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PRELIMINARY GEOTECHNICAL INVESTIGATION REPORT PROPOSED MARTISON PHOSPHATE MINE SITE DEVELOPMENT HEARST, ONTARIO

Submitted to:

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EXECUTIVE SUMMARY

AMEC Earth & Environmental, a division of AMEC Americas Limited (AMEC), was retained by PhosCan Chemical Corp. (PhosCan) to provide engineering services for a preliminary geotechnical investigation for a proposed mine site development.

The proposed mine site is located approximately 90 km to the Northeast of Hearst, Ontario. A part of the geotechnical investigation was conducted in tandem with exploration work conducted by PhosCan. AMEC's scope of work was derived from the PhosCan's Request for Proposal of January 14, 2008, and was outlined in the AMEC's proposal PY86006 of January 29, 2008.

The site is currently undeveloped, and is mainly covered by wet muskeg, along with spruce forested areas. The area is generally low lying with poor drainage. Small ponds and creeks occur throughout the area.

The fieldwork for the current investigation consisted of 12 shallow boreholes outside the proposed open pit footprint, 6 deeper boreholes within the open pit footprint, and 37 test pits. The boreholes were advanced to depths of up to 115.5 m below existing grade. The boreholes were put down by truck and track mounted drills between January 31st and March 11th, 2008. The test pits were excavated with an excavator between 10th and 15th of February 2008.

The general soil stratigraphy revealed in the boreholes and test pits comprised a surficial muskeg and swamp deposit, underlain by glacial deposits, preglacial deposits, and then the weathered Precambrian bedrock. The glacial soils consist primarily of sequences of fine to coarse grained tills, with fine-grained silty clay to silt and sand interlayers. The preglacial deposits, described as Cretaceous sediments, consist of heterogeneous silt with some clay to silty sand layers with occasional to frequent organic material (lignite). In general the deep boreholes encountered weathered bedrock, underlying the preglacial heterogeneous silt deposit. A high water table exists across the site with water levels located within the surficial muskeg.

Based on the above soil and groundwater condition information, it is considered that excavations below the groundwater table and in swampy areas will require dewatering and drainage of the muskeg layer (e.g., construction of isolation berms and pumping). The excavation within the existing silty till soils will be straightforward provided groundwater flow from the muskeg layers is adequately controlled. Significant groundwater flow is likely to occur in excavations intersecting pockets and/or layers of water bearing soil layers encountered within the deeper preglacial deposits. In this regard, dewatering within the excavation will require a combination of pumping from strategically located sumps and/or other suitable methods, such as filter drains, pump wells or well points, etc.

Dewatering of the overburden soils will be crucial to ensure pit slope and basal stability, and allow for suitable working conditions within the open pit. Seepage and runoff control at the pit walls will be required both during development of the open pit as well as during the mining operations.

The use of imported fill materials of specified geotechnical characteristics will likely be required for specific applications (e.g. drainage, road and slab-on-grade base, etc), where the on-site materials may not be appropriate.

Further geotechnical investigation, including detailed field in-situ and laboratory testing, will be required to characterize the nature and geotechnical characteristics of the soil strata to carry out the detailed geotechnical design.

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1.0 INTRODUCTION

AMEC Earth & Environmental, a division of AMEC Americas Limited (AMEC), has been retained by PhosCan Chemical Corp. (Phoscan) to assist with a preliminary geotechnical investigation for the proposed Martison Phosphate Mine Site project, north of Hearst, Ontario (Figure 1).

1.1 Geotechnical Investigation

AMEC's scope of work was based on the Phoscan's Request for Proposal of 14 January 2008 and was responded to in AMEC's proposal PY86006 of January 2008 (re. D-1¹). The scope of work for this preliminary investigation included the following:

- Brief review of the existing background information.
- Site reconnaissance by a geotechnical engineer.
- Supervision of the winter 2008 investigation fieldwork.
- Carry out sample examination and routine laboratory testing.
- Assess the baseline geotechnical conditions (pre-feasibility level) for the planned main facilities:
 - o Open Pit
 - Waste Rock dumps
 - o Beneficiation Plant
 - Tailings Management Area
 - All season access roads

It should be noted that the investigation program, including selection of drilling contractors and type of drill rigs, was developed prior to our involvement. Our understanding of our scope of work was to supervise the drilling fieldwork, review the available historical information, obtain geotechnical samples, prepare geotechnical logs of the boreholes and provide a preliminary discussion regarding the geotechnical concerns, with the missing information and recommendations gaps to be filled during the next phase(s) of investigation.

Environmental considerations were not part of the scope of work for this geotechnical investigation.

This report presents the details of the preliminary geotechnical investigation, including details of fieldwork procedures, laboratory testing and interpretative comments from geotechnical engineering standpoint as they affect the development of the mine facilities.

1.2 Hydrogeological Study

In addition to the preliminary geotechnical investigation, a preliminary hydrogeological study was also undertaken to determine groundwater regime and flow conditions, as they relate to the construction of the proposed open pit. The results of the preliminary hydrogeological study are presented in a separate report.

¹ References are listed in the last section of this report.



2.0 SITE AND GEOLOGICAL SETTING

2.1 Site Description

The proposed mine site is located approximately 90 km northeast of Hearst, Ontario. It is understood that the proposed development consists of an open pit mine, waste rock storage areas, tailings management areas, and various plant and mine offices. The site is generally low lying with poor drainage and is covered with muskeg and some treed areas. Small ponds, swamps and creeks exist through out the area. The grade variation within the pit area is approximately 2.6 m.

Currently, the access to the site includes a 30 to 40 km long winter road. The proposed development will include construction of an all-season access road, improvements to the existing road and installation of a pipeline and utilities.

Historically, the majority of subsurface investigations have taken place on-site since the early 1980's with one investigation in 1965 (re. R-3). The investigation reports (re. R-3 to R-8) are listed in the list of references at the end of this report.

Existing known drill hole locations are shown on Figure 2, based on information available from various sources.

2.2 Geology

2.2.1 Introduction

The following geological background is based on published information primarily available from the Ministry of Northern Development and Mines (MNDM). Specific references are provided and the reader is encouraged to seek out each reference for further information. Open File Report 5597 and Open File Report 5708 (re. GP-5 and GP-7) were reviewed during the preparation of this history. Additional geological information was made available from the Technical Report of April 1, 2007, titled "Martison Phosphate Project – South Ridge Lake Area, prepared by J.S. Spalding (re. GP-9). The primary focus of this section is to understand the findings of the field investigations and assessing the soil and rock characteristics within the geologic framework.

2.2.2 Bedrock and Preglacial Geology

The project site is located within the physiographic region called Hudson Bay Lowland area (Fig. 20.1, Easton R.M. 1992, re. GP-1), which is underlain by Palaeozoic and Mesozoic bedrock and soil material, over a Precambrian base.

Reportedly, regional tectonic events occurred in Paleozoic and Mesozoic. A particular outcome of these events of a direct interest for the project site was the creation of a relatively small subsidence (depression) in the Precambrian base, identified as Moose River Basin, which facilitated the deposition of one of the only two small depo-centres of Paleozoic and Mesozoic sediments present in Ontario. In the Moose River Basin, the depth reach of the Precambrian depression is about 500 m below sea level (Fig 20.2, Easton R.M. 1992, re. GP-1).



The southern margin of the Moose River Basin is, in part, bounded by a dominantly east-west major fault and displays a number of smaller-scale structural features, the most significant being the Pivabiska Ridge, Grand Rapids High, and Moose River High. It appears that the project site is located within, or in the immediate vicinity of the Pivabiska Ridge (Fig 20.6, Easton R.M. 1992, re. GP-1). While the height of this structural feature is relatively small, it influenced at certain times the sedimentation. Thus, the strata display steeper dips away from the ridge and from the southern faulted flank than the slopes along the northern flank of the basin. The Cretaceous (late Mesozoic era) sediments show themselves faulting features indicating that tectonic movements continued in this platform after the Mesozoic time (re. GP-1)

The oldest sediments discovered in the deeper depressions in the Hudson Platform would originate in Middle to Upper Ordovician (Bad Cache Rapids Group) but do not necessarily appear in the shallower depression of the Moose River Basin, where, the lowest elevation of the Precambrian depression base is only about 500 m below sea level. This "shallowness" of the Moose River basin could be the reason that the oldest sediment overlying the Precambrian in this shallow depression appears to be the Middle Devonian age, called Moose River Formation and consisting of limestone, dolostone and shale. In turn, younger layers (later Devonian) are topped in sequences described as William Island Formation (limestone, dolostone, shale) and then Long Rapids Shale Formation. Then, the Devonian base is "abruptly" (disconformably) covered by a Cretaceous formation, with only occasional lenses from Middle Jurassic, thus marking a geological "gap" of about 200 Million Years (Ma), or more between the two successive layers. The Cretaceous deposits are described as Mattagami and Mistuskwia Beds differentiated by the distribution and proportions of kaolinitic clays, clay, sand and lignite.

In accordance with an ESRI bedrock map, the area of the proposed pit seems to coincide with a small "speck" on top of the Precambrian base which northern projection was described previously as Pivabiska Ridge. The ESRI map describes this speck as "Intrusion of Unknown Age" consisting of Carbonatite – intrusive suite of early Paleozoic within the surrounding mass of Archean age. Hence, all, or most, of the bulk of the Paleozoic deposits mentioned earlier seem to be completely missing underneath the localized perimeter of this project site.

Instead, as referred to in various references (Spalding J.S. 2007 (re. GP-8), and the Ontario Geological Survey [OGS] materials (re. GP-1 to GP-6) the Precambrian – early Paleozoic base seem to be overlain by weathered parent bedrock material described as Residuum. The Residuum seems to have been concentrated within 3 neighbouring sub-zones described as Anomalies A, B, and C. In turn, the Residuum would be overlain by Mesozoic materials.

It is largely assumed that no Mesozoic material would be present west of Burstall-McBrien Township (OGS, 1982, GP-3). However, this appears to be refuted by boreholes PT08-03 and PT08-04, completed at the site. A very limited review of historic holes completed in 1983 indicated that some holes also encountered Mezozoic – Cretaceous deposits at the site. The material encountered in the current boreholes, below the glaciated soils, seem to be very similar with the reported Cretaceous soils encountered by historical drilling within the Mattagami Formation and/or Mistuskwia Beds basin extending easterly of the present site.



A more detailed description of the Cretaceous materials provided in Easton R.M., 1992 (re. Gp-1) is presented as follows:

Unit	Distribution	Deposition Environment	Thickness Range	Description
Mattagami Formation	Central & Southern Moose River Basin	River flood plain, lacustrine, swamp and bog component	14 to 166 m	Weakly consolidated kaolinitic mudrock with lesser silica sand, gravel and lignite. Mudstones are grey, black, white, yellow or red and may be organic rich and laminated, or may contain pebbles. Silica sand is white, massive, flat bedded or planar cross-stratified and associated with stacked gravel or silt deposits. Upper contact with Pleistocene is difficult to determine. Lower contact is sharp and disconformable with Mistuskwia Formation and unconformable with older strata.
Mistuskwia Beds	Central Moose Basin	Lacustrine, shoreline, deltaic	19 m (max)	Varicolored (grey, brown, green, pink, red) calcareous clays with thin beds of medium-grained unconsolidated calcareous quartz sands. Basal 2 m is a conglomerate with abundant limestone and red sandstone fragments, pyrite concretions, quartz, chert and volcanic pebble in sandy or silty matrix. Upper contact is sharp and disconformable with either Mattagami Fm. or Pleistocene deposits. Lower contact is sharp and disconformable with William Island FM.

Table 1 – Description of Cretaceous Materials, as per Easton R.M. 1992

2.2.3 Quaternary Geology

Twenty thousand years ago Ontario was completely covered by the Laurentide Ice Sheet. There are no Tertiary deposits known in Ontario, which led to the assumption that the repeated advancement and retreat of the glaciers in Pleistocene have scrapped these deposits completely. The older deposits of unconsolidated Paleozoic and Mesozoic material may have survived the erosion from glaciers due to some particular ground features that have prevented the removal of the material completely.



While the entire Great Ice Age began some 1.8 Ma ago, the Quaternary deposits in Ontario would not be older than 190,000 years, which includes 2 main glacial stages: the Illinoian and the Wisconsinan, separated by the interglacial Sangamonian Stage.

The glacial deposits in the Hudson Bay Lowland physiographic area (Fig. 21.23 Easton R.M. 1992, re Gp-1) are considered to be among the oldest Illinoian deposits in Ontario. There are three or more layers of tills. Texturally, all these tills are stony sand tills that seem to have been deposited in preglacial lakes.

The Interglaciar Sangamonian material overtopping the Illionian Till sequence in this region is described as Missinaibi Formation which would incorporate a lower marine layer topped by a fluvial member, a forest bed member, and finally an upper glaciolacustrine layer.

The last Wisconsinian glaciation began some 110,000 years ago and has left controversial records. Some researchers support the idea of a continual ice cover over the entire Hudson Bay Lowland area during the entire Wisconsinan period. As such, the tills deposited over the Missinaibi Formation would all have a subglacial origin explaining the stratified structure of the till encountered today below the much younger postglacial deposits.

Another group of researchers suggests that the area was not continuously covered by the continental ice sheet. It is believed that the lowland was ice-free at least twice; some 74 ka and again some 36 ka ago. Accordingly, at least two different major till depositions might have occurred as ice-marginal retreat / readvancement lakes.

The above debates are based on interpretations of the amino-acid dating method, or other similar techniques that all require some level of judgment.

At the end of last glaciation, apparently the entire area has been inundated by the Tyrell Sea which is believed to have deposited up to 7 m, or more, of marine sediments (clays and silts that coarsen upward into near-shore and beach deposits of sand and gravel in the vicinity of the Pivabiska River). Closer to James Bay, the marine sediments thickness increases to up to 60 m.

Muskeg blankets most of the Hudson Bay Lowland. Up to 4 m of muskeg cover has been observed, but the cover is considerably thinner, or absent, near riverbanks and on raised shoreline deposits.

2.2.4 Summary of the Geological Setting

In summary, the following general geological traits are anticipated to have a tangible impact on the geotechnical design of the proposed open pit:

While no active faults are described in the region, the site seem to be located in the zone of confluence of geological structures and materials of extremely wide genesis and age from Precambrian migmatites, basalts and andesites, to early Paleozoic carbonitites, to Devonian limestone, dolostone and shale, to Cretaceous. The entire region is flattened out by a mantle of Quaternary material know for its records thicknesses (50 m +) compared to most of the Ontario surface.



- While most of the Moose River Precambrian depression base is covered by Paleozoic deposits, within the localized area of the site there seems to be a geological 'anomaly' whereby the bulk of the Paleozoic mantle is missing. Over limited areas, the surface of the Precambrian (or early Paleozoic) was weathered and generated the so-called Residuum deposit.
- The Paleozoic material (claystone, shale, mudstone, dolomitic and brecciated limestone) is in general lithified. It is expected to offer a relatively weak strength and low resilience to weathering when exposed to the elements. The thickness of the Paleozoic deposits would vary from zero to not more than 200 m.
- The Mesozoic deposit seems to be highly erratic with respect to the composition and consolidation. The material is essentially unlithified and presents a prevalent loose condition. The thickness of the deposit varies from zero to possibly over 50 m (OGS 1982, re. GP-3). Trace to significant organic soils and lignite are present. In the local area of interest, the Mesozoic deposit bears in part on the Residuum, and probably in part over intact Precambrian, or Paleozoic base.
- The glaciation from Pleistocene may have eroded the Tertiary deposits but could not completely erode the unlithified Mesozoic deposits.
- The Quaternary deposit is mostly dense fine-to-medium grained densely packed till with occasional thin interlayers of glaciolacustrine and glaciofluvial lenses. Occasional seams of Pleistocene peat occur sometime within or below the till.
- Earlier postglacial deposits are of a marine origin (clay-silts topped by and near-shore sand and gravel).
- Most of the area is blanketed by a muskeg mantle of 0 to in excess of 4 m thickness.

3.0 INVESTIGATION PROGRAM AND PROCEDURES

The fieldwork for this project was carried out from January 31 to March 12, 2008, when 6 deep sampled boreholes (numbered PT08-01 to 06) were advanced to 40 to 115.5 m depth and 12 medium-depth sampled boreholes (numbered GT08-1 to GT08-12) were put down to 12.8 to 16.6 m depth. The deep boreholes (PT08-01 to PT08-06) were located around the perimeter of and within the proposed outline of the open pit. The shallow boreholes (GT08-01 to GT08-12) were located on the northwest, west and southwest areas outside the open pit area. In addition to these boreholes, 37 test pits (TP08-01 to TP08-27), from 4.3 to 4.9 m deep, were excavated. The borehole and test pit locations were determined by PhosCan and are shown on Figure 2.

The boreholes were advanced with track and truck mounted soils drill rigs and the borehole logs with details of sampling, testing and inferred stratigraphy are presented in Appendix A. The test pits were excavated with a track mounted hydraulic excavator and their findings are summarized in a table in Appendix B. The drilling and backhoe contractors were retained by PhosCan.

Boreholes PT08-01, PT08-02A, PT08-03B, PT08-04, PT08-05 and PT08-06 were equipped with monitoring wells, installed on completion of the boreholes. The groundwater levels were measured at different dates in February and March 2008, and readings are indicated on the borehole logs (Appendix A).

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In addition, information was provided by Davidson Well Drilling (Davidson), who installed and logged four wells for a pump test. This information is presented in Appendix C.

The sampled boreholes (PT and GT series) provided information such as, soil identification, relative density or consistency, as well as indications about the engineering properties of the soils. The sampled boreholes were advanced using hollow stem augers and wireline coring. Tricone drilling techniques were utilized in Borehole PT08-03A to a depth of 83.5 m, prior to coring.

Soil samples were recovered at predetermined depth intervals using split spoon samplers. Standard Penetration Tests (SPT) were carried out in conjunction with split spoon sampling according to ASTM D-1586 procedure. The SPT results are recorded on the borehole logs (Appendix A) as 'N'-values. The soil samples were placed in plastic bags and delivered to our office for further examination and testing.

Due to the generally dense to very dense nature of the existing fine-grained till deposit, hammer or auger refusal occurred at relatively shallow depths (less than 14 m below grade). Coring was undertaken in all deeper drill holes, except in Boreholes GT08-04, GT08-05, GT08-10, GT08-11, and GT08-12. Cores of the very dense soil were logged in the field and delivered to our office for further examination and testing.

Field vane tests were also carried out in the boreholes to assess the in-situ shear strength of the cohesive soils; however, due to the dense nature of the insitu material, the use of field vanes was limited. Field vane tests were carried out in Boreholes GT08-02 and GT08-05.

Ground surface elevations at the borehole and test pit locations were interpolated from a topographic survey of the site. Borehole locations were geo-referenced to UTM co-ordinates using a handheld Global Positioning System (GPS). Elevations and GPS co-ordinates of the borehole locations are summarized in Appendix A. Elevations and GPS co-ordinates for the test pits are given in Appendix B.

4.0 SOIL CONDITIONS

A summary of the subsurface conditions encountered in the boreholes and test pits is presented below.

4.1 Surficial Layers

A 0.3 to 3.5 m thick surficial layer of organics (muskeg) was encountered in all boreholes and test pits. The muskeg is expected to be in a moist to wet or saturated condition depending on the prevalent weather, thickness and relative elevation, at a particular location. The muskeg is expected to vary in quality and thickness across the site.



4.2 Upper Clayey Silt to Silty Clay

An upper layer of clayey silt to silty clay with some gravel, was encountered in several boreholes (Boreholes GT08-03, GT08-04, GT08-05, GT08-08, GT08-11, PT08-03, PT08-05, TP08-06, TP08-10, TP08-11, TP08-15, TP08-17, TP08-21, TP08-22, TP08-23, TP08-24, TP08-25, TP08-31, and TP08-32) right below the muskeg. The encountered thickness of this layer ranged from 0.3 to 2.3 m. The SPT 'N' values determined in this stratum varied between 1 and 24, indicating a very soft to very stiff consistency. The natural moisture content varied from 13% to 35 %. The consistency of this deposit was generally very soft immediately below the muskeg and increased rapidly with depth.

It is likely that this upper and relatively shallow deposit has a postglacial origin related to the assumed marine or freshwater floods and accordingly, it is anticipated to present increased sensitivity to remoulding.

A grain size analysis test was run on a selected sample. The test results, presented on Figure 3, indicated silt plus clay fractions of 80%.

4.3 Heterogeneous Sand and Silt Till

An extensive deposit of predominantly grey and damp to moist sand and silt till was encountered in all boreholes. The till layer is characterized by varying gravel and clay content, and occasional presence of cobbles and boulders within the sand and silt matrix. The till deposit was found to be very heterogeneous, varying between cohesive soils that are very stiff in nature, to cohesionless soils in a very dense state. Occasional to frequent sand and gravel pockets are expected throughout the till soils. The till soils extended to depths of between 31.7 m to 67.1 m and overlay preglacial soils (unlithified material). The till soils in PT08-02 extended to 33.2 m below grade, overlying fractured bedrock.

The SPT 'N' values within the stratum varied from 5 to in excess of 50, indicating a loose to very dense condition. The relative density of the material increases with depth, to a prevalent very dense condition. Below a maximum depth varying from about 3 m to a maximum of 14 m, the SPT testing was no longer practical due to extreme denseness of the material. Sampling in the extremely dense material was carried out using wireline coring.

A grain size analysis tests conducted selected representative samples (Figure 4) indicated silt plus clay fractions ranging between 59% and 92%.

Atterberg limit testing done on select soil samples resulted in liquid limit values ranging between 33% to 18% and plastic limits of between 26% and 10%. The Atterberg test results, plotted on the borehole logs, show CL to CI soils, which indicate soils with low to intermediate plasticity.

4.4 Lower Silty Clay Layers

Although, thin seams of silty clay to clayey silt were encountered randomly within the till soils, there were some distinct varved silty clay layers present at different horizons in the boreholes. Such a layer was encountered in 7 of the 19 boreholes at a depth of between 5.5 to 9.5 m and its thickness



ranged from 0.5 to 1.3 m. Another 0.2 to 2.2 m thick varved silty clay layer was encountered in 11 of the 19 boreholes at a depth of 10.5 to 15.5 m. The varved silty clay seam may be thicker than 1.1 m in Borehole GT08-02, as the borehole was terminated in this layer.

A varved silt and clay layer was also encountered over the preglacial Cretaceous deposits, or over residuum layers in Boreholes PT08-01, PT08-05 and PT08-06. A varved silt and clay layer, overlaying an organic soil layer, was encountered in Borehole PT08-03.

4.5 Organic Silt Layer

A 12 m thick deposit of an organic soil (40% organic content in a spot sample) was encountered in Borehole PT08-04 at a depth of 57.8 m, within the Cretaceous and/or Residuum layer. Similarly, a 0.8 m thick organic material layer was present at 67.8 m depth in Borehole PT08-03, and below 60 m depth in Borehole PT08-01, as traces and seams dispersed within the assumed Cretaceous deposit of sand and silt. It should be noted that an organic layer in this area has been also identified in previous investigations carried out in 1983 and 1984.

While this layer has been primarily identified as organic silt, there is the possibility that some samples contained lignite. Organic content was measured in selected sampled between 5 and 40% in two samples tested.

A grain size analysis test was run on one sample. The test results, presented on Figure 5, indicate the material comprises 45% of fraction passing Sieve #200 (silt plus clay size fractions).

Atterberg limit testing done on a select soil sample indicated liquid limit, plastic limit and plasticity index values of 78%, 60% and 18, respectively. The results indicate a MH-OH soil, which typically have high compressibility.

4.6 Residuum Stratum

From a geotechnical perspective, the Residuum deposit appears as a heterogeneous mixture of sand and silt with varying sand, silt and clay content and occasional gravel. The Residuum has mostly a red to dark brown colour but is occasional greenish to olive colour, with pockets of cemented, or lithified Residuum that is typically yellow to white in colour. Carbonatite fragments are present, along with discrete organics, possible lignite particles. The Residuum name seems to have been attributed by the geologist, to the geological deposit that incorporate the minerals of mining interest, in association with the inferred genesis of the deposit from weathering of the parent bedrock. However, as mentioned earlier, from geotechnical perspective this material is expected to behave as a generally non-cohesive, heterogeneous sand and silt deposit, with associated potential for erosion and piping, where conditions exist.

The Residuum was likely present in all PT series boreholes, except Borehole PT08-02, as unlithified or lithified (re-cemented) material, at depths of 31.7 to 68.6 m. The Residuum deposit thickness ranged between 15.5 and over 59.6 m, and it was encountered overlying bedrock, except in Borehole PT08-01 (the thickest Residuum deposit) which was terminated within the deposit.



A grain size analysis test was run on selected samples. The test results, presented in Figure 6, show the material to vary from clayey silt to predominantly silty sand with some silt and trace gravel. The results of the grain size analysis testing indicated silt plus clay size fractions varying between 30% and 90%.

Atterberg limit testing done on select soil samples of the Residuum deposit indicated liquid limit, plasticity limit and plasticity index values of 52% to 23%, 28 to 18%, and 24% to 5%, respectively. The Atterberg test results show primarily CI to CH soils (i.e., soils with intermediate to high plasticity), as well as ML and MI soils (i.e., silts with low to medium compressibility).

It was difficult to make a clear, visual distinction between the cretaceous and unlithified Residuum, except when the carbonatite component is obvious in the Residuum.

4.7 Weathered Bedrock – Cemented Residuum

Weathered bedrock was encountered in all PT series boreholes, except Borehole PT 08-01, at depths of between 33.4 to 108.4 m below the existing grade. Bedrock was not encountered in Borehole PT 08-01, which was terminated at a depth of 115.4 m.

The bedrock quality ranged from very poor to good (RQD values from 0% to 80%). RQD values were not calculated for all bedrock samples due to poor core quality or sample disturbance.

In the absence of specific mineralogic and textural analysis in some cases, it is not obvious whether the bedrock samples obtained during this investigation represent weathered parent bedrock, or recemented Residuum. Bedrock type is noted on the borehole logs and ranges from recemented Residuum, carbonatite and a wacke/conglomerate hybrid.

4.8 Groundwater

Groundwater readings were taken towards the end of fieldwork on March 14 and 15, 2008, within the monitoring wells installed in the PT series boreholes. The water levels were measured to be between 4 to 6.8 m below the existing grade. The long term groundwater level is expected to fluctuate, being lower during extended dry periods and higher during wet periods.

Indications of water bearing zones in the sand and silt layer were observed during drilling, especially within the cretaceous and residuum deposits. There is little data available with regard to the extent and therefore the transmissivity and storage capacity of these zones, however, the evidence of washouts at some cored samples, as well as occasional 'sinking', or dropping of the casing experienced at some locations, allude to potential challenges with excavations intersecting such buried aquifers (see Table 2).

A perched groundwater table is also present within the muskeg deposit. Based on the limited observations during test pitting, the flow rates and transmissivity of the perched groundwater could be significant.

More information about the groundwater is provided in the hydrogeological report.



