Seine River Watershed – SoW Inputs, MB Geological Survey

Surficial Geology

The surficial sediments in the watershed are primarily till, glaciofluvial sand and gravel and glaciolacustrine sand, gravel and clay. Holocene organic deposits occur in the northeast part of the area. The units are shown on a **surficial geology map** and a **depth to bedrock map** which accompany this report.

The surface till in the area is primarily silty with a high carbonate content. An older, sandy till outcrops in a few locations. The glaciofluvial deposits consist of sediments of a wide range of grain size (from sand to boulders) and of varying depths (up to >15 m for some deposits). The beach ridges are more uniform in material and depths. They usually contain 2 to 3 m of sandy pebble gravel.

The eastern half of the watershed is underlain by silty clay deposited in deep basin areas of glacial Lake Agassiz. Clay thicknesses are variable and range from < 5 m to >20 m. The clay plain has a gentle ridge and swale topography in places. The ridges are 1-3 m high, with 1- 3 km spacing and are oriented southeasterly. The clay plain is also marked by randomly oriented, curvilinear ridges that are generally about 1 m high. The western part of the area lies above the elevation of clay deposition but beach ridges and areas of littoral sand attest to the presence of Lake Agassiz over the area.

Late Glacial History

The general sequence of events during the Late Wisconsinan glaciation of Manitoba has been outlined by several authors and the following is a compilation of their work.

Manitoba was glaciated by ice from two centres of outflow; the Labradorean and Keewatin ice domes. During the Late Wisconsinan, in southeast and central Manitoba, ice first advanced from the northeast to an undetermined western limit while Keewatin ice flowed over the western part of the province. During deglaciation, the Keewatin ice stagnated on the uplands.

As the Labradorean ice retreated, it split into two lobes: the Red River Lobe in the Manitoba Lowlands and the Rainy Lobe in southeastern Manitoba. The Rainy Lobe stabilized while the Red River Lobe advanced southeastwards, eventually reaching Iowa. The Belair, Milner Ridge and Sandilands Interlobate moraines were formed between the two ice lobes during temporary halts as the Red River Lobe advanced.

A series of readvances characterize the overall retreat of the Red River ice from southern Manitoba. Since natural drainage is to the north, meltwater ponded against the retreating ice front, forming glacial lakes. Glacial Lake Agassiz was the largest of these, covering parts of Ontario, Manitoba and Saskatchewan. The lake has a four part history: 1) the high water Lockhart phase during which the lake drained south to the Mississippi River and the Gulf of Mexico, 2) the low water Moorehead phase during which the lake drained through eastern outlets to the Atlantic Ocean, 3) the high water Emerson phase when drainage was again south to the Gulf of Mexico and 4) the Morris phase when the lake finally disappeared from the continent.

Within the watershed, the Rainy Lobe deposited the sandy till that is occasionally seen in outcrop. The Red River Lobe deposited a calcareous silty till, often in southeast-oriented ridges (flutes) ; the straight ridges in the west are a result of clay deposits reflecting the underlying fluted till surface. The eskers and outwash deposits were formed by meltwater carrying sediment to the ice front as this glacier retreated.

The deposit at Blumenort is a moraine formed along the ice front during a halt in the overall retreat of the Red River Lobe. As the ice retreated, Lake Agassiz formed and the silty clays were deposited in the basin. Beach ridges formed along the lake shore and islands as the lake retreated from the area. Icebergs calving from the ice front scoured the clay floor resulting in the subtle, curvilinear ridges that mark the plain.

Mineral Rights

There is no simple answer as to who owns the mineral rights on a parcel of land--it depends on what is on the title. There are some broad general rules but each time the land changes hands, the seller could have retained certain rights or split titles. Often there are the words "excepting out" followed by a list of minerals, meaning the seller has retained ownership of those minerals, however occasionally the title states "valuable stone". In some instances, that has been considered to mean sand and gravel. In other cases, quarter or half interests of the mineral rights have been retained or split among heirs. So the only certain way to tell who owns what rights is to go to the appropriate Land Titles office and examine the wording on the title.

Having said that, the following is the case for most titles. There are usually three parts to the title of any piece of land: 1) the surface rights, 2) the sand and gravel rights and 3) the mineral underrights. Whether these rights are crown or private depends on when the land was homesteaded (or first title issued):

- Prior to Jan 11/1890, everything went to the purchaser except gold & silver with some exceptions. e.g. the lands given to the Hudson Bay Co. when they deeded their charter lands to Canada.

