2008 Fall Field Trip

OFR ME 2008-2

Selected Mineral Deposits and Sites of Geological Interest in the Cumberland Basin, Northern Nova Scotia

Field Trip Leaders

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September 27th and 28th, 2008

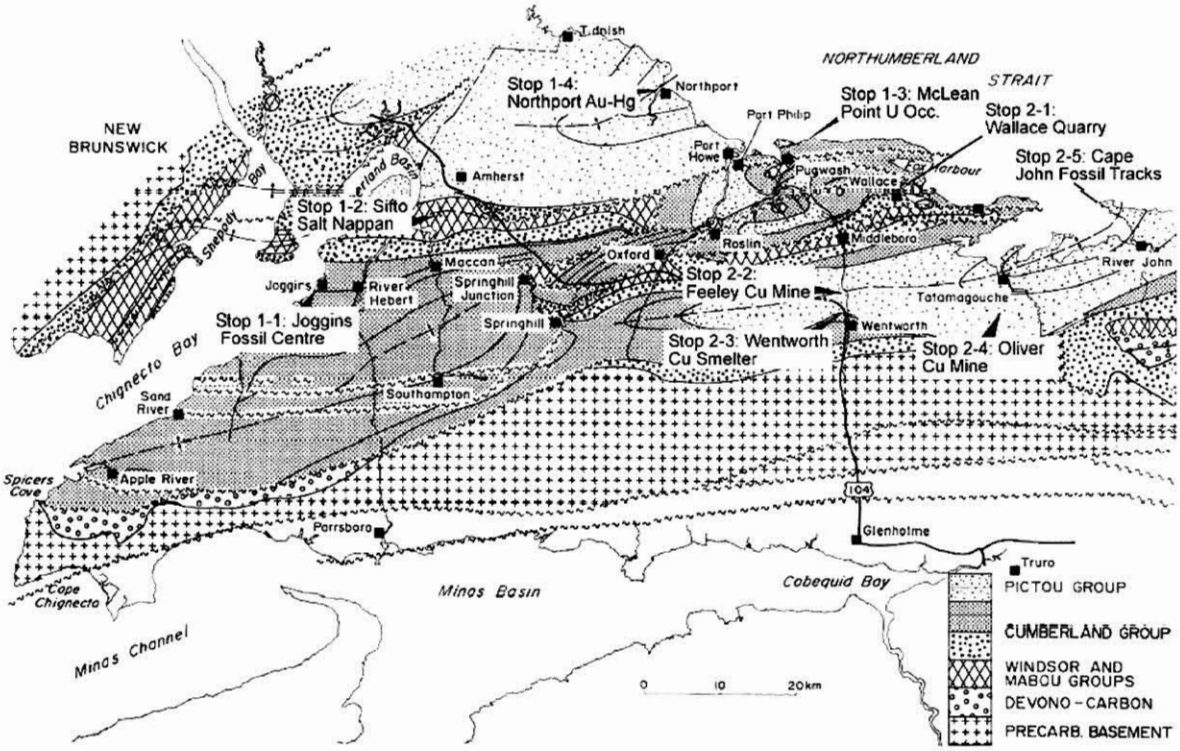

Figure 1 Geology of the Carboniferous age Cumberland Basin of northern mainland Nova Scotia showing the location of field trip stops.

Day 1 - Saturday, September 27, 2008

Stop 1-1. Joggins Fossil Centre.

Directions:

Depart from the Super 8 Motel and drive south on Highway #2 for 2.5 km and turn right on to Highway #302 to Nappan. Follow Highway #302 for 8.7 km to Maccan and the intersection with Highway #242 on the right. Follow Highway #242 for 19 km through the communities of River Hebert and Joggins to the Joggins Fossil Centre. The route to the centre is well marked.

Background and Description:

This past summer, the Joggins Fossil Cliffs received the very prestigious designation as a United Nations Educational, Scientific and Cultural Organization (UNESCO) Wold National Heritage Site. UNESCO thus recognizes Joggins as the world's most complete fossil record of the Carboniferous (300 million years ago) "Coal Age". A time when this region had a tropical climate and was covered with lush, swampy forests rich in organic matter.

This designation is the successful and exciting end of 15 year process of studies, proposals and applications on the part of numerous persons and organizations none of whom were more important than NSDNR's own Dr. John Calder. This designation will have profound implications

on the international stature of Joggins and area and, no doubt, will spin off significant economic benefits to the region. In fact, perhaps the first recognizable benefit is the construction of the beautiful and impressive Joggins Fossil Centre immediately adjacent to the most oft used access point to the beach and the richly fossiliferous cliffs. The centre is a just completed, state-of-the-art facility with a design that incorporates the features that make the Joggins cliffs unique and attractive. It also is serving as a central repository to house and display numerous, world-class examples of Joggins fossils that, until now, had been found in scattered locales about the region and internationally. At this stop we will have a chance to visit and enjoy this new facility. As well, if tidal conditions allow, we may visit a portion of the cliffs exposed close to the access entrance to the beach.

Stop 1-2. Sifto Salt Solution Salt Mining Operation at Nappan.

Directions:

Leave Joggins Fossil Centre and return via Highway 242 through Joggins and River Hebert to Highway #302 at Maccan. Drive north toward Amherst on Highway #302 for 5 km to a sharp, right hand turn in the highway at Nappan. At this turn, follow the road that leads north from Highway #302 across the Nappan River for 1.4 km to Smith Road on the right. Follow Smith Road for 1.4 km to the Sifto Salt Plant.

Stop Description:

Although referred to simply as a plant, in reality Sifto's Nappan salt operation is actually a type of mining which is formally termed "solution mining". Simply put, the mining of the salt takes place via drilling into a salt deposit, introducing water which dissolves the salt and this brine solution is subsequently collected and evaporated in a plant to produce a relatively pure salt precipitate (Fig. 1-1). These "evaporation plants" produce the highest purity salt in a variety of products such as table salt, food processing salt, salt for salt licks for animals and for water softening salt. Sifto's Nappan operation is one of 3 salt plants they operate across Canada.

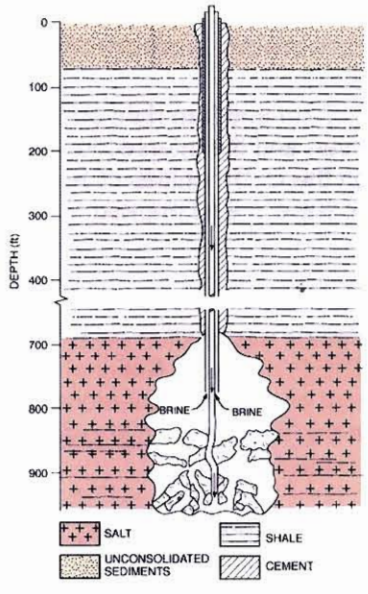

Figure 1-2 Schematic of the solution mining process for salt.

In the solution mining process, the salt, which typically occurs in thick beds or teardrop shaped salt domes, is penetrated by one or more drillholes (Fig. 1-1) for introducing the water and the brine is then collected either through the same drillholes or by way of a series of collector drillholes. The collected brine is then evaporated in a series of large vessels called vacumn pans. As the water evaporates, the salt settles and forms a slurry which is removed to a classifer tank where the sulphates are removed. Following this, the salt is passed into a filter-dryer and then on to the final processing area where they produce perfectly crystallized concentrates of greater than 99.8% sodium chloride.

