Testing has shown that the sandstone is continuous and is suitable for producing frac sand products. The sand can be broken down into different size fractions as required by the customer.

The Minago deposit has demonstrated potential as a large tonnage low-grade nickel sulphide deposit amenable to open pit, and the Paleozoic Winnipeg Formation sandstone must be stripped off in order to mine the nickel. The size and location of the sandstone are very well documented. Wardrop recommends that Victory Nickel compile five additional discreet samples from the existing drill core for quality analysis, at an estimated cost of $4,000, to confirm the sand’s suitability for frac sand.

The Property has a favourable location adjacent to a paved highway (Provincial Highway 6), which traverses from Winnipeg north to Thompson. The Property is only 60 km from the Omnitrax Canada railway line, which extends from Flin Flon and The Pas north to Churchill. A 230 kV power line runs parallel Provincial Highway 6 near the deposit.
2.0 INTRODUCTION AND TERMS OF REFERENCE

Victory Nickel commissioned Wardrop to conduct an independent resource estimation of the sandstone unit immediately above the Minago nickel deposit. The work entailed estimating mineral resources in conformance with the CIM Mineral Resource and Mineral Reserve definitions referred to in NI 43-101, Standards and Disclosure for Mineral Projects. It also involved the preparation of a Technical Report as defined in NI 43-101, and in compliance with Form 43-101F1. The inventory of resources represents a resource estimate delineated from recent and historical drilling data. The work necessitated an independent review of the geology, deposit style, and exploration history.

Victory Nickel provided the digital data files in batches. The first batch was delivered in March 2007 from Mirarco Mining Innovation (Mirarco) and Victory Nickel personnel. Shahé Naccashian, P.Geo., visited Laurentian University and met with Pavel Vasak, P.Eng. at Mirarco and obtained the data. This batch consisted of drill hole database including the 2006 drill holes, wireframe (grade shell) of the nickel zone, sedimentary surfaces and the block model. This batch was obtained in phases between April and August 2007. Data from the 2008 drill program was provided by Victory Nickel between April and September 2008.

Jim Chornoby, P.Geo. and Mr. Naccashian, along with Eric Harkonen, P.Eng. and Chris Sharpe, P.Eng., met in Winnipeg in September 2007 and discussed the approach for the geological interpretation.

Cliff Duke, P.Eng. is responsible for the resource estimation. Ruth Bezys, P.Geo. reviewed the deposit and style of mineralization. Gilles Arseneau, P.Geo. carried out the peer review of all work associated with this report.

Mr. Naccashian visited Victory Nickel’s Minago deposit near Grand Rapids, Manitoba from May 7 to 10, 2007. He met with Mr. Chornoby, performed core review and visited the Property. Mr. Duke subsequently visited the Property on July 21 and 22, 2008. This visit was intended to fulfil the NI 43-101 requirement of a site visit by a Qualified Person.

All amounts are listed in Canadian dollars unless otherwise noted.
3.0 RELIANCE ON OTHER EXPERTS

Wardrop has followed standard professional procedures in preparing the contents of this report. Data used in this report has been verified where possible and Wardrop has no reason to believe that the data was not collected in a professional manner. Qualified Persons as defined by the NI 43-101 regulations are relied upon for each section of this report.

The information contained in this report is derived from a variety of sources including:

- “Frac Sand Consumption in Alberta/Western Canada”, November 18, 2008 by Richard Craig.

While Wardrop has carefully reviewed all the technical information it has been provided, we have not conducted any independent geological investigation or sampling of the area. The frac sand market is extremely specialized, and publicly available reference data is limited.

Wardrop has not independently verified the legal status or legal title to the quarry leases, nor have we verified the legality of any of the underlying agreement(s) that may exist concerning the Property.
4.0 PROPERTY DESCRIPTION AND LOCATION

4.1 LOCATION

The Property is located 485 km north-northwest of Winnipeg, Manitoba on National Topography System (NTS) map sheet 63J/3, Figure 4.1.

Figure 4.1 Property Location Map
4.2 MINERAL DISPOSITIONS

Victory Nickel obtained a quarry lease (QL-1853) with an area of 69.88 ha on a portion of the mineral lease ML2 (Figure 4.3). Victory Nickel has also applied for four additional quarry leases, surrounding and contiguous with QL-1853 (Table 4.1), with an additional area totaling 244 ha. Finally, Victory Nickel has applied for a quarry lease, with an additional area of 69.92 ha, within claims MIN 1 and MIN 2, as a borrow pit. All quarry leases, except QL-1853, are “pending” as of June 1, 2009.

Quarry lease QL-1853 has a term of 10 years (to October 11, 2016) and may be renewable for a further 10 years, subject to the discretion of the Minister. The annual rental cost for the quarry lease is $1,677.12, payable on the anniversary date.

<table>
<thead>
<tr>
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<th>Lease Holder</th>
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<td>Victory Nickel Inc.</td>
<td>(Pending)</td>
<td>69.92</td>
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Mineral dispositions on the Property are comprised of one contiguous group of claims and one mineral lease, augmented by an isolated claim and a second adjacent mineral lease (Figure 4.2). The contiguous block consists of one mineral lease and 40 unpatented mineral claims with a combined surface area of 7,298.23 ha. The other block comprises one mineral lease and one unpatented mineral claim that are contiguous with a combined surface area of 281.85 ha.

Victory Nickel has entered into an agreement with Xstrata Nickel for an option on claims BRY 18, BRY 20, BRY 21, BRY 22, and DAD, located north of the Property (Figure 4.2). The agreement gives Victory Nickel a 100% interest in the claims, subject to a net smelter return (NSR). Victory Nickel has incurred expenditures of $500,000 on the properties and made payment of $150,000 to Xstrata Nickel. Payment of the remaining outstanding “cash in lieu” is on the books of Manitoba Science, Technology, Energy and Mines. The NSR consists of a 2% royalty, payable to Xstrata Nickel, when the LME three month nickel price is greater than, or equal to US$13,227.74/tonne, and a 1% NSR when the three month price of nickel is less than US$13,227.74/tonne. All other metals will be subject to a 2% NSR.
Figure 4.2 Minago Quarry Leases
Figure 4.3  Minago Mineral Dispositions
4.3 **Tenure Rights**

The holder of a mineral claim has the exclusive right to explore for and develop the Crown minerals, other than the quarry minerals, found in place on, in or under the lands covered by the claim [The Mines and Minerals Act, 73(1)].

The lessee of a mineral lease has the exclusive right to the Crown minerals, other than quarry minerals, that are the property of the Crown and are found in place or under the land covered by the mineral lease. Furthermore the lessee has access rights to open and work a shaft or mine and to erect buildings or structures upon the subject land [The Mines and Minerals Act, 108(a), (b), (i), (ii)].

With respect to the quarry leases, the lessee of a quarry lease has the exclusive right to the Crown quarry minerals specified in the lease that are found on or under the land covered by the lease and that are the property of the Crown [The Mines and Minerals Act, 140(1)(a)].

4.4 **Resources, Reserves, Development and Infrastructure**

There is no mining related infrastructure on the Property. The Minago River Nickel Deposit previously referred to as the Nose Deposit, is located on mineral lease ML-002.

4.5 **Legal Survey**

Mineral leases ML-002 and ML-003 were legally surveyed in January, 1972. The legal survey documents were filed with the Manitoba Director of Surveys in March 1972.

4.6 **Royalty and Rehabilitation Levy**

With respect to the quarry leases, royalties are applicable to quarry products at varying rates dependent upon their end use. A rehabilitation levy of $0.10/t is assessed on quarry production.

4.7 **Environmental Liabilities**

There are no environmental liabilities attached to the Minago Nickel Property.

4.8 **Permits**

Prior to commencing exploration field work, a work permit describing each work activity must be obtained from the Manitoba Conservation office in Wabowden, Manitoba and a letter of advice is obtained from the Federal Department of Fisheries and Oceans. The Norway House Resource Management Area committee is advised of the upcoming work.
5.0 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

5.1 ACCESS

Provincial Highway 6 crosses a portion of the Minago Nickel Property. A network of diamond drill roads enables pickup truck travel on the Property in the winter and all terrain vehicle travel in the summer.

5.2 LOCAL RESOURCES

Grand Rapids, a community of 336 people (2006 census) is located 107 km south of the Property on Provincial Highway 6 where the Saskatchewan River flows into Lake Winnipeg. Provincial Highway 6 is a paved two lane highway that serves as a major transportation route to northern Manitoba. The economy of Grand Rapids is based on tourism, forestry, trapping, commercial fishing and hydro electric generation.

Grand Rapids is served by a Royal Canadian Mounted Police (RCMP) detachment, a nursing station, daily bus and truck transportation to Winnipeg and a 1.02 km grass/turf airstrip in addition to a number of small supply and service businesses.

The Omnitrax Canada railway line connecting the southern prairie region of western Canada to Churchill, Manitoba (a seasonal seaport) crosses Provincial Highway 6 approximately 60 km north of the Property.

Manitoba Hydro high voltage alternating and direct current transmission lines parallel Highway 6, and cross a portion of the Property.