Borehole	Depth m	Soil Strata	Drilling Observations
PT08-01	62	Residuum	Casing dropped 600 mm while coring.
PT08-01	66.5	Residuum	Casing sank 150 mm.
PT08-01	68.9	Residuum	Casing sank 50 mm.
PT08-02	23.6	Till	Core barrel jammed.
PT08-02A	18.0	Till	Plugged bit.
PT08-02A	37.8	Residuum	All fines washed away.
PT08-02A	49.5	Residuum	Core barrel jammed
PT08-03	9.76	Till	Fines washed out.
PT08-03	10.7	Till	Fines washed out during drilling for CS#2. Attached sand trap to barrel for next run.
PT08-03	85.3	Bedrock	Casing jammed.
PT08-03	88.4	Bedrock	Casing remained in hole. Hole abandoned.
PT08-04	16.6	Till	Core barrel jammed.
PT08-04	19.7	Till	Sand washed out from barrel was collected from drilling mud.
PT08-04	22.7	Till	All fines washed out from CS 16
PT08-04	30.3	Till	Core barrel sanded in at 30.3 and 33.3 m.
PT08-04	39.5	Till	Core barrel sanded in at 39.5 m.
PT08-04	102	Residuum	Barrel jammed at 102 m. Sample from cuttings.
PT08-04	109.7	Bedrock or Cemented Residuum	Casing sanded in. No water return.
PT08-05	13.6	Till	300 mm of sand heave up rods. Spoon refusal at 14.2 m. Start coring.
PT08-05	70.8	Cemented Residuum	Casing remained in hole. Bottom of casing 70.84m.
PT08-06	10.7	Till	All fines washed out.
PT08-06	12.9	Till	All fines washed out.
PT08-06	18.3	Till	Artesian water pressure noted
PT08-06	19.5	Till	All fines washed out.

Table 2 – Drilling Condition Observations



5.0 DISCUSSION OF INVESTIGATION RESULTS

The following section presents general discussions and interpretative comments and recommendations as they affect the design and construction of the plant structures, the open pit mine and other mine structures.

The detailed design to be developed for all mine components will be governed by economic considerations, site specific design considerations, design criteria (including regulatory requirements), and site conditions and limitations.

For construction work, appropriate technical specifications will have to be developed for all clearing, grubbing, stripping, seepage control and dewatering, earthwork construction, including use of geosynthetics (if required), concrete structures, pumping stations, etc. All construction will have to be carried out as per the requirements of the technical specifications and other contract documents.

Further detailed subsurface investigation, analyses and testing will be required as the design of the aforementioned mine components evolves. The following discussion is based on the preliminary data obtained from the current investigation and from the available background information.

5.1 Plant Facilities and Structures

Once the site plant building layout is developed, AMEC should review the final design layout in terms of our recommendations and perform additional geotechnical investigations at the finalized plant locations.

Most likely, the beneficiation plant and its infrastructures and supporting facilities will be built on an engineered fill pad placed over stripped intact till, or intact marine/lacustrine silty clay to clayey silt deposits.

5.1.1 Site Grading and Stripping

It is recommended that all the muskeg and other unsuitable soils be removed within the plant area. Any structure or facility founded on the muskeg deposit will experience excessive long-term total and differential settlements.

Based on the flat, poorly draining areas of the site, consideration should be given to raising site grade (using compactable inorganic soil) within the mine plant area to ensure that damage due to possible flooding is minimized. If the high clay content soils are not removed from these areas, a grade increase and the subsequent weight from the soil could cause long term settlements of these soils.

5.1.2 Earthquake Considerations

In conformance to the criteria in Table 4.1.8.4A, Part 4, Division B of the National Building Code (NBC 2005), the project site is classified as Site Class "D - Stiff Soil". The four values of the Spectral response acceleration S_a (T) for different periods and the Peak Ground Acceleration (PGA) can be obtained from Table C-2 in Appendix C, Division B of the NBC (2005). The design values of F_a and F_v for the project site should be calculated in accordance to Table 4.1.8.4 B and C.



Consideration should be given to conducting in-situ testing to determine the actual seismic site classification of the site. Based on the results of the field testing, an improved site classification is possible,"

5.1.3 Shallow Foundations – Conventional Spread Footings

Conventional spread footings would be suitable to support some the associated site plant and building structures. The footings should be founded on the native, undisturbed, inorganic soil deposit, or on engineered fills built over competent, inorganic subgrade soils.

Footings within unheated areas, or perimeter footings should be founded below the depth of frost penetration. Based on the Ministry of Transportation (MTO) guidelines, the depth of frost penetration at this site and in areas subjected to frequent snow removal is about 2.8 m below finished grade.

The stiff to very stiff glacio-marine silty clays or compact to dense tills will be able to sustain footing loads of 250 kPa net bearing pressures.

The soft zones of the silty clays, encountered immediately below the muskeg deposit are not suitable to support footings, or structural fill, and should be removed from the foundation limits. These should be stockpiled and examined for possible use elsewhere.

Engineered fill forming the building pad will also be competent to support structural loads. Using standard procedures of compaction, in conjunction with approved, compactable materials (imported well-grade granular, on-site select till, etc.) footings placed on such engineered fill will support loads of 200 kPa net bearing pressures.

The above recommendations are general in nature; the foundation design for each building or mine facility will have to be developed based on considerations of nature of foundation deposit, loading magnitudes, settlement sensitiveness, depth of embedment, and the like.

Prior to pouring foundation concrete, an engineer should examine the foundation surfaces. This is necessary to confirm the assumed founding conditions and to review the foundation construction procedures, etc. The subgrade should be protected from freezing, inundation and disturbance from seepage inflow, equipment traffic, and the like, at all times.

5.1.4 Reuse of Excavated Soil

The existing muskeg and organic material should be properly separated and stockpiled for reuse for pit closure or landscaping purposes.

Due to the lack of on-site aggregate sources, and the requirements for berm, roads, and building pads, the large amounts of local soils obtained from the main pit excavation should be considered for reuse. The excavated, native, inorganic, till soils should be stockpiled separately. For example



materials that are primarily silt and clay, as discussed above, should be set aside for the construction of berms and potential pond liners. Materials that contain more coarse material, such as the (conditioned) till, may be utilized for building pads and roadway construction.

The reuse of these materials will depend strongly on the time of year of construction and the moisture content of the material. Frozen or excessively wet material should not be utilized for construction purposes.

5.1.5 Service Trenches

Service trenches are expected to be cut within native inorganic subgrade or within engineered fill pads and/or embankments.

Protection against freezing is an integral part of buried service pipe design. The standard protective measure is to bury the service lines below the anticipated frost penetration depth (2.6 m for heated structures plus 0.2 m because of snow removal and no heat loss).

The bedding and cover of service lines will have to follow the manufacturer's specifications and the applicable provincial specifications (OPSS). The bulk of the trench backfill should be completed with material similar to the soils abutting the utility trench.

In the case of high hydraulic conductivity bedding and / or cover materials, cut-off collars consisting of less pervious soils, or grout, should be implemented at strategic locations to limit the potential, uncontrolled flows of perched groundwater accumulated within such conduits.

5.1.6 Conventional Excavations

All excavations must comply with the Occupational Health & Safety Act and Regulations for Construction Projects (the Act). As such, the side slopes of any excavations deeper than 1.2 m must be sloped as outlined in the Act.

Based on the criteria in the Act, the existing muskeg should be considered to be a Type 4 soil. The underlying dense till soil should be classified as a Type 2 Soil, while the firm to stiff silt and clay should be classified as Type 3, if ground water control methods are implemented to eliminate seepage. Exposure to weathering of the trench walls, without due protection, in general, would cause a downgrading of the soil behaviour.

Seepage from adjacent muskeg deposits is expected to be significant and should be diverted away from the excavations via berms and / or interceptor ditches.

Groundwater seepage thru the native inorganic soils should be moderate and can be handled with conventional dewatering methods from collection sumps and pumping.



5.2 Open Pit Development

The following section presents general comments and recommendations relative to the development of the open pit mine. Further detailed subsurface investigation, analyses and testing will be required to develop the pit slope designs. The following comments are based on the preliminary data obtained from the current investigation and from the available background information.

It is our understanding that pit development will be carried out in phases according to the development plan and its inter-relationship with other development activities, including the necessary infrastructure construction.

Objective	Anticipated associated works	Geotechnical Issues
1. Stripping	 Stripping the muskeg under and inside the surface isolation berms 	 Stability of the access & haul roads and working surfaces
	 Stockpiling stripped organics for use at closure 	
2. Pit excavation and drainage of the pit area	 Excavating slopes as per the design geometry (inclination and benches) 	 Stability of slope segments, including suitable instrumentation
	Seepage collection and removal at selected sections of benches	Olicnes, sumps & berm construction
	 Protection of weak or excessive seepage outflow areas 	 Long-term stability of the berms
3. Maintenance of the slopes	 Monitoring Dewatering and runoff management 	 Instrumentation, monitoring, interpretation & developing corrective measures
	Periodic repairs	Control surface erosion
		 Control weathering, especially from freezing-thawing and wetting- desiccation
		 Control groundwater seepage and piping
4. Mining of the ore	Excavations & transport	 All issues discussed in Items 1 and 3
5. Water Management	 Pumping, holding, reclaim, treatment and release to environment 	 Geotechnical, geochemistry, hydrology and hydraulics support as required
6. Pit Closure	 Design in consideration of the overall closure plan and regulatory requirements 	 Geotechnical, hydrology, hydraulics and hydrogeological support, as required

Table 3 - Anticipated Steps of Pit Development



5.2.1 Stripping and Diversion Berm Construction

The site within the footprint limits of the open pit and the surface water diversion berm around the site perimeter should be stripped to allow effective surface water diversion and dewatering at the construction sites.

Diversion or site isolation berms to limit perched groundwater and surface water inflow into the open pit will be required. It is largely anticipated that select native soil materials should be suitable for berm construction. However, the reuse of these materials will depend on the time of year during construction and the moisture content of the material. Frozen or excessively wet material should not be utilized for construction purposes. During initial construction operations, suitable on-site material may not be available for berm construction and imported material or appropriate liners may be required.

The strength and permeability requirements for berms entail the need for carefully engineered structures to ensure acceptable performance for the entire life span of the facility, under the anticipated severe weather. The compactable, local, inorganic materials would require berm slopes of 2H:1V, or flatter and a compactive effort of at least 95% Standard Proctor Maximum Dry Density (SPMDD) in order to generate acceptable levels of performance.

The slope faces should be stabilized against erosion from runoff, seepage, and particularly freezingthawing cycles.

Based on the heterogeneous nature of the native soil material, adequate monitoring during construction and long term monitoring of the berms will be required to ensure that the berms integrity and functionality are maintained during the lifetime of the open pit mining operations.

5.2.2 Overburden Excavation

The overburden over the ore deposit and the underlying Residuum deposits will be excavated using appropriate open pit development procedures.

The crucial geotechnical concerns for this operation are:

- Short-Term Stability
- Long-Term Stability
- Stability of the access routes and working surfaces

The pit slopes should be designed in consideration of the soil stratigraphic and pore pressure variations encountered in the perimeter sectors of the open pit. Due consideration should also be given to dewatering measures and provision of ramp/roads for construction and mining traffic.

It should be noted that both the sand and silt till and (especially) the cretaceous materials will be susceptible to lose strength due to disturbance, and thus are expected to be essentially unsuitable for heavy tire traffic, until they are fully frozen. In addition, in adverse groundwater conditions, areas



of cretaceous soils may become also inaccessible to heavy track mounted equipment due to localized softening/liquefactions. Therefore, surface treatment of the traffic and working surfaces with granular or fine rockfill mat, with or without geosynthetic reinforcement, may be necessary.

It is recommended that selected slope segments be instrumented and monitored for vertical and horizontal deformation (with inclinometer and settlement points), pore pressure generation and/or dissipation (with piezometers), seepage quantities, etc. Also, a regular program of visual inspections and surveys of the pit slopes would be necessary.

Permanent groundwater control is an intrinsic component of the slope design, stability and safety, as well as of the entire mining operation. There are two major geotechnical aspects related with the groundwater control:

- To ensure that pore water pressures within the slope soil and the underlying rock mass do not trigger deep-seated slope failures, or basal instability; and,
- To ensure that groundwater seepage, that may daylight on the slope surface, does not cause unacceptable erosion and/or sloughing.

The dewatering will be required both at the surface (e.g., seepage collection and pumping out from sumps located at slope benches) and deep within the soil and/or bedrock. A number of potential options may be considered for dewatering to control pore water pressure from slope stability standpoint. These options may include: deep well pumping, vertical relief wells, filtered horizontal drains drilled into slope or slope toe, filtered horizontal drains (covered with toe berm) installed at selected bench segments, well points, etc. The drainage system will have to be designed based on detailed geotechnical and additional hydrogeological investigations, and optimized during early stages of open pit excavation.

As described earlier, the till deposit is heterogeneous and may contain water bearing sand and gravel seams. The installation of horizontal drains or other suitable drainage measures may be required to drain or control water pressure in these seams.

5.3 Service Corridor

The following discussion is limited to the construction of the "causeway" embankment within the lowland area covered by muskeg.

As no geotechnical information is available along the corridor, the preliminary discussion given hereafter is based on information available at the project site, and should be considered preliminary, subject to revision in the future.

5.3.1 Access Road Foundation

Generally thin and essentially non-submerged muskeg or other unsuitable soils can be stripped to expose sound subgrade for building the road embankment.



Thick and submerged muskeg covering large areas may be impractical and/or uneconomical to remove, and may require the use of "displacement" technique to build the road foundation. Overloading may be helpful in reducing subsequent settlements. Alternatively, or in conjunction with the displacement technique, corduroy type construction (depending on the availability of suitable material) or the use of geogrids may also be considered to float the embankment. Both methods would keep the existing muskeg in place, which will lead to long-term settlements and frequent road maintenance issues.

Once the road foundation (subgrade) is completed to the desired elevation, the road structure can be placed. The road base should consist of at least 600 mm of well graded crushed aggregate meeting the specifications of a Granular B Type II, placed in lifts not exceeding 250 mm and compacted to 100% SPMDD. Blast rock, with proper gradation and sufficient aggregate strength may be used to reduce the importation of Granular B Type II.

If a smoother riding surface is intended, a final lift consisting of least 150 mm of well graded crushed aggregate meeting the specifications of a Granular A, compacted to 100%, may be placed over the above noted base. However, it should be noted that the Granular A surface loses most of its strength during the spring thaw and load restrictions may be necessary during such the spring seasons.

Any of the construction phase which is weather and frost sensitive, should not be completed during adverse weather conditions. No frozen materials should be used for the road base, or foundation, where controlled compaction is required. The 'displacement' of the muskeg by oversized rock may be conducted in part during the winter time, if the contractor proves that freezing of the exposed muskeg does not prevent the "sinking" of the rock. It should be noted that during the excavation of test pits in mid February 2008, frost depth in the muskeg was noted to be as little as 200 mm in Test Pit TP 08-25.

5.3.2 Culverts and Bridge Abutments

Further geotechnical investigations involving stream or creek crossings will be required once the roadway alignment has been chosen. Recommendations regarding culverts and bridge abutments will be presented at a future date.

5.4 Pipeline Corridor

It is understood that approximately 90 km of slurry pipeline will be constructed. The slurry pipeline will consist of a coated steel pipe and either buried approximately 2 m below grade (Jacobs 2008) or installed in protective berm.

Consideration should be given to placing the pipeline within the all-season access road, and to allow adequate access for repairs. The bedding and cover of the service lines will have to follow the manufacturer's specifications and the applicable OPSS. The bulk of the trench backfill should be completed with material similar to the soils abutting the utility trench.



Culverts, pipelines or concrete placed within the muskeg environment, may experience excessive corrosion leading to reduced life expectancy. Future testing of the organics (muskeg) and associated groundwater is recommended to provide sufficient information in regards to the corrosion potential of the soils and groundwater.

The use of alternative products, such as HDPE pipelines and culverts should be considered.

6.0 CLOSURE

The Limitations of Report, as presented in Appendix F, forms an integral part of this report.

The recommendations included in this report, although site specific, have a general nature. It is recommended that the soil conditions described in this report be interpreted by a geotechnical designer in view of the applicable design requirements and the adopted construction methodologies.

The investigation work presented in this report was conducted under the technical guidance of Dr. Dan Dimitriu, P.Eng. This report has been prepared by Mr. Tommi Leinala and Dr. Dimitriu, and reviewed by Dr. Narendra S. Verma, P.Eng.

We trust that the information presented in this report is complete within our terms of reference. If you have any questions, please do not hesitate to contact our office.

Respectfully submitted,

AMEC Earth & Environmental

Mar last to

Dan Cacciotti Project Manager



7.0 REFERENCES

Government Publications:

- GP-1. Easton, R.M. 1992. The Grenville Province and the Proterozoic history of central and southern Ontario; in Geology of Ontario, Ontario Geological Survey, Special Volume 4, Part 2, p.714-904
- GP-2. OGS, March 2000, Erlis Data Sets #6 and #14
- GP-3. OGS. 1982. Mesozoic Geology and Mineral Potential of the Moose River Basin, edited by P.G.
- GP-4. Telford and H.M. Verma, Ontario Geological Survey, Study 21, 193p.
- GP-5. Open File Report 5597, Palynological Analyses of Drillhole Series OGS83-01 to 83-08D and
- GP-6. OGS 84-01 to 84-11, Moose River Basin, Ontario, 1986
- GP-7. Open File Report 5708, The Onakawana B Drillhole (OGS 85D), District of Cochrane, 1989.
- GP-8. Spalding, J.S. 2007. Martison Phosphate Project South Ridge Lake Area. Unpublished.

Technical Reports:

- R-1. Golder Associates, 1983. Preliminary Geotechnical Assessment of a Martison-Phosphate Deposit. Report to Camchib. Part of MNDM AFRI File 42J06SW001.
- R-2. Golder Assoicates Ltd 2007. Preliminary Pit Slope Design Criteria. Unpublished.
- R-3. South Ridge Mining and Exploration, 1965. Drill logs. MNDM AFRI File 42J06SW0019
- R-4. Selco Mining Corporation Ltd. 1980. Drill logs. MNDM AFRI File 42J06SW8032
- R-5. Selco Mining Corporation Ltd. 1982. Drill logs. MNDM AFRI File 42J06SW0500
- R-6. Selco Mining Corporation Ltd. May 1982. Drill logs. MNDM AFRI File 42J06SW006
- R-7. Camchib Mines Inc. 1983. Drill logs. MNDM AFRI File 42J06SW0341
- R-8. Camchib Mines Inc. 1984. Drill logs. MNDM AFRI File 42J06SW0001

Other Documents:

D-1. AMEC Earth and Environmental, 2008. Proposal for Engineering Services, Geotechnical and Hydrogeological Study, Martison Phosphate Project, Hearst, Ontario, Project No. PY86006

EXPLANATION OF BOREHOLE LOG

This form describes some of the information provided on the borehole logs, which is based primarily on examination of the recovered samples, and the results of the field and laboratory tests. Additional description of the soil/rock encountered is given in the accompanying geotechnical report.

GENERAL INFORMATION

Project details, borehole number, location coordinates and type of drilling equipment used are given at the top of the borehole log.

SOIL LITHOLOGY

Elevation and Depth

This column gives the elevation and depth of inferred geologic layers. The elevation is referred to the datum shown in the Description column.

Lithology Plot

This column presents a graphic depiction of the soil and rock stratigraphy encountered within the borehole.

Description

This column gives a description of the soil stratums, based on visual and tactile examination of the samples augmented with field and laboratory test results. Each stratum is described according to the *Modified Unified Soil Classification System*.

The compactness condition of cohesionless soils (SPT) and the consistency of cohesive soils (undrained shear strength) are defined as follows (*Ref. Canadian Foundation Engineering Manual*):

Compact	ness of	Consistency of	Undrained	Shear Strength
Cohesionless SPT N-Value		Cohesive Soils	<u>kPa</u>	psf
<u>Soils</u>		Very soft	0 to 12	0 to 250
Very loose	0 to 4	Soft	12 to 25	250 to 500
Loose	4 to 10	Firm	25 to 50	500 to 1000
Compact	10 to 30	Stiff	50 to 100	1000 to 2000
Dense	30 to 50	Very stiff	100 to 200	2000 to 4000
Very Dense	> 50	Hard	Over 200	Over 4000

Soil Sampling

Sample types are abbreviated as follows:

SS	Split Spoon	τw	Thin Wall Open (Pushed)	RC	Rock Core	GS	Grab Sample
AS	Auger Sample	ТР	Thin Wall Piston (Pushed)	ws	Washed Sample	AR	Air Return Sample

Additional information provided in this section includes sample numbering, sample recovery and numerical testing results.

Field and Laboratory Testing

Results of field testing (e.g., SPT, pocket penetrometer, and vane testing) and laboratory testing (e.g., natural moisture content, and limits) executed on the recovered samples are plotted in this section.

Instrumentation Installation

Instrumentation installations (monitoring wells, piezometers, inclinometers, etc.) are plotted in this section. Water levels, if measured during fieldwork, are also plotted. These water levels may or may not be representative of the static groundwater level depending on the nature of soil stratum where the piezometer tips are located, the time elapsed from installation to reading and other applicable factors.

Comments

This column is used to describe non-standard situations or notes of interest.

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AMEC E 131 Field Lively, O Ph: (705 Fax: (705 www.am	arth & Environr ding Rd. N P3Y 1L7) 682-2632 5) 682-2260 ec.com	nental	୵ୢ	Note 1: and beh Note 2: range b Enginee Rev. 5 I	Soils an naviour. The mo y weigh ering Ma Nov. '06	re class odifying t of min anual (:	adjecti adjecti lor corr 3 rd Editi	nd descr ves use aponents ion, Can	ribed ac d to de s are co nadian (cordin fine the onsiste Geoteo	e actua nt with	eir engin I or estin the Can Society,	eering nated p adian f 1992.)	proper percen Founda	ties tage ation		













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APPENDIX A

BOREHOLE LOGS

Project No.: TY86002

	ect Number: 110	6002							Drilling	Location:	See Figure 2			Logge	d by:	PRL
Рго	ect Client: Pho	sCan Chemical Co	rp						Drilling	Method:	200 mm Ho	llow Stem Auger and Cor	ing	Compi	led by:	ETB
Рю	ect Name: Mart	ison Phosphate Pr	nate Project						Drilling Machine: Truck Moun			ed Drill		Review	ved by:	TJL
Proj	ect Location: Hear	rst, Ontario							Date S	Started:	<u>06 Mar 08</u>	_ Date Completed: 06 Ma	w 08	Revisi	on No.:	<u>4, 17/09/0</u>
	LITHOLO	GY PROFILE		SC	IL SA	MPLI	NG			FIELD	TESTING	LAB TESTING	-	co	MMEN	rs
ology Plot	DES	CRIPTION		nple Type	nple Number	overy (%)	r 'N' Value	(m) HTe	EVATION (m)	Penetra ○ sPT MTO Vane* △ intect ▲ Remould	tionTesting DCPT Nilcon Vane* O Intact Remould	Atterberg Limits W, W W, B	TRUMENTATION TALLATION			
Ē	Local Ground Surface	Elevation: 187.6 m		San	San	Rec	R			Undrained Sh 15 30	ear Strength (kPa) 45 60	20 40 80 80	NSN NSN NSN NSN NSN NSN NSN NSN NSN NSN			
<u> </u>	ORGANICS (MUSKE	G)						Ē	187 -							
<u>, 17</u>				ss	1	8	2	Ē	_	þ						
: 2 7 - 1	brown to grey		185.9 1.7	ss	2	79	24	Ē,	1 86	c		₀ 11	I			
	SAND and SILT varying gravel and cla cobbles or boulders (ay content, occasional	I	SS	3	100	507	Ē				° ₉				
	moist to wet, very der	nse				100		E 3	185			_12				
					4	100	125mm		184			5				
				ss	5	95	88	4			88	_{) o} 10				
				SS	6	100	67		183 -		o	₀ 10				
	Boulders from 5.2m to	o 5.5m.	182.1	cs	7	57			197 -			₀ 14		Start coring at	5.2 m.	
Н	SILTY CLAY varved		5.5					6 - 6								
N	moist to wet, stiff grey		181.0 6.6	cs	8	100			181 -			0 ¹⁴				
	SAND and SILT varying gravel and cla or boulder (TILL)	ay content, occasional	cobble					~ 7								
	moist to wet, very der	ise							180 -			٩				
				cs	9	100			170			° 9				
								149	1/10							
				cs	10	82			178 -			₀ 10				
								10								
Ū,	grey		176.9 10.7						177 -		:	20				
Ŋ	varved moist to wet, stiff			cs	11	83			176 -			° ₂₀				
H								12								
			174 7	cs	12	50		1414	175 -			₀ 14				
	grey SAND and SILT		12.9					13								
	varying gravet and cla or boulder (TiLL) moist to wet, very der	ay content, occasional nse	cobble					14	174 ~							
				cs	13	100			173 -			₀ 14				
								15 15								
			171.8	CS	14A	100			172 -			₀ 12				
	grey SAND some silt moist		15.9 171 0	cs	14B	57		E- 16				_o 22				
-	END OF BOREHOLE (no refusal)		16.6													
	C Earth & Environme	ntal N	lo freestar	nding gi	oundwa	ater mea	asured i	in open	borehol	e on completi	on of drilling.					
131	Fielding Road	χ. G	Groundwat	er dept	h obser	vecion	<u>07/03/2</u>	2 <u>008</u> at	a depti	n of <u>1.5 m</u> .		🛛 Cave in depth recorded	07/03/2	008 at a depth	of <u>3.2 m</u>	
Live																

R	ECORD OF BORE	HOLEN	о.	<u>GT(</u>	08-0	<u>2</u> C	:o-C	Drid.	032706 g Location:	57 E, 557	77151 N		Logge	
Pro	oject Client: PhosCan Chemi	cal Corp.						Drillin	g Method:	200 mm Ha	llow Stem Auger and Co	ring	Comp	iled by: <u>ETB</u>
Pro	oject Name: Martison Phosph	hate Project		_				Drillin	g Machine:	Truck Mount	ted Drill		Revie	wed by: <u>TJL</u>
Pro	oject Location: Hearst, Ontario							Date Started: 07 Mar			ar 08 Date Completed: 07 Mar 08			ion No.: <u>4, 17/09/08</u>
	LITHOLOGY PROFIL	LE	SC	DIL SA	MPLI	NG			FIELD	TESTING	LAB TESTING		cc	MMENTS
ithology Plot	DESCRIPTION		sample Type	Sample Number	Recovery (%)	SPT 'N' Vatue	DEPTH (m)	ELEVATION (m)	Penetra O SPT MTO Vane* △ Intact ▲ Remout * Undrained Sh	tionTesting DCPT Nilcon Vane* A Intact Remould sear Strength (kPe) 45	Atterberg Limits W, W W, Plastic Liquid * Passing 75 um (%) Moisture Content (%) 20. 40. 50. 60.	NSTRUMENTATION NSTALLATION		
<u>.</u>	Diack ORGANICS (MUSKEG)	<u></u>		- ~			Ē	Y		43 00	10 40 00 00			
2 2	fibrous						Ē,	189 -						
		188.4	SS	1	25	0	Ē		25					
	probably SILTY CLAY	1.5	VT VT	1 2			E 2	188 -	▲5 ³ ▲ ⁵ △ ²⁰					
			VT VT	3					▲ ⁶ ▲ ²	30 5	80			
		186.9		<u> </u>			E 3	187 ~			10			
	SAND varying gravel, silt and clay content	, occasional	SS	2	87	33	Ę			>	0 ¹⁰			
	cobble or boulder (TILL) moist to wet, very dense		SS	3	92	56	₽₄	186 -		С	_റ 10			
					-	65				0	_15			
			35	4	8	50/	5	185 -		0	13			
			CS	6	100	75mm		184			0		Start of coring	g at 5.5 m.
							6							
	1		cs	7	34		Ē,	183 -			° ⁹	-		
ŀ,^				_			Ē							
1.						:	: Г- в	162 -						
1.			cs	8	65			\boxtimes			o ¹⁴			
1				L	<u> </u>		. 9	181 -						
	Cobbles from 9.3 m to 9.5 m										10			
			cs	э	30		- 10	180 -			0.0			
1.						-	ŀ							
			27	10	100		- 11	179 -			_11			
ŀ			3								U	ł		
	Thin dark grey silt and clay seam						- 12	178 -						
			cs	11	50			177 -			_o 10			
.							- 13							
·.					1		L.	176 -				1		
. .			cs	12	81						⁰ 11			
. •							- 15	175 -						
NIN	dott ornu	174.4												
	SILTY CLAY varved, moist	10.01	ട	13	40		- 16	174 -			¹⁸			
		173.3				_	-							
	(no refusal)	10.0												
AM	EC Earth & Environmental	Pro freestar	nding gr	roundwa	ater mea	isured i	n open	borehol	e on completi	on of drilling.		1	L	
131 Live	Fielding Road	E Groundwat	er depti	h obser	ved on	08/03/2	<u>008</u> a	t a depti	n of <u>0.3 m</u> .		🔯 Cave in depth recorded	08/03/2	008 at a depth	of <u>8.2 m</u> .
Car Tei	ada P3Y 1L7 +1(705) 682-2632 +1(705) 682-2652	Boretuole details an qualified Geotechy	s present sical Engi	ed, do re mer. Ab	x constitu o, boreho	ite a thoro le informi	ough und ation sho	ienstandin xaid be rea	g of all potential id in conjunction	conditions present a with the geotechnic	and requires interpretative assistant al report for which it was commisio	e from a ned and the		Scale: 1 : 100
www	+1(705) 682-2260 w.amec.com	accompanying Exp	planation	af Boreh	ole Logʻ.									Page: 1 of 1