Removing the salt from their deposits in the ground results in a cavern being created within the salt structure. However,

generally, the salt is at a sufficient enough depth that collapsing or subsidence of the rock above the cavern does not occur. By nature, salt domes at depth behave very plastically and self-heal any fractures or ruptures that occur within them and as such they are very dry and impermeable to water. Otherwise, if water easily penetrates, and salt being what it is, the circulating groundwater would have long since naturally dissolved the deposit away. These manmade caverns have many commercial uses, and are exploited in many areas as sites of underground storage of hydrocarbons like natural gas and even industrial wastes. They have also been considered as possible sites for the storage of the excess energy created by renewable energy production operations during periods of low demand from the grid. They have even been suggested as sites for disposal of CO_2 scrubbed from the exhausts of fossil fuel burning power generators.

Stop 1-3. McLean Point Uranium Occurrence.

Directions:

Leave the Sifto salt plant and continue east along Smith Road for 3.4 km to where it intersects Highway #2 about a kilometre south of Exit 4 on the TCH. Drive north on Highway #2, past the TCH overpass through a set of traffic lights to another set of lights at the corner of John Black Road and Highway #2 (now called Albion St.). You will note a Smitty's Restaurant on the opposite corner. Turn right and follow John Black Road for about 5 km to where it intersects Highway #6 to Pugwash northeast of the town of Amherst. Turn right on Highway #6 and drive to the town of Pugwash some 40 km distance. At the stop sign you come to on entering Pugwash, turn right and proceed 200 m to Gulf Shore Road on the left. Follow Gulf Shore Road for 4.4 km to the Natural Resources Gulf Shore Provincial Park on the right. We will meet in the parking lot and proceed on foot east along the shore to McLean Point.

Geology of the Copper and Uranium Occurrences in the Cumberland Basin:

Numerous Cu deposits, some of which were mined on a small scale in the latter part of the 19th century and early in the 20th, are found throughout the Cumberland Basin Carboniferous sediments (Fig. 1-3a). During the 1950's it was recognized that many of these Cu occurrences also contained appreciable amounts of U in a mineralization style quite similar to deposits of U that were being mined at that time throughout the Colorado Plateau area of the USA. This recognition spurred some exploration interest in the potential for economic sized deposits of U and several exploration projects were run at that time. A second pulse of uranium exploration occurred from 1975 up to the calling of the provincial uranium moratorium in 1981. This exploration was mostly focused, in two broad areas, one more or less centred at Tatamagouche and another at Pugwash. These exploration efforts determined that the U occurrences were generally of low grade bút widespread in occurrence. Studies on the geology of the U occurrences determined that two main mineralization styles are present: (1) classic roll front deposits; and (2) concentrations of U minerals replacing and adjacent to organic detritus within reduced horizons that occur within sequences of highly oxidized red bed sediments. Both these mineralization styles share a relationship with each other in that they have formed by a similar process. They really only vary in their size in that the former are typically much larger than the latter.

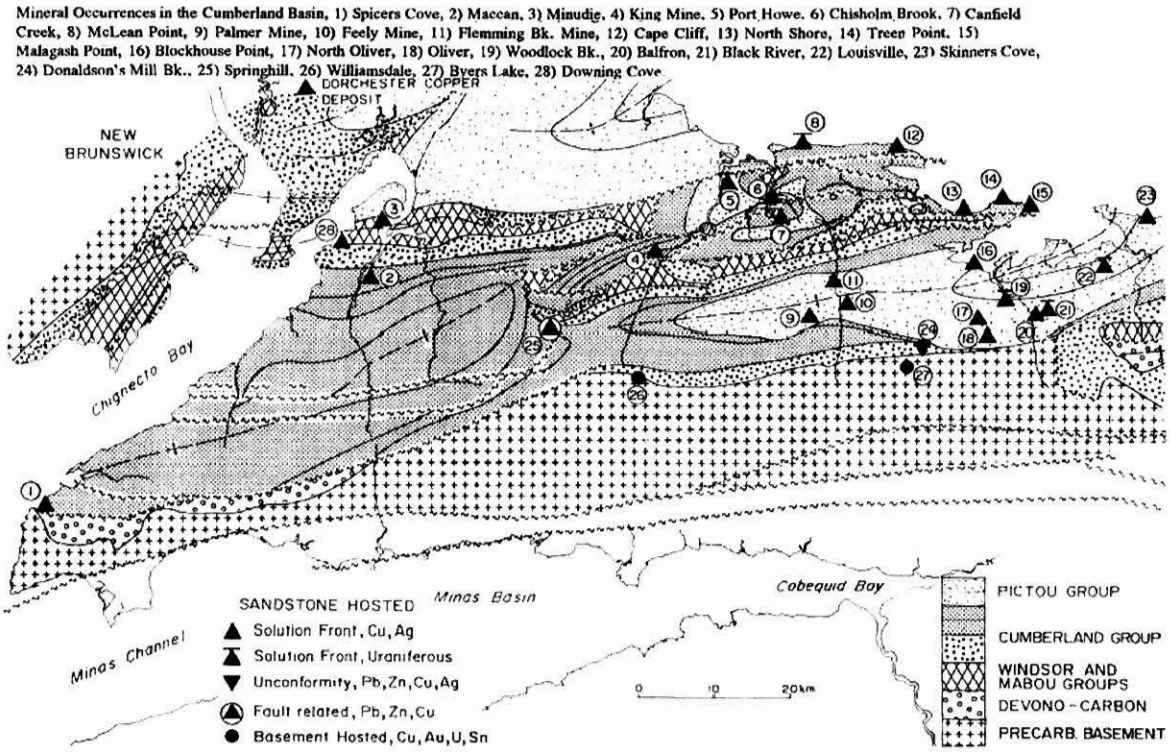

Figure 1-3a Geology of the Cumberland Basin showing examples of the main mineral deposit types.

From an economic standpoint, prior to calling of the uranium moratorium, it remained to be demonstrated whether or not the U deposits that are frequent throughout the Cumberland Basin are of mineable proportions. However, the exploration work that was done, most notably the well water surveys for U and Rn content, clearly demonstrated that the presence of elevated levels of these radionuclides is widespread throughout this region. In many incidences the level of U in the well waters exceeds Health Canada's 20 ppb guideline as given in the Guidelines for Canadian Drinking Water Quality.

Uranium may occur in two valence states U^{4+} and U^{6+}. The geochemistry of U in nature is complex, but in general terms, it can be said that under oxidizing conditions (i.e. in environments in which there is an abundance of oxygen) U is oxidized to the U^{6+} state and is highly mobile and can be easily dissolved and transported in water. Conversely, under reducing conditions (i.e. in environments of low oxygen availability), the U reverts back to the U^{4+} state and is far less soluble in water. As a result, waters migrating trough geological sequences are very much influenced by the chemical composition of the rocks through which they are passing such that chemistry of the rocks is often imparted into the water. The late Carboniferous sedimentary rocks of the Cumberland Basin are typically alternating sequences of red and grey sandstone, siltstone and conglomerate all of terrestrial origin. The red coloured units are the result of deposition and formation under highly oxidized conditions, hence their red, hematized colour, and the grey units are the result of formation under low oxygen, reduced conditions. Water migrating through the red bed sequences will have a resultant highly oxidized state and waters within the grey sequences will be reduced. Uranium will be U^{6+} within the red beds and thus will remain in solution but when this same water encounters the grey reduced beds,

especially in portions containing highly reductant plant detritus and coaly fragments, the U will be changed to the U^{4+} state and precipitate quite rapidly from the water. In geology, these reactions are termed Redox reactions (Reduction/Oxidization) and the transition from oxidized conditions to reduced conditions, and vice versa, are know as crossing the Redox boundary.