5.3 CLIMATE

Weather data collected at Grand Rapids, Manitoba from 1971 to 2000 indicates that January is the coldest month of the year with a daily temperature averaging -19.7°C; extremes range from +7.5°C to -43.0°C. July is the warmest month of the year with daily temperature averaging +18.6°C and extremes ranging from +36.5°C to +3.3°C. Total annual precipitation is 473.7 mm comprising 111.5 mm of snow and 362.2 mm of rain with 57.5% of the total precipitation occurring in the four months from June to September.
5.4 PHYSIOGRAPHY

The Property is almost entirely swampy muskeg and topographic relief is less than 3.0 m. Vegetation consists of sparse black spruce and tamarack. Oakley Creek runs along the south side of the mineral lease that hosts the Minago deposit, and drains into Lake Winnipeg.
6.0 HISTORY

There has been no historical reference to the use of the Ordovician sandstone Winnipeg Formation unit in the local area. The area has been explored for nickel by numerous companies since 1966, namely Amax Potash Exploration, Grange Resources, Black Hawk Mining Inc., Nuinsco Resources Limited and Victory Nickel.
7.0 GEOLOGICAL SETTING

The Phanerozoic geology comprises the north-eastern edge of the sediments of the Western Canada Sedimentary Basin that unconformably overlie Precambrian crystalline basement rocks, which includes the Thompson Nickel Belt. The Western Canada Sedimentary Basin tapers from a maximum thickness of about 6,000 m in Alberta to zero to the north and east where it is bounded by the Canadian Shield. The Williston Basin strata, in Manitoba, form a basinward-thickening, southwesterly-sloping wedge, with the strata reaching a thickness of 2.3 km in the extreme southwestern corner of the province.

The deposition of the Winnipeg sand in the Williston Basin is thought to be controlled by tectonics in the Williston Basin to the south and the ancestral Sweetgrass Arch (in Saskatchewan) to the west. The bulk of the sediments were derived from the erosion of the Cambrian Deadwood Formation sediments (present in the extreme southwestern portion of Manitoba and into Saskatchewan) and deposition occurred in marine beach to offshore bar environments. The sandstone is distinguished from all other sediments in the basin on the basis of being quartzose and well rounded with variable cementation. The quartz grains are thought to have undergone both fluvial and aeolian transport. They show distinctive frosting caused by wind transport. It has been suggested that these sediments may have been partially derived from the Upper Proterozoic Athabasca Group in northern Saskatchewan (Paterson, 1971; Gent, 1993).

The Ordovician clastic and carbonate sequence in the Minago area was part of a large cratonic depositional platform that extended from the Hudson Platform in the northeast to New Mexico to the south (Norford, et al., 1994). The lowermost Paleozoic unit on the Property is the Ordovician Winnipeg Formation (see Figure 7.1) which is composed of Lower and Upper units in the southern portion of the basin in Manitoba (a lower continuous, poorly consolidated, quartz-rich sandstone sheet overlain by an upper unit of shale with interbedded sandstone). The Lower Unit was deposited in a marine beach to off-shore bar environment. Near-shore, high-energy, shallow-marine to shoreline conditions, possibly at times terrestrial, prevailed in the northern margin of the basin (McCabe, 1978). The northern edge probably approximates the average shoreline position during early Winnipeg time. The Lower Unit rapidly thins to a sandstone sheet to the northern portion of the basin, at the sacrifice of the upper shale unit. The shale is not present in the Minago Sandstone Deposit area.
The Winnipeg Formation varies in content from 90% sand to 90% shale. The formation has a maximum thickness of 68.6 m in southwestern Manitoba and thins to zero metres to the north, at a rate of least 17% per 100 km, with the sandstone content increasing relative to shale from south to north (see Figure 7.2). The Winnipeg Formation sandstone that overlays the Minago deposit averages 8.9 m vertical thickness in the proposed pit area, occurring as highly cemented competent rock to loose, and unconsolidated sand size grains.
In southern Manitoba, the sand of the Lower Unit was quarried at Black Island in Lake Winnipeg for its high-quality silica sand; the quarry is now abandoned due to a loss of markets for the sand product. The Winnipeg Formation sandstone has not been quarried elsewhere in Manitoba.

The Ordovician Red River Formation dolomite conformably overlies the Winnipeg Formation in the Project area. However, there is debate that the contact between the
Winnipeg and Red River formations can be erosional (Norford, et al., 1994). There is no outcrop on the Property and bedrock geology is interpreted from diamond drill hole core and regional structural and isopach trends.

7.1 PROPERTY GEOLOGY

There is no outcrop in the quarry lease area, although Ordovician Red River Formation dolomite is present along Highway 6, east of the Property and west of the Minago claim blocks. Regional Ordovician Winnipeg Formation bedrock geology is inferred from isopach data gathered from the provincial Manitoba Stratigraphic Database, a repository of all non-confidential diamond drill hole data. Local geology has been interpreted from the drill core recovered from the 271 drill holes that have been drilled on the Property.

7.1.1 SURFICIAL GEOLOGY

The surface cover typically comprises 1.0 to 2.1 m of muskeg and peat that is underlain by 1.5 to 10.7 m of impermeable compacted glacial lacustrine clays. The clays are dark brown to grey and carbonate rich.

7.1.2 ORDOVICIAN STRATIGRAPHY

Underlying the surficial cover are flat lying Ordovician dolomite and sandstone. The dolomite (Red River Formation – see Figure 7.1) is finely crystalline, massive to laminated and varies in colour from creamy white to tan brown to bluish grey. Dolomite thickness ranges from 42 to 62 m with thickness increasing southward across the Property. The upper 24 m of the formation is stratified with horizontal, clay-rich beds, 1 to 5 mm in thickness at intervals ranging from millimetres to a metre. A stratified zone of dolomite breccia and microfracturing characterized by dolomite clasts in a carbonate clay matrix and varying in thickness from 30 cm to 3 m is located 15 to 21 m below the surface of the formation. Scattered throughout the dolomite are occasional soft clay seams ranging from 1 to 2 cm in thickness. The seams may contain dolomite fragments and sand grains and vary in orientation from semi-horizontal to semi-vertical.

The Ordovician sandstone (Winnipeg Formation) occurs stratigraphically below the dolomite approximately 46 to 73 m below the surface across the Property. The average depth to the top of the sand in the proposed pit area is 60.2 m. The sandstone ranges in thickness from 5.1 to 15.9 m across the Property (128 drill hole intersections). Cohesiveness varies from consolidated (well indurated) and carbonate cemented to semi-consolidated, friable and clay/silt rich to unconsolidated sand. Clay/silt rich zones are brown grey in colour while white zones are carbonate cemented.
8.0 DEPOSIT TYPE

Wardrop is investigating the Winnipeg Formation silica sand overlaying the Minago deposit as part of the Victory Nickel’s Minago Feasibility Study of the underlying nickel deposit. In a Preliminary Economic Assessment (PEA) Study, Wardrop identified a sandstone horizon above the unconformity of the main nickel-bearing serpentinite, ranging in thickness from 5.1 to 15.9 m and averaging 8.9 m thick (data from 14,128 Winnipeg Formation intersections across the Property). The sandstone layer must be removed to access the mineralization within the proposed open pit mine.

Silica sand is an industrial term used for sand, or easily disaggregated sandstone with a high percentage of quartz grains (silica). Use of silica sand depends on its purity and physical characteristics. Some of the more important physical properties include grain size and distribution, shape (sphericity), strength and refractoriness.

From tests conducted on the sand from the Minago Sandstone Deposit (see Section 13), the sandstone unit can be used as fracture sand, or “frac sand”. Frac sand is typically comprised of small, round, uniformly-sized silica sand is predominantly used in the oil and gas industry. Sands with a high sphericity are required for packing and hydraulically fracturing rocks to optimize groundwater and petroleum well production. Packing sands are used in groundwater wells to fill the space between the well wall and screen. Fracturing sands are injected into petroleum-bearing formations as a hydraulic fracturing and propping agent. The grain size is closely controlled, and the required grain compressive strength increases with the depth of the producing formation. Grain size requirements are subject to the amount to which the sedimentary beds can be separated (Gent, 1993).

The Minago sandstone unit is the same stratigraphic unit being quarried at the Saskatchewan Hanson Lake sand deposit. The Hanson Lake deposit provides a good comparison. The sand unit in the Winnipeg Formation in the northern portion of the Williston Basin (north-central Manitoba and Saskatchewan) is essentially sandstone (shallow marine deposition), whereas the Black Island Winnipeg Formation sand deposit is in the southern, or basinal, portion of the Williston Basin (southern Manitoba), is interbedded with shale and is deposited in a different depositional environment (deeper marine).

8.1 WINNIPEG FORMATION BLACK ISLAND (LAKE WINNIPEG, MB) DEPOSIT

The Winnipeg Formation sandstone on Black Island Lake, about 370 km SSE from the Minago Deposit (Figure 7.2), has undergone extraction since 1929. Extraction activities were abandoned in 1993, and the island has become a Provincial Park. East of the island and on the eastern shore of Lake Winnipeg, near Seymourville and
Manigotogan, another deposit of Winnipeg Formation sand is being investigated for a source of silica sand, but has had no production.

The Black Island Winnipeg Formation sandstone outcrops along the south shore, to nearly 14 m thick. The semi-consolidated, nearly flat-lying beds consist of rounded, frosted quartz grains, loosely cemented with limonite and kaolinite. It ranged from pure white to iron-stained, chocolate-brown. Heavy minerals were present in total concentrations less than 1% (mainly tourmaline, zircon, and magnetite) (Genik, 1952). In 1964, average annual tonnage was 42,878 t. In 1988 it had increased to 75,000 t. Reserves were estimated at 20 Mt in 1988 (Tooley, 1988). These estimates do not use resource categories as defined in the NI 43-101 Standard; historical estimates are presented here only for historical completeness and should not be relied upon.

American Petroleum Institute (API) RP 56 tests for frac sand were not conducted on the Winnipeg Formation sand at Black Island (API, 1995 — see Appendix 1 in Doundarov, 2008, and Appendix E in this report). A representative chemical analysis of the Black Island sand is provided in Table 8.1.