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R	ECORD OF BOR	EHOLE N	0.	<u>GT(</u>)8-0	<u>3</u> C	:o-C	Ord.	032642	24 E, 557	76833 N		1	m	2
Pro	oject Number: TY86002							Drilling	g Location:	See Figure 2	<u> </u>		_ Logged	lby:	PRL
Pro	iject Client: PhosCan Cher	nical Corp.						Drilling	g Method:	200 mm Ho	liow Stem Auger and Cor	ing	Compi	ed by:	ЕТВ
Pro	ject Name: Martison Phos	phate Project						_ Drilling Machine: Truck Mount			ed Drill	Review	ed by:	TJL	
Pro	eject Location: Hearst, Ontario	0						_ Date Started: 07 Mar 08			_ Date Completed: 08 Ma	Revisio	n No.:	<u>4, 17/09/08</u>	
	LITHOLOGY PROF	FILE	SC	AL SA	MPLI	NG			FIELD	TESTING	LAB TESTING	_	CO	MMEN	тѕ
Lithology Plot	DESCRIPTIO	N 189.5 m	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	Penetra ○ SPT MTO Vane* △ Intect ▲ Remould * Undrained Sh 15 30	tionTesting DCPT Nilcon Vane* Intact Remould ear Strength (kPa) 45 60	Atterberg Limits W, W W, Passic Liquid * Passing 75 um (%) O Moissure Content (%) 20 40 60 80	INSTRUMENTATION INSTALLATION			
<u></u>	black ORGANICS (MUSKEG)	<u></u>						100						-	
2 P 7 7	fibrous							189 -							
				1	•	0		188 -							
<u></u>			\$S	2	8	1	2								
/, . NN	grev	187.0		3A 38	100	1		187 -			16				
11	SILTY CLAY increasing silt with depth, wet, ve	186.5 ty soft 3.1					- 3				12				
	SAND and SILT varying gravel and clay content. c	occasional	SS	4	87	35	Ē	186 -		١	0				
	cobbles or boulders (TILL) moist to wet, very dense		ss	5	67	56	4			0	°15				
			SS	6	100	-50 / 100mm		185 -			o ¹¹				
							5	184			•	St	art of coring	at 5.2 m	
			CS	7	122		E - 6	104			°				
			cs	8	96		7	183 -			o ¹⁰				
	grey to dark grey SILTY CLAY varved, moist	<u>181.6</u> 7.9	cs	9	100		8	181		_	o ¹²				
4	grey SAND and SiLT varying gravel and clay content, of cobbles or boulders (TILL) moist to wet, very dense	9.2 9.2	ß	10	89		10	180 -			ം ⁸				
		477.0	ß	11	97		11	178 —			° ₉				
4//	grey to dark grey SILTY CLAY varved, moist grey	<u>177.2</u> 12.4 <u>176.1</u> 13.4	cs	12	99		13	177			_ാ 26				
	SAND and SILT varying gravel and clay content (1 moist to wet, very dense	FILL) 174.3	cs	13	53		14	175 -			0 ¹¹				
- <i>i</i> -,Ľ	END OF BOREHOLE (no refusai)	15.2					-								
AM A d	AMEC Earth & Environmental A division of AMEC Americas Limited														
131 Live	Fielding Road ay, Ontario ada P3Y 11 7	Groundwat	ter dept	h obser	vedion	09/03/2	2 <u>008</u> a	t a depti	nof <u>0.2 m</u> .		Cave in depth recorded	09/03/2008	iata deptho	of <u>12.3</u>	<u>m</u> .
Tel Fax	+1(705) 682-2632 +1(705) 682-2260	Borehole details a qualified Geotechi accompanying Eq	s preseni nicel Engi planation	ted, do no Inser. Also of Borels	t constitu o, boreho ole Logʻ.	ste a thorn ia informa	ough un ation sha	oerstandir ould be rea	ig of all potential ad in conjunction	conditions present 4 with the geotechnic	and requires interpretative asolistant al report for which it was commisio	e from a ned and the		S	ale: 1 : 100
ww	w.amec.com													۲ 8	iye. 1071
Pro	Diject Number: <u>TY86002</u>		0.	911	<u>00-U</u>	<u>4</u> (-0-(Drilling	g Location:	<u>See Figure 2</u>	<u>002 I IN</u>		Logged by:	PRL	
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Pro	ject Client: PhosCan Chemical	Corp.						Drittin	g Method:	200 mm Hoi	low Stern Auger		_ Compiled by:	ЕТВ	
Pro	ject Name: Martison Phosphate	Project						Drilling	Machine:	Truck Mount	ed Drill		_ Reviewed by:	TJL	
Pro	ject Location: Hearst, Ontario							Date	Started:	<u>11 Mar 08</u>	Date Completed: 11 M	lar 08	Revision No.:	<u>4, 17/09/0</u>	
	LITHOLOGY PROFILE		SC	DIL SA	MPL				FIELD	TESTING	LAB TESTING		COMMEN	TS	
Lithology Plot	DESCRIPTION		Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	OEPTH (m)	ELEVATION (m)	Penetra SPT MTO Vane* A Intact Remould * Undrained Sh 15 30	titionTesting ● DCPT Nilcon Vane* ○ Intact ● Remould tear Strength (kPa) 45 80	Atterberg Limits Wr W Wi 5	INSTRUMENTATION INSTALLATION			
<u>. 1</u>	Diack ORGANICS (MUSKEG)							▼							
<u></u>	norous		ss	1	8	1		189 -							
<u></u>			ss	2	16	0		186 -							
	grey	<u>187.4</u> 2.3		-		1									
447	trace sand, wet, soft to stiff increasing in silt content with depth						3	187 -							
147			- 55	4	75	24		188 -	C						
		185.1													
	brown to grey SAND and SILT varying gravel and clay content, occasic	4.6 nal	ss	5	100	99	5	185		99 C)				
	moist to wet, compact to very dense							184 -							
			SS	6	100	50 / 125mm		100							
							7	183							
			ss	7	100	93	- 8	182 -		93)				
•								181 -							
			SS	8	100	507 125mm	- e			ļ					
							- 10	180 -							
• •			SS	9	100	- 50/		179 -							
							- 11								
			55	-10	93	501	- 12	178							
						126mm	- 13	177 -							
						50/		176							
·		175.4	- 55	11	/4	125mm	- 14				<u> </u>				
	(no refusal)	14.0						:							
					ĺ										
									I						
ME	C Earth & Environmental	No freestar	nding gr	oundwa	ater mea	asured in	n open	borehole	on completio	on of drilling.					
31 ivel	Fielding Road	Groundwat	er depti	obser	ved on	<u>12/03/2</u>	<u>008</u> a	t a depth	of <u>0.3 m</u> .		Cave in depth recorded	<u>12/03/2008</u> a	tadepth of <u>5.0 m</u>	ļ.	
ani el 1 ax	ada P3Y 1L7 Boo -1(705) 682-2632 gui +1(705) 682-2260 gci	whole details as Alfied Geotechr ompanying Exp	s present tical Engli stanction	ed, do no neer. Also of Boreh	t constitu o, borsho ole Log'.	de a thoro le informa	rugh und rtion sho	ierstanding with be rea	of all potential of in conjunction (conditions present an with the geotechnical	d requires interpretative easistance report for which it was commissio	e from a ned and the	Sc	ale: 1 : 10	

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RI Pro Pro Pro	ECORD OF BORE	HOLE N	0.	GT)8-0	<u>5</u> C	o-C	Dritling Dritling Dritling	D32735 Location: Method: Machine:	See Figure 2 200 mm Hol Truck Mount	16228 N Now Stem Auger		Logged Compile Review	by: PRL ed by: ETB ed by: TJL
Pro	ect Location: Hearst, Ontario	•						Date S	tarted:	<u>11 Mar 08</u>	_ Date Completed: 11 Ma	r 08	Revisio	n No.: 4, 17/09/08
		E	so	IL SA		NG	·	-	FIELD	TESTING	LAB TESTING		CO	AMENTS
Lithology Plot	DESCRIPTION	.1 m	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	Penetra OSPT MTOVane* △Intact ▲Remound *Undrained Sh 15 30	tionTesting DCPT Nilcon Vane* O Intect Remould ear Strength (kPe) 45 50	Atterberg Limits W, W W, Pastic Lituid × Pessing 75 um (%) O Molisture Contant (%) 20 40 60 80	INSTRUMENTATION INSTALLATION		
<u>974</u> 57 - 0	DIACK ORGANICS (MUSKEG) fibrous				1			y i						
	grey SILT with some clay, trace sand and grav moist to wet, stiff grey SAND and SILT varying gravel and clay content, occ cobbles or boulders (TiLL) moist to wet, compact to very dense	187.8 1.3 1.86.9 2.2 rasional	SS SS VT VT SS SS	1A 1B 1 2 2 3	17 53 51 100	1 51 57	1 2 3	188 1 188 1 187 1 186 1 186 1	⊃ ⊃ ▲5	▲39	85 95			
							4	185						
<u></u>			\$S	4	100	48	5	184		0				
			SS	5	100	29	6 7	183	o					
ž	grey SILTY CLAY	181.0 8.1 180.6	SS	6	95	65	8	181		0				
	Varying sit content, wet grey SAND and SILT varying gravel and clay content, occ cobbles or bouiders (TILL) moist to wet, very dense	<u>8</u> ,6	55	7	100	50 / 25mm	10 10	180						
			- 55	8		-507- 25mm	ر. درستارین ا	178						
			SS	9	100	-50 / 50mm	12 12 13	177						
				10	80	50 /		110						
	END OF BOREHOLE (no refusal)	<u>174.8</u> 14.3				 100mm	14 	175						
												NK Re m	<u>ole:</u> ssidum depti deoth by Go	h inferred to be at 31.0 Idder 1983
AM A d 131	EC Earth & Environmental ivision of AMEC Americas Limited Fielding Road	∑ No freesta	anding g		vater me	asured	in ope	n boreho at a der#	le on comple	tion of dritting.	☆ Cave in depth recorded	12/03/2008	at a depth	of <u>3.4 m</u> .
Live Cai Tel Fao	ely, Ontário nada P3Y 1L7 +1(705) 682-2632 (+1(705) 682-2260	Borehole details qualified Geolecia accompanying E	as preser Insical Englishmetion	ted, do i pineer. Al	not constit iso, boreix hole Log'.	ule a thoracte	rough ur retion sh	denstands ould be re	ng of all potentia ad in conjunctio	i conditions present n with the geotechni	and requires interpretative assistancel report for which it was commisk	ce from a med and the		Scale: 1 : 100 Page: 1 of 1

R Pro	ECORD OF BOREH	IOLE N	0.	GT	<u>)8-0</u>	<u>6</u> C	:o-C	Drd.	032712 Location:	21 E, 557 See Figure 2	<u>'5292 N</u>			d by:	
Pro	ject Client: PhosCan Chemical	l Corp.						Drilling	Method:	200 mm Ho	llow Stem Auger and Cor	ing	Compi	led by:	ETB
Pro	ject Name: Martison Phosphat	e Project						Drilling	Machine:	Truck Mount	ed Drill		Review	ved by:	TJL
Pro	ject Location: <u>Hearst, Ontario</u>					·		Date S	Started:	10 Mar 08	_ Date Completed: 10 Ma	ar 08	_ Revisi	on No.:	4, 17/09/08
	LITHOLOGY PROFILE		SC	IL SA	MPLI	NG			FIELD	TESTING	LAB TESTING	z	со	MMEN	TS
Lithology Plot	DESCRIPTION	m	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	Penetra C SPT MTO Vane* ∆ intect ▲ Remoukt * Undrained Si 15 30	titionTesting ● DCPT Nilcon Vane* ○ Intact ● Remould tear Strength (kPa) 45 60	Atterberg Limits W _p W W ₁ Plassic Liquid × Passing 75 um (%) C Mointure Content (%) 20 40 60 60	INSTRUMENTATIO			
<u></u>	black ORGANICS (MUSKEG)						TH T	Y							
<u>신</u> 신년 	norous	190.5	ss	1	13	0	1	- 191							
<u> </u>	No Recovery	1.5	ST		0		E_2	190							
			ST	1	-						_o 13				
	grey SAND and SILT	189.0 3.1	\$S	2	38	11	13	189 -	c		_ം 30				
	cobbles or boulders (TiLL) moist to wet, compact to very dense	ionai	ss	3	92	42	4	188 -		0	_o 13				
	grey SILTY CLAY	187. <u>4</u> 4.6	ss	4	75	33	44 14 14	187 -		S	_് 20				
	varying sitt content, wet grey SAND and Sill T	186.7 5.3	SS	5	87	81		8		81) o ¹⁴				
	varying gravel and clay content, occas cobbles or boulders (TILL) motet to wet very dense	ional		-	100	90	6	186 -		80	13				
	Thoist to way, very dense		33	0	100	~		185 -							
											13				
			SS	7	100	56	8	184 -		o	013				
				_			- 9	183 -		70					
			SS	8	100	79	-			()	₀ -13				
							- 10 -	162 -			14				
			ss	_9	100	25mm	- 11	181 -			c,,				
			ន	10	62		- 12	160 -			°15		Start of coring	at 11.3	m .
											.9				
		178.3	CS	11	21		- 13	179 -			0-				
	grey SILTY CLAY varying silt content, wet, stiff	13.7		10	400		- 14	178 -			_10				
	grey SAND and SILT varying gravel and clay content, occas	sional 176.8	3	12	100		- 15	177 -			5				
- Ľ	Loobbles or boulders (TILL) moist to wet, very dense END OF BOREHOLE	15.2					<u> </u>					1			
	(no rerusai)														
AM A d	EC Earth & Environmental vision of AMEC Americas Limited	∑ No freesta	nding g	roundw	ater me	asured	in oper	n borehoi	le on complet	ion of drilling.	L	1	L		
131 Live Car	Fletding Road ay, Ontario ada P3Y 1L7	Groundwa	ter dept	h obsei	rved on	11/03/2	2 <u>008</u> a	at a depti	n of <u>0.5 m</u> .	nondlines	Cave in depth recorded	11/03/2	2008 at a depth	of <u>5.5 r</u>	<u>n</u>
Tel Fax	+1(705) 682-2632 +1(705) 682-2260 w.amec.com	qualified Geotech accompanying Ex	planation	una, ano hi Inner. Ala In of Borel	noie Log'.	une a uner Sie inform	un ation sh	ouid be rea	ng ya an borning Ng ya coulonggo	with the geotachnic	al report for which it was commisic	and and th	•	S Pa	cale:1:100 age:1 of 1
ww	w.emet.com													~~	age. I (

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RI Pro	ECORD OF BOREI	HOLE N	o.	GTO	08-0	<u>7</u> C	:o-C	Drilling	03268(Location:	9 E, 557 See Figure 2	<u>4894 N</u>			i by:	
Pro	ect Client: PhosCan Chemic	al Corp.						Drilling	Method:	200 mm Hoi	llow Stem Auger and Cor	ing	Compi	ed by:	ЕТВ
Pro	ject Name: Martison Phosph	ate Project						Drilling	Machine:	Truck Mount	ed Drill		Review	ved by:	TJL
Pro	ect Location: Hearst, Ontario							Date S	itarted:	09 Mar 08	Date Completed: 09 Ma	r 08	Revisio	n No.:	4, 17/09/08
	LITHOLOGY PROFIL	£	SC	IL SA	MPLI	NG			FIELD	TESTING	LAB TESTING		co	MMEN	TS
hology Plot	DESCRIPTION		imple Type	smple Number	scovery (%)	PT 'N' Value	EPTH (m)	EVATION (m)	Penetra SPT MTO Vane* A Intact Remould * Undrained Sh	tionTesting DCPT Nilcon Vane* intact Remould ear Strength (kPa)	Atterberg Limits W, W W Plastic Liquid * Passing 75 um (%) O Moisture Contant (%)	STRUMENTATION STALLATION			
드	Local Ground Surface Elevation: 191. black	6 m	ů	ů	ŭ	<u>0</u>	ē	<u> </u>	15 30	45 60	20 40 60 80	<u>zz</u>		-	
2 2	ORGANICS (MUSKEG) fibrous							191 -							
<u></u>		190.1	SS	1	8	2			þ						
	grey SAND and SILT	1.5	SS	2	84	6	Ē	190 -	o		0 ¹⁵				
	varying gravel and clay content, occa or boulder (TILL)	asional cobble	SS	3	100	50/	Ē				₀ 13				
	moist to wet, loose to very dense						Ē 3	189 -							
		107 0	SS	4	100	74		188		c	, o ¹⁰				
4	grey	787.8 3.8	SS	5	100	59	E 4			0	₀ 11				
	varying silt and gravel and clay conte moist to wet, very dense	ent (TILL)				>90/		187			<u>_</u> 9				
				ь ——	89	300mm	5						Start of contorn	at 5.7 m	
			cs	7	86			166			° ⁹		start of coning	al J.2 11	L
•							6	-							
			cs	8	12			185 -			_റ 11				
÷.							- 8	184 -				h S	io Recovery Sample wash	ed out of	core barrei.
			cs	9	0			182							
·."							- 9	100							
		1						182 -							
•			cs	10	0		- 10								
								181 -							
•							L 11	-							
• ,*			cs	11	O	1		180 -							
							12								
•			cs	12	0		F - 13	179 -							
								170							
			SS	13	16	>50 for 150mm	E 14				₀ 13				
	END OF BOREHOLE	177.3					f								
							l								
						l									
	C Earth & Earthmannet	A • •	<u> </u>		<u> </u>		<u> </u>								
AMI A di 131	EC Earth & Environmental vision of AMEC Americas Limited Fielding Road	¥ No freestar	nding gi	roundwa	ater me	asured i	n oper	to com	e on complet	ion of drilling.	M Cave in death recorded	10/03/20/	18 at a denth	nf 43.n	n
Live	ly, Ontario ada P3Y 1L7	Borehole details a	s present	led, do m	ol constit	ute a thorn	oughun	derstandin	g of all potential	conditione present a	and requires interpretative assistant	to from a	<u></u> or a cobor.	. <u></u>	
Fax	+1(705) 682-260 v.amec.com	qualified Geolech accompanying Ex	nical Engi planation	of Boreh	io, borehi iole Log'.		etton siv	AURO DIE MEN	ia in conjunction	with the geolechnic	au report for which It was commissio	meto and the		Pa	age: 1 of 1

rojec	t Number: <u>TY86002</u>							Drilling Location	: See Figure 2	2		Logged by: PF	<u>ય</u>
rojec	t Client: PhosCan Chemical Corp.							Drilling Method	<u>200 mm Ho</u>	Niow Stem Auger and Co	ring	Compiled by: El	<u>18</u>
rojec	t Name: Martison Phosphate Proje	ct						Date Started:	09 Mar 08	Data Completed: 09 M		Reviewed by: <u>13</u> Revision No : 4	17/09/
rojec		<u> </u>											11/040
-			so	IL SA	MPLI	NG		Fibl	U IES IING		z	COMMENTS	
Lo	DESCRIPTION		Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	E O SPT N MTO Va L ∆ Intact V A Remo UI * Undraine III 15	DCPT DCPT Nilcon Vane* intact intact shear Strength (kPa) 30 45 60	We we we Plastic Liquid x Passing 75 um (%) Moisture Content (%) 20 40 60 80	INSTRUMENTATIC		
0	ack RGANICS (MUSKEG)	1	1					1					
si nt	rous	F	22		13	2	Ē.,	1					
- 	1	189.8					É.	190		20			
	AYEY SILT me sand 1	1.5	SS	2	84	1	2	1		്യ			
bi	et, soft to firm own to grey	7	ss	3	100	38	Ē	169	0	₀ 17			
. νa . α	anying gravel and clay content, occasional bobles or boulders (TILL)		SS	4	100	50/- 125mm	- 3	186		_ی 13			
. m :	oist to wet, dense to very dense	_					Ē					Start coring at 3.6 m.	
·			cs	5	42			187		°°			
: I da	ark grey to grey 1	186.4					- 5						
6	LTÝ CLAY oist. firm. varved	5.2	cs	6	73			186		o ¹⁷			
S	cy AND and SILT srying gravel and clay content, occasional	_					- - -						
CC m	obles or boulders (TILL) oist to wet, dense) on thick dark turnwn SIIT, varvinn clav cont	tent	~	-				169		_14			
ai	5.94 m creased gravel content with depth		ŝ	,	13		Ē. 7	184			1		
		-					Ē.						
			cs	8	5		Ē	183 -		ی ²³			
							Ē.	1111					
								182					
			cs	9	0		E 10	181					
		-					ŧ						
			cs	10	0		E 11	180				No sample recovered from	CS 10
							12						
		F					Ē	179 -			1		
			cs	11	10		- 13						
						ļ	4144	178					
							14	177		29			
			cs	12	10					°*°			
E	ND OF BOREHOLE	176.1 15.2					E 16		·	<u> </u>	-		
(r	o refusal)												
					1								
										1			
IEC livis	Earth & Environmental	reestand	ting gr	oundw	ater me	asured	in ope	n borehole on com	pletion of dritting.				
Fu sly,	Ading Road School	Indwater	r depti	h obser	ved on	10/03/2	2 <u>008</u> (at a depth of 0.30	<u>m</u> .	Cave in depth recorde	d <u>10/03/</u> 2	2008 at a depth of <u>2.8 m</u> .	
+1(+1	705) 682-2632 gambled G (705) 682-2260 accompany	walls as p lected mic lying Expla	present sal Engi Instion	ed, do n meer. Als of Bonel	n constitu no, boreho nole Log'.	ute a thor de inform	ough ui ntion sì	werstanding of all pote pulki be read in conjun	nui conditions present tion with the geotechni	enu requires interpretative assistan cal report for which it was commiss	nce morn a ioned and ti	- Scale	e: 1 : 1
	1111 TO 11											L Made	

Pn	oiect Client: PhosCan Chemical C	Corn.						Drilling	- Method:	200 mm Ho	llow Stem Auger and Co	ripo	Compile	ed hv: F
Pn	oject Name: Martison Phosphate	Project						Drilling	Machine:	Truck Mount	ted Drill	1194	Review	ed by: T
Pr	oject Location: Hearst, Ontario							Date S	Started:	08 Mar 08	Date Completed: 08 M	ar 08	Revisio	No.: 4
	LITHOLOGY PROFILE		SC	DIL SA	MPL	NG	Γ	-	FIELD	TESTING	LAB TESTING	1	COM	
								_	Penetra	tionTesting	Atterberg Limits	No		
Lithology Plot	DESCRIPTION		Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m	O SPT MTO Vane* △ hiect ▲ Remould * Undrained Sh 15 30	DCPT Nilcon Vane* Inlact Remound ser Strength (kPa) 45 60	Wp W With Plastic Liquid X Passing 75 um (%) ○ Moisture Content (%) 20 40 60 80	INSTRUMENTAI		
<u></u>	Diack ORGANICS (MUSKEG)						1.1	191 ~						
ビュ マル	1 fibrous		ss	1	13	2	Ē,	Ţ	h					
<u> </u>	- 						ŧ	190 -						
<u></u>	:	189.1	SS	2	13	0	2	2	9					
	brown to grey SAND and SILT vaning gravel and clay content, occasion	2.3	SS	Э	79	18		189 -	0		° ¹¹			
	cobbles or boulders (TILL) moist to wet, compact to very dense	~1	ss	4	0	57	È 3	⊠ - 88 -		0				
	•			-	105		É.				11		Start of coring a	it 3.7 m.
			US	5	109			187 -			0			
	' Dark grey, sitt and clay seam		cs	6	99		5	186			o ¹¹			
			cs	7	99		1 6 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	185			c ¹¹		1	
			cs	8	100		ه	183			_c 11			
	grey to dark grey SILTY CLAY varved, moist	181.8 9.6 180 9	CS	9	74		10 10	182			° ⁹			
	grey SAND and SILT varying gravel and clay content, occasion cobbles or boulders (TILL) moist to wet, dense to very dense	10.5 nał	cs	10	100			180			_c 10			
	•		~		100	<u> </u>		179 -						
4 10		178.3	ŝ	11A			E 13				~			
£1	SILTY CLAY	13.1 177.7	cs	11B	100	ļ	E.	178 -			° ²¹			
	. grey SAND and SILT varying gravel and clay content, (TILL), dense 20 cm grey sit and clay seam at 14.0 m 15 cm grey to dark grey sit and clay sea RL	moist, mat 1462	cs	12	100		14	177			₀ 14			
	(no refusal)													
AN	L tEC Earth & Environmental Tivision of AMEC Americas Limited =	No freestar	nding gr	noundwa	ater mea	asured	in oper	n borehoi	e on completi	on of drilling.]		