Stop Description:

Uranium mineralization at McLean Point was discovered by Lacana Mining Corporation in 1976 during a regional uranium exploration program of the Pugwash area. Three samples collected from 10 metre intervals along a 30 m long zone returned values of 0.174% (1740 ppm), 0.013% (130 ppm) and 0.08% (800 ppm) U_3O_8. It was in the fall of 1976 that I examined the site with Dr. A. K. Chatterjee who subsequently reported his findings on the geology and mineralogy of the occurrence in the Departments Report of Activities (Report 77-1) the following year. Figure 1-3b is a map of the McLean Point area taken from Chatterjee's report. The geology of the McLean Point occurrence conforms quite closely with the geological features outlined in the above section in that along the shore the mineralization is hosted within grey units of coarse and medium grained sandstones (reduced beds) interbedded with thick units of oxidized red bed

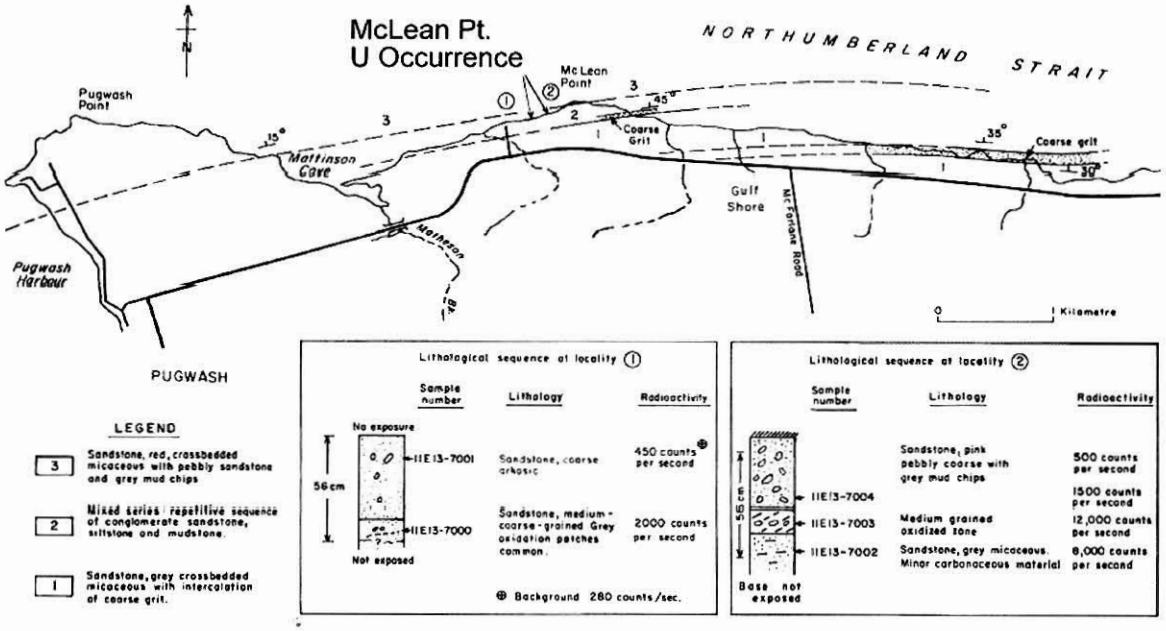

Figure 1-3b The geology of Stop 1-3, the McLean Point U Occurrence, Cumberland County.

sandstones. More specifically, the zones of uranium mineralization within 125 to 30 cm thick beds of grey sediment in which are concentrated abundant plant fragments and other organic detritus. Along strike of the occurrence toward the west some of the beds of grey sandstone exhibit anomalous radioactivity in the order of 2 to 3 times background. This radionuclide elevation may not have significant economic implications but from an environmental standpoint it is worthy of note. Groundwater circulating through these aquifers will come in contact with uranium bearing minerals and quite possibly these minerals will pass some of their U content in to these waters.

The study by Chatterjee included x-ray diffraction work that defined a host of U-bearing minerals exist within the mineralized zones. The U-bearing suite of minerals he determined are the oxides becquerelite, billietite, schoepite and clarkeite, the sulphate zippeite and the phosphates bassetite and meta-uranocicrcite. As well, he noted the presence of what may be the multiple oxide davidite. All of these minerals were determined by x-ray diffraction of mineral separates and none are recognizable in hand specimen.

Stop 1-4. Northport Au-Hg Beach Placer.

Directions:

Return to Pugwash and take Highway #6 toward Amherst. There are 3 routes one can take to Northport but the easiest and most scenic is to drive as far as about a kilometre past the bridge over River Philip and turn right on to Highway #366. Follow this coast road past the community of Linden to Northport and turn right into the government wharf parking lot immediately before the bridge over the Shinimicas River (Fig. 1-4).

On leaving this stop to return to Amherst, there is a road leading from Northport to the community of Shinimicas Bridge which is about half way between Pugwash and Amherst. This road intersects Highway #366 at Northport about a couple of hundred metres east from the bridge over the Shinimicas.

Background and Stop Description:

If you suggest to most geologists that are knowledgeable of Nova Scotia geology that there may be gold deposits within the Cumberland Basin sedimentary rocks you are likely to be met with a blank stare and disbelieving grunt. However, there are several features that come together to strongly suggest there is potential for just that, an as yet to be discovered deposit of Au in the Northport area. In 1984, reputable consulting geologist Mike Milner was teaching a prospecting course in New Brunswick when one of the students related to him that Au can be panned from the mouth of the Shinimicas River at Northport. Milner, who has a relative in the Northport area that he visited a short time later, spent some time panning the wave formed wisps of heavy minerals found on the beach immediately east of the government wharf and just below the rip-rap armour stone that lines the east end of the beach. He reports that he did indeed obtain sights of Au and Hg in his pans. Milners reputation is beyond reproach as is his prowess with the gold pan. This would be the first feature of note.

During 1986 and 1987, the Nova Scotia Department of Mines and Energy (now Natural Resources) co-field trip leader Ron Mills ran a stream sediment geochemical survey over northern Nova Scotia. This survey returned two of it's most highly anomalous samples for Au from the Northport area (Fig. 1-4a). This would be feature two.