Table 8.1 Representative Chemical Analysis of Black Island Sand (Bannatyne, 1971; Cole, 1928; and Pearson, 1984)

<table>
<thead>
<tr>
<th>Reference</th>
<th>Silica SiO₂</th>
<th>Iron Oxide Fe₂O₃</th>
<th>Aluminum Oxide Al₂O₃</th>
<th>Titanium Oxide TiO₂</th>
<th>Calcium Oxide CaO</th>
<th>Magnesium Oxide MgO</th>
<th>Loss On Ignition (LOI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson (1984)</td>
<td>99.55%</td>
<td>0.020%</td>
<td>0.219%</td>
<td>0.005%</td>
<td>0.018%</td>
<td>0.037%</td>
<td>0.106%</td>
</tr>
<tr>
<td>Cole (1928)</td>
<td>95.52 to 97.48%</td>
<td>0.192% to 0.096%</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Bannatyne (1971)</td>
<td>99.58%</td>
<td>0.02%</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

The sandstone at Black Island was drilled and blasted. Sand preparation was achieved by washing, primary screening, dewatering, attrition scrubbing and laudering, separation and final dewatering. The processing broke up the lumps and aggregates and washed out the cementing clay and fine sand. The resulting product was a very high quality white silica sand (-20+100 mesh material) with a silica content of approximately 99.5%. It compared favourably with the best industrial silica sands produced in North America. The quarried sand was then barged to Selkirk (north of Winnipeg, Manitoba on the Red River) to a processing plant. The sand was predominantly used for glass production, as well as foundry sand, fibreglass insulation, sandblasting, railway traction and filter industries.
8.2 Winnipeg Formation Winn Bay Sand Deposit (Hanson Lake, SK)

Winnipeg Formation sand is currently being quarried for frac sand in the Hanson Lake-Limestone Lake area of Saskatchewan, between Deschambault and Creighton (see Figure 7.2 for location). It is being quarried for use in the oil and gas industry. This deposit is approximately 285 km west of the Minago Deposit. The sand is trucked to Saskatoon where it is distributed and marketed. Some sand is trucked directly to Flin Flon to be transported by train to the United States. It is an open pit operation owned 100% by Winn Bay Sand Limited Partnership. It is a mining company owned by the Ochapowace First Nation. The quarry presently employs 50 people year round, many from the surrounding First Nation communities, as equipment operators, truck drivers, camp workers and lab workers.

The open pit is located slightly east of the south end of McIlvenna Bay on Hanson Lake. The Winnipeg Formation sandstone is an unindurated friable marine orthoquartzitic sandstone which was formed by the weathering and erosion of the Cambrian Deadwood Formation and the exposed granitic rocks. In the Hanson Lake area, the sandstone either escaped cementation and induration following deposition or had the cement removed by groundwater action in post-Ordovician times. The Winnipeg Formation is overlain by up to 18 m of cliff-forming, greyish orange, locally fossiliferous, locally mottled and iron-stained, well-bedded and jointed Red River Formation dolomite. The dolomite is overlain by Pleistocene to Recent tills, silts, peat deposits, and calcareous tufa, approximately 1 to 3 m thick. For detailed geology of the Hason Lake sand deposit, refer to Gent (1993).

The greyish orange to white, medium-grained, friable, unconsolidated sands belong to the Black Island Member (Saskatchewan terminology) of the Winnipeg Formation (Lower Unit in Manitoba terminology – see Figure 7.1). Measured thicknesses of the Winnipeg Formation sand vary in thickness from 3 to 5 m. The base of the sand interval conforms to the underlying erosional surface and the thickness of this sand blanket is determined by highs and lows on the erosional surface.

Using roundness and sphericity tests, the sands were super-mature orthoquartzites which contained 99.8% frosted quartz grains and 0.2% other grains (feldspars, tourmaline, ferromagnesians and pyrite, zircon, magnetite, and staurolite) with minor clay and iron oxide adhering to the grain surfaces. The average sphericity of 0.84 and roundness of 0.70 led to the conclusion that the sands would make an excellent frac sand.

Daren Resources Ltd. (2000 and 2001) released the following test results for four samples from Hanson Lake (Table 8.2):
Table 8.2  API RP 56 Results for the Hanson Lake Sand (Darren, 2001)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Roundness</td>
<td>0.60</td>
<td>0.80</td>
<td>0.70</td>
<td>0.83</td>
<td>0.82</td>
</tr>
<tr>
<td>Sphericity</td>
<td>0.60</td>
<td>0.83</td>
<td>0.74</td>
<td>0.84</td>
<td>0.81</td>
</tr>
<tr>
<td>Acid Solubility</td>
<td>2%</td>
<td>1.65%</td>
<td>1.50%</td>
<td>1.19%</td>
<td>0.9%</td>
</tr>
<tr>
<td>Bulk Density (g/cubic cm)</td>
<td>-</td>
<td>1.65</td>
<td>1.65</td>
<td>1.66</td>
<td>1.58</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>-</td>
<td>2.65</td>
<td>2.64</td>
<td>2.64</td>
<td>-</td>
</tr>
<tr>
<td>Crush Test 14% (20/40)</td>
<td>6.20%</td>
<td>9.30%</td>
<td>8.60%</td>
<td>14% (4000 psi) 7.9%</td>
<td></td>
</tr>
<tr>
<td>Crush Test 8% (40/70)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>95.7%</td>
</tr>
<tr>
<td>Insize</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>95.7%</td>
</tr>
<tr>
<td>Medium diameter</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.532</td>
</tr>
</tbody>
</table>

Winn Bay Sand reports a specific gravity of 2.64 for their Winn Bay Canadian White™ sand and a weight percent for SiO₂ of 98.96%.

Table 8.3 outlines the tonnage amounts estimated for Hanson Lake through the years from historical accounts. These estimates do not use resource categories as defined in the NI 43-101 standards; these historical estimates are only presented here for historical completeness and should not be relied upon. Wardrop has been unable to verify the information on Hanson Lake and the information provided about the Hanson Lake Frac Sand deposit is not necessarily indicative of the quantity of Frac Sand on the Minago Property that is the subject of the technical report.

Table 8.3  Hanson Lake Estimated Reserves

<table>
<thead>
<tr>
<th>Date</th>
<th>Reserves Listed*</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1955</td>
<td>1,000,000 tons</td>
<td>Chernoff (1955)</td>
</tr>
<tr>
<td>1977-78</td>
<td>7,500,000 tonnes</td>
<td>Holocene Resources Ltd. (1977-1978)</td>
</tr>
<tr>
<td>2000</td>
<td>11,000,000 tonnes silica sand</td>
<td>Daren Resources Ltd. (2000-2001)</td>
</tr>
<tr>
<td>2000</td>
<td>4,200,000 tonnes frac sand</td>
<td>Hanson Lake Silica Co.*</td>
</tr>
</tbody>
</table>

*Saskatchewan Government Website

There are no recent published reserves available. Inquiries were made to the Saskatchewan government (data is considered confidential) and to Winn Bay Sand (data was unavailable).

The Black Island and Winn Bay Sand deposits are used for comparison in this report based on the fact that they both represent the Ordovician Winnipeg Formation sandstone, equitable to the formation of interest at Minago.
9.0 MINERALIZATION

The Minago Winnipeg Formation sandstone unit is the equivalent stratigraphic unit being quarried at the Saskatchewan Hanson Lake sand deposit. Therefore, when comparing other frac sand deposit types with the Minago Sandstone Deposit, the Hanson Lake deposit is correlative for comparison. The sand unit in the Winnipeg Formation in the northern portion of the Williston Basin (north-central Manitoba and Saskatchewan) is essentially sandstone (shallow marine deposition), whereas the Black Island Winnipeg Formation sand deposit is in the southern, or basinal portion of the Williston Basin (southern Manitoba), is interbedded with shale and is deposited in a different depositional environment (deeper marine).

The Winnipeg Formation, in Manitoba, is subdivided into Lower and Upper units (see Figure 7.1). The Lower Unit is a quartz-rich sandstone sheet overlain by an Upper Unit of shale with interbedded sandstone. The Lower Unit rapidly thins to a thinner, shelf facies, sandstone sheet (blanket-like) in the northern portion of the basin (north-central Manitoba and eastern Saskatchewan), at the sacrifice of the upper shale unit (McCabe, 1978). The shale from the Upper Unit is not present in the Minago Sandstone Deposit area.

The Winnipeg Formation sand in the Minago Sandstone Deposit area ranges in thickness from 5.1 to 15.9 m (14128 drill hole intersections), and averages 8.7 m within the proposed pit area. The unit is overlain by the Ordovician Red River Formation (dolomite). The genesis of the sandstone/dolomite contact is debatable. Some believe the contact to be transitionally conformable, whereas some believe the contact to be erosional (unconformable) (Norford, et al., 1994). The average depth to the top of the Winnipeg Formation (from surface) is 60.2 m within the proposed pit area. The contact of the sandstone with the underlying Precambrian is unconformable. In the Minago Sandstone Deposit area, the contact with the basement rocks appear to be consistently flat lying with no abrupt change in basement elevation or basement faulting (refer to vertical sections 8W, 12W, 14W and 21C in Appendix B as examples).

The Ordovician sandstone (Winnipeg Formation) occurs stratigraphically below the dolomite approximately 46 to 73 m below the surface across the Property. Sandstone cohesiveness varies from consolidated (well indurated) and carbonate cemented to semi-consolidated, friable and clay/silt rich to unconsolidated sand. Clay/silt rich zones are brown grey in colour while white zones are carbonate cemented.

The Winnipeg Formation sandstone is distinguished from all other sediments in the Williston Basin on the basis of being composed of well rounded quartzose sand and with variable cementation. The quartz grains are thought to have undergone both
fluvial and aeolian transport. They show distinctive frosting caused by wind transport.

Five distinct drill holes with cored intervals of the Winnipeg Formation were used for API RP 56 testing on the Minago Sandstone Deposit. Results follow in Sections 10.0 and 12.0.
10.0 EXPLORATION

Information on the Winnipeg Formation sandstone is gathered via basement mineral exploration drilling conducted by Victory Nickel and previous exploration companies. All drilling to basement must pass through the Winnipeg Formation. Regional isopach data on the formation for the area is collected from Minago exploration drilling, as well as data available in the provincial Manitoba Stratigraphic Database. This database is a repository of all stratigraphic drill hole information on wells drilled within and through the Paleozoic and Mesozoic units in Manitoba. This database is available from the Manitoba Geological Survey.