RI Pro	ECORD OF BOREH ject Number: <u>1Y86002</u> ject Client: <u>PhosCan Chemic</u>		0.	GT	08-1	<u>0</u> C	:o-C	Drilling	032737 Location: Method:	28 E 557	5605 N kow Stern Auger	La	And the second s
Pro	ject Name: Martison Phospha	te Project						Drilling	Machine:	Truck Mount	ed Drill	R	eviewed by: <u>TJL</u>
Pro	ject Location: Hearst, Ontario							Date \$	Started:	10 Mar 08	Date Completed: 10 Ma	<u>8708</u> R	evision No.: <u>4, 17/09/08</u>
		E	SC	NL SA	MPLI	NG		+	FIELD	TESTING		z	COMMENTS
Lithology Plot	DESCRIPTION	lm	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	Penetra ○ SPT MTO Vane* △ Intect ▲ Remould * Undrained Sk 15 30	● DCPT Nilcon Vane* ○ intact ● Remould near Strangth (kPa) 45 60	Attendenty Limits W _p W W Plastic Liquid # Passing 75 um (%) O Moisture Content (%) 20 _ 40 60 80	INSTALLATION	
4	black ORGANICS (MUSKEG)						E C	194 -					
নিটা	brown to grey	<u>193.5</u> 0.9	SS	1A 1B	240	5	Ę,		0				
	SAND and SILT varying gravel and clay content, occa cobbles or boulders (TILL)	sional					ŧ	193 -					
	wet to moist, loose to very dense			2	100	14	<u>-</u> 2	102 -	0				
	1 1	191.4	SS	3	100	25 507	Ē,		0				
	red SANDY SILT	3.1	SS	4	100	125 mm	Ę	191 -					
+	grey	<u> </u>	SS SS	5A 5B	100	58	1			o			
	SAND and SILT varying gravel content, occasional c boulders (TILL)	obbles or	65	6	100	35	Ē	₩ 90 -		0			
	wet to moist, compact to very dense						1.5	189 ~		-			
							Ē.,						
			SS	7	100	26	Ē	188 ~	0				
]				-7	187 -					
			SS	8	100	- 50 /- 75mm		107					
	•							186 ~					
								X		78			
			SS	9	100	78	-	185 -		Ċ	þ		
							10 	184 -					
			SS	10	100	907 275mn	n - 11						
								183 -					
					400		- 12	182 -		~			
	•		- 35	11	100	09	- 13			0			
								181 -					
		180.1	SS	12	100	82	- - 14			82 () 		
	END OF BOREHOLE (no refusal)	14.3											
AN	EC Earth & Environmental	$\frac{1}{2}$ No freesta	anding g	Iroundw	vater me	asured	in ope	n boreho	le on comple	tion of drilling.	L_,	•	
13 Liv	I Fielding Road ely, Ontario	E Groundwa	ater dep	th obse	rved on	<u>11/03/</u>	2008	at a dep	hof <u>4.5 m</u> .		Cave in depth recorder	11/03/2008 at a	depth of <u>9,0 m</u> .
Tel Fa	+1(705) 682-2632 x +1(705) 682-2260	Borehole details qualified Geotect accompanying E	as preser Indeal Eng Isplanatio	sted, do r pinser. Al n of Bore	not constil iso, boreh ihole Log'.	ute a tho ole inform	rough ui nation si	nderstandi houid be re	ng of all potentie ad in conjunctio	I conditions present (n with the geotechnic	and requires interpretative assistants al report for which it was commis-	ce from a oraci ánsi the	Scale: 1 : 100
ww	w.amec.com												iaye. i 0

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R Pro		EHOLE N	0.	<u>GT(</u>	0 8-1	<u>1</u> C	Co-C	Drd. Drillin	032759	94 E, 557 See Figure 2	75898 N 2		Logo		C ^O
Pro	pject Client: PhosCan Chem	nical Corp.						Drillin	g Method:	200 mm Ho	bilow Stem Auger		Com	piled by: El	лв.
Pro	oject Name: Martison Phos	phate Project						Drillin	g Machine:	Truck Mount	ted Drill		Revi	ewed by: <u>TJ</u>	L
Pro	oject Location: Hearst, Ontario							Date	Started:	<u>11 Mar 08</u>	_ Date Completed: 11 M	ar 0 <u>8</u>	Revi	sion No.: <u>4,</u>	17/09/08
	LITHOLOGY PROF	ILE	SC)IL SA	MPLI	NG		ļ	FIELD	TESTING	LAB TESTING	1	C	MMENTS	
hology Plot	DESCRIPTIO	N	mple Type	mple Number	covery (%)	T 'N' Value	PTH (m)	EVATION (m)	Penetrar OSPT MTO Vane* ∆Intect A Remould • Undersident Shi	tionTesting DCPT Nilcon Vane* C Intect Removal	Atterberg Limits W. W. W. Plastic Liquid * Pessing 75 um (%) O Moisture Content (%)	TRUMENTATION			
<u></u>	Local Ground Surface Elevation: 15 black ORGANICS (MUSKEG)	93.5 m	ŝ	8 N	ar ar	<u>2</u> 2	Ē	<u> </u>	15 30	45 60	20 40 60 80	Ξž			
<u>्र र</u> बाहा	fibrous	192.6	ss	. 1A	320	в	Ē,	193 -	0						
H	SILTY CLAY trace sand, firm, wet	0.9	SS	1B	104	8		192	0						
14		101.2	SS	2	100	11	Ę_2		0						
	brown to grey SAND and SILT	2.3	ss	3	100	20		191 -	0						
	cobbles or boulders (TILL) wet to moist, compact to very dens	se	ss	4	100	32	E 3	100	0						
							E_4	190							Í
								189							l
			SS	5	100	40	5			0			1		[
								188							
			SS	6	100	50 / 125mm	- °	187 -							
								107							
			-55-1		100	50/-		186 -							
		-				125mm									
							112124	185 -							
		-	SS	8	100	50 /~ 125mm	- •	184 -							
							10								
		-				- 00 /-		¥ 83 −							
11		ŀ	SS	9	100	225mm	E 11								
					Í			182							
		-	SS	10	100	- 50 / 125mm	- 12	181 -							
		Í					13								
								180							
		179.2	SS	11	0		14	1111							
	END OF BOREHOLE (no refusal)	14.3													
													Note: Residum dep m deoth by G	th inferred to b oldder 1983	e at 32.0
AME	C Earth & Environmental		ding or	Jundwał	er mea	sumed is	n open *	horebold	on comulation						
Adiv 131 Live	ision of AMEC Americas Limited Fielding Road	E Groundwate	er depth	observ	ed on <u>'</u>	11/03/2	<u>008</u> at a	a depth	of <u>10.4 m</u> .	o or ormany.	🛛 Cave in depth recorded	<u>11/03/</u> 2	008 at a depth	of <u>10.8 m</u> .	
Cana Tel +	ida P3Y 1L7 1(705) 682-2632	Borshole details as qualified Geotechnie	presente cal Englis	d, do not ser. Also,	constitut borehole	e a thoro e informa	ugh unde Non shou	instanding Jid be read	of all potential co i in conjunction w	nditions present an th the geotechnical	nd requires interpretative assistance I report for which it was commision	from a ed and th	,	Scale:	1:100
,⊤ax + ₩₩₩	amec.com	accompanyingExpl	enution c	a Borehol	e Log'.									Page:	1 of 1

R		IOLE N	0.	GTO	08-1	<u>2</u> C	:o-C)rd . <u>(</u>)3269	52 E, 557	7566 N		an	Jec O
	siect Client: PhosCan Chemica	al Corp.						Drilling	Method:	200 mm Hol	llow Stern Auger		Compiled by	C ETB
Pro	ject Name: Martison Phospha	nte Project						Drilling	Machine:	Truck Mount	ed Drill		Reviewed b	y: <u>TJL</u>
Pro	ject Location: Hearst, Ontario							Date S	tarted:	11 Mar 08	Date Completed: 11 Ma	ar 08	Revision No	.: <u>4, 17/09/08</u>
	LITHOLOGY PROFILI	E	SC	DIL SA	MPLI	NG		1	FIELD	TESTING	LAB TESTING		COMME	INTS
Lithology Plot	DESCRIPTION) m	Sample Type	Sample Number	Recovery (%)	SPT 'N' Vatue	DEPTH (m)	ELEVATION {m}	Penetra SPT MTO Vane [®] A Intect Remould "Undrained Sh 15 30	tionTesting ● DCPT Nilcon Vane ⁴ ○ Intact ● Remould war Strength (kPa) 45 60	Atterberg Limits W, W W, Presic C Liquid * Pessing 75 um (%) Omissure Content (%) 20 40 60 80	INSTRUMENTATION INSTALLATION		
$\frac{3}{4}$	black ORGANICS (MUSKEG)						Ē	198 -					Borehole had been i water level or depth be determined	of cave could
<u></u>	norous	196.8	GS	1				197					De determined.	
÷	brown to grey SAND and SiLT wanter gravel and clay content, occa	1.5 eional	S 5	2	100	38	2	1111		C				
÷ ;	cobbles or boulders (TiLL) wet to moist, dense to very dense	Sional	55	3	100	51		196 -7		0				
			ss	4	25	46	1_3 [[195 -		0				
* : • :				Γ			Ē.	1111						
÷ ;			SS	5	89	50 / 125mm	l l	194						
÷ .							5	193 -						
* *			_SS	6	100	50/-	- -	1111						
* 4 *						1301181		192						
4 4						50 / 50		191 -						
* + + .			SS	7	50		1 [8	11111						
* =								190						
* • ÷ •			SS	8	100	50 / 25		189 -						
4 +				ļ			- 10	111111						
÷ .			SS	9	100	50 / 75	,	168						
÷ 4							- 11	187 -						
÷							12							
* : + ;		185.5	ss	10	41			186 -						
	END OF BOREHOLE (no refusal)	12.8												
AN A di 131	EC Earth & Environmental ivision of AMEC Americas Limited Fielding Road	오 No freesta	inding g	roundw	ater me	asured	in open	borehole	e on complet	ion of drilling.		<u> </u>		
Live Car Tel	ely, Ontario lada P3Y 1L7 +1(705) 682-2632	Barehole details : qualified Geotech	ns presen micel Eng	ted, do te Inter: Als	ol constitu o, boreix	ute a thor de inform	ough und ation sho	denstanding build be read	; of all potential I in conjunction	conditions present a with the geotechnic	and requires interpretative analytics al report for which it was commissio	ts from s and and th		Scale: 1 : 100
+ax	.т.(705) 662-2260 w.amec.com	accompanying Ex	penetion	or Borel	HONE LOG'.						<u></u>			Page: 1 of 1

R	ECORD OF BOR	EHOLE N	lo.	<u>PT</u>	0 <u>8-0</u>	<u>1</u> C	Co-O	Drd. 0	32826	5 E, 557 See Figure 2	76446 N			ec
Pr	oject Client: PhosCan Chen	nical Corp.						Drilling	Method:	200 mm Ho	llow Stem Auger and Co	ning	Compiled by:	ETB
Pr	oject Name: Martison Phos	phate Project						Drilling	Machine:	Track Mount	ted Drill		Reviewed by:	TJL
Pr	oject Location: <u>Hearst, Ontaric</u>)						Date St	arted:	<u>14 Feb 08</u>	_ Date Completed: 20 F	eb 08	Revision No.:	<u>4, 17/09/08</u>
┝	LITHOLOGY PROF		s	DIL SA	MPLI	ING			FIELD	TESTING	LAB TESTING	Z 88.	COMMEN	TS
Lithology Plot	DESCRIPTIO	N 69.1 m	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	Penetrat ○ SPT MTO Vane* △ Intect ▲ Remould * Undrained Sha 15 30		Atterberg Limits W, W W, Please Liquid K Passing 75 um (%) O Moisture Content (%) 20 40 60 80	INSTRUMENTATIO	iser pipe in backfil iser pipe in sand Jotted pipe in sand Installation, only bento	nite
		407.0					1	188 -						
	brown CLAYEY SILT trace sand, wet, dense grey SAND and SILT	1.5 186.9 2.2	SS	1	97	34	2	187	С)	_o 18			
	varying gravel and clay content, or cobbles or boulders (TILL) moist to wet, compact to very den	ccasional se	SS	2	100	28	surfrund B	186 m	0		°15			
							til ₄Ÿ	¥ ⊒85 -		100	12			
				3	84	100	5	184		Ċ	> 013	A D C C		ſ
						, 	1 6 1 (((((((((((((((((((183				D C C C C C C C C C C C C C C C C C C C	corioc at 6.7 m	
		100.0	CS	4	100			182					50 mg 51 0.7 m.	
ZZ	grey to dark grey SILTY CLAY varved, moist, firm grey	8.2 180.1 9.0		5	4/			181				00,000		
	SAND and SILT varying gravel and clay content, oc cobbles or boulders (TILL) moist to wet, compact to very dens	casional se	cs	6	67		10	179						
			cs	7	7		11	178				000,000,000,000		
			cs	8	100		12	177				SPMD	D 1,757 kg/m3, O	MC 17.7%
			cs	9	100		14	175 175			× 68			
			cs	10	100		15	174) 174) 173						
			cs	11	92		17	172				000 000 000 000		
		[cs	12	88		- 18	171 - 1				00000		
AME A div	C Earth & Environmental ision of AMEC Americas Limited	문 Groundwate	er depth	record	ed on co	mpletic	on at a d	depth of	<u>4.0 m</u> .		Cave in depth recorded	on completion o	fdrilling <u>103 m</u> .	
Livel	y, Ontanio da P3Y 1L7	Groundwate	er depth	observ	ed on 1	4/03/20	0 <u>08</u> ata	a depth of	<u>4.0 m</u>					
Tel + Fax +	1(705) 682-2632 1(705) 682-2260 .amec.com	qualified Geotachni accompanying Expl	cal Engin	ver. Also xf Boreho	, borehole ie Log'.	Informat	tion should	id be med in	conjunction wi	th the geotechnical	report for which it was commision	ad and the	Sca Pag	le:1:100 e:1 of 6

		S	DIL SA	MPLI	NG	1	1		LAB TESTING		CONHENTE
							-	PenetrationTesting	Atterberg Limits	TION	1 riser pipe in bentonite
5 So	DESCRIPTION	þ	umber	(%)	-	Ŷ	L N	O SPT ● DCPT MTO Vane* Nilcon Vane*	Plastic Liquid	ENTA	1 riser pipe in sand
ology i		nple T ₃	nple N	overy	L N. Č	TH (r	EVATIC	△ Intect ◇ Intect ▲ Remould ◆ Remould	≭ Pessing 75 um (%) C Moisture Content (%)	TALLA	no installation, only bentonite
<u>f</u>	grey	Sar	Sar	Rec	dS dS	ä		* Undramed Shear Strength (kPa) 15 30 45 60	20 40 60 80	NSN NSN	
	ŠAŃD and SILT varying gravel and clay content, occasional combies or boulders (TILL)					Ē				0000	d । ब
	moist to wet, compact to very dense dark grey silt and clay seam at 19.2 m	cs	13	100		20	169 -			D	
	grey silt seam at 19.8 m					E 21				D	
•			1				168 -				
•	, varved dark grey silt and clay	CS	14	100		22	167 -			6.00	
	varved dark grey silt and clay		-	-		Ē				000	۲ Co
	•	cs	15	47		- 23	166 -			000	
	•					24					
	•					Ē	165 -			000	
	•	CS	16	100		25	164 -			Dar	
-				<u> </u>						000	
	, , ,	cs	17	96		- 26 -	163 -				
	•					27					
							162		-		a c
		cs	18	34		28	161 -		1		
•	•	_							- - -	D	2 2 0
	•	cs	19	96		E 29	160 ~		P	000	с с
•	•					Ē - 30					d d
							159 -			000	7 g g
	boulder encountered in CS20	cs	20	87		- 31	158 -		2	000	े व
•									5 7 8		a a
		CS	21	80		- 32	157		2		
	cobble encountered in CS21	~		~		- 33			6 1 1		۲ ۲
						1	156		2 5 3	Dec	
		cs	22	53		- 34	155 -		2	000	
									P 7		
				~		- 35	154 -		: > >		4
			23	89		- 36				1000	
							153			000	
		cs	24	93		- 37	152		1 5 8	1000	
							-		2 2 2		9
						38	151 -				7 0 1
		CS	25	100		E - 319					
ŀ							150		2 2	Dar Car	
		cs	26	20		40	149		1 1 1	000	
11			-1 -0 -0-0			-			¢	1.	

Pr	bject Number: <u>1786002</u>			<u></u>	<u> </u>		Drilling	g Location: See Figure 2	<u>0440 N</u>		
	LITHOLOGY PROFILE	SC	DIL SA	MPLI	NG			FIELD TESTING	LAB TESTING	Τ	COMMENTS
Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	PenetrationTesting ○ SPT ● DCPT MTO Vane* Nilcon Vane* △ Intect ○ Intect ▲ Remould ● Remould *Undrained Shear Strength (NPa) 15 30 45 60	Atterberg Limits <i>W_p W W</i> Plastic Liquid × Plassing 75 um (%) O Molature Contant (%) 20 40 60 60		1 neer pipe in bentonite 1 neer pipe in becklil 1 nieer pipe in backlil 1 nieer pipe in aand 1 siented pipe in aand son installation, only bentonite
	grey SAND and SILT varying gravel and clay content, occasional cobbles or boulders (TILL) moist to wet, compact to very dense	cs	27	100		41	148				
		cs	28	100		43	146				0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
		cs	29	100		44	145				
	cobble encountered in CS29	cs	30	97		46	143				20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
		cs	31	100		47	142 1911 191				ब ब ब ब ब ब ब ब ब ब ब ब ब ब ब ब ब ब ब
		cs	32	100		40	140			0000 0000	م ⁰ د م. م
	increase in gravel content	cs	33	100		- 50 - 51	139 138 138				र तिवर, र िवर,
		cs	34	100		- 52	137				< ₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽
	Note: Residum depth inferred to be at 53.0 m depth by Golder 1983	cs	35	100		- 53 - 54	136 171 136 171 171 171 171 171 171 171 171 171 17			1000 0000 1000 000	a Dear
	grey to dark grey 55.3 SILTY CLAY 133.2 varved, moist, firm 133.2	cs	36	52		- 55	134 134				90000 2000 2000
	Tech to dark brown 55.9 SAND and SILT varying sand, silt and clay content, trace to some gravel occasional organics (lignite?), wet, dense (probably residuum) trace organics	cs	37	100		- 50	133 Juni 132 132				۹ ۱
		cs	38	80		- 58	131 11111111				
		cs	39	68		60	13 129 129				
	white calcium carbonate inclusions	cs	40	92		- 61	128 JUL				
	Borehole details as qualified Geotechn accompanying Exp	s presents ical Engin lemation o	id, do noi per. Also of Boreho	constitute , borehole le Log'.	a thorou informati	igh under ion shoui	nstanding d be read	of all polantial conditions present an I in conjunction with the geotechnical	It requires interpretative assistance report for which it was commision	from a ed and t	he Scale: 1 : 100 Page: 3 of 6

R	ECORD OF BOREHOLE N	о.	<u>рт(</u>)8-0 ⁻	<u>1</u> C	0-0	rd.	0328265 E, 557	<u>'6446 N</u>		amec ^o
Pro	ject Number: TY86002						Drillin	g Location: See Figure 2	<u> </u>		Logged by: PRL
	LITHOLOGY PROFILE	SC	HL SA	MPLI	NG			FIELD TESTING	LAB TESTING	z	
Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	PenetrationTesting C SPT ● DCPT MTO Vane* Nilcon Vane* △ Inluct ◇ Inluct ▲ Remould ◆ Remould * Undrained Shear Strength (kPa) 15 30 45 60	Atterberg Limits W, W W, ■ C ● Plastic Liquid × Passing 75 um (%) C C Molisiums Content (%) C 20 40 60 60	INSTRUMENTATION	A in the paper in particulate A in the paper in backfill A inter pipe in sand A solited pipe in sand A solited pipe in sand Solited pipe in sand
	red to dark brown SAND and SiLT varying sand, silt and clay content, trace to some gravel occasional organics (lignite?), wet, dense (probably residuum) trace organics	cs	41	100		63	126 -				Casing dropped 600 mm while coring at 62 m.
	while calcium carbonate inclusions trace lignite	CS	42	92		64	125 -				
		cs	43	100		66	123 -				Casing sank 150 mm at 66.5 m.
		cs	44	90		67 68	122				
		cs	45	100		69 70	120		► * 70		Specific Gravity = 3.16 Casing sank 50 mm at 68.9 m.
		cs	46	16		71	119				
		cs	47	7		- 72	117 -				
		cs	48	47		74	116		_റ 31		
		cs	49	67		- 75	114		୍ <mark></mark> 29		
		cs	50	2		- 77	112		98 ₀		
		ĊS	51	27		- 78	111		₀ 25		
	while calcium cathonate inclusions	CS	52	55		- 80	109		_د 41		
		cs	53	86		~ 81 - 82	108		₀ 36		
		cs	54	0		83	106				No recovery from samples CS 54 to 57 (82 to 86.7 m)
	Boretrole details a gailified Geotectr accompanying Eq	s present ricel Engi planation	ed, do no inser. Also of Boreh	k constitu o, borehoi ole Logʻ.	ta a thoro e informa	ugh unde tion shou	rstandin id be rea	g of all potential conditions present a cd in conjunction with the geotechnics	nti requires interpretative assistant al report for which it was commisio	e from a ned and t	h Scale: 1 ; 100 Page: 4 of 6

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R	ECORD OF BOREHOLE N	lo.	<u>PT(</u>	<u>)8-0</u>	<u>1</u> C	0-0	rd.	<u>0328265 E, 557</u>	<u>'6446 N</u>		amec ^Q
Pro	bject Number: TY86002						Drillin	g Location: See Figure 2	<u> </u>		Logged by: PRL
	LITHOLOGY PROFILE	SC	DIL SA	MPLI	ŇG			FIELD TESTING	LAB TESTING	z	
Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	PenetrationTesting C SPT ● DCPT MTO Vane* Nilcon Vane* △ htact ○ intect A Remould ● Remould * Undrained Shear Strength (kPs) 15 30 45 er	Atterberg Limits W, W W, Plestc Liquid × Pessing 75 um (%) O Motsture Content (%)	NSTRUMENTATIO	Inser pipe in banchite Inser pipe in backfill Inser pipe in band Inser pipe in band Inser pipe in band Insertion Insertion Insertion Insertion Insertion
Ī	red to dark brown SAND and SILT	us i	55	0		Ē.,			_ 20 40 60 80		
	grave! occasional organics (lignite?), wet, dense						105 -				
	(probably residuum)	cs	56	0		E 85	104 -				
	102.5	cs	57	0		66 1	103 -				
	reddish brown 86.6 SILTV CLAY 101.9 varying sand, silt and clay content 101.9 varist, dense 87.2 (probable residum) red to dark brown	cs	58	55		87	102 -		_് ദാ		
	SAND and SILT varying sand, silt and clay content, occasional gravel and cobble, occasional black organics (lignite?), wet, dense (probably residuum)	cs	59	70		88	101			4 ¹⁰⁹	
		cs	60	70		90 1	99 -		°38		1
						91	98 _		44		
			61	40		92	97 -		٥		
		cs	62	10		94	96		_ാ 37		
		cs	63	40		95	84 -		<mark>.</mark> 42		
		cs	64	26		96	93		_ି 46		
	white calcium carbonate inclusions	cs	65	13		98	91		_o 18		
		cs	66	52		100	89 89		₀ 45		
	boulder encountered in CS67	ස	67	30		- 101	88		₀ 35		
	cobble encountered in CS68	cs	68	75		102 10 2	87 1111 1		<mark>ہ</mark> 42		
	sand lense	cs	69	52		104	85 85		°38	,	
	Borshole details an resultfied Getails	i present ical Envi	ed, do no	l constitu	le a thoro		rstanding d be re-	of all potential conditions present en d in conjunction with the number land	ni requires interpretative assistant I report for which it was committee	a from a	Scale: 1 · 100
	accompanying Exp	denation	of Boreha	xie Log'.			_ / •••				Page: 5 of 6

	LITHOLOGY PROFILE	sc	DIL SA	MPLI	NG			FIELD TESTING	LAB TESTING	T	COMMENTS
	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	PenetrationTesting O SPT DCPT MTO Vane* Nilcon Vane* △ Intact O Intact A Remould • Remould *Undrained Shear Strength (APe) 15 30 45 60	Atterberg Limits ₩₂ ₩ ₩, Plassic Liquid * Passing 75 um (%) C Moisture Content (%) 20 40 60 80	INSTRUMENTATION INSTALLATION	1 friser pipe in benkonke 1 friser pipe in benkonke 1 friser pipe in bankfil 1 riser pipe in sand 1 stotled pipe in sand 1 stotled pipe in sand no installation, only benkonite
re Sva gi	d to dark brown NND and SILT avring sand, silt and clay content, occasional avrel and cobble, occasional black organics onte?), wet, dense robably residuum)	ß	70	67		106	B3 -		<u></u> 35		
		CS	71	87		107	82 ~				No recovery from CS 71 (106.4 to 107.9)
	ulders encountered in CS72	cs	72	68		108	81 -		°38		
resiver	ddish brown 79.4 LTY CLAY 109.7 rying send, sill and clay content 78.8 tist, dense 110.7 Obably residuum) 7	cs	73	68		110	79 _		<mark>ം</mark> 30		
S/ va gr wr (p	10 Gark brown rying sand, silt and clay content, occasional avel It dense obably residuum)	cs	74	92		111	78		₀ 35		
•		cs	75	73		113	76		_े 24		
	73.6	ය	76	52		115	75		_ି 40		
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R Pro	RECORD OF BOREHOLE No. <u>PT08-02</u> Co-Ord. <u>0328063 E, 5577054 N</u> Project Number: <u>TY86002</u> Drilling Location: <u>See Figure 2</u> Logged												
Pro	ject Client: PhosCan Chemical Corp.						Drilling	Method:	200 mm Ho	Now Stem Auger and Co	ring	Compiled by: ETB	
Pro	ject Name: Martison Phosphate Project						Drilling	Machine:	Track Mount	ted Drill		Reviewed by: <u>TJL</u>	
Pro		-					Date Si	arted:	22 Feb 08	_ Date Completed: 23 Fe	80 08	Revision No.: <u>4, 17/09/08</u>	
		ગ	IL SA		NG			Penetra	tionTesting	Atterberg Limits	z	COMMENTS	
Lithology Plot		Sample Type	Sample Number	decovery (%)	sPT 'N' Value)EPTH (m)	ELEVATION (m)	O SPT MTO Vane* △ Intect ▲ Remould * Undrained Shu	● DCPT Nilcon Vane* ○ intact ● Remould bar Strength (kPa)	W _p W W _i Plastic Liquid * Pessing 75 um (%) O Moisture Content (%)	USTRUMENTATI		
5	black ORGANICS (MUSKEG)			- 44		Ę	190 -	13 30	45 60	20 40 60 80			
	188.5 grey 1.7 SAND and SILT varying gravel and clay content, occasional cobbies or boulders (TLLL)	SS SS	1A 1B	116 120	4		189 111 189 111 188 111	0		o ¹²	;34 3		
	muist in wel, kose in vely uelse	ss	2	84	20		187 111 min	O		o ¹¹			
		SS	3	3443	54	ر مىربايىرىيى	186		0	_o 10			
		SS	4	98	44	6	184 7		0	o ¹¹		Start of coring at 6.7 m.	
		cs	1	9		7	183		ĺ	°11		<u> </u>	
	cobbles encountered in CS2	cs	2	9		- B 	182			° ⁷			
		ss	5	75	43	10	181 181 180 1		0	°15			
		SS	6	100	56	11	179		0	₀ 10			
	·	SS	7	46	73	12	178		c	_c 16			
	cobble encountered in CS3	cs	3	5		14	177 - 177 - 176 - 176 -			₀ 15			
	increased gravel content cobbles	cs	4	10		15	175			°6			
	grey to dark grey 173.4 SLLTY CLAY 16.8 SLLTY CLAY 173.0 Varved, moist 17.2	cs	5	80		17	174 T 173 T 173 T			_o 10			
	AND and SILT Varying gravel and clay content, (TILL) moist to wet, very dense	cs	6	100		18	172		·	₀ 13			
AME A div 131 F	MEC Earth & Environmental division of AMEC Americas Limited Si Fielding Road Si Fielding Road												
Cana Tel + Fax + www	da P3Y 1L7 1(705) 682-2632 amec.com Continued on Next Page	presente cel Engin ienation o	d, do not ser. Aiso, f Boreho	constitut , borehole le Log'.	e a thoro informa	ugh unden tion shouid	standing c d be read i	f all potential or n conjunction w	onditions present an whithe geotechnics	nd requires interpretative assistance il report for which it was commision	e from a ned and the	Scale: 1 : 100 Page: 1 of 2	