- Between 1890 & July 15/1930, mineral underrights were retained by the Canadian government. Sand & gravel was not included in this. During this time, sand & gravel ran with the surface title unless specifically excepted out on the new title when the land was resold.

- Subsequent to July 15, 1930 Manitoba became the Crown. Only the surface rights went to the purchaser and the sand & gravel and mineral underrights were retained by the Crown.

Unless the land reverts to the Crown during a tax sale, the private rights on the original title are conveyed to the new owner--unless the seller "excepts out" things they want to retain rights to.

Crown-owned mineral rights, excluding oil and gas, are administered by the Mines Branch of the Department of Science, Technology, Energy and Mines.

Petroleum Branch regulates oil and gas production in the province. Under the Mines Branch, minerals are divided into quarry minerals and other minerals, primarily metals.

Quarry Minerals Regulation (Manitoba Regulation 65/92) lists the minerals which are considered "quarry minerals". Crown quarry minerals are extracted either under a quarry lease, which gives the holder exclusive rights to the commodity listed on the lease, or by casual quarry permit. The permit is for a designated area and many contractors can remove material from the deposit.

Minerals other than those designated as "quarry" are regulated under the Mineral Disposition and Mineral Lease Regulation (Manitoba Regulation 64/92). Initially an exploration company will take out a mineral claim, often several claims as a block covering a large area. If a viable deposit is discovered, the claim will be converted into a mineral lease before mining takes place.

Regulation of Aggregate Resources

Aggregate extraction is regulated through the Quarry Minerals Regulation (Manitoba Regulation 65/92) under the Manitoba Mines and Minerals Act, through policies under the Planning Act and through municipal development plans and their zoning by-laws. Policy #9 under the Planning Act is designed to protect high quality mineral resources from conflicting land uses until the resource has been extracted. Most development plans include maps showing high quality aggregate deposits. Zoning by-laws identify where extraction is allowed or excluded; the by-laws may set strict land use controls on mining.

The Quarry Minerals Regulation sets standards for such things as safety slopes, setbacks from adjacent property lines and waterways, noise levels and location of petroleum storage, etc. It also provides for the "Pit and Quarry Rehabilitation" program. Under this program, landowners can apply to have depleted or abandoned gravel pits and quarries rehabilitated to a standard that is "safe, environmentally stable and compatible with adjoining lands".

Mineral Resources in the Seine River Watershed - *Quarry Mineral Leases and Mining Claims*

Mining claims and quarry leases are shown on an attached map.

- There are sixteen mining claims in the watershed area; all are for diamond potential.
- There are five aggregate quarry leases--two are active and three are unopened. The leases are all for sand and gravel;
- There are no bedrock quarries in the watershed.
- There are six peat leases; of these, three are in active production.

While Lake Agassiz clay has been used for such things as manufacturing bricks and portland cement, there are no current operations within the watershed area utilizing this material. Silica sand, ranging in purity from 70% to 95% SiO_2, is present in some of the glaciofluvial sand deposits east of Steinbach. High purity silica sand is present at depth but attempts to mine the sand have been unsuccessful.

Aggregate Resources

The Seine River Watershed has an abundance of aggregate resources found in glaciofluvial and glaciolacustrine sand and gravel deposits. **An attached map shows the distribution of these aggregate deposits** across the area **as well as the locations of gravel pits.**

The glaciofluvial deposits occur as outwash plains or as linear ridges. Most of these deposits are at least partially overlain by till deposits. The material in glaciofluvial deposits is highly variable and they commonly contain aggregate ranging from boulders to fine sand. They are generally much thicker than beach deposits and in the Seine watershed area, they can reach >15 m deep. They contain large quantities of good quality gravel, with a 65 – 85% carbonate lithology. However, much of the remaining reserves in these deposits, particularly the eskers, lie below the water table and some are being mined by dragline.

As described in the surficial deposits section, the glaciolacustrine sand and gravel deposits are beach ridges formed during the regression of Lake Agassiz. The beaches overlie glaciofluvial deposits in places. The deposits are most often 2 to 3 m thick, consisting of interbedded sand and pebble gravel. The lithology is primarily carbonate pebbles with the balance formed of Precambrian clasts. Most of the deposits have had gravel extracted from them; the largest deposits have been long standing sources of gravel.