One hundred and forty-one drill holes have been drilled through the Winnipeg Formation on the Minago Property and tops information was used to determine the isopach of the unit. A total of five of these drill holes were able to retain complete cored intervals of the Winnipeg Formation for testing. These five drill holes were selected as they are representative across the proposed open pit and have a reasonable chance of being mined as part of the stripping phase of the proposed open pit.

Across the Minago Property and within individual drill holes the sandstone varies from competent, carbonate cemented, well consolidated sand to semi-consolidated, to friable, compact and poorly cemented, to entirely unconsolidated clean white sand. In all drill holes, core recovery of the Winnipeg Formations ranged from 15% to 98%.
11.0 DRILLING

The top of the Winnipeg Formation sandstone occurs from 46 to 73 m below surface on the Property, while in the proposed pit area the average depth is 60 m below surface. Across the Property and within individual drill holes the sandstone varies from competent, carbonate cemented, well consolidated sand to semi-consolidated, to friable, compact and poorly cemented, to entirely unconsolidated clean white sand. The sandstone is flat lying with an average thickness in the proposed pit area of 8.7 m.

11.1 2005 AND 2006 DRILLING

It was necessary during the drilling of the Minago Sandstone Deposit to employ NQ size rods to drill through the Ordovician strata and into the upper Precambrian basement, and to then reduce rod size to BQ and to use the NQ drill string as casing for the remainder of the hole. Due to the drill hole lengths required to cut a section through the sand deposit, changing the drill bit midway through each hole is an almost forgone conclusion. If it were not for the reduction in rod size shortly below the unconformity, removal of the NQ rods from the hole to change a bit invariably results in collapse of unconsolidated Winnipeg Formation sand into the hole, and the near certain loss of the hole below the unconformity (Wagg, 2006).

Based on observations on the first two drill holes for the 2006 drilling program, the Winnipeg Formation sandstone represents a water saturated aquifer of regional extent. However, no rapid outflows of groundwater were encountered by the drill crew when the unit was encountered and the horizon does not appear to be significantly ‘pressurized’. The following describes, in detail, the drilling results through the Winnipeg Formation in the first two drill holes:

For drill hole NM0601, mixed sand and sandstone was encountered between 62.8 m and 72.0 m. The uppermost few metres consisted of rather weak intact rock with fairly high porosity, followed by a 2 m section of clean and well sorted loose sand from which 90% of the material was washed and not recovered during drilling. Below approximately 67.8 m, recovery was much better, with only about 10% of the compact but poorly consolidated material lost. A few intact 30 cm lengths were found within the lowermost 5 m of the unit, with the remainder a light grey silty semi-consolidated material, which cored well but disaggregated over time in the core box due to lack of confining pressure and drying with exposure to air.

For drill hole NM0602, sandstone was encountered between 71.4 and 82.8 m. The unit was much better cemented, with intermittent sections of loose material from which recovery ranged from 5% to 80%. Approximately 0.6 m of loose clean material was washed and not recovered below 72.3 m, with only about 5% recovery from 74.0 to 76.0 m, and 20% recovery from 76.0 to 76.8 m. Perhaps 20% of the section, from
78.3 to 79.7 m was lost, with the recovered material dirty, light grey, and compacted similar to that noted in the lower part of the first drill hole. Below 79.7 m, the unit appears moderately well cemented and likely to be reasonably competent in situ, but is rather fragile to handle as NQ core and is quite weak in terms of its inherent strength.

Generally, the upper half of the sandstone unit appears to contain most of the unconsolidated sand layers within the lithology, where the bulk of the loose material is fine silica of very uniform grain size, without appreciable clays, carbonate or other impurities. The lower parts of the unconsolidated sections, and the compacted but incompetent material present in some portions of the lower part of the unit is somewhat dirtier due to the presence of matrix constituents other than silica.

11.2 2007 AND 2008 DRILLING

Major Drilling Inc. (Major Drilling) performed the drilling in 2007 and 2008. In both years, the drilling began in January and completed in May. In 2007 and 2008, the drill hole diameters were decreased as follows:

- the drill holes were collared with HW casing to the dolomite
- HQ was drilled to the top of the Precambrian
- thereafter the drill hole was reduced to NQ size core.

In a few holes that were tight, the NQ size was further reduced to BQ. The casings were left in all holes and they were capped.

All drill hole collars in the 2007 and 2008 drilling were surveyed for location by Pollock and Wright of Winnipeg. Ongoing in-hole surveys were performed by Major Drilling every 50 m in all drill holes using a Reflex Instruments Easy Shot. Generally, drill holes greater than 200 m were in-hole surveyed by Victory Nickel contractors/employees using a Reflex Instruments Maxibor II.

The drill core was picked up at the drill site daily by Victory Nickel personnel and transported by pick-up truck to the core room in Grand Rapids, Manitoba. In Grand Rapids, the drill core was securely stored indoors.

All drill hole logs are available in Appendix A.
12.0 SAMPLING METHOD AND APPROACH

Since Nuinsco Resources Limited and Victory Nickel started drilling on the project in 2004, the top of the Winnipeg Formation sandstone was picked where the dolomite could not be recognized in the sandstone. This is typically where the sandstone becomes visibly “pure” and the dolomite content, if any, is less than 5%. This contact to the overlying Red River Formation is usually sharp. The dolomite, if present in the sandstone, exists as millimetre to centimetre scale layers of impure dolomite containing sand grains or as dolomite interstitial to quartz grains and does not persist for more than a few tens of centimetres into the sandstone. The base of the dolomite generally contains sand grains ranging in abundance from a few percent to approximately 15 to 20%. The sand enriched portion of the base of the dolomite is usually in the order of 1 m thick, but sometimes extends several metres above the sandstone. The sand enriched portion of the dolomite is logged as dolomite.

Recognizing the sandstone contact with the regolith (basement) can be more problematic. Typically the base of the sandstone is comprised of loose quartz grains and the regolith is highly altered to unconsolidated clay-sized minerals, sometimes with remnant coarser subangular quartz grains and sometimes feldspar. Limonite may or may not be present. The contact is picked on the basis of the dominant mineral type and change in the quartz grain content (abundance, size and shape). On the sandstone side of the contact, the quartz grain content is very high (approximately 85 to 95%) with minor (approximately 5%) clay, which can be white, light grey and pale green in colour. Quartz grains are rounded, uniform in size and usually more fine grained than in the regolith.

On the regolith side of the contact, clay-sized minerals are dominant. In cases where there are no quartz or feldspar grains, the parent rock is probably ultramafic. In cases where quartz and feldspar grains are present, they may be less coarse grained and more angular than the quartz grains in the overlying sandstone and much less abundant (less than 40%). Hematization may be present. The presence of remnant quartz and feldspar probably indicates that the parent rock is a granitic rock-type.

Wardrop concludes that the samples fairly represent the sandstone unit within the proposed Minago pit shell. The samples taken were biased toward the more consolidated parts of the sandstone, but this will not have a material impact on the frac sand properties of the sandstone.

12.1 SANDSTONE CORE SAMPLING

All sandstone samples used for testing were collected from the 2007 and 2008 drilling program. The drill core was picked up at the drill site daily by Victory Nickel personnel and transported by pick-up truck to the core room in Grand Rapids,
Manitoba. In Grand Rapids, the drill core was securely stored indoors, logged and half split. Splitting was performed by residents of Grand Rapids who were hired by Victory Nickel on a casual basis. Consolidated sample material was rinsed with clean water prior to being bagged for analysis.

Consolidated sandstone core was split with a saw (diamond impregnated blade) and the poorly consolidated and loose sand was cut with a knife and picked/scooped out of the core boxes. The water for the drill core saw was changed once every six to ten core boxes cut. The samples collected came from complete cored intersections of the Winnipeg Formation within the proposed pit site area (Figure 17.1). Each sample was placed in a plastic bag along with a tag with a unique identifying number.

Sandstone recovery varied greatly depending on the competency of the unit. Unconsolidated material would frequently wash out of the hole while the hole was being cored. The depositional characteristics of the sandstone unit indicate that the degree of cementation of the sand particles is unrelated to the sand particles themselves. Cementation is a post-depositional feature. Poor core recovery should not be a limiting factor in sample selection. Instead total sample volume should be considered for testing and resource estimation purposes.

Five discrete samples from five different drill holes have been tested for frac sand test specifications. Each sample was split for submission to 2 different laboratories. One composite sample was made from five drill holes and submitted to Outotec Labs (Outotec). Four individual drill hole samples were submitted to Loring, and four sample intervals from one drill hole were submitted to SRC (see Table 12.1).

### Table 12.1 Minago Sandstone Deposit Sampling for Frac Sand Testing

<table>
<thead>
<tr>
<th>Drill Hole #</th>
<th>Sample #</th>
<th>Laboratory</th>
<th>Interval (m)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-07-01</td>
<td>924079</td>
<td>Loring</td>
<td>83.32-96.73</td>
<td>Half of the core sample</td>
</tr>
<tr>
<td>N-07-09</td>
<td>924080</td>
<td>Loring</td>
<td>74.70-84.35</td>
<td>Half of the core sample</td>
</tr>
<tr>
<td>N-07-25</td>
<td>924060</td>
<td>SRC</td>
<td>77.28-78.62</td>
<td>Half of the core sample for each sample</td>
</tr>
<tr>
<td></td>
<td>924061</td>
<td></td>
<td>78.62-83.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>924062</td>
<td></td>
<td>83.00-86.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>924063</td>
<td></td>
<td>86.00-88.20</td>
<td></td>
</tr>
<tr>
<td>N-07-41B</td>
<td>924081</td>
<td>Loring</td>
<td>69.14-78.19</td>
<td>Half of the core sample</td>
</tr>
<tr>
<td>N-07-43A</td>
<td>924078</td>
<td>Loring</td>
<td>78.14-86.00</td>
<td>Half of the core sample</td>
</tr>
<tr>
<td>N-07-01</td>
<td>28965-20</td>
<td>Outotec</td>
<td>83.32-96.73</td>
<td>One composite sample created from half of the core sample from each drill hole (intervals indicated in left-hand column)</td>
</tr>
<tr>
<td>N-07-09</td>
<td>28965-21</td>
<td></td>
<td>74.70-84.25</td>
<td></td>
</tr>
<tr>
<td>N-07-25</td>
<td>28965-24</td>
<td></td>
<td>77.28-88.20</td>
<td></td>
</tr>
<tr>
<td>N-07-41B</td>
<td>28965-25</td>
<td></td>
<td>69.14-78.19</td>
<td></td>
</tr>
<tr>
<td>N-07-43A</td>
<td>28965-28</td>
<td></td>
<td>78.14-86.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>28965-29</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>28965-32</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>28965-33</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
12.1.1 LORING

Four sand samples were collected and shipped by commercial transport truck to Loring Laboratory on May 11, 2007 for testing. Each sample (one per pail) represents half of the entire interval of sand intersected in four drill holes as noted in Table 12.1.