Pn	oject Number: TY86002						Drilling	g Location: See Figure 2	2		Logged by: AMEC
	LITHOLOGY PROFILE	s	OIL S.		NG			FIELD TESTING	LAB TESTING	Т	COMMENTS
ithology Plot	DESCRIPTION	sample Type	sample Number	tecovery (%)	sPT 'N' Value)EPTH (m)	LEVATION (m)	PenetrationTesting O SPT DCPT MTO Vane* Nilcon Vane* A intact O intact A Remould Remould * Undrained Sheer Strength (kPa)	Atterberg Limits W _F W W, Plaetic Liquid Plaetic Liquid Passing 75 um (%) O Moldure Content (%)	USTRUMENTATION USTALLATION	
Ţ	grey to dark grey	7		<u> </u>			171 -	13 30 45 60	20 40 60 80		
	etime ctay, varyed, moist grey SAND and SILT varying gravel and clay content, occasional cobbles or boulders (TILL) moist to wet, very dense	s s	7	100		20 21	170 -		° ⁷		
		cs	8	33		22	168 ~		c ⁷		
		cs	9	16		23	167		с ⁸		Core barrel jammed at 23.6 m.
		cs	10	12	L	25	166		0 ¹¹		
		cs	11	93		26	164 -		ೆ ⁶		
		CS	12	99		28	163		°0		
		cs	13	100		- 29	181		7 _{د.}		
		cs	14	100		- 30 - 31	160 11 11 11 11 11 11 11		് ⁸		
		cs	15	99		- 32	158		₀ 10		
	Olive to grey 15 BEDROCK, likely Carbonatite Sitt filled seams	6.8 ^{33.4} CS	16	45		- 33 - 34	157 157 156 1				RQD≕50% for CS 16
		cs	17	99		- 35	155				RQD≈45% for CS 17
Ĭ		cs	18	32		- 36 - 37	154 154 153 153				RQD=0% for CS 18
		cs	19	100		38	152				RQD=80% for CS 19
Ň	END OF BOREHOLE 4	0.1 0.1	20	84		- 39 - 40	151 -				RQD=43% for CS 20 Density 2.82 Mg/m3
ł	Borettole del qualified Geo accompanyia	ails as presen nactivical Eng ng'Explanation	ted, do no Inser. Also of Boreh	t constitut o, borshole ole Log'.	e a thorou Informati	ion should	standing d be read	of all potential conditions present a i in conjunction with the geotechnics	nd requires interpretative assistance I report for which it was commision	e from a ned and the	Scale: 1 : 100

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R Pri	ECORD OF BOREHOLE	No.	<u> </u>	PTO	8-0	<u>2A</u>	Co-	Ord	. 0328(Location:)45 E, 55 See Figure 2	576446 N		Am Logged by:	
Pre	oject Client: PhosCan Chemical Corp.							Drilling	Method:	<u>200 mm Ho</u>	Now Stem Auger and Co	ring	_ Compiled by:	ETB
Pre	oject Name: Martison Phosphate Proje	ct						Drilling	Machine:	Track Mount	ted Drill		Reviewed by:	TJL
Pro	oject Location: Hearst, Ontario							Date S	started:	24 Fęb 08	_ Date Completed: 28 Fo	eb 08	Revision No.:	4, 17/09/08
	LITHOLOGY PROFILE	_	SOIL	L SA	MPLI	NG			FIELD	TESTING	LAB TESTING		COMMEN	TS
Lithology Plat	DESCRIPTION	Comolo Trae	sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	Penetra O SPT MTO Vane* △ Intact ▲ Remoutd * Undrained Sh 15 30	tionTesting ● DCPT Nilcon Vane* ◇ Intect ◆ Remould ear Strength (kPa) 45 60	Atterberg Limits W _p W W ₁ Plastic Liquid × Passing 75 um (%) O Moisture Content (%) 20 40 60 80	INSTRUMENTATION	1 neer pipe in benionde 1 niser pipe in backfil 1 niser pipe in sand 1 slotted pipe in sand no installation, only bento	nite
	black ORGANICS (MUSKEG) Tibrous							189 -						
포토	<u>}</u>	87.6 S	s	1	2 1	2	1 2	188	þ			0000		
	grey SAND and SILT varying gravel and clay content, occasional cobbles or boulders (TILL)	2.1						187 -				0.00		
	moist to wel, compact to very dense	s	s	2	54	27		186 -	0		0 ¹¹			
								7				0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		
		s	s	3	95	31	1. 1. 1. 1.	V 85	0		o ¹¹	2000 0 0		
							L. 6	184 ,			٩	DID	empted Shelby Tube	at61m.
		s	s	4				183 -			°a		be was crushed.	
			_					182			11	0000		
		s	s	5	100	61	1~ 8	1111111		0	0''	D		
			-			1	11 	181 - 181			. 9	2000		
		с С	s	7	16		10 10	180 180			0 ¹⁵	D Sta	art of coring at 9.8 m	
	cobbles encountered in CS8	c	s	8	3		11 11	179 179 178 m						
		c	s	91	15		12	177 177			° 56	, , , , , , , , , , , , , , , , , , ,		
		C	s	911	30		14	178 J			₀ 15			
N.	1 grey to dark grey 1 Full TY CLAY 1 trace gravel, moist grey 5 SAND and SILT	74.5 75.2 15.5 C	s	10	100		1- 15 	174 Julium			° ⁷	2000 000 2000 000 2000 000		
	 varying gravel, silt and clay content, occasional cobbles or boulders (TILL) moist to wet, very dense trace organics 	c	s	11	35		17 10	173 J			് ചെം ട്		ecific Gravity = 2.73 MDD 1973 kg/m3 at	OMC 10.2%
	poorly graded sand	-6	s	12A_	76		E- 18				°8		ugged bit.	
	·	c	s /	12B	10		Ē_18-	171 _			° 7			
AMI A di 131	EC Earth & Environmental ivision of AMEC Americas Limited Fielding Road	idwater d idwater d	lepth r lepth c	ecord	ied on d <i>r</i> ed on	completi <u>14/0</u> 3/2	ion at a 2 <u>008</u> at	depthoi tadepth	f <u>4.7 m</u> . of <u>4.8 m</u> .					
Live Can Tel Fax www	sky, curiano	talis as pre otachrical i ng Explana	eentad, Enginee tion of l	, do noi er. Also Boreho	t constitu 5, boreho sie Log'.	te s thor ie inform	ough und ation sho	leretunding uid be rea	g of all potential of all potential of all potential of a line on punction	conditions present a with the geotechnic	and requires interpretative assistan al report for which it was commisio	ce from a med and the	Sc	ale:1:100 ge:1 of4

LITHOLOGY PROPILE SOLISAMPLING THED TESTING LAB TESTING CALL TESTING 0 DESCRIPTION 5 <	Project Number: TY86002	0.	<u> </u>	<u>10-0</u> /	<u>2</u> A	LO-	Drilling	g Location: See Figure 2	<u> </u>		Logged by: AMEC
DESCRIPTION S <th< th=""><th>LITHOLOGY PROFILE</th><th>SC</th><th>NL SA</th><th>MPLI</th><th>NG</th><th></th><th></th><th>FIELD TESTING</th><th>LAB TESTING</th><th></th><th>COMMENTS</th></th<>	LITHOLOGY PROFILE	SC	NL SA	MPLI	NG			FIELD TESTING	LAB TESTING		COMMENTS
Sector St. T. Werker stress. H. T. C. St. St. St. St. St. St. St. St. St. St	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	PenetrationTesting ○ SPT ● DCPT MTO Vane* Nilcon Vane* △ Intect ○ Intect ▲ Remould Remould * Undrained Shear Strength (XPa) 15 15 30 45	Atterberg Limits W, W W, Plastic Liquid r. Passing 75 um (%) O Moisture Content (%) 20 40 60 80	INSTRUMENTATION	1 riser pipe in bentionke 1 riser pipe in backfill 1 riser pipe in backfill 1 riser pipe in sand 1 slotted pipe in sand 2 slotted pipe in sand 3
Solid data brown	Grey SAND and SLT Varying gravel, silt and clay content, occasional cobbles or boulders (TILL) moist to wet, very dense cobbles encountered in CS13	cs	13	20		20	170 -		° ₉		
CS 15 99 -2 10 -3 -3 CS 16 95 -3 16 -3 -4 -3 CS 17 81 -3 -3 -4 -3 -3 CS 17 81 -3 -3 -3 -3 -3 CS 18 100 -3 -3 -3 -3 -3 -3 CS 19 35 -3 <td></td> <td>cs</td> <td>14</td> <td>15</td> <td></td> <td>- 21</td> <td>168 _</td> <td></td> <td>o⁷</td> <td>0,000,000</td> <td></td>		cs	14	15		- 21	168 _		o ⁷	0,000,000	
Image: Solution of		cs	15	99		- 23 24	167		°8	80,000,000 80,000,000	
CS 17 81 28 100		CS	16	95		- 25	165		8	000 000 0	
CS 18 100 28 100		cs	17	81		- 26 - 27	163 —		°9	10000000	به ^{ور} د و هر در د و م د و م د و م د و د د و و م د م د و م م د و م د و م د م د م د م د م د م د م د
Image: Second and Supervised and S		cs	18	100		26	162		° 9	<u> </u>	
CS 20 7 31 156 1 edito dark brown 31.7 31.7 31.8 0.15 Yenymanna, Sill and clay content, occasional write draw brown is like and clay content, occasional claum carbonale inclusions CS 21 7 31.7 Yenymanna, Sill and clay content, occasional write draw brown is like and clay content, occasional claum carbonale inclusions CS 21 7 31.7 CS 22 20 34 156 35 36 CS 22 20 34 156 35 CS 23 34 35 156 34 CS 23 34 35 156 36 SAND and SiLT CS 24 93 37 151 SAND and SiLT CS 25 3 36 35 I fines washed away. CS 25 3 151		cs	19	35		29 30	160		o ¹⁴	0.00000	رم. ۵. م ۱۹۹۹ - ۲۹۹۹ - ۲۹۹۹ - ۲۹۹۹ - ۲۹۹۹ - ۲۹۹۹ - ۲۹۹۹ - ۲۹۹۹ - ۲۹۹۹ - ۲۹۹۹ - ۲۹۹۹ - ۲۹۹۹ - ۲۹۹۹ - ۲۹۹۹ - ۲۹۹۹
Image: State Stat		cs	20	7		31	159 -		₀ 15		
	SAND and SILT SAND and SILT verying sand, silt and clay content, occasional grave grave vet, dense occasional calcium carbonate inclusions (probably Residuum)	cs	21	7		32 33	157		<mark>.</mark> 42	88	~
Ight brown to yellow to light grey 152 Ight brown to yellow to light grey 152 SND and St.T 152 cemented, porous, dense 152 CS 25 CS 26 35 40		cs	22	20		- 34	156 m 156 m 155 m		و <mark>48</mark>		
light brown to yellow to light grey 152.2 CS 24 93 153 -		cs	23	34		- 35	154 154		° ²⁴		
CS 25 3 CS 25 3 Alt fines washed away.	light brown to yellow to light grey 152.2 SAND and SLT	cs	24	93		37	153 julia angle 152 li		_് 15		
CS 26 35 40 0 ²⁵	cemented, porous, dense	cs	25	3		- 38 - 39	151 Juni -				niiliks washed away.
	9 4 9 4 9 4 9 4 9 4 9 5 9 5 9 5 9 5 9 5 9 5 9 5 9 5	cs	26	35		40	150	and all exchanges	o ²⁵		

	LITHOLOGY PROFILE	s	NL SA	MPII	NG	1		FIELD TESTING	AB TESTING		CONNENTS
Lithology Plat	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Vatue	DEPTH (m)	ELEVATION (m)	PenetrationTesting O SPT DCPT MTO Vane* Nilcon Vane* A Intact A Remould Remould Pundimed Sharer Strength (kPa) 15 30 45 60	Atterberg Virmits W, W W W, W, Plessic Liquid * Passing 75 um (%) O Molature Content (%) 20 40 60 80	NSTRUMENTATION NSTALLATION	COMMENT 1 S
	light brown to yellow to light grey SAND and SILT					Ē	149				
	cemented, porous, dense	cs	27	0		- 41 - 42	148 -				No recovery at 41. 5 m.
	145.8	cs	28	16		43	147				
	Tred to dark brown 43.9 SAND and SIL T varying sand, silt and clay content, occasional gravel wet, dense (probably Residuum)	cs	29	50		44	145		0 ³⁵		
	trace organics greenish to red 143.1 greenish to red 46.6	ଓ	30	70		46	144		0 ¹⁹		
	varying sand and silt content (probably Residuum)	cs	31	51		47	142		₀17] 65		Specific Gravity = 3.19
	139.7	cs	32	13]	49 11 11	141 -				Core barrel jammed at 49.5 m.
	grey to white 50.0 BOULDERS and COBBLES poor sample recovery	cs	33	16		50	139		_് ദാ		
		cs	34	5		52	138 (1000000000000000000000000000000000000		₀ 31	an a	
	135.1	cs	35	10		54	136				
	red to dark brown 54.6 SAND and SILT varying sand, silt and clay content, occasional gravel wet, dense (probably Residuum) 133.6	cs	36	0		55	135 134 134		o ²⁴		No recovery at 54.5 m
	reddish brown 56.1 SILTY SAND damp (probably Residuum)	cs	37	80		57	133		° 44		
	grey 131.3 Bedrock, weathered, carbonatite cobbe to siti sized particles	cs	38	0		58	132 / 132 131 / 131		o ⁵¹		8
	moist	cs	39	99		60	130				
		cs	40	45		61	129 128 128				

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LITHOLOGY PROFILE	s		MPLI	NG			FIELD TESTING	LAB TESTING	1	COMMENTS
DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	PenetrationTesting O SPT DCPT MTO Vane* Nilcon Vane* A Intect O Intect Remould Remould Remould * Undrained Sheer Strength (kPe) 15 30 45 60	Atterberg Limits Wr W W, Plastic Liquid × Passing 75 um (%) O Moisture Content (%) 20 40 60 80	INSTRUMENTATION	1 riser pipe in bentonite 1 riser pipe in backfil 1 riser pipe in backfil 1 riser pipe in sand 1 slotted pipe in sand no installation, only bentonite
ey schock, weathered, carbonatite bloble to silt sized particles oist	CS	41	34		63	127				
	cs	42	73		64 1	126				
ND OF BOREHOLE 65	.5				65			. <u></u>		
				ł						
									,	

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R		HOLE N	0.	<u>РТ(</u>	<u>)8-0</u>	<u>3</u> C	:o-O	rd. <u>0</u>	32748	3 E, 557	7297 N		am	ec®
Pro	bject Number: <u>TY86002</u>							Drilling	Location:	See Figure 2	<u> </u>		Logged by:	AMEC
	biect Name: Martison Phoso	bate Project						Drilling	Method:	ZUU mm Ho	NIOW Stem Auger and Co and Delli	pring	Compiled by:	ETB
Pro	ject Location: Hearst, Ontario	nate i re <u>po</u> t						Date Si	harted:	09 Feb 08	Date Completed: 21 F	eb 08	Revision No :	4 17/09/08
-		LE	SC	DIL SA	MPL	NG		· · · ·	FIELD.	TESTING			COMMEN	<u></u>
Lithology Ptot	DESCRIPTION	l 9.4 m	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	Penetral OSPT MTO Vane* ∆Intact A Remould * Undmined Shu 15 30	tionTesting DCPT Nilcon Vane* C Intect Remould ser Strength (kPa) 45 80	Atterberg Limits W, W W, Plastic Liquid * Paresing 75 um (%) O Moisture Content (%) 20 40 60 80	INSTRUMENTATION	installation, only banks	nile
	Not Sampled							189						
	light brown / light grey SILTY CLAY moist, stiff	<u>187.8</u> 1.6	SS	1	75	8	1 2	188	0		_o 26			
Ž	grey SAND and SILT vaying gravel and clay content, oc; cobbles or boulders (TiLL) moist to wet, compact to very dense	186.4 3.1 casional e	SS	2	75	40	ulu 3 ∑⊡	186		0	_o 10			
			SS	3	51	50	5 5	185		0	_o 10			
		ſ	SS	4	25	53		183 183 183 183 183 182 182 182 182 182 182 183 183 183 183 183 183 183 183 183 183		0	°15			
		180.3	SS	5	51	50	8	181		0	°15			
•	SAND and GRAVEL occasional cobbles or boulders (TIL moist to wet, compact to very dense (fines washed out during drilling)	9.2 L)	ss cs	6	28		10	180 T			o ¹¹	ິວິດ Start (ເວັດຊີ Start (coring at 9.7 m. washed out.	
		-	cs	2	13		11	179 179 178 178				Fines CS#2. CS#2.	washed out during Attached sand tra tt run.	g drilling for ap to barrel
		-	cs	3	24	1	13	177						
		174.2	cs	4	20		14	175 /				5000000 500000000000000000000000000000		
NN	grey Varved, moist grey SAND and SILT vanying gravel and clay content, occ. cobbles or boulders (TILL)	173.8 15.5 asional	cs	5	16		- 16	174						
	moust to wet, compact to very dense	,	cs	6	20		17	172 171				Sand I	rap removed.	
	C Earth & Environmental	모 Groundwate	r depth	recorde	ed on ca	ompletic	- 18 On at a de	epth of	<u>4.0 m</u> .			2°°d		
131 F Lively Cana Tel + Fax + www.	Fielding Road , Ontario da P3Y 11.7 1(705) 682-2632 1(705) 682-2260 amec.com	Borehole details as qualified Geotechni accompanying Expl	presente cel Engin anation di	d, do not ser. Also, f Borehol	constitut borehole le Log'.	e a thoro informat	ugh unders Lion should	standing o I be read h	f all potential co n conjunction w	nditions present an Ith the geotechnical	rd requires interpretative assistant I report for which it was commisic	ce from a mad anzi the	Sca	le: 1 : 100 e: 1 of 5

Pro	ject Number: TY86002		<u> </u>		<u> </u>		Drilling	Location: See Figure 2			Logged by: AMEC
	LITHOLOGY PROFILE	SC	DIL SA	MPLI	NG			FIELD TESTING	LAB TESTING	T	COMMENTS
ithology Plot	DESCRIPTION	sample Type	sample Number	tecavery (%)	SPT 'N' Value	JEPTH (m)	EVATION (m)	PenetrationTesting O SPT DCPT MTO Vane* Nilcon Vane* A Remould Remould * Undrained Shear Strength (kPa)	Atterberg Limits Wr W WL Plassic Liquid × Passing 75 um (%) C Molisture Content (%)	NSTRUMENTATION VSTALLATION	° ∘ [ne installation, only beckfil ∭ no installation, only bentonile
	grey SAND and SILT varying gravel and clay content, occasional cobbles or boulders (TILL)	- &	7-	72-			170		20 40 60 60		
	cobble	cs	8	97		21	169 -				SPMDD 1 959 kn/m3 at OMC 11 5%
		cs	9	100		22	167 —		* 68		
		cs	10	100		23	166 -				
		cs	11	90		25	164 -				
		cs	12	50		20	163 -				
	cobble	cs	13	100		28	161 -				
		cs	14	30		- 30	160 -				
		cs	15	15		- 31	158			0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,	
		cs	16	88		- 33	157				
		cs	17	93		- 34	155				
		cs	18	5		- 36	154				
		cs	19	o		37	152 min				No recovery for CS 19.
		cs	20	13		2000 - 100 -	151 151 150				
	Borstvia Auto	CS	 	29	te a thore	40	149	of all potential conditions research an			
	quilified Ger accompanyli Confinitied on Next Page	stachmical Engli ng Explanation	of Bareh	o, borehol ole Log'.	e informa	tion sho	uid be ree	d in conjunction with the geotechnical	report for which it was commisi	and and the	Scale: 1 : 100 Page: 2 of 5

R	ECORD OF BOREHOLE N	lo.	<u>PT0</u>	<u>)8-0:</u>	<u>3</u> C	0-0	rd. (0327483 E, 557	7297 N		amec
Pro	ject Number: 1786002	1					Dunno	Location: See Figure 2			Logged by: AMEC
	LITHOLOGY PROFILE	sc	DIL SA		NG		-	FIELD TESTING	LAB TESTING	z	
Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	PenatrationTesting ○ SPT ● DCPT MTO Vane* Nilcon Vane* △ Intact ○ Intact ▲ Removid ← Removid *Undrained Shear Strength (kPe) 15 30 45 60	Atterberg Limits W, W W, Plassic Liquid * Pessing 75 um (%) C Moisture Content (%) 20 40 60 80	INSTRUMENTATIO	no installation, only bentonita
	grey SAND and SILT					- 41				0.00	
	varying graver and clay content, occasional cobbles or boulders (TILL) moist to wet, compact to very dense	cs	22	0		42	148				
		cs	23	42		43	146 -				
		cs	24	49		45	145				
		cs	25	97		46	143 —		⊷ 61		Specific Gravity = 2,76 SPMDD 2,040 kg/m3 at OMC 9.3%
		cs	26	1		48	142				
	poorly graded sand seam (0.3 m thick)	cs	27	27		49 49 50	140 —				
		cs	28	56		51 1	139		_د 11		
		cs	29	99		1 52 53	137 -		°11		
		cs	30	100		1 1 1 54	136 -		o ¹¹		
		cs	31	22		1 55 1 1 1 55	134 —		_c 12		
	increased silt content	cs	32	89		57	133 -		o ¹⁰		
		cs	33	98		58 11111 59	131 -		o ¹²		
		cs	34	93		100 100	129 -		0 ¹¹		
		cs	35	100		5	128 -			00000	
- <u></u>	Borehole details qualified Geolea accompanying E	as presen Innical Eng xplanation	ted, do n ineer. Als of Boref	at constitu 10, boreho 10ie Log'.	ste a thom ia Informa	tion sho	erstandir uld be rei	:) g of all potential conditions present (of in conjunction with the geotechnic	l and requires interpretative assister al report for which it was commis-	te from a oned and th	 Scale: 1 : 100 Page: 3 of 5
<u> </u>	Continued on Next Page										<u> </u>

		6				T	1				
Τ		3					!	PeretrationTesting	Atterber Limite	z	COMMENTS
	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	O SPT ● DCPT MTO Vane* Niicon Vane* △ Intact ○ Intact ▲ Remould ● Remould * Undrained Shear Strength (kPe) 15 30 45 60	Wp W W_L Bestic Liquid × Pessing 75 um (%) Moleture Content (%) 20 40 60 80	INSTRUMENTATIC INSTALLATION	o installation, only bentonite
90.0 % 8 E	ay ND and SILT ying gravel and clay content, occasional obles or bouiders (TILL) ist to wet, compact to very dense	cs	40	93		63	127		o ¹¹		
		cs	41	100		64	125 -		₀ 13		
•	122.3	cs	42A	20		66	123 -		°23		
	y to usin' girey 67.1 TY CLAY 121.6 ved, moist, stiff 121.6 k brown 67.8 janics 120.8 to ridark brown 69.6	cs	428	100		68	122		₀ 16		Specific Gravitv ≈ 3.93
SA Vai gra we	No and SiLT WD and SiLT ying sand, silt and clay content, occasional wel, occasional black organics (lignite?) , dense bbably Residuum)	cs	43	74		- 69	120		° ²⁴ *53		Organic content 5%
		cs	44	100		÷ → 71	119		₀ 21		
		cs	45	100		- 72	117				
ligr	ite?	cs	46	16		- 74	116		_് 33		
bro SA cer (pri	wn ko grey. 114.1 ND and SiLT rented, porous, dense bably Residuum)	cs	47	75		- 75	114 114 114 114 114 115		e ¹⁶		
	·	cs	48	20		77	112 112		_o 51		
		cs	49	43		79	111 110		c ⁸		
	ſ	cs	50	3		80	109 109		₀ 18		
	·	cs	51	10		82	108		° ⁹		
		cs	52	92		83	111131		° ₁₈		

B

LITHOLOGY PROFILE SOIL SAMPLING DESCRIPTION	roject Number: <u>1Y86002</u>		o .		0-81	<u>3</u> C	o-Or	orilling	U32/483 E, 55/ Location: See Figure 2	<u>7297 N</u>		
DESCRIPTION X <thx< th=""> X X <thx< th=""><th>LITHOLOGY PROFILE</th><th></th><th>SC</th><th>NL SA</th><th>MPLI</th><th>NG</th><th></th><th></th><th>FIELD TESTING</th><th>LAB TESTING</th><th><u> </u></th><th>COMMENTS</th></thx<></thx<>	LITHOLOGY PROFILE		SC	NL SA	MPLI	NG			FIELD TESTING	LAB TESTING	<u> </u>	COMMENTS
Image: constraint constraint Image: c	DESCRIPTION		Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	PenetrationTesting O SPT DCPT MTO Vane* Nilcon Vane* A Intact O Intact A Remould * Undrained Sheer Stength (kPa) 15 30 45 60	Atterberg Limits W _p W W ₁ Plestic Liquid × Pessing 75 um (%) C Moisture Content (%) 20 40 60 80	INSTRUMENTATION INSTALLATION	no installation, only back%i ∑ ho installation, only bentonite
	grey to dark grey Weathered Bedrock, Probable cemented Residuum Cobble to Slit sized	<u>105.3</u> 84.1	cs	53	30		85	105				
Col 55 50 100 100 Cating mained in hole Hole BND OF BOREHOLE 884 I <t< td=""><td></td><td></td><td>cs</td><td>54</td><td>55</td><td></td><td>86 1 1 1 1 87</td><td>103</td><td></td><td></td><td></td><td>Casing jammed at 65.3 m.</td></t<>			cs	54	55		86 1 1 1 1 87	103				Casing jammed at 65.3 m.
	END OF BOREHOLE	<u>101.0</u> 88.4	cs	55	50		88	102				Casing remained in hole. Hole

R Pro	ECORD OF BOR		<u>PT(</u>	08-0	<u>3A</u>	Co-C	rilling Location:	181 E, 55	<mark>577293 N</mark> оf РТЗ		Logged by:	
Рто	pject Crient: <u>Phosuan Cher</u>	nical Corp.				ט ת	nilling Method:	NQ mm Rot	ck Coring		_ Compiled by:	ETB
Pro	iect Location: Hearst, Ontario					U	ate Started	OF Max 09	Deta Campletedi OC N	00	_ Reviewed by:	
									Date Completed. Do N	nar us	Revision No.:	<u>4, 17/0</u> 9/0
		-ILE SC	JIL SA		NG		FIELD Penetrat	TESTING tionTesting DCPT	Atterberg Limits		COMMEN riser pipe in bentonite riser pipe in backfil	TS
Lithology Plot	DESCRIPTIO	א א א א א א א א א א א א א א א א א א א	Sample Numt	Recovery (%)	SPT 'N' Vatue	DEPTH (m)	MTO Vane* △ Intact ▲ Remould * Undrained She 15 30	Nilcon Vane* ◇ intact ◆ Remould ter Strength (kPe) 45 80	Pleasic Liquid * Pleasing 75 um (%) © Moisture Content (%) 20_40_60_80_		slottad pipe in sand to installation, only bent	>nite
						$ \begin{array}{c} 1 \\ $				۲۵۰ مول دول دول دول دول دول دول دول دول دول د		
MEC divis 31 Fi	Earth & Environmental sion of AMEC Americas Limited leding Road		recorde	ed on con	mpletion	→te atadept	h of <u>4.3 m</u> .					
rvely, anad ei +1 ax +1 ax +1	Untano la P3Y 1L7 (705) 682-2632 (705) 682-2260 amec.com	Borshole details as presented qualified Geotechnical Engine accompanying Explanation of	l, do not er. Also, / Borehol	constitute borehole e Log'.	a thorou informatio	n underster	Iding of all potential con read in conjunction wit	ditions present and h the geotechnical r	requires interpretative assistance sport for which it was commision	e from a ad and the	Sca	 le: 1 : 100 e: 1 of 6