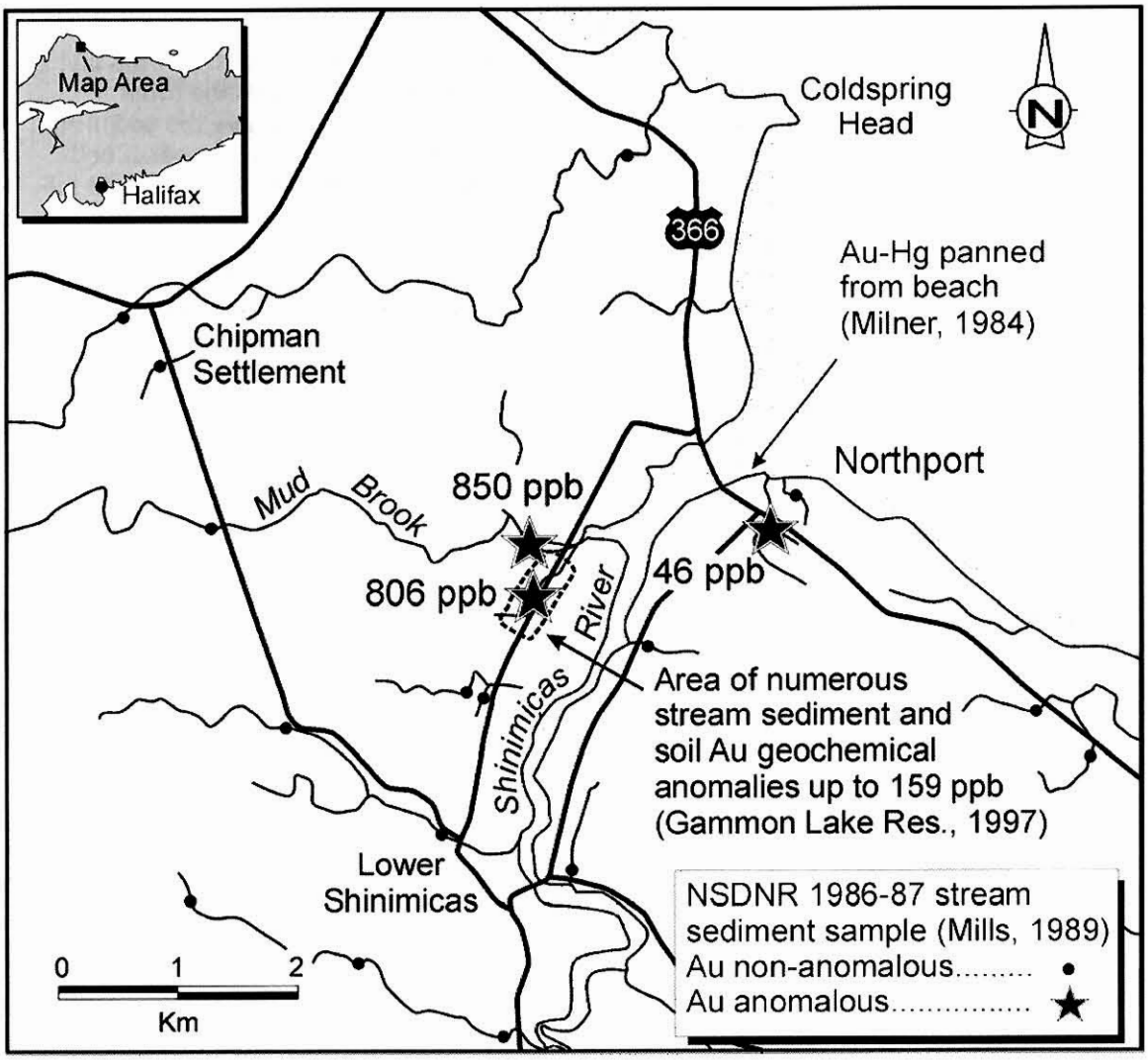

Figure 1-4a Map of Stop 1-4, the Northport Au-Hg Beach Placer, showing the distribution of government and industry stream sediment and soil geochemical samples anomalous for Au.

This geochemical survey result perked the interest of local junior exploration company Gammon Lake Resources who ran an exploration project over the area of the anomalies in 1997. their exploration consisted of a more detailed stream sampling of Mud Brook and the small unnamed stream following the road linking Lower Shinimicas with Highway #366. In addition, they laid a grid over part of this area and collected soil samples. Although they did not obtain Au anomalies of the magnitude of the government survey, their stream samples returned numerous anomalous samples up to 159 ppb Au. As well, their soil sampling returned numerous low level Au positive results. This would be feature three.

Is the concept of there being a Au deposit in the Cumberland Basin rocks so outlandish? Perhaps not. It's a known fact that there are several obscure reports documenting that at least some of the numerous deposits of Cu that pepper the Cumberland Basin had low levels of Au and some even report the existence of Hg. For example, in 1896 the Canadian Mining Review

reported that a 40 ton bulk sample from the Oliver Cu Deposit (Stop 2-1) yielded "appreciable quantities of Au and Ag along with the Cu". The King Cu Mine near Oxford and some smaller Cu prospects near Maccan returned assays of 0.03-0.18 oz/ton Au. Perhaps the most compelling examples are found just across the border in New Brunswick where the sediment-hosted Dorchester Cu Deposit (Fig, 1-3a) and the nearby Aboujagane Cu-Ag prospect both have confirmed minor amounts of Au. These associations would be feature four. You do the math, you're supposed to be out after three strikes. What about after four?

The purpose of this stop is to present and discuss this interesting exploration target and to give you prospectors a chance to do some panning. We are very interested to see if any or all of you can repeat the success that Mike Milner had in 1984 and add yet another chapter to this unfolding story.

Day 2 - Sunday, September 28, 2008

Stop 2-1. The Wallace Sandstone Quarry.

Directions:

Leave Amherst and retrace the route to intersect Highway #6 northeast of the town. Follow Highway #6 to Pugwash as in Day 1. At the stop sign in Pugwash, turn and continue on Highway #6 east to the village of Wallace. In Wallace, drive past the intersection with Highway #307 for about 200 m to Quarry Hill Drive on the right. The Wallace Quarries are at the top of the hill at the end of Quarry Hill Drive.

Background and Stop Description:

Figure 2-1a Quarry workers from a past era at the Wallace Sandstone Quarries.

The sandstone quarries at Wallace, Cumberland County have a storied past and have developed a fine reputation both nationally and internationally. The legacy left from the heyday of the various epochs of activity at the quarries is a source of pride for the local area. Wallace sandstone had many uses from sidewalk blocks, breakwaters, head stones, but it is most famous for its building stone applications.

The story of the Wallace sandstone begins 300 million of years ago when the sandstone formed at the base of a gigantic meandering river system draining part of the Appalachian Mountains which were formed from the Acadian Orogeny. These rivers deposited beautiful clean, well sorted sand as it wound its way out into the ancient seas. The history of quarrying operations of the Wallace sandstone goes well back before the nineteenth century, when early pioneers first worked the stone.