Loring crushed each sample and screened the sand into different size fractions. The different size fractions were subsequently tested according to API procedure RP 56 (see Appendix C).

12.1.2 SRC

Four samples representing the cored sand from one drill hole (N-07-25) were shipped to the Saskatchewan Research Council on April 30th, 2007. The drill hole interval of each sample is given in Table 12.1 and represents half of the entire interval of core sand encountered.

SRC™ Analytical Laboratories (SRC) used the same procedure as Loring and crushed all the sand prior to screening and testing according to API procedure RP 56. Crushing tests of the sand were performed outside the SRC at the Rock Mechanics Laboratory of the University of Saskatchewan in Saskatoon.

12.1.3 OUTOTEC

One composite sample was made from the remaining split cores from holes N-07-01, N-07-09, N-07-25, N-07-41B, and N-07-43A, and was submitted to Outotec for testing. Outotec optimized its sample preparation procedure to improve on the final product. Their report has been attached in Appendix D.

Outotec improved the crush resistance by separating the sandstone into a hard (non-friable) sand and a consolidated (friable) sand. Other sand parameters also improved compared to the results from the previous tests in the other labs. The Outotec flowsheet (see Figure 1 in Doundarov (2008) in Appendix A) also increased the potential production volumes.

Hydraulic fracturing sand and glass and foundry sand testing was conducted by Outotec in January 2008 on the Minago Sandstone Deposit. Unfortunately, the testing was done on one sample (#28965-1), which is a composite of five individual core samples from five drill holes.

Outotec used innovative techniques by separating the sandstone into a hard (non-friable) sand and a consolidated (friable) sand at the start of the proposed flowsheet. Using this technique, Outotec improved the crush resistance parameter of the friable sand and increased its marketable volume. The non-friable sand was crushed and produced a fine frac sand product suitable for shale gas applications.
The initial feed sample was screened at 25 mm to remove a majority of the non-friable fraction from the sample. After the +25 mm fraction was removed, the sample was split into two representative samples. One sample was scalped at 6.3 mm and the other at 1.7 mm. No crushing was involved in this process.

The samples went through an attrition scrubbing, drying and then magnetic separation. The non-magnetic fraction was then screened (+20, 20/40, 40/70 and 70/140) to produce the 20/40 and 40/70 frac sand products and then sent to the Stimlab Division (Stimlab) of Core Laboratories where the complete API RP 56 suite of tests were completed. The non-magnetic fraction of the 40/140 product was also submitted for assay to determine if this product could be used as glass sand. No test work was conducted on the 70/140 mesh (100 mesh frac sand) to determine if this product met API RP 56 specifications. No test work was conducted for foundry sand although the process should produce a good foundry product as the grains are clean and have a good size distribution.
13.0 SAMPLE PREPARATION, ANALYSES, AND SECURITY

All sandstone samples used for testing were collected from the 2007 and 2008 drilling program. The drill core was picked up at the drill site daily by Victory Nickel personnel and transported by pick-up truck to the core room in Grand Rapids, Manitoba. In Grand Rapids, the drill core was securely stored indoors, logged and half split. Splitting was performed by residents of Grand Rapids who were hired by Victory Nickel on a casual basis. Consolidated sample material was rinsed with clean water prior to being bagged for analysis.

Consolidated sandstone core was split with a saw (diamond impregnated blade) and the poorly consolidated and loose sand was cut with a knife and picked/scooped out of the core boxes. The water for the drill core saw was changed once every six to ten core boxes cut. The samples collected came from complete cored intersections of the Winnipeg Formation within the proposed pit site area. Each sample was placed in a plastic bag along with a tag with a unique identifying number.

13.1 MINAGO DEPOSIT SAND ANALYSES

13.1.1 INTRODUCTION

The drill holes sampled for sand testing and the individual sample numbers are provided in Table 12.1.

Four sand samples were collected and shipped by commercial transport truck to Loring Laboratories Ltd. (Loring) in Calgary on May 11, 2007 for testing. Loring crushed each sample and screened the sand into different size fractions. The different size fractions were subsequently tested according to API procedure RP 56 (see Appendix C).

Four samples representing the cored sand from one drill hole (N-07-25) were shipped to the Saskatchewan Research Council Laboratory in Saskatoon. Prior to the analysis, each silica sand sample was prepared by:

- disaggregation with minimal abrasion (e.g. rubbing by hand)
- drying
- mixing with minimal abrasion (stirring, gentle tumbling), splitting, and storage of all material.

SRC then crushed all the sand prior to screening and testing according to API procedure RP 56. Crushing tests of the sand were performed outside SRC at the Rock Mechanics Laboratory of the University of Saskatchewan in Saskatoon.
The remaining half cores from the five drill holes that were sampled were combined and submitted to Outotec as a single sample. Outotec processed the sample with the intention of optimizing the recovery of frac sand from the sample.

13.1.2 LORING LABORATORIES

In order to determine the quality of the sand and to evaluate the feasibility of the project, Wardrop led a test program on the Minago Deposit sand samples for the viability for frac sand (Appendix E, Wardrop Doc# 0751330300-REP-P0003-01). Four drill hole representative samples were tested for different quality parameters in accordance with the standards of the API RP 56 (API, 1995) at Loring Laboratories. The four drill hole samples tested represented half of the four drill holes from the drill core, initially split in two for testing in two different and independent laboratories.

The Loring Lab crushed all the sand and then tested it for the different API standards. In doing so, the sand lost its crushing strength and the test results show that the majority of the products cannot meet the API requirements for crush resistance.

In order to decrease the percentage of fines to the maximum allowed by the API level of 14%, two trials were preformed where attrition scrubbing and an acid bath were introduced in order to remove the calcium, which is the weaker component. With this, the crush resistance improved significantly to the level of the API standard but half of the useful product was lost.

The results from the roundness and sphericity tests meet the minimum requirements of 0.60 set up by API. Results for turbidity analysis show favourable results between 45 and 195 FTU in comparison to 250 FTU which is the maximum allowed by API (see Table 13.1).

Whole rock Inductively Coupled Plasma (ICP) analysis and total metals analysis was also conducted. Results are presented in Appendix E.

Wardrop compared the size fractions from the four samples submitted to Loring. The grain size distribution is similar, as shown in Figure 13.1. The similarity between the samples supports the depositional model and suggests that there will be little variability within the sand unit. Table 13.1 present the amount (%) of usable product from Loring’s screen analysis used to construct Figure 13.1. Fractions coarser than 6 mesh and finer than 140 mesh are not recognized.

Table 13.2 outlines the results from the roundness, sphericity and crush resistance tests for the samples at Loring. The crush resistance tests were applied in three different procedures. For trial #1, a standard jaw crusher and plate impactor are used to obtain the unacceptable 30 to 40% of fines. This is a standard procedure for testing the crush resistance of the sand. In order to decrease the percentage of fines to 14%, the maximum allowed by the API, two trials were preformed, where attrition scrubbing and an acid bath are introduced in order to remove the calcium, which is
the weaker component. With this, the crush resistance improved significantly to the level of the API standards but about half of the useful product was lost.

Table 13.1  Usable Product Meeting API Standards for Screen Analysis from Loring

<table>
<thead>
<tr>
<th>Usable Product</th>
<th>Sample Number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>924078 (%)</td>
</tr>
<tr>
<td>% 20/40</td>
<td>10.34</td>
</tr>
<tr>
<td>%40/140</td>
<td>72.46</td>
</tr>
<tr>
<td>Total Usable</td>
<td>82.80</td>
</tr>
</tbody>
</table>

Table 13.2  Roundness, Sphericity and Crush Resistance (20/40 sand fraction)

<table>
<thead>
<tr>
<th>Usable Product</th>
<th>Sample Number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>924078</td>
</tr>
<tr>
<td>Trail # 1 – Jaw Crush + Plate Impactor</td>
<td></td>
</tr>
<tr>
<td>Roundness</td>
<td>0.63</td>
</tr>
<tr>
<td>Sphericity</td>
<td>0.64</td>
</tr>
<tr>
<td>Crush Resistance</td>
<td>39.7%</td>
</tr>
<tr>
<td>Trail #2 – Jaw Crush + Plate Impactor + 2 Hours Attrition</td>
<td></td>
</tr>
<tr>
<td>Roundness</td>
<td>0.68</td>
</tr>
<tr>
<td>Sphericity</td>
<td>0.69</td>
</tr>
<tr>
<td>Crush Resistance</td>
<td>25.0%</td>
</tr>
<tr>
<td>Trail #3 – Jaw Crush + Plate Impactor + 2 Hours Attrition + Acid Bath</td>
<td></td>
</tr>
<tr>
<td>Crush Resistance</td>
<td>-</td>
</tr>
</tbody>
</table>
13.1.3 Saskatchewan Research Council

Four samples representing cored sand from one drill hole (N-07-25) were numbered 924060, 924061, 924062, and 924063 and were sent to the Saskatchewan Research Council. The SRC laboratory used the same procedure as Loring and crushed all the sand and then tested it for the different API standards. Crush resistance tests were also completed by the Rock Mechanics Lab at the University of Saskatchewan in Saskatoon.