R Pro	ECORD OF BOREHOLE N	077293 N								
	LITHOLOGY PROFILE	sc	DIL SA	MPLIN	IG			FIELD TESTING	LAB TESTING	COMMENTS
Lithology Ptot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	PenetrationTesting ○ SFT ● CCPT MTO Vane* Nilcon Vane* △ Intact ○ Intact ▲ Remould • Remould * Undrained Sheen Strength (kPa) 15 30 45 80	Atterberg Limits Wp W W_L Plastic Liquid × Pessing 75 um (%) O Moisture Content (%) 20 40 60 80	X 1 free rips in benchnie X 1 free rips in backfil 1 free rips in backfil X 1 is block for in and X 1 is block for in a block
Ē	Tricone from surface to 85.3 m.					Ę	170 -			
						20	169			وه - ۲۰ م - ۲۰ ه - ۲۰ ۲۰ - ۲۰ ۵۰ - ۲۰ - ۲۰ ۵۰ - ۲۰ ۵۰ - ۲۰ ۵۰ - ۲۰ ۲۰ ۲۰ ۲۰ ۲۰ ۲۰ ۲۰ ۲۰ ۲۰ ۲۰
							168			
						22	167 -			
						23	166 -			
						24	165			
						25				
							164			
						26	163			
						27				
							162			
						28	161 _			2
						20	160 -			
						- 30 	159 -			
						31	158 -			
						32	157 -			2000 2000 2000 2000 2000 2000 2000 200
						33	156 -			
						14 14 14	155 -			د و م و د و و و و و و و و و و و و و و و
						35	154 ~			10, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
						36	153 -			
						37	152 -			۳
						11 38 11 11	151 -			, , , , , , , , , , , , , , , , , , ,
						39 1	150 -			
						40	149 -			
	Borehole details qualified Geote accompanying T	as prese Indical En Seplemetio	nted, do r gineer. At n of Bore	not constitu iso, boreho ihole Log'.	ite a tho le inform	rough und mation sho	ierstandia ould be re	ng of all potentiel conditions present ad in conjunction with the geotacheid	and requires interpretative assists cal report for which it was commi	area from a Scale: 1 : 100 Page: 2 of 6

R	ECORD OF BOREHOLE N	о.	<u> PT0</u>	8-03A	Co-	Ord	. <u>0327481 E, 55</u>	577293 N	amec ^S		
Pro	ject Number: TY86002					Drilling	g Location: <u>3.05 m west</u>	of PT3	_	Logged by: PRL	
	LITHOLOGY PROFILE	SC	DIL SA	MPLING			FIELD TESTING	LAB TESTING	Γ,		
Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%) SPT 'N' Value	DEPTH (m)	ELEVATION (m)	PenetrationTesting ○ SPT ● DCPT MTO Vane* Nilcon Vane* △ Intact ◇ Intact ▲ Removid ◆ Removid * Undrained Shear Strength (k ^{Pa}) 15 30 45 60	Atterberg Limits W _p W W _k Plastic Liquid x Passing 75 um (%) O Moisture Content (%) 20 40 60 80	INSTRUMENTATION INSTALLATION	No inser pipe in benchnäe	
Lithol	Tricone from surface to 85.3 m.			Reco	a b b b b b b b b b b b b b b b b b b b c c c c c c c c c c <td< th=""><th>Line Line <thline< th=""> <thline< th=""> <thline< th=""> <thline< th=""> <thline< th=""><th>* Undraimed Shear Shear Shear QL (VPa) 15 30 45 60</th><th></th><th>Labor - Control - Control</th><th></th></thline<></thline<></thline<></thline<></thline<></th></td<>	Line Line <thline< th=""> <thline< th=""> <thline< th=""> <thline< th=""> <thline< th=""><th>* Undraimed Shear Shear Shear QL (VPa) 15 30 45 60</th><th></th><th>Labor - Control - Control</th><th></th></thline<></thline<></thline<></thline<></thline<>	* Undraimed Shear Shear Shear QL (VPa) 15 30 45 60		Labor - Control		
	guartine discussion qualified Geotechin accompanying Exp	ical Engli	of Boreho	, borshole info le Log'.	metion should	d be rea	y or exponential conditions present as d in conjunction with the geotechnics	na requires interpretative assistant I report for which it was commissio	red and th	 Scale: 1 : 100 Page: 3 of 6 	

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R	ECORD OF BOREHOLE N	о.	<u>PT0</u>	<u> 8-03A</u>	Co-	Ord	. <u>0327481 E, 5</u>	<u>577293 N</u>	amec ⁽⁾
Pro	oject Number: TY86002					Drilling	g Location: 3.05 m west	of PT3	Logged by: PRL
	LITHOLOGY PROFILE	SC	DIL SA	MPLING			FIELD TESTING	LAB TESTING	
Ithology Plot	DESCRIPTION	ample Type	ample Number	ecovery (%) PT 'N' Value	EPTH (m)	LEVATION (m)	PenetrationTesting ○ SPT ● DCPT MTO Vane* Nilcon Vane* △ Intect → Intect ▲ Remould * Brenould * Undwined Sheer Strength (kPa)	Atterberg Limits W _r W W _L Plastic Liquid × Passing 75 um (%) O Moisture Content (%)	C XX I have pipe in benchis L X I have pipe in beckfil L X I have pipe in beckfil L X I have pipe in aend X I X I X I Have pipe in aend X I X I X I Have pipe in aend X I X I X I Have pipe in aend X I X I X I X I X I X I X I X I X I X I
<u> </u>	Tricone from surface to 85.3 m.	<i>w</i>	رم ا	<u>α</u> 0	- <u>-</u>	<u>ш</u> 127 —	15 <u>30 45 60</u>	20 40 60 80	
					66 67 70 71 72 73 74 75 77 78 60 60 60 61 61 62 62 63 64 64 64 64 64 64 65 65 65 65 65 65 65 65 65 65 65 65 65	127			
	Borefole details as qualified details an accompanying Exp	i presente icel Engle lanation e	ed, do not neer. Also of Boreho	: constitute a th , borehole infor le Log'.	rough und mition sho	erstanding ald be read	y of all potential conditions present a d in conjunction with the geotechnics	nd requires interpretative assistant al report for which it was commision	ce from a Scale: 1 : 100 Page: 4 of 6

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R	ECORD OF BOREHOLE N	о.	<u>РТ(</u>) <mark>8-0</mark> 3	<u>8</u>	Co-	Ord	. <u>0327481 E, 55</u>	ame	ec	
Pro	ject Number: TY86002						Drilling	Location: 3.05 m west	of PT3	Logged by:	PRL
	LITHOLOGY PROFILE	SC	NL SA	MPLIN	IG			FIELD TESTING	LAB TESTING		rs
Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recavery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	PenetrationTesting ○ SPT DCPT MTO Vane* Niicon Vane* △ Intact ◇ Intact ▲ Remould ◆ Remould * Undrained Shear Strength (kPe) 15 30 45	Atterberg Limits W, W W, Plassic Liquid × Passing 75 um (%) O Moisture Content (%) 20 40 60 80	A X 1 mar pipe in benchts A X 1 mar pipe in backfil Y 0 Y 1 mar pipe in backfil Y 0 Y 1 acted pipe in backfil Y 0	nite
	Tricone from surface to 85.3 m.					-					
	104.0 Dark Grey 85.3 BEDROCK weathered to intact, Cemented Residuum, Poor rock quality.	cs	56	84		84 1 85 1 86	105				
		cs	57	89		87	102 -			RQD=55% CS 57	
		cs	58	100		69	101 -			RQD=45% CS 58	
		cs	59	93		90	99 -			RQD=47% CS 59	
		cs	60	69		92	97 -			RQD=17% CS 59	
		cs	61	97		93	96 - 95 -			Rul=22% CS 80	
		cs	62	93		- 95	94 -				
		జ	63	59		- 97	93 - 92 -				
		cs	64	89		1 98 1 98 1 99	91 -				
		cs	65	B0		100 100	89				
		cs	66	80		101	88 - 87 -				
		cs	67	72	_	103	86			Ж ииппи ииппи	
	Borehole details a	CS	68 and, do ra	47	e a tho	104 E 105 rough und	85 -	g of all potential conditions present a	nd requires interpretative statistics		ale: 1 · 100
	quilified Geolech accompanying Ex	racal Engi planation	of Boreh	icie Log'.	antorn	atuon shiù	uiti be rea	na in conjunction with the geolachnics	nı report tor which it was commisio		ge:5 of 6

R		0 .	<u>PT0</u>	8-03	<u>BA</u> (Co-Ord	. 0327481 E, 55	577293 N of PT3	
	LITHOLOGY PROFILE	SC	DIL SA	MPLI	NG		FIELD TESTING	LAB TESTING	COMMENTS
Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m) ELEVATION (m)	PenetrationTesting C SPT DCPT MTO Vane* Nilcon Vane* A Intact O Intact A Remould * Undrained Shear Strength (KPa) 15 30 45 60	Atterberg Limits W, W W, Pletic Liquid × Passing 75 um (%) O Molature Content (%) 20 40 60 80	No installation, only bentonite
	Dark Grey BEDROCK weathered to intact, Cemented Residuum, Poor nock quality. 82.6 End of Borehole 106.7	cs	69	22		84			
	End of Borenole 106.7								
			interest, do				ng of all potential conditions present	and requires interpretative assistant	
	Borehole details qualified Geolec accompanying E	es prese hnicel Et spienetic	inted, do a Igineer. Al on of Bore	not constit iso, borshi ihole Log'.	ute a thoi de inform	rough understandi nation should be m	ng or all potenzial conditions present ad in conjunction with the geolachyl	and requires interpretative assistant ical report for which it was committi	oned and the Scale: 1 : 100 Page: 6 of 6

R	ECORD	OF BOREH		o. <u>I</u>	<u>РТ0</u>	8-04	<u>4</u> C	o-C	ord. <u>0327</u>	581 E, 557	7 <u>6834 N</u>		am	ec
Ртс	ject Number:	TY96002							Drilling Locate	n: <u>See Figure 2</u>		rina	Logged by:	FTR
Pro	ject Client:	PhosCan Chemical (Corp.						Drilling Metho): <u>200 mm mc</u>	tod Dell	11154	Complete by:	<u> </u>
Pro	ject Name:	Martison Phosphate	Project						Drilling Machie	00 Est 00	Dete Completed: 04 M	or 09	Revision No :	A 17/09/08
Pro	ject Location:	Hearst, Ontario							Date Starteo:		_ Date completed: 04 m			
	LITH	OLOGY PROFILE		SO	IL SA	MPLI	NG		FIE	LD TESTING	LAB TESTING	z	COMMEN	ITS
-ithology Plot	Local Ground 8	DESCRIPTION	-	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	Pe E ○ SPT N MTO V OL △ Intac EV ▲ Rem Undrain 15	etrationTesting ● DCPT ane* Nilcon Vane* t ○ intact ould ● Remould ad Sheer Strangth (kPe) 30 45 60	Atterberg Lumits W, W W, Plastic Liquid × Passing 75 um (%) O Moisture Content (%) 20 40 60 60	INSTRUMENTATIC INSTALLATION	1 riser pipe in backfil 1 riser pipe in send 1 slotted pipe in send 2 no installation, only bent	onite
<u></u>	black ORGANICS (N	IUSKEG)	i						190					
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	fibrous							1	189					
<u>, 1</u> /	ļ			ST	1	0		Ē 2						
د ت برز ا			<u>187.2</u> 3.2	SS	2	67	5	1111 1113	188 - 		₀ 27	000 000 000 000 000 000 000 000 000 00		
	SAND and SIL varying gravel	.T and clay content, occasi	onal		_			ŧ.				0000		
	cobbles or bot moist to wet, o	ulders (TILL) compact to very dense						4	186 ~~~			0		
	•			SS	3	100	56	-5		0	c ¹³			
	·								Z 1 85 - E			000		
			I					Ë 6				000		
				ss	4	40		E	184 -		°10			
				cs	5	100			183		° ⁹		Start of coning at 6.7 f	n.
				cs	6	16		- 	182 -		_o 10	້ຄໍບີລ້ອງ ເຈັ້ນ ເຈັ້ ເຈັ້ນ ເຈັ້		
				cs	7	43			181		₀ 17	000000000 0000000000000000000000000000		
N N	SILTY CLAY SILTY CLAY varved grey SAND and SI		179.9 170.5 10.7	cs	8	35		14 14 14 14 14 14 14 14 14 14 14 14 14 1	180		_റ 20			
	 varying grave cobbles or bo moist to wet, silt and clay s 	I and clay content, occasi ulders (TILL) compact to very dense eam	ionai	cs	9	0			178			000 000 000 000 000 000 000 000 000 00	No recovering from C	S 9.
	boulders and	cobbles		cs	10	9		п. 4 на 14	177					
	- - - - - -			cs	11	10		15 15 10 10 10				0.00000		
	· • • •			cs	12	20		17	173		o ¹¹		Core barrel jammed.	
	• • •				12	n		1* 1	172				No sample recovered	I from CS 13.
A	IEC Earth & Environmental Groundwater depth recorded on completion at a depth of <u>5.3 m</u> .													
A 13	aivision of AME 11 Fielding Road velv. Ontano	ivision of AMEC Americas Limited Fielding Road V Groundwater depth observed on <u>15/03/2008</u> at a depth of <u>5.5 m</u> .												
Ca Te Fa	anada P3Y 1L7 el +1(705) 682-2 ix +1(705) 682-2 ww.amec.com	632 2260	Borehols details qualified Geotec accompanying E	an preser Indeal Eng Indeantion	nted, do r ginser, Al n of Bore	not consti leo, boreh hole Logʻ	tute a the role infor	prough u mation a	nderstanding of all p hould be read in con	otential conditions preser unction with the geotech	nt and requires interpretative assist mical report for which it was commi	ance from a sioned and th	• \$	Scale: 1 : 100 Page: 1 of 6

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R	ECORD OF BOREHOLE No. PT08-04 Co-Ord. 0327581 E, 5576834 N Diect Number: 1Y86002 Drilling Location: See Figure 2													
Pro	ject Number: TY86002						Drillin	g Location: See Figure 2	2			Logged by: PR/PRL		
	LITHOLOGY PROFILE	SC	DIL SA	MPLIN	G			FIELD TESTING	LAB TESTING	_ ,	,	COMMENTS		
Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	PenetrationTesting ○ SPT ● DCPT MTO Vane* Nilcon Vane* △ Intact ○ Intact ▲ Remould ● Remould * Undrained Shear Strength (APa) 15 30 45 60	Atterberg Limits W, W W, Pleasic Liquid × Passing 75 um (%) O Moisture Content (%) 20 40 60 80	INSTRUMENTATION	INSTALLATION	X Trace pope in Definition te X Trace pope in Definition 1 riser pipe in search 1 riser pipe in search 1 storted pipe in search N no installation, only bentonite		
	grey SAND and SILT varying gravel and day content, occasional				-		171 -				· •			
	cobbles or boulders (TILL) moist to wet, compact to very dense	cs	14	15		20 21	170 ~		°8			Sand washed out from barnel was collected from drilling mud.		
		cs	15	12		22	169 - 168 -		°8	000,000	- 0 0 C -			
		cs	16	12	بىلىسىسلىر	- 23 - 24	167 -			,		All fines washed out from CS 16.		
		cs	17	0		- 25	166 -					No sample recovered from CS 17.		
	cobble in Core barrel	cs	18	2	بىيايىر بىيىنى ئى	26 27	164 -			,				
		cs	19	0		26	162 -			000.000	~ 0 ~ ~ 0 ~	No sample recovered from CS 19.		
		cs	20	12		· 29 · 30	161		° ⁷			Lost core barrel in casing. Trying to retrieve.		
		cs	21	10		- 31	159		°2	- <u>- 0</u> - 0 - 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	33 m.		
	dark grey silt and clay varved (0.2 m thick)	cs	22	90	1 manutana	- 32 - 33	158		o ¹⁰		- 0 0 0			
		cs	23	0		- 34	156 -			00,000,000	00,000	No sample recovered from CS 23 and CS 24.		
		cs	24	0	hunnahun 	- 35 - 38	155 -			0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0				
		cs	25	13	uninnan)	- 37	153 -		°15	000,000				
		cs	26	12		- 39	152 -		o ¹²	000,000,000	· · · · · · · · · · · · · · · · · · ·			
				- E0		- 40			_12	000	0.00	Core parter sanded in at 39.5 m.		
<u>i i i</u>	Borehole details (is present	∠/ ted, do no	x constitute	a thorou	gh unde	<u>150 —</u> retendir	ng of all polential conditions present	nnd requires interpretative assists	ince fro	na na	9		
	qualified Geotach accompanying Ex	mical Engineering	of Boreh	o, borehole ole Log'.	informatio	on shou	Ad be re	ad in conjunction with the geotachnic	cal report for which it was commis	ioned a	und th	Scale: 1 : 100 Page: 2 of 6		
L	Continued on Next Page													

_	LITHOLOGY PROFILE	SC	DIL SA	MPLI	NG			FIELD TESTING	LAB TESTING					
	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Vatue	DEPTH (m)	ELEVATION (m)	PenetrationTesting ○ SPT ● DCPT MTO Vane* Nilcon Vane* △ Intact ○ Intact ▲ Remould ● Remould * Undrained Shear Strength (iPe) 15 30 45 60	Atterberg Limits Wp W With Plastic Liquid × Passing 75 um (%) C Moinsture Content (%) 20 40 60 60	INSTRUMENTATION INSTALLATION	I ner ppe n benonte I ner ppe n benonte I ner ppe n band I ner ppe n and I stated ppe n and I stated ppe n and no hataliation, only bentonite			
	some set of the set of		<u> </u>			E - 41								
	cobbles or boulders (TILL) moist to wet, compact to very dense	cs	28	59		42	149 - 148 -		o ¹⁰	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0				
		cs	29	72		43	147 -		₀ 12		د م م			
		cs	30	95		- 44	146 -		° ⁹	D00,0000	E ace			
	144. olive to brown 46. SANDY SILT to SILT	2 3 CS	31	100		- 46	145 - 144 -		₀ 14	0000 0000	2000			
	moist, very dense (probable Residuum) boulder at 46.3 m boulder at 47.1 m	cs	32	60		- 47 - 48	143		_د 20	0.000,000	0000 6000			
	141. olive to reddish brown: 49. SAND and SILT 49. varying silt and clay content	2 2 CS	33	100		49	142 -		₀ 16					
	moist, very dense ´ (probably Residuum)	3	34	100		5- 50	140 -		<u>-21</u>					
		cs	35	100		- 52	138		₂ 0ء					
CS 36 75 - 54 54 54 54 54														
		cs	37	63		55	135		₀ 16					
CS 38 100 57 50 0 ²¹														
-	132. black 57: SILT 57: increasing sand content with depth, possible lignite, moist, dense	cs	39	100		58	132 -		* 46	,117	Organic content 40% Specific Gravity = 2.02			
		cs	40	99		5 60	131 - 130 -			,10B				
		cs	41	100		61 1	129 -			132				

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Project Minitir 10002 Dilling Location: See Ligan 2 Ligan 2 <thligan 2<="" th=""> Ligan 2</thligan>	R	RECORD OF BOREHOLE No. PT08-04 Co-Ord. 0327581 E, 5576834 N Co-Ord. Co-Ord.													
Utricit DCGY PROPELE SOL SAMPLY PELD TESTINO Lat TINO Comparison Comparison <thcomparison< th=""> Comparison <t< td=""><td>Pr</td><td>oject Number: TY86002</td><td></td><td>-</td><td></td><td></td><td></td><td>Drilling</td><td>g Location: See Figure 2</td><td><u> </u></td><td></td><td>Logged by: PR/PRL</td></t<></thcomparison<>	Pr	oject Number: TY86002		-				Drilling	g Location: See Figure 2	<u> </u>		Logged by: PR/PRL			
DESCRIPTION No		LITHOLOGY PROFILE	so	SIL SA	MPL	ING			FIELD TESTING	LAB TESTING	7	COMMENTS			
Image: Strate of the out in deptile, possible Image: Strate of the out in deptile, possible Image: Strate of the out in deptile, possible Image: Strate of the out in deptile, possible Image: Strate of the out in deptile, possible Image: Strate of the out in deptile, possible Image: Strate of the out in deptile, possible Image: Strate of the out in deptile, possible Image: Strate of the out in deptile, possible Image: Strate of the out in deptile, possible Image: Strate of the out in deptile, possible Image: Strate of the out in deptile, possible Image: Strate of the out in deptile, possible Image: Strate of the out in deptile, possible Image: Strate of the out in deptile, possible Image: Strate of the out in deptile, possible Image: Strate of the out in deptile, possible Image: Strate of the out in deptile, possible Image: Strate of the out in deptile, possible Image: Strate of the out in deptile, possible Image: Strate of the out in deptile, possible Image: Strate of the out in deptile, possible Image: Strate of the out in deptile, possible Image: Strate of the out in deptile, possible Image: Strate of the out in deptile, possible Image: Strate of the out in deptile, possible Image: Strate of the out in deptile, possible Image: Strate of the out in deptile, possible Image: Strate	Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION {m}	PenetrationTesting ○ SPT ● DCPT MTO Vane* Nilcon Vane* △ Intact ○ Intact ▲ Remould ◆ Remould * Undrained Shear Strength (kPe) 15 30 45 60	Atterberg Limits Wr, W. 2 C Plastic Liquid × Passing 75 um (%) ○ Moisture Content (%) 20 40 60 80	INSTRUMENTATION INSTALLATION	Inter pipe in backful Inter pipe in backful Inter pipe in backful Inter pipe in sand Isolted pipe in sand Isolted pipe in sand Inter pipe in sand			
In Crassed all congent Image: set in co		black SILT increasing sand content with depth, possible lignite, moist, dense		42				128 -		.70					
Improvement all content CG 43 100 -0				42	39		- 64	127		0 -					
Image: provide the consent increase of the cons		increased silt content	cs	43	100		65	126 ~		₀ 69					
			cs	44	100		- 86	124 -		° <mark>46</mark>					
1 100			cs	45	99		68	123		<mark>ം</mark> 28					
1 Sector and Suff 0		120.6	cs	46	100		69	121		₀ 13					
1 1 0		SAND and SILT varving sift and clay content	cs	47A	100		F- 70	120 ~		²⁸					
CS 48 90 72 110 016 018 CS 48 90 73 110 030 030 CS 50 99 75 116 021 021 CS 51 97 76 116 017 017 CS 52 92 76 116 017 017 CS 53 0 91 00 100 017 019 CS 54 80 91 017 019 019 019 CS 54 80 91 000 02 019 019 CS 54 80 90 90 90 017 019 019 CS 55 87 0075m 00 019 019 019 CS 55 87 0075m 00 019 019 019 CS 56 00 00 00 02 02 019 019 CS 56 00 00		moist, very dense ´ (probably Residuum)	cs	47B	75		1111 1111 11111	119		° 3 5					
CS 49 99 73 174 106 030 030 CS 50 99 75 115 030 029 021 CS 51 97 76 116 021 021 021 CS 51 97 76 112 021 021 021 CS 52 92 76 112 021 017 011 CS 52 92 76 112 017 019 017 CS 53 0 60 100 62 024 024 024			cs	48	90		72	118 ~		₀ 18					
CS 50 99 75 115 -29 32 CS 51 97 77 113 -21 -21 CS 52 92 78 112 -21 -017 CS 53 0 66 110 -017 -019 -019 CS 54 80 81 100 -019 -024 -019 -024 Dotted didates to Exception the able to explorted to exclude to exclude to exclu			cs	49	99		73	117 -		<mark>.</mark> 30					
CS 51 97 77 113 0 ²¹ 0 ¹⁷ CS 52 92 78 0 ¹⁷ 0 ¹⁷ 0 ¹⁷ CS 53 0 80 0 ¹⁰ 0 ¹⁷ 0 ¹⁹ CS 54 80 91 0 ¹⁹ 0 ²⁴ 0 ¹⁹ Statistic appresented, to not considue a through understated bread from opticities present and mediates measures from any statistic and the present any statistic and the present any statistic and the prese			ß	50	99		75	115 -		► ²⁹ * 32					
CS 52 92 78 017 CS 53 0 80 017 CS 53 0 80 017 CS 54 80 100 017 CS 54 80 100 017 SS 55 87 50/75mm 100 SS 55 87 50/75mm 100 Boretools details as presented, do not constitute a through understanding of all potential conditions present and requires interpretative assistances from a gradified Constitutes of through under through under through the two constitutes a through under through under the two constitutes a through under through under the two constitutes a through under the two consthrough the two constitut			cs	51	97		1 76	114		_े 21					
CS 53 0 80 110 110 100 0.17 CS 54 80 100 62 SS 55 87 5075mm 100 0.17 SS 55 87 5075mm 100 62 SS 55 87 50775mm 100 624 Bothold details as presented, do not constitute a throngth indextanding of all potential conditions present and requires interpositive statisticar from all Scale: 1: 10			cs	52	92		1 78 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	112		₀ 17					
CS 54 80 B1 00 017 017 017 017 017 017 017 017 017			cs	53	0			111 111 110							
SS 55 87 50/75m/E 100 07 CS 56 100 63 024 024 Borehols details as presented, do not constitute a through understanding of all potential conditions present and requires interpretative assistance from a quantified Goodscinical Engineer information should be made in conjunction with the geotechnical requires the commissional and the Scale: 1 : 10 Scale: 1 : 10			cs	54	80		81	109 109		0 ¹⁷					
CS 56 100 - 83 - 024 Borehole details as presented, do not constitute a through understanding of all potential conditions present and requires interpretative assistance from a qualified Geologinical Engineer. Also, borehole information should be read in conjunction with the geologinical engineer. Also, borehole in formation should be read in conjunction with the geologinical engineer. Also, borehole in formation should be read in conjunction with the geologinical engineer. Also, borehole in the source of the source			ss	55	87 (0/75mr	I	106 1		<mark>.</mark> 19					
Borehole detaile as presented, do not constitute a through understanding of all potential conditions present and requires interpretative assistance from a qualified Geologinital Engineer. Also, borehole information should be mad in conjunction with the geotechnical report for which it was commissioned and the Scale: 1 : 10			cs	56	100		E- 83			₀ 24					
accompanying Explanation of Bonahola Log'. Page: 4 of		Borstole datalia qualifiad Geotechn accompanying Esp	a present ical Engli stanation	ed, do no neer. Also of Borets	t constitu o, boreho ole Log'.	ite a thoro le informa	ugh unde tion shou	id be rea) of all potential conditions present at d in conjunction with the geotechnics	nd requires interpretative assistance I report for which it was commision	e from a red and th	Scale: 1 : 100 Page: 4 of 6			
R	ECORD OF BOREHOLE No. PT08-04 Co-Ord. 0327581 E, 5576834 N														
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Pro	ject Number: TY86002						Drilling	Location: See Figure 2			Logged by: PR/PRL				
	LITHOLOGY PROFILE	SC	AL SA	MPLI	NG			FIELD TESTING	LAB TESTING	,					
Lithology Plat	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	PenetrationTesting ○ SPT ● DCPT MTO Vane* Nilcon Vane* △ Infact ○ Intect ▲ Remould ● Remould * Undrained Shear Strength (kPa) 15 30 45 60	Atterberg Limits Wp W W_ Plastic Liquid × Pessing 75 um (%) 0 Omisture Content (%) 20 40 60 60	INSTRUMENTATION INSTALLATION	1 filter pipe in banchille 1 filter pipe in banchille 1 filter pipe in sand 1 teletited pipe in sand				
	reddish brown changing to brown with depth SAND and SILT														
	varying slitt and clay content moist, very dense (probably Residuum)	cs	57	100		85	106		₀ 19						
		cs	58	98		86	104	- - - - -	0 18						
		ss	59	33 5	0/100ml	gg 87	-		_് 31						
		cs	60	100			103 -		_o 20						
		cs	61	87		69	101 -		c ²²						
		CS	62	99		- 90	100		₀ 23						
			63	25.6	1/100m	01 6	86 +		_23						
				255		- 92			~						
		cs	64	100			98 -		ംയ						
		cs	65	67		93 94	97		<mark>28</mark>						
		cs	66	100		95	95		ی ⁵⁰						
		cs	67	78		98	94		_c 16						
		cs	68	84		98	92		<mark>ം</mark> 20						
	boulder encountered at 100 m	cs	69	92		100	91 -		₀ 16						
		cs	70	81		101	89 -		₂ 21	·					
		ws	71			103	88 -				Barrel jammed at 102 m. Sample from <i>cu</i> ttings.				
		cs	72	78			86 -		₀ 19						
	Borshole details qualified Geotech accompanying Ex	in present wical Eng planation	ted, do no imer. Als of Boreh	ot constitu o, boreho iole Log'.	te a thoro le informe	tion sho	erstandin ald be rea	g of all potential conditions present a Id in conjunction with the geotechnics	nd requires interpretative assistan al report for which it was communi	ce from a	Scale: 1 : 100 Page: 5 of 6				
·	Continued on Next Page						_				······································				