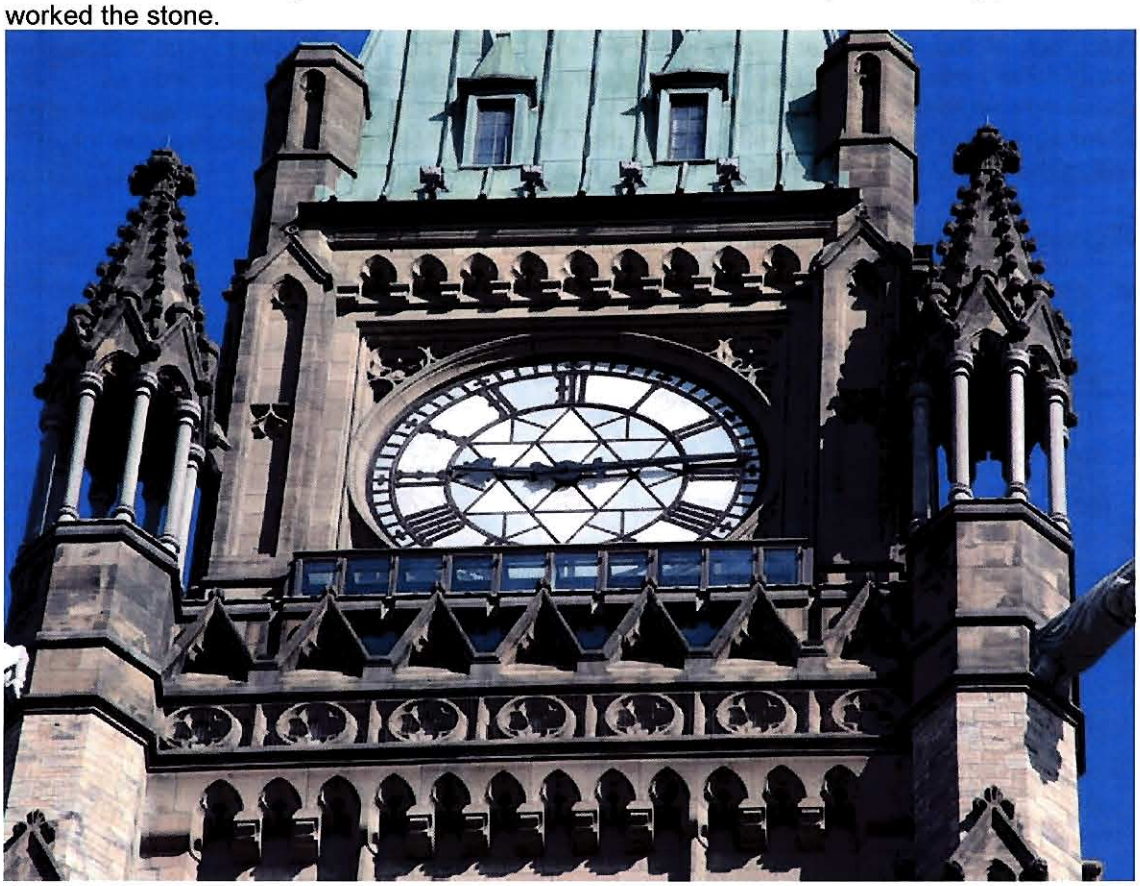

Figure 2-1b Stone from the Wallace Quarries was used in the reconstruction of Canada's Parliament Buildings after they were ravaged by a fire.

The quarries have operated intermittently over the past 200 years and have provided stone for many a major project. Used widely in new buildings, restoration and landscaping, the stone has a reputation for being one of the most durable sandstones in the world and has often been the first choice for architects, stone carvers, and homeowners. Stone from Wallace graces buildings such as the Canadian Parliament as well as churches, universities, government buildings and private homes across North America. It is easily recognizable by it's classic, olive-grey color. You saw Wallace stone used in the Joggins Fossil Centre at Stop 1-1 yesterday.

The quarry has changed hands several times over the last century and a half. The first quarry in the area was opened by architect Robert Scott, who was commissioned to build the Nova Scotia Legislature in 1811. Eventually, several quarries opened along the Wallace River and two in Wallace village but, this particular quarry has outlasted the others. The first largely

commercial operation began in 1863 when the stone was quarried by a local man, William McNab. He quarried and loaded schooners in the Wallace Harbor by means of a scow.

In 1872, a company leased the quarry from William McNab and erected the first cranes for loading schooners bound for Boston, among other places. The quarry was then sold to the Dorchester Union Freestone Company, probably the largest marketer of stone to North America at that time. Based in the United States, they shipped stone regularly to cities up and down the US east coast as well as throughout Canada. They installed a gravity railroad from the quarry to the company wharf which allowed easy loading of schooners for the next 27 years.

In 1912, P. Lyall & Sons , large contractors of their day, purchased the quarry. They modernized the operation with a steam mill for sawing, and installed a large electric crane and steam shovels. They shipped stone all across Canada and the US including rebuilding of the Parliament buildings in Ottawa after a devastating fire consumed all but the library. They continued quarrying sandstone first under the name Wallace Sandstone Quarries Ltd., and then as Wallace Quarries Ltd.

References:

Nova Scotia Wallace Sandstone by Wallace Quarries, Ltd. www.wallacequarries.com

Wallace Sandstone: Building Stone for the Nation. Virtual Museum Canada. Wallace area museum. www.virtualmuseum.ca.

Stop 2-2. The Feeley Cu Mine, Wentworth Centre.

Directions:

Leave the quarry and return down the hill to Highway 6. Turn left and then turn left again on to Highway #307 which leads to Wentworth. Drive south on Highway #307 for 17.4 km to a point at the south end of a farmers field on the right side of the road (Fig. 2-2a). **Care must be taken here as the shoulder of the road is too narrow to allow adequate parking for all of us to park off the pavement.** We have obtained permission of the landowner of the farm field to use his field for parking provided the conditions are dry enough. If the conditions are wet, he has granted us permission to use his driveway which is at the north end of this same field. It will mean a bit longer of a walk, but will be much safer than trying to park on the narrow shoulder.

Stop Description:

The Feeley Cu Mine is reached by walking about 30 metres along a path that leads from the extreme south end of the farm field mentioned above. You will almost immediately notice the waste rock piles related to the past mining activity. **Be extremely careful, as these piles are along the top of a rather steep embankment some 30 m high that is above the Wallace River.** The now collapsed entrance to the adit is located at the base of this embankment along the east shore of the Wallace River. Local people have created a rope- lined walking path that leads down the side of the embankment to the river below. Follow this path and do not try to clamber down the embankment as you will likely not make it without falling.