The results for roundness and sphericity are within the limits established by the API standard. The average percent fines, by mass, for samples 924060 through 924063 were: 51.4%, 62.6%, 41.9% and 34.2%, respectively. For all the samples, the average percentage fines exceeded the maximum acceptable value of 14% recommended in the API standard by a substantial amount.

The tests, like those obtained from the Loring Lab, did not identify any problematic quantities of impurities. Nevertheless, like the Loring Lab results, impurities of pyrite and some minor amounts of agglomerates (clusters) were noted. Wardrop has not identified these materials as problematic as they can easily be removed using a magnetic separator.

Whole rock ICP analysis and total metals analysis were also conducted. Results are presented in Appendix E.
The Outotec test program used different techniques in terms of how the sand is prepared for testing. Loring and SRC laboratories crushed all the sand and then tested it for the different API standards. In doing so, the sand loses its crushing strength and the test results showed that the products cannot meet the API requirements for crush resistance. Outotec instead used innovative techniques, by separating the sandstone into a hard (non-friable) sand and a consolidated (friable) sand in the beginning of the proposed flowsheet (see Figure 1 in Appendix E). As a result, the friable sand kept its crushing strength meeting the API standards for crushing resistance. In addition, the saleable volume of the potential sand products was significantly increased. The non-friable portion (about 42% of the total sand) is to be processed separately to produce the finer 50/140 sand product.

Table 13.3 outlines the results on the 20/40 product. Initial scalping size and the number of attrition scrubbing stages affected the product quality.

Table 13.3 Stimlab API56 Results on the 20/40 Size Fraction Product

<table>
<thead>
<tr>
<th>Sample #</th>
<th>Scalp Size</th>
<th>Scrub</th>
<th>Cluster</th>
<th>Acid Solubility</th>
<th>Silt/Turbidity</th>
<th>Crush Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>API Specs</td>
<td>&lt;1%</td>
<td>&lt;2%</td>
<td>250 FTU</td>
<td>&lt;14%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28965-20</td>
<td>6.3 mm</td>
<td>S</td>
<td>2</td>
<td>1.0</td>
<td>39</td>
<td>9.8</td>
</tr>
<tr>
<td>29865-24</td>
<td>1.7 mm</td>
<td>S</td>
<td>2</td>
<td>1.2</td>
<td>26</td>
<td>11.8</td>
</tr>
<tr>
<td>28965-28</td>
<td>6.3 mm</td>
<td>D</td>
<td>4</td>
<td>0.8</td>
<td>18</td>
<td>13.3</td>
</tr>
<tr>
<td>28965-32</td>
<td>1.7 mm</td>
<td>D</td>
<td>2</td>
<td>0.7</td>
<td>10</td>
<td>11.2</td>
</tr>
</tbody>
</table>

S: Single Scrub  
D: Double Scrub

By using the process developed by Outotec for the 20/40 product, API specifications were met, except for the cluster specifications. The tests also showed that the additional scrubbing stage (D=double attrition scrub) reduced the acid solubility and the amount of silt. This is to be expected since more energy would have provided a cleaner product and break down the softer grains, which would be more acid soluble.

As in Table 13.4, with the exception of the cluster specifications, all tests met the API specifications for 40/70 sand. The additional scrubbing stage for the 40/70 sand did not have an impact on the product quality. However, the finer scalping size of 1.7 mm allowed the product to meet the cluster specifications and produce a crush value of approximately 1% lower than the 6.4 mm scalp.

Glass sand was also assayed for the Outotec report. The sample was sent to an outside lab that is an existing producer of glass sand and therefore follows the proper procedure of high silica samples containing minor amount of contaminants. Table 13.5 indicates the results of the assay, showing that the sand sample is capable of meeting most glass sand specifications. There is no significant difference between the two scalping sizes on glass sand quality. The Minago sand sample tested by
Outotec is comparable to the Winnipeg Formation Black Island sand (see Table 8.1), which was used for glass sand.

### Table 13.4  Stimlab API 56 Results on the 40/70 Product

<table>
<thead>
<tr>
<th>Sample #</th>
<th>Scalp Size</th>
<th>Scrub</th>
<th>Cluster</th>
<th>Acid Solubility</th>
<th>Silt/Turbidity</th>
<th>Crush Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>API Specs</td>
<td>&lt;1%</td>
<td>&lt;2%</td>
<td>250 FTU</td>
<td>&lt;8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28965-21</td>
<td>6.3 mm</td>
<td>S</td>
<td>2</td>
<td>1.0</td>
<td>33</td>
<td>7.3</td>
</tr>
<tr>
<td>29865-25</td>
<td>1.7 mm</td>
<td>S</td>
<td>1</td>
<td>0.8</td>
<td>48</td>
<td>6.4</td>
</tr>
<tr>
<td>28965-29</td>
<td>6.3 mm</td>
<td>D</td>
<td>2</td>
<td>0.9</td>
<td>9</td>
<td>7.2</td>
</tr>
<tr>
<td>28965-33</td>
<td>1.7 mm</td>
<td>D</td>
<td>1</td>
<td>1.0</td>
<td>16</td>
<td>6.5</td>
</tr>
</tbody>
</table>

S: Single Scrub  
D: Double Scrub

### Table 13.5  Glass Sand Assay for Minago Sandstone Deposit

<table>
<thead>
<tr>
<th>Sample #:</th>
<th>28965-38 (6.3 mm scalp)</th>
<th>28965-42 (1.7 mm scalp)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Fe₂O₃</td>
<td>0.037</td>
<td>0.038</td>
</tr>
<tr>
<td>Al₂O₃</td>
<td>0.07</td>
<td>0.08</td>
</tr>
<tr>
<td>TiO₂</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>K₂O</td>
<td>0.01</td>
<td>0.02</td>
</tr>
<tr>
<td>Na₂O</td>
<td>&lt;0.02</td>
<td>&lt;0.02</td>
</tr>
<tr>
<td>CaO</td>
<td>0.03</td>
<td>0.04</td>
</tr>
<tr>
<td>MgO</td>
<td>0.03</td>
<td>0.03</td>
</tr>
<tr>
<td>BaO</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>LOI</td>
<td>0.14</td>
<td>0.16</td>
</tr>
<tr>
<td>SiO₂</td>
<td>99.6</td>
<td>99.6</td>
</tr>
</tbody>
</table>

Overall, the sample provided to Outotec Labs (a composite sample from five drill holes), is capable of providing both a good quality frac sand and glass sand, using the methodology outlined in their report.

#### 13.1.5  TSL Labs

In November 2008, 46 samples of the sandstone unit were submitted to TSL Laboratories Inc. (TSL) in Saskatoon for density measurement. TSL evaluated the samples using both a wet and a dry method. The wet method simply involved weighing the sample, and then immersing it in water to find the total volume of water it would displace. The density was subsequently calculated using $SG = \frac{Mass}{Volume}$. In the dry method, the sample was first coated with a thin layer of wax to prevent the water from penetrating the interstitial pore space in the sandstone. The density was then obtained using the same method.
13.1.6 Summary

A summary of the average results from all labs is compared in Table 13.6. API standards were met by all labs, except for the crush resistance for the Loring and SRC labs, due to an initial crushing stage of the samples. Outotec’s samples met the standard to crush resistance, only because their samples were not crushed initially.

Table 13.6 Summary of API RP 56 Results from all Labs for the Minago Sand Samples

<table>
<thead>
<tr>
<th>Test</th>
<th>API Standard</th>
<th>Loring/EBA Lab</th>
<th>SRC Lab</th>
<th>Outotec Lab</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roundness</td>
<td>0.60</td>
<td>0.64</td>
<td>0.60</td>
<td>0.77</td>
</tr>
<tr>
<td>Sphericity</td>
<td>0.60</td>
<td>0.70</td>
<td>0.71</td>
<td>0.72</td>
</tr>
<tr>
<td>Turbidity</td>
<td>250 FTU</td>
<td>66 FTU</td>
<td>82 FTU</td>
<td>25 FTU</td>
</tr>
<tr>
<td>Crush Resistance (for 20/40)</td>
<td>14%</td>
<td>33%</td>
<td>44%</td>
<td>11.4%</td>
</tr>
<tr>
<td>Crush Resistance (for 40/70)</td>
<td>8%</td>
<td>30%</td>
<td>-</td>
<td>6.8%</td>
</tr>
<tr>
<td>Acid Solubility</td>
<td>2%</td>
<td>-</td>
<td>-</td>
<td>1.0%</td>
</tr>
</tbody>
</table>

The results compare favourably to the results presented for the Hanson Lake frac sand, shown in Table 13.7.

Table 13.7 API RP Results for the Hanson Lake Sand

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Roundness</td>
<td>0.60</td>
<td>0.80</td>
<td>0.70</td>
<td>0.82</td>
</tr>
<tr>
<td>Sphericity</td>
<td>0.60</td>
<td>0.83</td>
<td>0.74</td>
<td>0.81</td>
</tr>
<tr>
<td>Acid Solubility</td>
<td>2%</td>
<td>1.65%</td>
<td>1.50%</td>
<td>1.19%</td>
</tr>
<tr>
<td>Bulk Density (g/cm³)</td>
<td>-</td>
<td>1.65</td>
<td>1.65</td>
<td>1.66</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>-</td>
<td>2.65</td>
<td>2.64</td>
<td>1.58</td>
</tr>
<tr>
<td>Crush Test</td>
<td>14% (20/40)</td>
<td>6.20%</td>
<td>9.30%</td>
<td>8.60%</td>
</tr>
<tr>
<td></td>
<td>8% (40/70)</td>
<td>-</td>
<td>-</td>
<td>14% (4000 psi) 7.9%</td>
</tr>
<tr>
<td>Insize</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Medium diameter</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.532</td>
</tr>
</tbody>
</table>

Whole rock ICP analyses are presented in Table 13.8. Silica content compares favourably between the Winn Bay, Black Island and Loring samples. The SRC sample #924060 depicts very low silica percentages. This is probably attributed to the location of the sampled interval (top of the Winnipeg Formation) which may have interbedded dolomite beds or laminae from the Red River Formation. SRC sample #924063, with the highest silica value, was sampled at the base of the formation.
Silica values for the SRC samples increase from lowest to the highest down the cored interval sampled for drill hole N-07-25.