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R	ECORD OF BOREHOLE No. PT08-04 Co-Ord. 0327581 E, 5576834 N Order Operation See Figure 2 Operation See Figure 2 Logged by: PR/PRL												
		s	OIL S/	MPLI	NG			FIELD TESTING	LAB TESTING		COMMENTS		
Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SpT 'N' Value	DEPTH (m)	ELEVATION (m)	PenetrationTesting ○ SPT ● DCPT MTO Vane* Nilcon Vane* △ Intact ○ Intact ▲ Remould * Undrained Shear Strength (APa) 15 30 45 40	Atterberg Limits W _p W W ₁ Plessic Liquid × Pessing 75 um (%) O Moisture Content (%) 20 40 60 80	INSTRUMENTATION INSTALLATION	1 niser pipe in bentonile 1 niser pipe in back#l 1 niser pipe in back#l 1 niser pipe in sand 1 stotted pipe in sand no installation, only bentonite		
	reddish brown changing to brown with depth SAND and SILT varying silt and clay content moist, very dense (probably Residuum)	cs	73	50		106	85 -		° ²²				
		cs	74	100)	107	83		o ¹⁴				
	8: 100 Possible weathered bedrock or cemented Residuum Significant sand and clay, wet 8/	2.0 8.4 CS 0.8	75	86		109	82 -		₀ 19				
							vystantik				Casing sanded in. No water return.		
	porenois dat qualified Geo accompanyir	ans as pres stochuical E ng Explanat	ngineer. Al on of Bore	so, borets hole Log'.	ale inform	wyn undi Istion Shou	id be rea	id in conjunction with the geotechnic	al report for which it was commisi	oned and ti	Bane: 6 of 6		

R	ECORD OF BOREHO	DLE N	0.	<u>PT(</u>) <u>8-0</u>	<u>5</u> C	:0-0	Drd.	032807 g Location:	<u>'3 E, 557</u> See Figure 2	7 <u>6053 N</u>		Logg		e M
	oject Client: Phosean Chemical C oject Name: Martison Phosphate	Project						Drillin Drillin	g Method: g Machine:	200 mm Ho	bliow Stem Auger and C ted Drill	oring	Com Revi	piled by: <u>E</u> ewed by: T	. <u></u>
Prc	ject Location: Hearst, Ontario							Date	Started:	31 Jan 08	_ Date Completed: 08	Feb 08	Revis	sion No.: <u>4</u>	, 17/09/08
	LITHOLOGY PROFILE		SC	DIL SA	MPL	NG			FIELD	TESTING	LAB TESTING	1	C	OMMENTS	
Lithology Plot	DESCRIPTION		Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	Penetra O SPT MTO Vane* A Intact Remould Undrained Sh 15 30	tionTesting ● DCPT Nilcon Vane* ○ Intact ● Remould eer Strength (kPa) 45 60	Atterberg Limits W, W W, Plastc Liquid × Passing 75 um (%) O Molsture Content (%) 20 40 60 80	I INSTRUMENTATION INSTALLATION	1 riser pipe 1 riser pipe 1 riser pipe	in bentonite in beckfill in sand w in sand	
	Not Sampled									_			8		
	brown SILTY CLAY some sand, some gravel, very stiff	<u>190.2</u> 1.5	SS	1	92	17	2	191 — 190 —	С		₀ 13		xxx - 0.0 0 - 0.70		
	brown to grey SAND and SiLT varying gravel and clay content, occasion cobbles or boulders (TILL)	<u>188.7</u> 3.1 nai	SS	2	100	60	3	189 - 186 -		0	o ¹²				
	moist to wet, compact to very dense		SS	3	100	-53/ 150mm	- 4	187 —			₀ 12				
			 \$\$	4		<u>50./</u> 100mm		186 ▼85			9 ي		0000		
		1	SS	5	100	50 / 150mm	8	184			0 ¹¹				
		-	SS	6	100	113	10	182 -		113 () o ¹⁴	0000 0000	9090 9090		
		-	SS	7	100	897 230mm	11	181			°11	100,000,00 00,000,00 00,00,00	10 00 00 00 00 00 00 00 00 00 00 00 00 0		
			SS	8	100	109	13	179		109	_{) e} 19				
		-	ss cs	9	100	36	14	178	(c	o ¹¹		300 mm of sa Spoon refusa Start coring.	and heave up al at 14.2 m.	rods.
		-	cs	2	100		16	176 -				00,000,000			
		ſ	cs	3	100		18	175							
								173 -					9 		
AME A div	C Earth & Environmental	No freestan	ding gri	oundwa	ter mea	isured in	n open	borehol	e on completio	on of drilling.					
Livel Cana Tel + Fax	y, Ontario da P3Y 1L7 1(705) 682-2632 +1(705) 682-2660 accor arrec.com	Hole details as Fiel Geotechni Impanying Expl	r depth presents ical Englin lanation o	d, do not wer, Also of Boreho	red on t constitut b, borehol de Log'.	10/U3/2 te a thoro a informa	UU8 at sugh und ition sho	t a depth lerstanding ould be rea	of <u>6.8 m</u> . of all potential o d in conjunction v	onditions present a with the geotechnics	nd requires interpretative assiste al report for which it was commis	ce from a oned and th	e	Scale	:1:100 :1 of 4

R	RECORD OF BOREHOLE No. PT08-05 Co-Ord. 0328073 E, 5576053 N Project Number: TY86002 Drilling Location: See Figure 2 Logged by: M													
									LAP TESTING					
Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	PIELD TESTING PenetrationTesting O SP7 DCPT MTO Vane* Nicon Vane* A Intact A Remould • Remould · Undrained Share Steergh (kPa) 15 30 45 60	Atterberg Limits W ₂ W W ₁ Plase Liquid × Pase Liquid × Pase (%) O Moleure Content (%) 20 40 60 80	COMMENTS COM				
	brown to grey SAND and SILT	6	4	100		1.1.1								
	varying gravel and clay content, occasion cobbles or boulders (TILL) moist to wet, compact to very dense	CS	5	100		20	172 - 171 -			2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2				
		cs	6	100		22	170 - 169 -							
	thin silt some clay seam	cs	7	100		23	168 ~							
	thin sand seam (75 mm)	cs	8	100		25	167 ~ 166 ~			2000 000 000 000 000 000 000 000				
	cobbles	cs	9	100		27	165 ~			2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 -				
		cs	10	100		28	164 ~ 163 ~							
	thin silt seam trace organics @29.4 , 29.6, 30.0, 30.3 m	cs	11	100		1.4.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1	162 -							
		cs	12	100		31	161 ~							
		cs	13	100		33	159 -	***						
		cs	14	100	1	34	158 -							
		cs	15	100		1.1.1.1.38	156 -			0 0 0 0 0 0 0 0 0 0 0 0 0 0				
		cs	16	100		37	154 -							
		cs	17	100		39 11	153 -			100,000,000,000,000,000,000,000,000,000				
			10	100		E 40								
		whole datails as preser	ted, do n	not constitu	ute e tha	rough un	derstand	ing of all potential conditions present a	and requires interpretative assists	nce from a Scale: 1 · 100				
	qua aco	ompenying Explanation	neer. Ab	hole Log'.				Contraction of Controlling		Page: 2 of 4				
<u> </u>	Continued on Next Page				_									

Project Number: TY86002 Drilling Location: See Figure 2 Logged by: AM LITHOLOGY PROFILE SOIL SAMPLING FIELD TESTING LAB TESTING COMMENTS												
	LITHOLOGY PROFILE	sc	DIL SA	MPLI	NG			FIELD TESTING	LAB TESTING		COMMENTS	
Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH {m}	ELEVATION (m)	PenetrationTesting ○ SPT ● DCPT MTO Vane* Nilcon Vane* △ Inlact ○ Inlact ▲ Remould ● Remould * Undrained Shear Strangth (kPa) 15 30 45 60	Atterberg Limits W _p W W ₁ Plassic Liquid × Passing 75 um (%) C Moisture Content (%) 20 40 60 80	INSTRUMENTATION INSTALLATION	1 riser pipe in bentionite 1/1 if also pipe in backfil 1 riser pipe in sand 1 riser pipe in sand 1 aloned pipe in sand	
	brown to grey SAND and SILT						151 -					
	verying gravel and clay content, occasional cobbles or boulders (TILL) moist to wet, compact to very dense	cs	19	100		41	150 -					
	Note: Residum depth inferred to be at 42.5 m depth by Golder 1963	cs	20	100		43	149 - 148 -					
	cobbles encountered in CS21	cs	21	100		45	147 -					
		cs	22	77		46	140					
		cs	23	75		48	144					
	dark brown organic silt seam	cs	24	77		49	142 -		∎—● 80			
	**	cs	25	92		51 1	141 -					
	grey to dark grey 139.6 SILTY CLAY 52.1 SULTY CLAY varved, trace organics moist, stiff 138.6 reddish brown to grey 53.1	cs	26	100		52	139 -					
	SAND and SILT varying sit and clay content moist, very dense (probably Residuum)	cs	27	100		54	138					
	<pre>cobbles encountered in CS30</pre>	cs	28	100		55	136 -		▶● × 61			
		cs	29	80		57	135 -					
		cs	30	25		58	133					
		CS	31	72		60 1	132 -					
			32	80		61	130			00000000000000000000000000000000000000		
	Borstroke distalla qualified Geolect accompanying Ex	nicel Engi planation	ad, do no inser, Aha of Boreh	o, borshitu o, borshol ole Logʻ.	ta a thoro e informe	Nigh with Ition shou	instandin Id be rea	g of all potential conditions present a of in conjunction with the geotechnics	nd requires interpretative assistan i report for which it was commisic	ce from a and and th	Scale: 1 : 100 Page: 3 of 4	

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R	ECORD OF BOREHOLE No. PT08-05 Co-Ord. 0328073 E, 5576053 N iect Number: TY86002 Drilling Location: See Figure 2 Logged by: AM												
Pro	ject Number: TY86002							ບດາແກຊ	Location: See Figure 2			Logged by: <u>AMI</u>	
			SO	IL SA	MPLI	NG			FIELD TESTING	LAB TESTING	z		
Lithology Plot	DESCRIPTION		Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	PenetrationTesting O SPT ● DCPT MTO Vane* Nilcon Vane* △ Intact ○ Intact ▲ Remould ◆ Remould * Undrained Shear Strength (kPe) - 15 30 45 60	Atterberg Limits W, W W Plassic Liquid × Passing 75 um (%) O Moissure Content (%) 20 40 60 80	INSTRUMENTATIO	1 riser pipe in backfil 1 riser pipe in sand 1 sicted pipe in sand	
	reddish brown to grey SAND and SILT		_										
	varying silt and clay content moist, very dense (probably Residuum)		cs	33	88		63 64	129		▶ ——● 57		Specific Gravity = 3.14	
			cs	34	90		11 11 11 11 11 11	127					
			cs	35	95		11.66 11.1.66	126 ~					
			cs	36	97		1000 1000 1000 1000 1000 1000 1000 100	124				Specific Gravity = 3.13	
			cs	37	97		69 1 1 1 1 1 70	122 -		► 30			
		120.1	cs	38	100			121				Casing remained in hole. Bottom of casing 70.84m.	
• • •	dark grey / dark brown / dark orange Possible Cemented Residum, weathered SAND. varying silt and clay content moist, very dense	71.6	cs	39	92		- 72	119					
•	END OF BOREHOLE	73.2											
					ļ								
				ļ									
					1								
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										1			
	Boretx qualifit	ole details a ed Geolech penvineTr	na presen Inical Eng Iplanetic	nted, do n ginetr. Ab n of Borel	iot consti so, borsh hole Loo'	tute a tho cile inform	rough un nation sh	derstandi ouid be re	ng of all potential conditions present ad in conjunction with the geotechnic	and requires interpretative assist cal report for which it was comm	ence from a sioned and ti	Scale: 1 : 100	
1												Page: 4 of 4	

Prok			0.	<u>r I (</u>	<u>10-0</u>	<u>o</u> C	0-0	Drilling	USZ/40	0∠ <u>E, 557</u> See Figure 2	2000/N			B		ec"
Proje	ect Client: PhosCan Che	mical Corp.						Drilling	Method:	200 mm Ho	llow Stem Auger and C	oring		Compil	ed by:	ETB
Proje	ect Name: Martison Pho	sphate Project						Drilling	Machine:	Track Mount	ted Drill			Review	ed by:	TJL
Proje	ect Location: Hearst, Ontar	io		_				Date S	started:	<u>08 Mar 08</u>	_ Date Completed: 11	Mar O	8	Revisio	n No.:	4, 17/09/08
	LITHOLOGY PRO	FILE	SO	IL SA	MPLI	NG			FIELD	TESTING	LAB TESTING	Т		co	AMEN	TS
bgy Plot	DESCRIPTIO	DN	ole Type	ple Number	very (%)	N' Vaiue	(m) HT	ATION (m)	Penetra O SPT MTO Vane* △ Intact ▲ Remould	ationTesting ● DCPT 'Nilcon Vane* ◇ intact ● Removid	Atterberg Limits W _p W W ₁ Plastic Liquid * Passing 75 um (%) C Molithurg Context (%)	RUMENTATION	ALLATION	1 riser pipe in t 1 riser pipe in t 1 riser pipe in t 1 riser pipe in t 1 sixtad pipe in no instalistion,	entonite esckill and naand only bento	onite
Lithol	ocal Ground Surface Elevation:	189.8 m	Sams	Samp	Reco	SPT	DEP.	ELE	* Undrained Si 15 30	mear Strength (kPa) 45 60	20 40 60 80	INST	INST			
	black ORGANICS (MUSKEG)												×	Approximately penetration	0.9 m fr	ost
2 2 1	ith ous						E 1	189 -					×			
4 2							1					00	P D			
<u></u>		187.6	SS	1	25	4	- 2	188 -	C			93				
	arey SAND and SILT	2.2			ļ								0.0			
	cobbles or boulders (TILL) moist to wet, compact to very de	ense					- 3	187			.18	000	000			
			55	2	84	12		184 -	0		6.1	, c	10			
			ST	1			- 4				₀ 16	° °				
			SS	3	100	53	-	₹ 185 -		С	₀ 13		0.			
		ſ		_	-	-	Ē	Z				- Car	000			
							- 6	184 -					00			
			SS	4	53			-			_ാ 10					
			ន	5	42		- 7	183 -			o ¹¹			Start coring at	6.8 m.	
								182				000	000			
	coodie		cs	6	30		і— В Е				_. 8					
				-			-	181 -								
	cobbles						Ē					0.0				
			cs	7	28		- 10	160 -			° 7	0.00	0000			
							5	-					0,0			
							E- 11	179 -				0.0		All fines washe	d out.	
			cs	8	10			179			2 ¹³		6.0			
							12					000	0.00			
			20	a	46			177 -			_ 15		, , 0			
			~	Ũ							Ĵ			All fines washe	d out.	
		1					E 14	176 -				000				
		175.0	cs	10	90			1111			_c 10	000	000			
NN,	dark grey SILT and CLAY	174.9 15.7					E 15	175								
	arved. trace sand						1111					0.0	0.0			
	varying gravel and clay content, cobbles or boulders (TILL)	occasional 173.5	cs	11	100		- 18 E	11111			. ₀ 14	0.00	0.00			
	noist to wet, very dense tark grey SILT and CLAY	16.3 173.0 16.8					Ē .	173				000	000			
	arved, trace sand]	20	12	9E.		E 17	11111			_7					
	SAINLY and SiL I varying gravel and clay content, cobbles or boulders (TILL)	occasional	~				18	172 -			5	0.0	0,0			
: '	noist to wet, very dense							1111			1	Doc	0.00	Artesian water	pressum	e noted.
: + : 	Farth & Environmental	7					E	171 -				0	20			
A divis	sion of AMEC Americas Limited	Groundwate	er depti	necord	vection o	20mpleti 15/03/2	onata 008 ≈	tadeptho:	0146m							
Lively Canad	, Ontario ta P3Y 1L7 (705) 682-2632	Borshole details as	present	ed, do no	t constitu	As a thore	ugh un	instanding	of all potential	conditions present a	nd requires interpretative essiste	ince from	n.a.	1	<u>.</u>	
Far +	1(705) 682-2260	accompanying Exp	langtion	of Boreh	o, Donehoi Die Logi.	e eformi	tion shi	uld be rea	a in conjunction	with the geolachnic	al report for which it was commi	Noned a	nd the		- 50	aue: 1:100

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R	RECORD OF BOREHOLE No. PT08-06 Co-Ord. 0327462 E, 5576607 N												
Pro	ject Number: TY86002		_				Drilling	Location: See Figure 2	2		Logged by: PRL		
	LITHOLOGY PROFILE	sc	HL SA	MPLI	NG			FIELD TESTING	LAB TESTING	Z			
Lithology Plot	DESCRIPTION	Sample Type	C Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	PenetrationTesting ○ SPT ● DCPT MTO Vane* Nilcon Vane* △ Intact ○ Intact ▲ Remould ● Remould * Undrained Shear Strength (kPa) 15 30 45 80	Atterberg Limits W, W W; Please Liquid * Pessing 75 um (%) O Molsure Content (%) 820 40 60 80		Inserpte nomenone Inserpte nomenone		
	SAND and SILT varying gravel and clay content, occasional										All fines washed out.		
	coboles or boulders (TILL) moist to wet, very dense	cs	14	13		20	170		° ⁹				
		cs	15	30		22	168		₀ 18	00,000 00,000			
	cobbles	cs	16A	50		23	167		ം ⁸		d d		
		cs	168	87		24	186 -		° 7				
		cs	17	99		25	165		°8				
		cs	18	100		27	163 -		°9		SPMDD 2.160 kg/m3 at OMC 8.1%		
	grey siit and clay seam	cs	19	99		28	162		α ^β • 59				
		cs	20	22		30	160		_° 12				
		cs	21	65		31	159		°11	000 000 000			
		cs	22	27		33	157 -		_o 10				
		cs	23	87		34	156 - 1 155 - 1		o ¹¹				
E	153.8 dark grey 36.0 SILTY CLAY 36.0	cs	24	92		- 38	154		° ₁₃				
<u> </u>	152.6 greenish red to reddish brown 37.2 SANDY SILT some clay, occasional cobbles wet	cs	25	22		37	153 - 152 -		o ¹⁵	×			
	(probably Residuum)	cs	26	50		39	151 -		, 0 ³²				
						40	150 -		24				
11	Barehole details :	CS present	27 ted, do no	56 t constitu	te a lihoro	- Nigh unde	ratandin	g of all potential conditions present :	c ^{.54}	e from a			
	qualified Geotech accompanying Ex	nical Eng planation	of Borein	o, borehol ole Log'.	le informa	tion shou	id be rea	d in conjunction with the geotechnic	al report for which it was commisk	Hed and th	Page: 2 of 5		

RI	RECORD OF BOREHOLE No. PT08-06 Co-Ord. 0327462 E, 5576607 N One of the second s												
		SO	IL SA	MPLI	NG		1	FIELD TESTING	LAB TESTING		COMMENTS		
Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	PenetrationTesting C SPT DCPT MTO Vane* Nilcon Vane* A Intact A Remould * Undrained Shear Strength (NPa) 15 30 45 60	Atterberg Limits W _p W W Plastic Liquid × Passing 75 um (%) C Noisture Content (%) 20 40 60 80	INSTRUMENTATION INSTALLATION	1 riser pipe in backfile 1 riser pipe in backfile 1 riser pipe in sand 1 riser pipe in sand 1 slotted pipe in sand		
	greenish red to reddish brown SANDY SILT					- 41	149 -						
	some clay, occasional cobbles wet (probably Residuum)	cs	28	45		42	148 -						
		cs	29	48		43	147						
		cs	30	30		ىرىيىياسىي تېرىيىيا	145 -						
	bourders encountered in CS31	cs	31	24		46	143 -						
		cs	32	37		48	142 -						
	Note: Residum depth inferred to be at 42.5 m depth by	cs	33	67		19 1 1 50	140 -			a sense i se			
	Goldder 1983	cs	34	83		51	139 - 138 -						
		cs	35	55		52	137 -						
		cs	36	49		54	136 - 135 -						
	- - - - - -	cs	37	20		56	134 -	T T T					
		cs	38	38		57	133 · 132 ·	alamanud a					
		cs	39	18		59	131 -				No recovery from CS 40		
		cs	40	0		61	130	1		Vision and the second se			
ŀ			inted. do i	not const	itute e the	-E	128 Inderstand	ing of all potential conditions preserve	I	ince from a			
	qualified Geole accompanying	chnicel Er Explaneti	on of Bore	iso, borel shole Log	nole infor	mation a	hould be r	and in conjunction with the geoteche	scal report for which it was commit	vioned and	the Scale: 1 : 100 Page: 3 of 5		
Ļ	Continued on Next Page												

Project Number: TY86002 Drilling Location: See Figure 2 Logged by: PRL													
	LITHOLOGY PROFILE	S	DIL SA	MPLI	NG	Γ	COMMENTS						
Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	PenetrationTesting ○ SPT ● DCPT MTO Vane* Nilcon Vane* △ Intect ○ Intect ▲ Ramould ● Remould * Undrained Shear Strength (kPa) 15 30 45 60	Atterberg Limits Wr W W Plastic Liquid x Passing 75 um (%) O Moleture Content (%) 20 40 60 80	NOULY THE REPORT FOR THE REPORT OF THE REPOR			
	greenish red to reddish brown SANDY SILT some clay, occasional cobbles					 							
	wet (probably Residuum) dark brown seam	cs	42	35		63 64	127 -						
		cs	43	70		65	125 -		► * 54				
		cs	44	90		66 67	124 -						
		cs	45	100		68	122						
	race grave	cs	46	53		59 70	121 1 120 1 120 1						
		cs	47	25		71	119						
		cs	48	30		- 72 - 73	118 117 117						
		cs	49	0		- 74	118						
	brown to grey Bedrock, weathered, significant sand and silt infilling	cs	50	42		75 76	115						
		cs	51	38		- 77	113 111						
	110.6	cs	52	46		- 78 - 79	111						
	grey to cark grey 79.3 Sedrock, probable wacke / conglomerate hybrid weathered, little infilling wet	cs	53	100		- 60	110 11111111111111111111111111111111111						
		cs	54	43		- 81 - 82	108 108						
	Brazilania destruto	cs	56	60		- 83	107						
	qualified Geotech accompanying Eq	planation o	er. Also, If Borehol	borehole e Log'.	Informat	ion shoul	d be read	in conjunction with the geotechnical (- v-pares and pretaine analytance report for which it was commisions	norm a Scale: 1 : 100 Page: 4 of 5			

DESCRIPTION The provided and the second sec	S Sample Type	57 57 58 59 60 61	(%) / Asorosoper 0 46 999 1000	SPT X Value	(E) H44 64 65 67 67 67 67 67 67 67 67 67 67	E ELEVATION (m)	PriELD TESTING PenetrationTesting O SPT OCPT MTO Vane* Nilcon Vane* A Remould Remould 'Undrained States Strength (JPa) 15 30 45 60	LAD IED ING	INCLUDENT IN INCLUDENT INCLUDENT IN INCLUDENT IN INCLUDENT IN INCLUDENT IN INCLUDENT IN INCLUDENT IN INCLUDENT INCLUDENT IN INCLUDENT IN INCLUDENT IN INCLUDENT IN INCLUDENT IN INCLUDENT IN INCLUDENT	COMMENTS				
DESCRIPTION	S S S	57 57 58 59 60 61	(%) / / iso0039 2/ 0 46 100 99 1000	SPT N' Value	(E) H-1-1-0 84 85 86 87 90 91	s s s s s s s s s s s s s s s s s s s	O SPT ● DCPT MTO Vane* Nicon Vane* △ Intert A Remould ● Remould *Undraimed Sheer Strength (kPa) 15 30 45 60	W ₂ W ² W ₄ Plestic Liquid × Passing 75 um (%) ○ Molaure Content (%) 20 40 60 80		ROD approximately 80%				
rey to dark grey ledrock, probable wacke / congiomerate hybrid wet rey 102.8 97.0 ledrock, probable wacke / congiomerate hybrid ledrock, probable wacke / congiomerate hybrid sedrock, probable wacke / songlomerate hybrid sedrock, probable wacke / songlomerate hybrid sedrock, probable wacke / songlomerate hybrid	3 3 3 5 Sample Type	57 57 58 59 60 61	ε) <u>Λιαγουρα</u> 0 46 100 99 100	SPT N Val	E H B B B B B B B B B B B B B B B B B B	a a c c c c c c c c c c c c c c c c c c	MID Vane - Michael O Intact A Remould - Remould - Undrained Share Strength (JPa) 15 30 45 60	× Passing 75 um (%) ○ Moissure Content (%) 20 40 60 80		ROD approximately 80%				
prey to dark grey sectorsk, probable wacke / congiomerate hybrid wet 102.8	CS CS CS CS	57 58 59 60 61	5 2 0 46 100 99 100		80 60 60 60 60 61 62 63 64 65 66 66 67 68 68 68 68 68 68 68 68 68 68	100 100 100 100 100 100 100 100 100 100	• Undrained Shear Strength (MPa) 15 30 45 60	20 40 60 80	MATT	ROD approximately 80%				
International and the second s	CS CS	57 58 59 60 61	0 46 100 99 100		84 65 67 67 67 67 67 67 67 67 67 67 67 67 67	106 107 107 107 107 107 107 107 107 107 107				ROD approximately 80%				
102.8 TEY 87.0 Bedrock, probable wacke / conglomerate hybrid SND OF BOREHOLE 91.4	CS CS CS CS CS	57 58 59 60 61	0 46 100 99		85 67 85 67 86 87 89 90 91 90	105 104 103 102 101 101 101 101 101 101 101 101 101				ROD approximately 60%				
102.8 Prey 87.0 Sedrock, probable wacke / conglomerate hybrid 98.4 ND OF BOREHOLE 91.4	CS CS CS CS	58 59 60 61	46 100 99 100		85 15 15 15 15 15 15 15 15 15 1	105 104 104 104 104 104 104 104 104 104 104				ROD approximately 80%				
102.8 87.0 sedrock, probable wacke / conglomerate hybrid 98.4 END OF BOREHOLE 91.4	CS CS CS	58 59 60 61	46 100 99 100			104 101 101 101 101 101 101 101 101 101				ROD approximately 80%				
102.8 87.0 Bedrock, probable wacke / conglomerate hybrid 98.4 END OF BOREHOLE 91.4	CS CS CS CS	58 59 60 61	46 100 99 100		88 87 87 87 88 88 90	103 102 102 102 103 104 104 104 104 104 104 104 104 104 104				ROD approximately 80%				
102.8 Prey 87.0 Sedrock, probable wacke / conglomerate hybrid 99.4 IND OF BOREHOLE 91.4	CS CS CS	60	100 99 100		87	103 102 101 100 101 101 101 101 101 101 101				RQD approximately 80%				
rey (102.0 87.0 86drock, probable wacke / conglomerate hybrid 98.4 END OF BOREHOLE 98.4	CS CS	59 60 61	100 99 100		87 	102 Perturbation (100 Perturbation) 103 Perturbation (100 Perturbation)				ROD approximately 80%				
98.4 IND OF BOREHOLE 91.4	CS CS CS	60	100 99 100		88 	102 101 101 100 100 100 100 100 100 100								
98.4 ND OF BOREHOLE 91.4	CS CS	60	99		- 89 - 90 - 91	101 100 BB HILLING								
98.4 IND OF BOREHOLE 91.4	cs cs	60	99		89 	101 100 99								
98.4 IND OF BOREHOLE 91.4	CS CS	61	100		90	100 98 98 100 100 100 100 100 100 100 100 100 10								
98.4 IND OF BOREHOLE 91.4	CS	61	100		90	100 99 99 1111								
98.4 IND OF BOREHOLE 91.4	CS	61	100		91	1000 C								
98.4 IND OF BOREHOLE 91.4					91									
ND OF BOREHOLE 91.4														
Bornhole details en p qualified Geotechnic		Borshole datalis as presented, do not constitute a thorough understanding of all potential conflicions present and requires interpretative assistance from a												