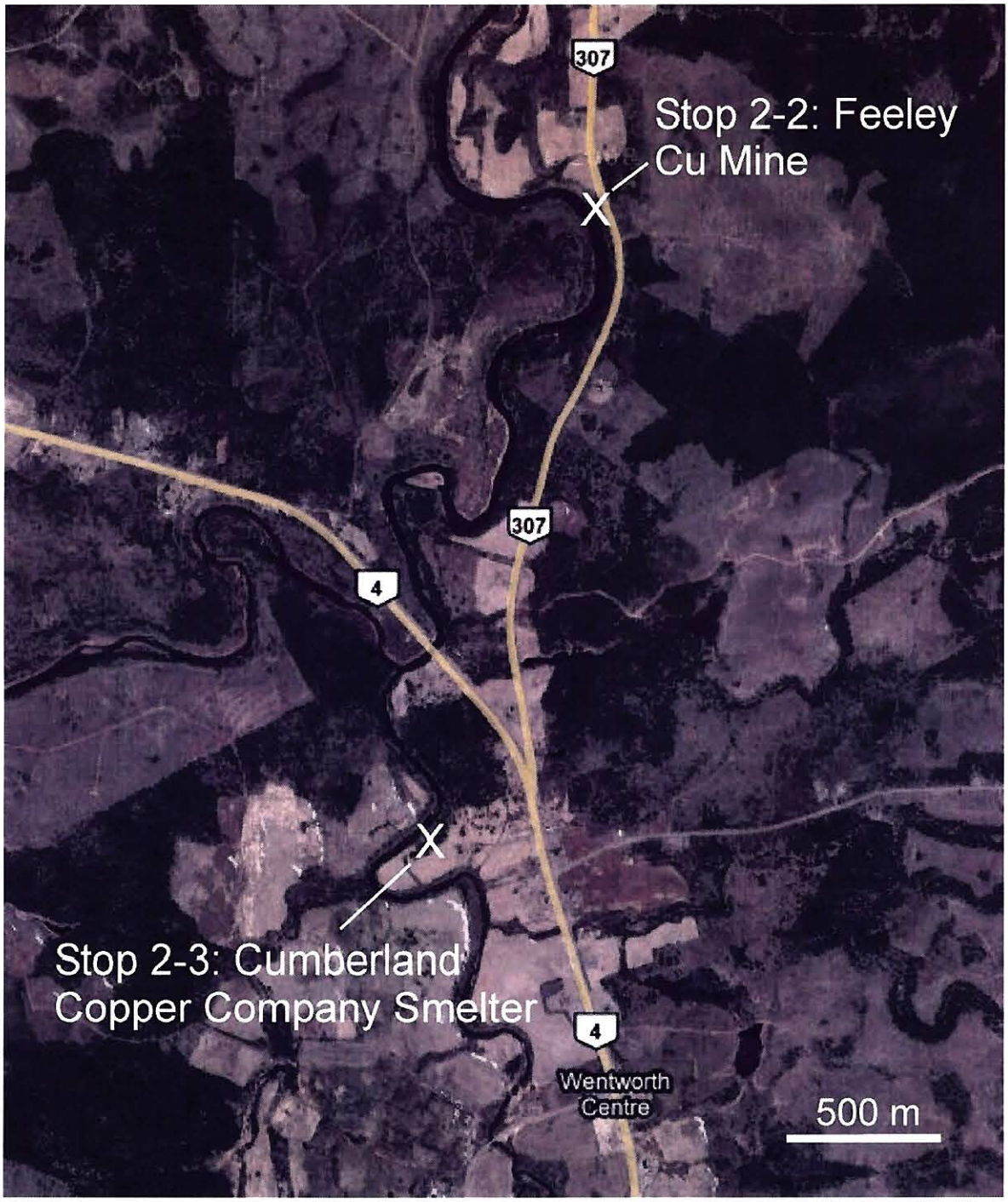

Figure 2-2a Location of the Feeley Cu Mine and Cumberland Copper Company smelter at Wentworth Centre.

Figure 2-2b is a historical photo of the Feeley Mine during it's years of operation in the early part of the 20th century. From this photo you will be able to determine the approximate location of the adit portal. As well, you will find the remnants of the wooden footings of the near vertical

hoist structure that looks like a steep staircase in the photo. Not much remains of the Feeley Mine infrastructure and the only real evidence other than the waste rock piles is the footings mentioned above as well as some remnant broken concrete.

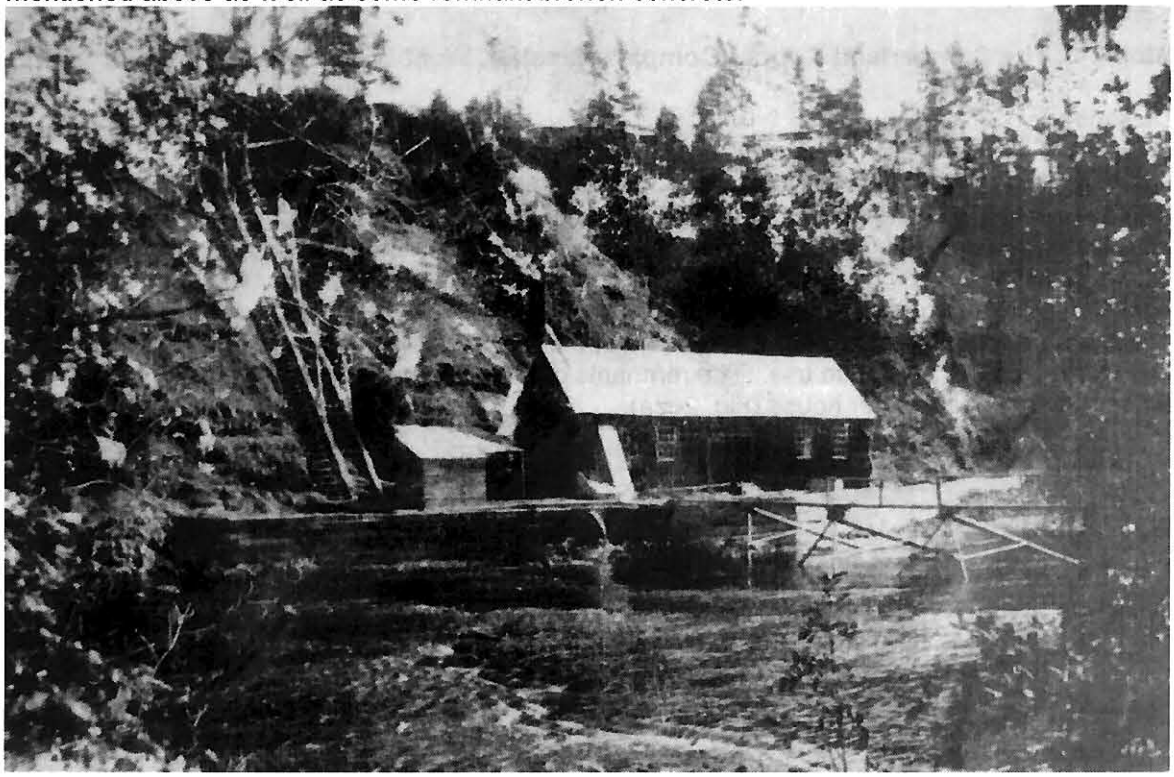

Figure 2-2b The Feeley Cu Mine, on the Wallace River north of Wentworth Centre some time during it's period of operation early in the 20th century.

The Cu ore bearing zone exploited at the Feeley Mine consisted of a flat-lying, finely laminated bed of light to medium grey sandstone rich in organic matter sandwiched between red bed grits and sands. The ore zone does not outcrop but it would be located about half way up the side of the bank. The adit was driven just to the north of east for 80 m and exposed the ore zone along it's roof for some 45 m after which it pinched out. Three metres in from the portal, a drift 38 m long was driven toward the northeast off the main tunnel and this drift, in turn, intersected another drift that also ran north from the main tunnel from a point 23 m from the portal. There are two other short drifts, one 12 m long at 27 m along the main tunnel and another 9 m long at 45 m in.

The reduced horizon was some 3.2 m thick but most mineralization was concentrated along a 50 cm thick, organic rich-layer that formed the top of the reduced sequence. Within this fossil-rich layer were found frequent knots and shoots of chalcocite ore in the form of concretions and replacements of wood fragments. Much of the malachite one sees nowadays is likely a recent phenomena and related to supergene weathering of the original, but now highly unstable, chalcocite. Diligent digging and poking around in the waste rock piles will return samples of the grey to light grey mineralized rock. The dark coloured chalcocite will be difficult to distinguish from the plant fragments but the greenish malachite will be easily recognizable. Chalcocite is one of the most prized sulphides of Cu due to it's high ratio of Cu to sulphur over that found in

most of the other common Cu-sulphides like chalcopyrite and bornite. You will notice a clear association of the degree of mineralization associated with rock samples rich in organic detritus and plant fragments.

Stop 2-3. The Cumberland Copper Company Smelter, Wentworth Centre (Optional Stop).

Directions:

If time permits, we will visit the site of the Cumberland Copper Company Smelter at Wentworth Centre. This judgement will be made the day of the trip. To reach this site, leave the Feeley Mine and continue south on Highway #307 for 2 km to where it intersects old Highway #4. Turn left and drive about 100 m, just passed a now closed ice cream stand, to a long driveway on the right leading to a large farmhouse about 100 m off the road. Follow this driveway almost to the house where we will direct you to park in one of the fields the landowner, Mrs Hope Bridgewater has granted us permission to use. The remnants of the smelter are located in the woods to the right of the field behind her house (Fig. 2-2a).