Overall, comparison of samples from Winn Bay (Hanson Lake), Black Island and Loring Lab are very favourable for the API test standards. Sample results from Outotec are also favourable. Outotec’s results should be regarded as what will be possible when the recovery and processing system are optimized. API standards for crush resistance are diminished for the Loring and SRC labs, based on the crushing procedure carried out at the beginning of the testing procedure.

All samples were collected correctly and in a secure manner. Sample amounts were limited due to core recovery of the Winnipeg Formation, but were approximately equal. Outotec’s testing procedure needed more volume of sample than could be provided by a single drill hole. This resulted in a composite sample which makes direct comparison between labs meaningless.

<table>
<thead>
<tr>
<th>Source</th>
<th>Sample #</th>
<th>SiO2</th>
<th>Al₂O₃</th>
<th>CaO</th>
<th>Fe₂O₃</th>
<th>K₂O</th>
<th>Na₂O</th>
<th>MgO</th>
<th>TiO₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winn Bay Canadian White™</td>
<td>98.96</td>
<td>0.46</td>
<td>&lt;0.132</td>
<td>&lt;0.014</td>
<td>&lt;0.02</td>
<td>&lt;0.3</td>
<td>&lt;0.26</td>
<td>&lt;0.12</td>
<td></td>
</tr>
<tr>
<td>(20/40 to 40/70 size)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black Island</td>
<td>99.558</td>
<td>0.219</td>
<td>0.018</td>
<td>0.020</td>
<td>-</td>
<td>-</td>
<td>0.037</td>
<td>0.005</td>
<td></td>
</tr>
<tr>
<td>Loring Lab*</td>
<td>924081</td>
<td>98.05</td>
<td>0.09</td>
<td>0.03</td>
<td>0.30</td>
<td>0.04</td>
<td>0.02</td>
<td>0.01</td>
<td>0.02</td>
</tr>
<tr>
<td>(20/40 size with attrition and acid cleaned)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SRC Lab</td>
<td>924061</td>
<td>76.55</td>
<td>0.39</td>
<td>6.22</td>
<td>0.83</td>
<td>0.075</td>
<td>&lt;0.01</td>
<td>4.73</td>
<td>0.095</td>
</tr>
<tr>
<td>(20/40 size)*</td>
<td>924063</td>
<td>93.7</td>
<td>1.30</td>
<td>0.34</td>
<td>1.18</td>
<td>0.13</td>
<td>&lt;0.01</td>
<td>0.955</td>
<td>0.21</td>
</tr>
<tr>
<td></td>
<td>924062</td>
<td>91.8</td>
<td>0.49</td>
<td>0.98</td>
<td>1.48</td>
<td>0.065</td>
<td>&lt;0.01</td>
<td>0.33</td>
<td>0.085</td>
</tr>
<tr>
<td></td>
<td>924060</td>
<td>39.05</td>
<td>0.42</td>
<td>8.14</td>
<td>1.88</td>
<td>0.065</td>
<td>&lt;0.01</td>
<td>12.9</td>
<td>0.055</td>
</tr>
</tbody>
</table>

Note: Size fractions measured are not indicated for the Black Island sand.
* values calculated by averaging between two samples for that size interval
14.0 DATA VERIFICATION

Wardrop has not verified the sample data used in estimating the resource. The samples sent for quality testing were sent to two different laboratories, leaving no remaining core for additional test work. There were no quality assurance/quality control (QA/QC) measures undertaken by Victory Nickel in the sampling of the sandstone. The small sample population renders the statistical analysis of sample populations largely ineffective. Wardrop normalized the Loring size fractions to correspond with those reported by Outotec and composited the results. The composite of the size ranges is compared to those reported by Outotec (Figure 14.1). The increased coarser fractions in the Outotec sample are a result of optimization of the testing process. Loring broke up some of the coarse quartz particles in the initial crushing process.

Figure 14.1  Particle Size Comparison Between Outotec and Loring
15.0 ADJACENT PROPERTIES

This section is not applicable.
16.0 MINERAL PROCESSING AND METALLURGICAL TESTING

Refer to Appendix E, Laboratory Test Work Results and Analysis.
17.0 MINERAL RESOURCE AND MINERAL RESERVE ESTIMATES

17.1 EXPLORATORY DATA ANALYSIS

Wardrop conducted a resource estimate of the sandstone unit at the Minago deposit. The estimation was completed for tonnage and quality using data from historic and recent drilling. Gemcom Version 6.1.3 was used for wireframing and block-modeling the resource estimate.

Victory Nickel provided the data in digital files. The first batch was delivered in March 2007 from Mirarco and Victory Nickel personnel. This batch consisted of a drill hole database including the 2006 drill holes, wireframes of the sedimentary surfaces, and a block model. The pre-2007 data was in imperial units and the mine grid coordinate system. A second batch was obtained in phases between April and August 2007. This batch consisted of the drilling data from the 2007 winter drill program and a topography file. The results from the 2008 drilling program were added between April and September of 2008. All the new data is in metric units and the Universal Transverse Mercator (UTM) coordinate system.

17.1.1 ASSAYS

Assay data used to evaluate the frac sand deposit was from test results performed by Loring, SRC, and TSL. Comparison of the sand particle size distribution between the different samples submitted to Loring shows little variation across the area of the proposed pit (see Figure 13.1). The size fraction data was combined into a coarse fraction (20/40) and fine fraction (40/140) for resource estimation purposes. Quality of the sand was shown by Outotec to be affected by the testing method, so actual quality values will ultimately be determined by the recovery process.

The samples that were submitted for testing were selected from drill holes that had good recovery (>90%) and represented the entire thickness of the sand unit. No compositing or capping of the samples was attempted.

17.2 BULK DENSITY

Bulk density of the sandstone unit was estimated from 46 measurements taken from samples collected by Victory Nickel (Figure 17.1). The measurements were made by TSL, using both wet and dry (wax coat) methods. Summary statistics of the data are provided in Table 17.1. Complete results of the density measurements are provided in Appendix D.
Figure 17.1 Location of Available Quality and Density Information
Table 17.1  Comparison of Density Measurements

<table>
<thead>
<tr>
<th></th>
<th>&quot;Wet&quot; SG</th>
<th>&quot;Dry&quot; SG Wax</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum</td>
<td>2.02</td>
<td>1.85</td>
</tr>
<tr>
<td>Mean</td>
<td>2.33</td>
<td>2.26</td>
</tr>
<tr>
<td>Median</td>
<td>2.32</td>
<td>2.26</td>
</tr>
<tr>
<td>Maximum</td>
<td>2.63</td>
<td>2.63</td>
</tr>
</tbody>
</table>

There was excellent correlation between the two sets of measurements, with the wax coat method suggesting a lower density. This is to be expected, as the air trapped within the pore space of the samples would contribute to a lower apparent density. Ultimately, the dry density will more accurately reflect the final product produced.

Figure 17.2  Correlation between Wet and Dry Density Measurements

The sample population appears slightly skewed by the 2.1 to 2.2 bin. There are two samples measured at 2.11 g/cm³, just above the lower bin limit of 2.10 g/cm³.
Shifting the bin limits of the histogram slightly will create a population distribution that is more normally distributed.

Figure 17.4  Distribution of Density Measurements – Alternate
17.3 **Geological Interpretation**

The sand model was defined by the “from” and “to” points of the sandstone unit, as recorded in the drill logs. Laterally, the sandstone extends far off of Victory Nickel’s quarry leases, but no attempt was made to model the lateral extents. Instead, a proposed pit shell, designed for the underlying nickel mineralization, was used as a lateral constraint. The top surface was created from all the “from” points, and a lower surface was created from the “to” points. In total, 141 points were used to define each surface. Wardrop created a table listing the drill hole intersections with the sandstone model, in order to validate the continuity of the model. There were six drill holes in the database that intersected the sandstone model that did not have any sandstone reported in the lithology. These are reported in Table 17.2, along with explanations for the missing sandstone.

**Table 17.2 Diamond Drill Holes Missing Sandstone Intersections**

<table>
<thead>
<tr>
<th>Hole ID</th>
<th>From</th>
<th>To</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>G-1-W1-74</td>
<td>66.367</td>
<td>78.385</td>
<td>Wedge off of G-1-74 started below sandstone</td>
</tr>
<tr>
<td>G-1-W2-74</td>
<td>66.538</td>
<td>78.621</td>
<td>Wedge off of G-1-74 started below sandstone</td>
</tr>
<tr>
<td>G-2-75</td>
<td>63.496</td>
<td>73.042</td>
<td>Upper part of hole not logged - litho starts 491.64m down hole.</td>
</tr>
<tr>
<td>G-4-W1-76</td>
<td>66.061</td>
<td>78.713</td>
<td>Wedge off of G-4-76 started below sandstone</td>
</tr>
<tr>
<td>G-4-W3-76</td>
<td>66.061</td>
<td>78.713</td>
<td>Wedge off of G-4-76 started below sandstone</td>
</tr>
<tr>
<td>MXB-70-48</td>
<td>75.458</td>
<td>83.65</td>
<td>No sandstone logged (dolomite)</td>
</tr>
</tbody>
</table>

Hole MXB-70-48 is the only drill hole that passes through the sandstone model, that does not have sandstone reported in the log. This is probably an oversight on the part of the geologist that logged the hole, and should be reviewed.