Suggested References

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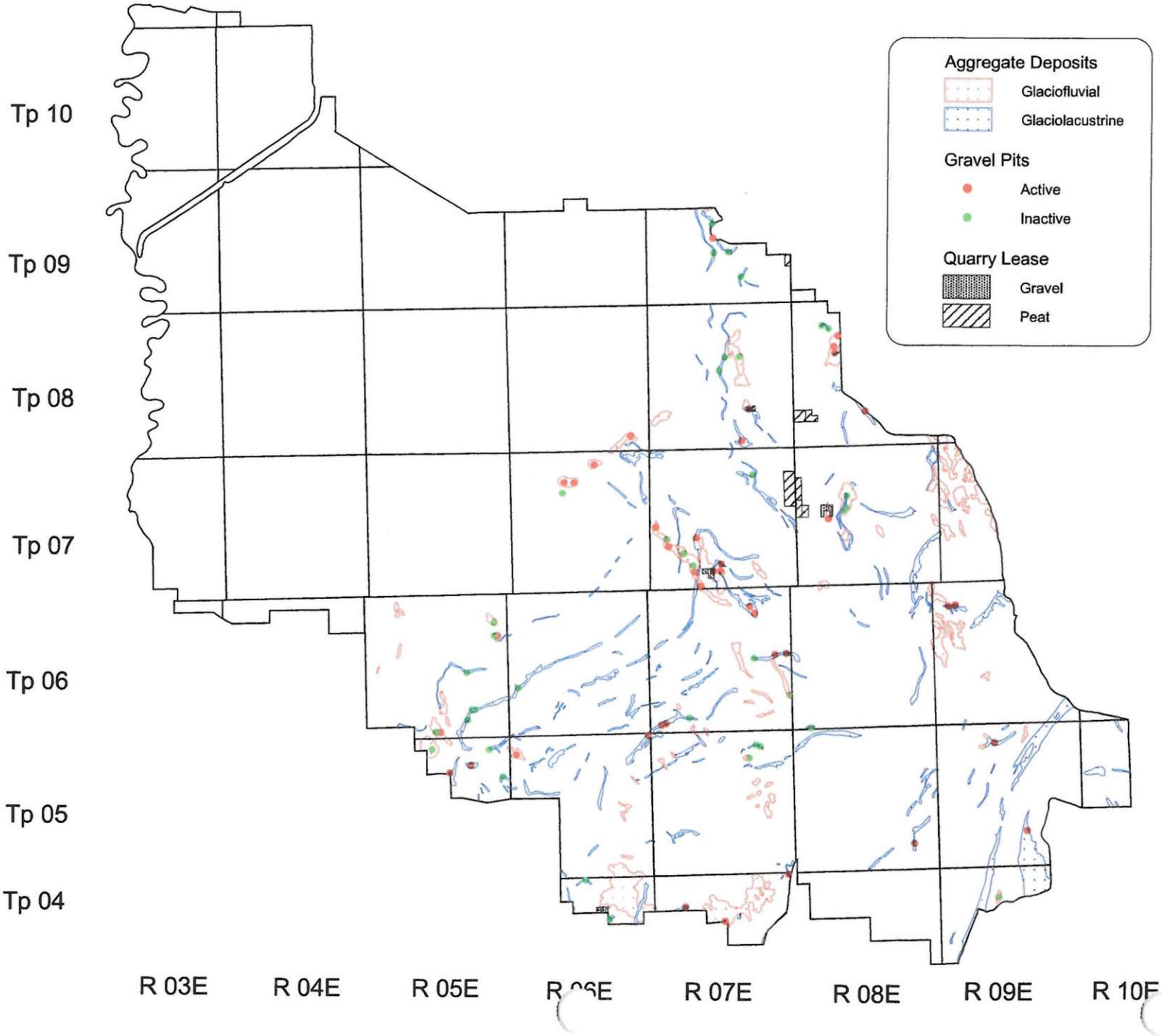
Teller, J.T., Thorleifson, L.H., Matile, G. and Brisbin, W.C. 1996: Sedimentology, geomorphology and history of the central Lake Agassiz basin (Field trip B2); Geological Association of Canada – Mineralogical Association of Canada Joint Annual Meeting, 1996, 101 p.

Seine River Watershed



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