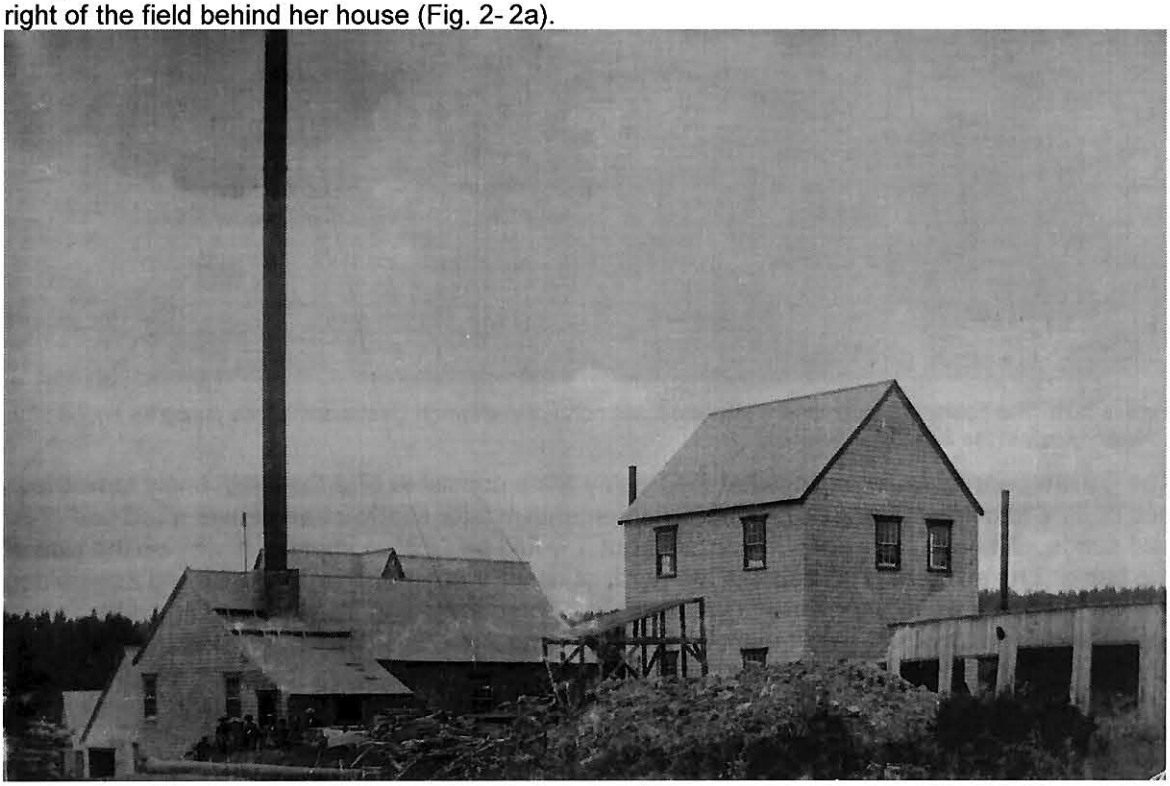

Figure 2-3a The Cumberland Copper Company smelter at Wentworth Centre during it's years of operation very early in the 20th century. Note the ore pile in the foreground.

Stop Description:

In 1902 a company called the Munro-Thompson Ore Reduction Company started construction of a leaching plane to handle Cu ores from a number of the small mines in the Wentworth area. By 1903 a roaster was built and a smelter was under construction and the name changed to the Cumberland Copper Company. The view of the smelter provided in Figure 2-3 is essentially the

plant as seen from Mrs Bridgewaters house. The smelter collected and processed ore from several sites but most came from the workings at the Feeley Mine. Second to that was ore provided from the Palmer Cu Mine a few kilometres to the west. A trip into the woods will quickly show the remnants of the industrial operation and considerable slag can be found in places. We will pay particular attention to an elongate pile of unprocessed ore (visible in Fig. 2-3a) some of which still remains. It is reported that good samples of the chalcocite-malachite ore can be obtained here and that there are also radioactive samples also present. It's quite overgrown so a bit of digging will be required.

Stop 2-4. The Oliver Cu Mine (French River Mine), Oliver.

Directions:

Drive south along Highway #4 from Stop 2-3 for 4.8 km to the intersection with Highway #246 on the left. Follow Highway #246 for 19.5 km to Oliver and John Lepper Road on the left. This

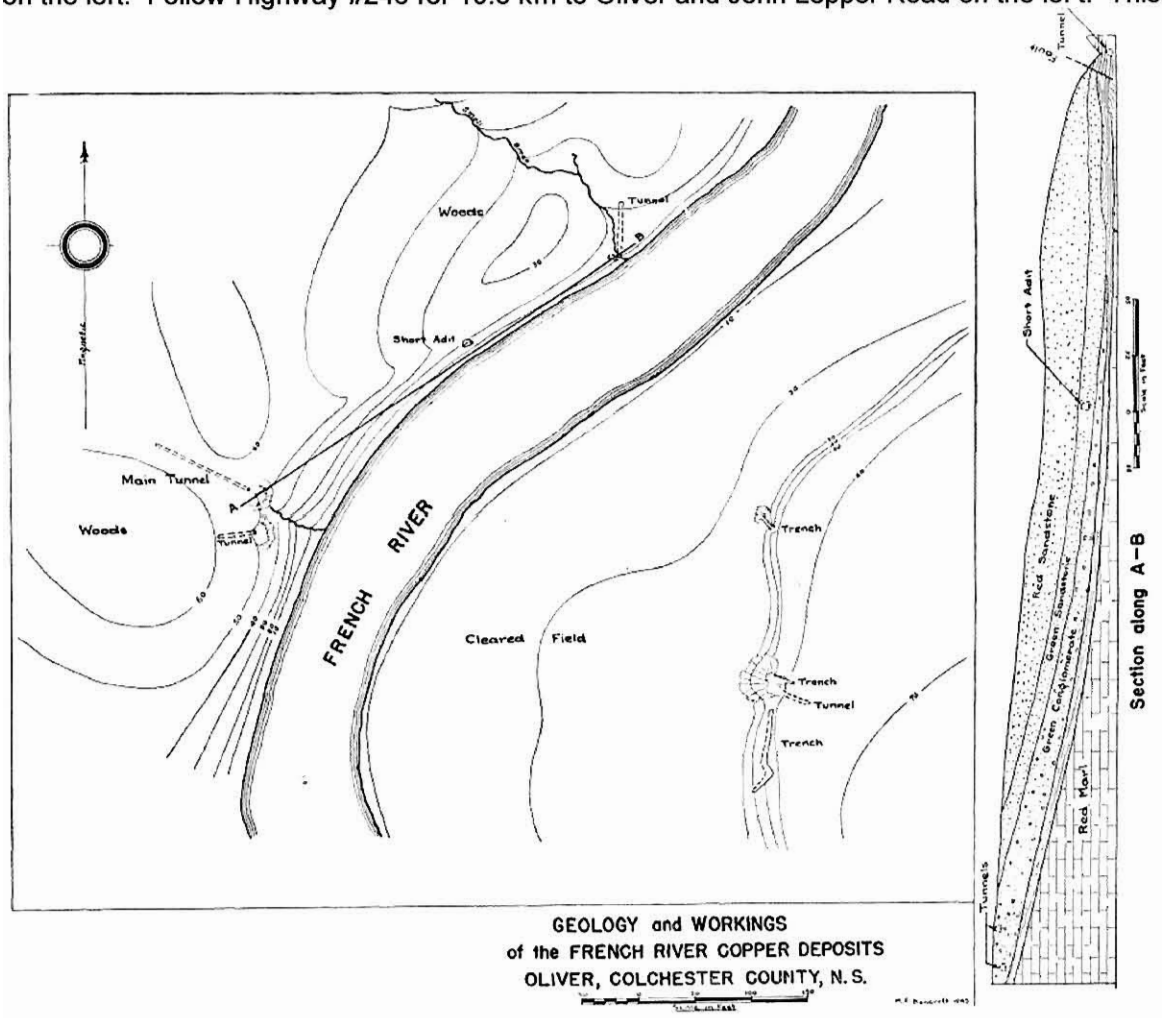

Figure 2-4a Site map of the workings of the Oliver Cu Mine on French River south of Tatamagouche.