17.4 **Spatial Analysis**

Very little data was available to define the quality of the sand. The data that was provided was from large samples taken at widely spaced points. Density data was widely spaced and showed a normal distribution. No variography was carried out either on the quality or density data.

17.5 **Resource Block Model**

Wardrop created a block model to represent quality, density, and the extent of the sandstone within the proposed pit shell. The block model origin and size are outlined in Figure 17.5.
Within this model, folders were set up for Rock Type, Density, and Percent, as well as two quality folders, 2040 and 40140. The 2040 folder was used to represent the percentage of sand in the 20 mesh to 40 mesh size range. The 40140 folder represents the percent of sand in the 40 mesh to 140 mesh size range. The rock type model was updated using a sandstone solid built using the bottom of the sandstone, and the bottom of the overlying dolomite horizon. The rock type model was updated so that any block having more than 1% of its volume inside the sandstone model wireframe, was considered to be sandstone. The percent model was updated so that it reflected the percentage of each block that was within the sandstone unit. The density folder was updated using values estimated from the available density measurements.

17.6 INTERPOLATION PLAN

Quality measurements were assigned to the block model using a nearest neighbour approach. The overall variability of the sand quality seems quite low, so this method was deemed adequate. Only blocks that had a sandstone rock type were estimated.

Density measurements were more plentiful and widely distributed. Wardrop estimated the sand density using an inverse distance squared (ID²) method. This method searched for sample results using a search radius of 1,000 m horizontally,
and 20 m vertically. A minimum of two samples, up to a maximum of five samples, was required to estimate any single block.

17.7 **MINERAL RESOURCE CLASSIFICATION**

Several factors were used in the determination of the mineral resource classification as follows:

- CIM requirements and guidelines
- experience with the Winnipeg Formation sandstone
- spatial continuity of mineralization.

No known environmental, permitting, legal, title, taxation, socioeconomic, marketing or other relevant issues are known to the authors that may affect the estimate of a mineral resource. Mineral reserves can only be estimated on an economic evaluation that is used in a preliminary feasibility or a feasibility study on a mineral project; therefore, no reserves have been estimated. As per NI 43-101 standards, mineral resources that are not mineral reserves do not have economic viability.

Wardrop has classified the Minago sandstone as an Indicated resource. The lateral extent of the sandstone unit has been outlined on a regional basis. On a local basis, within the proposed pit shell, the size, shape and density of the sand are well documented. The sand quality has been tested and shows little variation between samples.

17.8 **MINERAL RESOURCE TABULATION**

Wardrop estimates that the proposed pit shell contains 15 million tonnes of sand. Of this, 13% will report to the 20/40 size fraction, and 71% will report to the 40/140 size fraction. These size fractions can be broken down into additional size categories as required.

17.9 **BLOCK MODEL VALIDATION**

Wardrop used a nearest neighbour approach for the quality, and an ID² approach for the density of the sandstone. A visual comparison of the block values with the estimation variables was conducted, and the estimation appeared reasonable.
18.0 OTHER RELEVANT DATA AND INFORMATION

This section is not applicable.
19.0 INTERPRETATION AND CONCLUSIONS

Wardrop estimates that the proposed pit shell contains 15 Mt of sand. Of this, 13% will report to the 20/40 size fraction, and 71% will report to the 40/140 size fraction. The sand can be broken down into additional size fractions as required.

Based on the depositional model of the Winnipeg Formation sandstone, Wardrop expects the frac sand quality of the sandstone within the confines of the proposed pit shell to be fairly uniform. The size distribution of the sand particles that have been sampled is consistent across the area of the proposed pit shell. Initial testing of a sample composite indicates that a viable frac sand product can be produced from the resource. Drill hole intersections and density measurements have been sufficient to establish the tonnage of the deposit with a reasonable degree of accuracy.

Cementation of the sandstone is a post-depositional feature. Poor core recovery should not be a limiting factor in sample selection. Instead total sample volume should be considered for testing and resource estimation purposes.

There has not been enough testing of the frac sand to evaluate a quality control or quality assurance program. Comparison of Loring lab results with Outotec's test work shows that recovery of the sand is dependent on the processing method chosen. Wardrop chose to base its resource estimation on the more conservative Loring results. Additional testing may show that the higher values reported by Outotec are appropriate. The sand quality parameters appear to be constant across the area of the proposed pit, and the style of mineralization also supports this.
20.0 RECOMMENDATIONS

The Winnipeg Formation sand in the Minago Deposit area is considered viable for frac sand production. The sand deposit is very continuous regionally, and the fact that the sand varies in consolidation throughout the unit interval has no bearing on the quality of the actual quartz grains. Shale interbeds are practically non-existent and the sand in this area can be thought of as blanket-like in depositional extent.

Although the API RP 56 standard results differ between labs, testing has shown that the Minago sand is very favourable for frac sand. Wardrop recommends that a further five Winnipeg Formation core samples from drill holes located within the proposed pit excavation area be tested. As complete “cored” intervals of the formation are rare and core recovery varies from 15% to 98%, samples should be collected from the intervals with the highest recovery rates. Wardrop recommends the entire interval of the Winnipeg Formation be sampled and tested, whether they are indurated or not. One-half of the core should be retained for future testing. One of the retained core samples should be used as a duplicate. If available, a sample of Winnipeg Formation sand (preferably from Black Island), should be included for quality control along with the duplicates. The Manitoba Geological Survey could provide a sample for the Winnipeg Formation. Wardrop expects the costs of this program will be $4,000.
21.0 REFERENCES

API, 1995: Recommended practices for testing sand used in hydraulic fracturing operations, American Petroleum Institute, Recommended Practice 56, 2nd Ed., 11 pp.


Daren Resources Ltd. 1998. Assessment Report 63L10-NW-0131


Holocene Resources Ltd. (two refs) Still need refs


22.0 CERTIFICATE OF QUALIFIED PERSON

22.1 CERTIFICATE FOR CLIFFORD JOSEPH DUKE, P. ENG.

I, Clifford Joseph Duke, P. Eng., of Beausejour, Manitoba, do hereby certify that as a contributing author of this report titled “Minago Frac Sand NI 43-101 Compliant Technical Report” dated August 20, 2009, I hereby make the following statements:

• At the time of writing, I was a Senior Geological Engineer with Wardrop Engineering Inc. with a business address at 400-386 Broadway Avenue, Winnipeg, Manitoba, Canada, R3C 4M8.
• I am a graduate of the University of Manitoba (B.Sc. Geological Engineering, 1984)
• I am a member in good standing of the Association of Professional Engineers and Geoscientists of the Province of Manitoba (Registration #23030), and a member in good standing of the Association of Professional Engineers of Ontario (Registration #90544032).
• I have practiced my profession continuously since 1986.
• I have read the definition of “qualified person” set out in National Instrument 43-101 (NI 43-101) and certify that, by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a “qualified person” for the purpose of NI 43-101.
• My relevant experience includes 23 years of experience in resource estimation, mine geology and production.
• I am responsible for the preparation of all sections of this technical report titled “Minago Frac Sand NI 43-101 Compliant Technical Report” dated August 20, 2009.
• I have no prior involvement with the property that is the subject of the Technical Report.
• As of the date of this Certificate, to my knowledge, information and belief, this Technical Report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.
• I am independent of the Issuer applying the tests set out in Section 1.4 of National Instrument 43-101.
• I have read National Instrument 43-101 and the Technical Report has been prepared in compliance with National Instrument 43-101 and Form 43-101F1.

Signed and dated this 20th day of August, 2009 at Winnipeg, Manitoba.

"Original document, version 03, signed and sealed by Clifford Joseph Duke, P.Eng."

Signature
22.2 **CERTIFICATE FOR RUTH BEZYS, P.GEO.**

I, Ruth Bezys, P. Geo., of Winnipeg, Manitoba, do hereby certify that as a contributing author of this report titled “Minago Frac Sand NI 43-101 Compliant Technical Report” dated August 20, 2009, I hereby make the following statements:

- At the time of writing, I was a Senior Geologist with Wardrop Engineering Inc. with a business address at 400-386 Broadway Avenue, Winnipeg, Manitoba, Canada, R3C 4M8.

- I am a graduate of the University of Manitoba (B.Sc. (Hons.) Geology) in 1984, and a graduate of McMaster University (M.Sc.- Geology) in 1987.

- I am a member in good standing of the Association of Professional Engineers and Geoscientists of the Province of Manitoba (Certificate No. 20122) and a member in good standing of the Association of Professional Engineers and Geoscientists of Saskatchewan (Certificate No. 15994).

- I have practiced my profession continuously since 1987.

- I have read the definition of “qualified person” set out in National Instrument 43-101 (NI 43-101) and certify that, by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a “qualified person” for the purpose of NI 43-101.

- My relevant experience includes 22 years of experience in Manitoba Paleozoic stratigraphy including the Ordovician Winnipeg Formation, which hosts the Minago Deposit frac sand.

- I am responsible for the preparation of sections 1,3,4,6,7,8,9,10,11,12,13,19 and 20 of this technical report titled “Minago Frac Sand NI 43-101 Compliant Technical Report” dated June 2, 2009.

- I have no prior involvement with the property that is the subject of the Technical Report.

- As of the date of this Certificate, to my knowledge, information and belief, this Technical Report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

- I am independent of the Issuer applying the tests set out in Section 1.4 of National Instrument 43-101.

Signed and dated this 20th day of August, 2009 at Winnipeg, Manitoba.

"Original document, version 03, signed and sealed by Ruth Bezys, P.Geo."

Signature
APPENDIX A

DRILL HOLE LOGS
APPENDIX E

LABORATORY TESTWORK RESULTS AND ANALYSIS