road is immediately before the bridge over the French River at Oliver. Drive for 300 m along John Lepper Road to a point about 2 thirds of the way along a farm field on the right and park. The abandoned workings of the Oliver Cu Mine are found in the woods on east side of this farm field. We have landowner permission to cross the field but be careful not to disturb the sunflowers. The mine workings are found in the wooded area between the field and the river (Fig. 2-4a). **Be careful, the elongate depression that looks like a trench is actually a collapsed tunnel. Do not walk on it!**

Stop Description:

Most of the production from the Oliver Mine was from two sites. A now collapsed tunnel that was accessed from a portal near the top of the bank on the west side of the river. Evidence of these workings is easily found in the outcrop embankment on the river bank. A short distance down the river, where a small stream enters the French River from the west, a tunnel and remnants of a dam mark the site where there was a considerable portion of the ore mined in the form of Cu-rich soil and glacial till. The dam here was used in the process to wash the Cu minerals from the soil. The geological section provided in Figure 2-4a shows that, like at all the other Cu and U occurrences in the Cumberland Basin, there is an obvious association of the mineralization within reduced beds interbedded within highly oxidized red bed sequences.

Stop 2-5. Arthropleura Fossil Trackways and Cu Occurrence at Cape John.

Directions:

Return to Highway #246, turn left and drive 6.5 km to the intersection with Highway #6 at Tatamagouche. Turn right and drive east on Highway #6 for 20.4 km to the village of River John. Note: There may possibly be a detour along this route due to a washed out bridge just east of Brule. This bridge should be repaired by now but if it hasn't simply follow the detour route to where it returns to Highway #6 near River John. From the bridge at River John drive another 700 m east on Highway #6 to the Cape John Road on the left. Follow the Cape John Road for 8 km to where it ends at a small park adjacent to the government wharf. We will proceed north toward the cape along the shore from here.

Stop Description:

Access to this shoreline section is tide dependant. We intend to walk the shoreline but if the tide isn't low enough to allow this, we will follow the top of the bank to the sites of interest. The shoreline option is favoured as taking the bank top route will require we clamber down the embankment once the sites are reached and this could prove difficult.

There are two sites of interest along this section. The first site located at NAD 83 UTM"s E490143; N5072036 is a small but very well exposed Cu occurrence within a plant fragment-rich layer within a grey reduced sequence of sandstones. In turn, this reduced sequence is interbedded within much thicker sequences of red beds. Essentially all the features relating to the Cu and U mineralization in the Cumberland Basin are exposed here in a single snapshot.

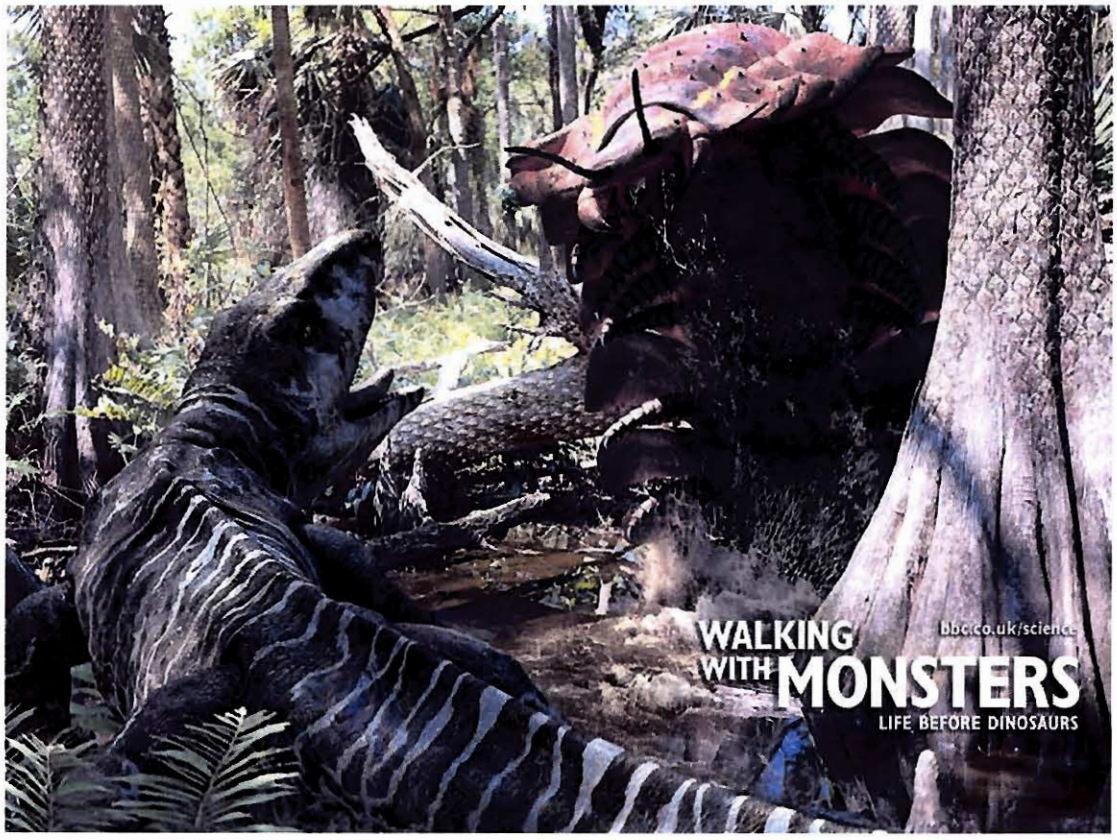

Figure 2-5a Arthropleura, the largest land invertebrate ever known to exist, frequented the coal swamps of the Cumberland Basin.

The second site of interest is found a bit further out toward the cap at UTM's E490075; N5072160 where a rather spectacular example of a bedding surface covered with fossil trackways of a very unique creature that inhabited the Carboniferous age swamps, Arthropleura (Fig. 2-5a). These were impressive creatures and can be best described as huge centipedes. Arthropleura ranged from 0.3 to 2.6 m in length and are an early relative of centipedes and millipedes. It is the largest known land invertebrate of all time and as such, would have had few predators. It is believed that Arthropleura were plant eaters, with the rotting plant debris common to these swampy areas being it's main diet. However, the beasts had a sharp and powerful set of jaws that lead many to believe they were, in part, also carnivorous. At a minimum, vegetarian or not, they were no doubt more than capable of defending themselves. The trackways exposed here (Fig. 2-5b) have been known for some time and, unfortunately, are starting to show the ravages of natural erosion. Originally, this example was believed to be one of the best exposures of Arthropleura trackways in the world. This may no longer be the case but it is still an impressive exposure and worth the walk to view it.

Figure 2-5b Four separate Arthropleura trackways traverse a bedding surface at Cape John.

So Ends the Field Trip – The Route Home:

Return to Highway #6 at River John. Those returning to points east and to Cape Breton should travel east on Highway #6 to Pictou and take appropriate routes from there. Those returning to Halifax or southern Nova Scotia can either follow Route #6 west to Tatamagouche and follow Route #311 south through Earltown to Truro. Alternatively, there is a short cut to Earltown. Follow Highway #6 west to Brule then take Highway #326 south through East Earltown to intersect Highway #311 at Earltown. Whatever route you choose, please drive carefully.