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APPENDIX B

TEST PIT TABLE

Project No.: TY86002



TEST PIT	DEPTH (m)	UTM	SOIL DESCRIPTIONS	Moisture Content (%)	Unit Weight	Standard Proctor Test Posulto
·				-		
08-01	0 - 2.1	5576873N 0327069E	1 – ORGANICS (Muskeg)			
	2.1 4.6		2 – TILL, Sandy SILT, trace gravel, grey, dense moist	27 %		
08-02	0 1.1	5577351N	1 ORGANICS (Muskeg)			
	1.1 – 4.9	03270031	2 – TILL, Sandy SILT, some gravel, grey, dense moist	9 19%	23.0	
08-03	0-0.8	5577627N	1 – ORGANICS (Muskeg)			
	0.8 – 4.6	03270342	2 – TILL, Sandy SILT, some gravel and cobbles, trace clay, brown to grey, dense, moist	9 17%	24.0	
08-04	0 – 1.4	5577478N	1 – ORGANICS (Muskeg)			
	1.4 - 4.9	0320010E	2 – TILL, SILT, some clay, some gravel, grey, dense, wet to dry	9 27%	18.2	
08-05	0 – 2.1	5577813N	1 – ORGANICS (Muskeg)			
	2.1 – 4.7	0326452E	2 – TILL, SILT, some clay, some gravel, grey, dense, wet to dry	9 24%	17.9	
08-06	0 – 0.6	5578017N	1 – ORGANICS (Muskeg)			
	0.6 – 1.4	0326298E	2 - SILTY CLAY, some gravel, brown, firm, moist	13 %		
	1.4 – 1.5		3 – SAND, wet, brown	14 %		
	1.5 – 4.7		4 – TILL, Sandy SILT, trace gravel, brown to grey, dense, dry	9 10%		
08-07	0 – 1.7	5577907N	1 – ORGANICS (Muskeg)			
	1.7 – 4.6	0320382E	2 – TILL, Sandy SILT, trace gravel, grey, dense, moist to dry	9 – 12 %		
08-08	0 - 0.6	5577688N	1 – ORGANICS (Muskeg)			
	0.6 - 4.3	0327125E	2 – TILL, SILT, some clay, some gravel, grey, dense, wet to dry	9 - 11%		
			3 – SAND, grey, wet			
	4.3 – 4.6		4 – TILL, Sandy SILT, trace gravel, grey, dense,	12%	:	
	4.6 - 5.2		moist to dry	11 %		
08-09	0 - 2.1	5574716N 0326152E	1 - ORGANICS (Muskeg)			
	2.1 - 4.6		2 – TILL, Sandy SILT, some gravel, grey, dense, dry	9 – 10%		



Propos Hearst 17 Sep	sed Martis , Ontario otember 20	on Phospha)08 _	C						
TEST PIT	DEPTH (m)	UTM	SOIL DESCRIPTIONS	Moisture Content (%)	Unit Weight (kN/m ³)	Standard Proctor Test Results			
08-10	0 - 0.6 0.6 - 1.4 1.4 - 4.6	5574784N 0326498E	 1 – ORGANICS (Muskeg) 2 – SILTY CLAY, trace gravel, grey to brown, firm, moist 3 – TILL, Sandy SILT, trace gravel, grey, dense, moist to dry 	20 % 9 – 13%					
08-11	0 - 0.6 0.6 - 2.3 2.3 - 4.3	5574773N 0326727E	 1 – ORGANICS (Muskeg) 2 – SILTY CLAY, some sand and gravel, brown, firm, moist 3 – TILL, Sandy SILT, trace gravel, brown to grey, dense, dry 	16 % 9 %	21.2				
08-12	0 - 2.4 2.4 - 4.7	5575045N 0326911E	1 - ORGANICS (Muskeg) 2 - TILL, Sandy SILT, trace gravel, grey, dense, moist	10 - 14%					
08-13	0 – 2.0 2.0 – 4.6	5575493N 0326912E	1 - ORGANICS (Muskeg) 2 – TILL, Sandy SILT, trace gravel, grey, dense, moist	11%	21.5	Sampled at 3.35 m SPMDD 2040 kg/m3 OMC 8.8%			
08-14	0 – 2.1 2.1 – 4.7	5575295N 0327129E	1 - ORGANICS (Muskeg) 2 – TILL, Sandy SILT, trace gravel, grey, dense, dry	10 - 12%	•				
08-15	0 - 0.6 0.6 - 2.1 2.1 - 4.7	5573559N 0327334E	 1 – ORGANICS (Muskeg) 2 – SILTY CLAY, some gravel, brown, soft, moist 3 – TILL, Sandy SILT, trace gravel, brown to grey, dense, dry 	20 % 10 - 17%					
08-16	0 - 1.5 1.52.4 2.4 - 4.6	5575806N 0327543E	 ORGANICS (Muskeg) SILTY CLAY, some sand and gravel, grey, firm, moist TILL, SANDY SILT, trace gravel, grey, dense, dry 	20 % 9 %					
08-17	0 - 0.6 0.6 - 1.5 1.5 - 4.6	5576094N 0327728E	1 – ORGANICS (Muskeg) 2 – SILTY CLAY, brown, firm, moist 3 – TILL, SANDY SILT, trace gravel, brown to grey, dense, dry	20 % 11 - 12%		At 1.2 m SPMDD 1800 kg/m3 OMC 17.37 %			

Project No.: TY86002



TEST PIT	DEPTH (m)	UTM	SOIL DESCRIPTIONS	Moisture Content (%)	Unit Weight (kN/m ³)	Standard Proctor Test Results
08-18	0 – 1.4	5576238N	1 – ORGANICS (Muskeg)			
	1.4 – 1.8	0327655E	2 - SILT, some clay and gravel, grey, firm, moist	13 %		
	1.8 – 4.6		3 TILL, SANDY SILT, trace gravel, brown to grey, dense, dry	10 - 11%		
08-19	0 - 0.6	5576229N	1 – ORGANICS (Muskeg)			At 2.4 m
	0.6 ~ 1.7	0327440E	2 Clayey SILT, some sand and gravel, brown, moist	19%		SPMDD 2030 ka/m3
	1.7 – 4.6		3 – TILL. SANDY SILT, trace gravel, brown to grey, dense, dry	9 10%		OMC 8.6%
08-20	0 – 2.1	5576235N	1 – ORGANICS (Muskeg)			
	2.1 – 3.2	0327034E	2 – CLAY, some gravel, grey, wet, soft	46 %		
	3.2 – 4.6		3 - TILL, SANDY SILT, trace gravel, grey, dense, dry	10 - 11%		
08-21	0 - 2.4	5576450N	1 – ORGANICS (Muskeg)			
	2.4 – 3.4	002/4021	2 – CLAY, trace gravel, grey, wet, soft	35 %		
	3.4 – 4.6		3 – TILL, SANDY SILT, trace gravel, grey, dense, dry	10 %		
08-22	0 – 2.3	5576808N	1 – ORGANICS (Muskeg)			
ļ	2.3 - 3.4	00274302	2 - CLAY, trace sand and gravel, grey, wet, firm	18 %		
	3.4 - 4.9		3 - TILL, SANDY SILT, trace gravel, grey, dense, dry to moist	12 %		
08-23	0 - 2.1	5576847N	1 – ORGANICS (Muskeg)			
	2.1 – 2.7	00272042	2 - CLAY, trace gravel, grey, wet, soft			
	2.7 – 4.6		3 – TILL, SANDY SILT, trace gravel, grey, dense, dry	10 %		
08-24	0 – 2.0	5576813N	1 – ORGANICS (Muskeg)			
	2.0 – 2.7	00202722	2 – CLAY, some gravel, grey, wet, firm	30 %		
	2.7 – 4.6		3 – TILL, SANDY SILT, trace gravel, grey, dense, dry	8 %		
08-25	0 – 2.1	5576841N	1 – ORGANICS (Muskeg)			
	2.1 – 3.0	002000TE	2 - CLAY. some gravel, grey, wet, firm	21 %		
	3.0 - 4.6		3 – TILL, SANDY SILT, trace gravel, grey, dense, dry	10 - 13%		

Project No.: TY86002



TEST PIT	DEPTH (m)	UTM	SOIL DESCRIPTIONS	Moisture Content (%)	Unit Weight (kN/m ³)	Standard Proctor Test Results
08-26	0 – 2.1 2.1 – 3.0 3.0 – 4.6	5576845N 0326857E	1 – ORGANICS (Muskeg) 2 – CLAY, some sand and gravel, grey, wet, firm 3 – TILL, SANDY SILT, trace gravel, grey, dense, dry	33 % 9 – 10 %	18.3	
08-27	0 - 3.0 3.0 - 4.0	5574191N 0327456E	1 – ORGANICS (Muskeg) 2 –TILL, SANDY SILT, trace gravel, grey, dense, dry	12 %		
08-28	0 - 1.2 1.2 - 2.4 2.4 - 4.9	5574525N 0327704E	1 – ORGANICS (Muskeg) 2 – CLAY, some gravel, grey, wet, firm 3 – TILL, SANDY SILT, grey, dense, dry	22 % 9 – 13%	17.2	At 3.35 m SPMDD 1960 kg/m3 OMC 10.5%
08-29	0 - 1.8 1.8 - 2.3 2.3 - 4.3 4.3 - 4.6	5574915N 0327990E	 ORGANICS (Muskeg) Clay, some gravel, grey, wet, firm TILL, SANDY SILT, trace gravel, grey, dense, dry SILT (varved), grey, dense, dry 	20 % 7 % 18 %	17.4	
08-30	0 – 2.1 2.1 – 2.7 2.7 - 4.9	5575338N 0328332E	1 – ORGANICS (Muskeg) 2 – Clay, some gravel, grey, wet, firm 3 –TILL, SANDY SILT, trace gravel, grey, dense, dry	12 % 11 - 13%		
08-31	0 - 3.5 3.5 - 3.8 3.8 - 4.6	5575718N 0328632E	1 – ORGANICS (Muskeg) 2 – Clay, some gravel, grey, wet, firm 3 –TILL, SANDY SILT, trace gravel, grey, dense, dry	31 % 12 %		
08-32	0 - 0.6 0.6 - 2.1 2.1 - 4.6	5574848N 0329993E	 1 - ORGANICS (Muskeg) 2 - Clay, some gravel, brown, wet, firm 3 - TILL, SANDY SILT, some gravel, grey to brown, dense, dry 	17 % 8 – 12%		



TEST PIT	DEPTH (m)	UTM	SOIL DESCRIPTIONS	Moisture Content (%)	Unit Weight (kN/m ³)	Standard Proctor Test Results
08-33	0 - 0.3	5574871N	1 –ORGANICS (Muskeg)			
	0.3 - 1.8	03295902	2 – CLAY, brown, wet, firm	21 %		
	1.8 - 3.4		3 – TILL, SANDY SILT, trace gravel, grey to brown, dense, dry	7 – 14%		
08-34	0 – 1.8	5574930N	1 – ORGANICS (Muskeg)			
	1.8 -2.3	00290231	2 – CLAY, some gravel, grey, wet, firm	12 %	20.5	
	2.3 - 4.0		3 – TILL, SANDY SILT, trace gravel, grey, dense,	8 13%		
	4.0 - 4.6		4 – SILT, grey, dense, dry to moist			
08-35	0 – 0.9	5575170N	1 –ORGANICS (Muskeg)			
	0.9 - 1.2	0023418	2 – CLAY, some gravel, brown, wet, firm	23 %	17.8	
	1.2 - 4.6		3 – TILL, SANDY SILT, trace gravel, grey to brown, dense, dry	8 – 13%		
08-36	0-0.8	5575452N	1 –ORGANICS (Muskeg)			
	0.8 2.3	00232301	2 - CLAY, some gravel, grey to brown, wet, firm	22 %	18.6	
	2.3 – 4.6		3 - TILL, SANDY SILT, trace gravel, grey, dense, dry	11%		
08-37	0 - 2.7	5575779N	1ORGANICS (Muskeg)			
	2.7 – 3.0	03200/ IE	2 - CLAY, some gravel, grey to brown, wet, firm	14 %	19.9	
	3.0 – 4.5		3 – TILL, SANDY SILT, trace gravel, grey, dense, dry	11%		

Notes: (1) SPMDD = Standard Proctor Maximum Dry Density (2) OMC = Optimum Water Content (for SPMDD)



APPENDIX C

DAVIDSON WELL LOGS

Project No.: TY86002

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R	ECORD		FORING	WE	ELL	No	. <u>MV</u>	<u>N-1</u>	Co. Drilling	-Ord. <u>3</u> g Location:	27943 E	<u>5576750 N</u>		And Logged by:	ec ⁹
Pro	ject Client:	PhosCan Chemic	cal Corporati	on					Drilling	g Method:	150 mm			Compiled by:	<u>ETB</u>
Pro	ject Name:	Martison Phosph	ate Project			·			Drilling	Machine:	Truck Moun	ted Drill		Reviewed by:	TJL
Pro	ject Location:	Hearst, Ontario				-	_		Date S	Started:	03 Mar 08	_ Date Completed:		Revision No.:	1,07/07/08
	LITH	OLOGY PROFIL	LE	SC	DIL SA	MPL	ING			FIELD	TESTING	LAB TESTING			TS
Lithology Plot	Local Ground S			Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	Penetra ○ SPT MTO Vane* △ Intact ▲ Remould * Undrained St 15 30	tionTesting ● DCPT Nilcon Vane* ◇ Intact ● Remould near Strength (KPa) 45 50	Atterberg Limits Wp W With Plastic Liquid × Passing 75 um (%) Moisture Content (%) 20 40 60 80	INSTRUMENTATIO	1 niser pipe in benkinne 1 niser pipe in backfill 1 niser pipe in sand 1 slotted pipe in sand no instaliation, only beni	onite
<u>~~</u>	black ORGANICS (M	uskeg)						1.0							
	ORGANICS (M soft	uskeg)	10.0					1.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2					<u>୰ୢ୶ୢ୰</u> ୢ୶ୢ୵ୢୄୄୄୄୄୄୄୄୄ୶ୢୢୄୄୄୄୄୄୄୄୄୄୄୄୄୄୄୄୄୄୄୄୄୄ	ater level is 5.5 m be sing.	low top of
AME A divi 131 F Lively Cana Tel +	C Earth & Envir ision of AMEC A Fielding Road V, Ontario Ida P3Y 1L7 1705) 682-2632	ronmentel mericas Limited	∑ Groundwate Borehole details	er depth	n observ	red on <u>A</u>	Aarch 10	47.0 48.0 49.0 50.0 51.0 51.0 53.0 53.0 55.0 6.2008 thorough	at a de	oth of: <u>5.55 n</u> landing of all p	g.	present and requires interpret		e	
Fax +	amec.com Continu	ed on Next Page	commisioned and	d the acc	:ompany	ing'Expl	enation o	of Boreh	ole Log'.					Pa	ge: 1 of 3

	LITHOLOGY PROFILE	SO	IL SA	MPL	ING			FIELD TESTING	LAB TESTING		COMMENTS
thology Plot	DESCRIPTION	ample Type	ample Number	есоvery (%)	PT 'N' Value	EPTH (m)	LEVATION (m)	PenetrationTesting O SPT ● DCPT MTO Vane* Nilcon Vane* △ Intact ○ Intact ▲ Remould ◆ Remould * Undrained Shear Strength (kPa)	Atterberg Limits W _e W W Plestic Liquid * Passing 75 um (%) O Moisture Content (%)	ISTRUMENTATION	1 niser pipe in bentonite 1 niser pipe in backfill 1 niser pipe in sand 1 slotted pipe in sand 1 slotted pipe in sand sont stallation, only bentonit
	brown-orange SAND	ö	ů_	ŭ	5	58.0	พี	15 30 45 50	20 40 60 80	N N	<u></u>
	with cobbles					57.0				000	
						58.0					0
						60.0				0.0	
•••						61.0				000	
•••		-				63.0				0	
						64.0					
••••						65.0				000	Doo
	black 67.0					- 67.0					
- 2 - 2	PEAT					68.0				000	
<u>, 1</u>						- 70.0				0.00	00
<u>د</u> ک						71.0					
<u>, 1</u>						73.0				00	
<u> </u>						- 74.0				000	
<u></u>						76.0				· · ·	
<u></u>						77.0				0	
 '						79.0				000	0
<u></u>						80.0					
: <u>2</u>						- 81.0 - 82.0					
<u></u>						83.0				000	
(<u>)</u>						84.0 85.0				0	
<u></u>						86.0				00	
: <u>></u> 34						- 87.0 - 88.0				000	
	grey 89.0					89.0				0	
	SILT & SAND					90.0 91.0				, • · ·	
						92.0				000	
						93.0 94.0				0	
						95.0					
			ĺ			96.0				000	
						98.0				2	
						99.0				0.00	
						101.0				8	
	· · · · ·					102.0					8
ЦЦ (red-brown 103.6					104.0					×
	oanu with silty clay					105.0					
						- 107.0					
						- 108.0					
•••]						- 109.0					
						111.0					
$\cdot \cdot $						- 112.0 - 113.0					
						114.0					
•••						- 115.0 - 116.0					
<u> </u>						- 117.0					1.1

	5	אפ וור		<u>-</u>			I AR TESTING		
DESCRIPTION	ample Type	ample Number	(%) (%)	DEPTH {m}	LEVATION (m)	PenetrationTesting ○ SPT ● DCPT MTO Vane* Nilcon Vane* △ Intact ○ Intact ▲ Remould ← Remould * Undrained Shear Strength (kPa)	Atterberg Limits W. W W Plestic Liquid * Passing 75 um (%) O Moisture Content (%)	VSTRUMENTATION VSTALLATION	COMMENTS I riser pipe in backfill I riser pipe in backfill T riser pipe in sand I slotted pipe in sand I slotted pipe in sand no installation only benionite
red-brown SAND with silty day	, since the second seco	05		3	.0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0	15 30 45 60	20 40 60 80		, ,
grey 13 SAND trace clay End of Hole 14 (No refusal)	0.0			132 133 134 134 135 136 136 137 138 139 140	0 0 0 0 0 0 0 0 0				8
								-	

RECORD OF MONIT Project Number: TY86002 Project Client: Project Name: Martison Phospi	CORING WELL No). <u>MW-2</u>	Co-Ord.3	27848 E 557663 See Figure 2 150 mm Truck Mounted Drill	<u>5 N</u>	Logged by: D Compiled by: E Reviewed by: T	Navidson TB
Project Location: Hearst, Ontario			Date Started:	08 Mar 08 Date Compl	eted:	Revision No.: 1	, 07/07/08
LITHOLOGY PROFI	LE SOIL SAMP	LING	FIELD	TESTING LAB TE	STING	COMMENT	s
한 DESCRIPTION 한 이 DESCRIPTION	Sample Type Sample Number Recovery (%)	SPT 'N' Value DEPTH (m)	E O SPT Z O SPT Z MTO Vane* △ Intact V A Removid Undrained S 15 30	stronTesting Atterberg DCPT W _P W Nikcon Vane* Plastic Plastic C Intact × Passing 75 0 Moisture Co hear Strength (kPa) 20 40	Limits W. Liquid Liquid MR124TNEUN MIN124SIN MIN1	rser pipe in bentonite neer pipe in backfill neer pipe in sand slotted pipe in sand slotted pipe in sand sinstallation, only bentoni	te
Local Cround Survey Mark ORGANICS (Muskeg) Mark Mark <		0 1 1 1.0 1 1.0 1 1.0 1 1.0 1 1.0 1 1.0 1 1.0 1 1.0 1 1.0 1 1.0 1 1.0 1 1.0 1 1.0 1 1.1 1.1 <t< td=""><td></td><td></td><td>Agi</td><td>ar level is 5.96 m belo</td><td>w top of</td></t<>			Agi	ar level is 5.96 m belo	w top of
AMEC Earth & Environmental		E \$5		_	PolPol		
A division of AMEC Americas Limited 131 Fielding Road Lively, Ontanio Canada P3Y 1L7 Tel +1(705) 682-2632 Fax +1(705) 682-2620 www.amec.com	E Groundwater depth observed o Borehole details as presented, do not o from a qualified Geotechnical Engineer commissioned and the accompanying E	n <u>March 16, 200</u> onstitute a thorou Also, borehole ir xplanetion of Bore	18 at a depth of: <u>5.96</u> Igh understanding of all Iformation should be rea shole Log'.	mbic m potential conditions present and requ d in conjunction with the geotechnica	ires interpretative assistance al report for which it was	Scal Page	e:1:290 e:1 of 3

	LITHOLOGY PROFILE	_	SC	NL SA	MPL	ING			FIELD TESTING	LAB TESTING		C	OMMENTS
	DESCRIPTION		nple Type	nple Number	covery (%)	T 'N' Value	PTH (m)	EVATION (m)	PenetrationTesting ⊂ SPT ● DCPT MTO Vane* Nilcon Vane* △ Intact ○ Intact ▲ Remould * Remould *	Atterberg Limits W _P W W Plastic Liquid X Passing 75 um (%) O Moisture Content (%)	STRUMENTATION	NOLLY 1 slotted pi 1 slotted pi 1 slotted pi no installati	in bentonite in backfill in sand be in Sand on, only bentonite
grey			Sat Sat	Sai	Ж	SP SP		EL	15 30 45 60	20 4D 6D 80	ž		,,,,,,,,,
race	Y e sand till						57.0				000		
							58.0				0		
							60.0						
word	'n	61.0					61.0				000		
SAN	D						63,0				0		
							64.0						
							65.0 66.0				000	Doc	
							67.0				0		
jrey-	-brown	68.6					68.0 69.0					0.0	
SAŇ	D						70,0				D o o	200	
							72.0				000	000	
ed-t	brown	73.2					73.0				20.0		
SAN vith	ID silty clay						75.0				0.0		
							76.0				50	0	
							78.0						
							79.0				60	000	
							80,0				000	0.00	
							82.0						
							84.0					700	
							85.0				000	000	
							87.0						
							88.0						
							90.0				0.00	000	
							91.0						
							93.0				0,0	0 °	
					ļ		94.0				000	000	
							96.0				000	, c , c , c	
						l	97.0					° ° °	
							99.0					×	
							100.0						
blaci	k	101.5					101.0					×	
	N (103.0						
ed~	orange	105.1					105.0						
SAN	ID T						- 106.0						
							108.0						
							- 109.0 - 110.0						
							111.0						
							112.0						
							114.0						
							115.0						

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RECORD OF MONITORING	WELL No. <u>MV</u>	V-2 Co-Ord. <u>327848 E 5576635 N</u> Drilling Location: See Figure 2	
	SOIL SAMPLING	FIELD TESTING LAB TESTING	
DESCRIPTION	Sample Type Sample Number Recovery (%) SPT N' Value	$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	NOLL I riser pipe in bentonite 1 riser pipe in backfill 1 riser pipe in sand 1 slotted pipe in sand 1 slotted pipe in sand no installation, only bentonite SSI
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APPENDIX D

LIMITATIONS OF REPORT

Project No.: TY86002



AMEC EARTH & ENVIRONMENTAL

LIMITATIONS OF REPORT

The conclusions and recommendations given in this report are based on information determined at the test hole locations. The information contained herein in no way reflects on the environmental aspects of the project, unless otherwise stated. Subsurface and groundwater conditions between and beyond the test holes may differ from those encountered at the test hole locations, and conditions may become apparent during construction, which could not be detected or anticipated at the time of the site investigation. It is recommended practice that the geotechnical engineer be retained during construction to confirm that the subsurface conditions throughout the site do not deviate materially from those encountered in boreholes.

The design recommendations given in this report are applicable only to the project described in the text and then only if constructed substantially in accordance with the details stated in this report. Since all details of the design may not be known, we recommend that we be retained during the final design stage to verify that the design is consistent with our recommendations, and that assumptions made in our analysis are valid.

The comments made in this report on potential construction problems and possible methods are intended only for the guidance of the designer. The number of test holes may not be sufficient to determine all the factors that may affect construction methods and costs. For example, the thickness of surficial topsoil or fill layers may vary markedly and unpredictably. The contractors bidding on this project or undertaking the construction should, therefore, make their own interpretation of the factual information presented and draw their own conclusions as to how the subsurface conditions may affect their work. This work has been undertaken in accordance with normally accepted geotechnical engineering practices. No other warranty is expressed or implied.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. AMEC accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.



Memo

 To
 Ian Pritchard

 From
 Dan Cacciotti

 Tel
 1 (705) 682-AMEC

 Fax
 1 (705) 682-2260

 Date
 August 18, 2008

File no cc

Tim Horner Janet Lowe Tony Copland Gary Pigg Dave Simms Derek Wilson Narendra Verma Dan Dimitriu Tommi Leinala

TY86002

Subject Draft Geotechnical Report Comments Proposed Martison Phosphate Mine Hearst, Ontario

1.0 INTRODUCTION

AMEC Earth & Environmental, a division of Americas Limited (AMEC), was retained by PhosCan Chemical Corp. (PhosCan) to carry out preliminary geotechnical and hydrogeological investigations for a proposed mine site development.

AMEC was contacted midway of January 2008 and requested to provide an estimate to supervise previously contracted drill rigs which were required to complete a predetermined investigation program in late January. Up to that stage, AMEC had not participated in the development of the investigation program, nor had we been involved in the borehole location selection planning. Our draft proposal was not finalized and the estimated costs were to be invoiced on a time and materials basis. Our understanding for our scope of work was to supervise the drilling fieldwork, review the available historical information, obtain geotechnical samples, prepare geotechnical logs the boreholes and provide a preliminary discussion about the geotechnical concerns, with primary recommendations gaps to be filled during the next phases of investigation.

We trust that our component of the field work has been completed in accordance with our scope of work. The report submitted was a first draft for review and discussion. It had not gone through our internal senior review. Your review comments are much appreciated and will allow us to complete the report in consideration of these comments and in compliance with our scope of work. Prior to revising the report, we are pleased to provide the following responses to your review comments on our draft report; the responses (in red text) are inserted within the review comment text.

AMEC Earth & Environmental A Division of AMEC Americas Limited 131 Fielding Road Sudbury, Ontario Canada P3Y 1L7 Tel +1 (705) 682-2632 Fax +1 (705) 682-2260

www.amec.com



2.0 TIM HORNER COMMENTS

- 1. The report is bottom heavy with 700 pages, the majority of which are appendices as historical drill logs. Our intent was to provide one document with everything in it. We will delete the appendices.
- 2. For the most part the document is light weight in content with regard to recommendations, however, the one section where some detail is added (Section 7.1) it is in conflict with our own road construction design. I would recommend that most of this section is amended / deleted, this is not how we're going to build it. Our understanding of this phase was to primarily supervise drilling fieldwork and provide general recommendations from geotechnical engineering standpoint. This section will be deleted.
- 3. Since we are planning to move to an Advanced Exploration stage in winter 2009 then Section 8.0 should be modified, since it is based only on a drill and test pit programme rather than the large scale excavations proposed, which will provide far better in situ geotechnical and hydroG information. We were asked to include our plan for future work but agree with this comment that it should be left to the individual designers. This section will be deleted. We will be glad to participate in the planning.
- 4. To reduce the size of the document to make it easier to carry in hardcopy. We do not need Appendix D & E which make up the bulk, they can be referenced as they already occur in other documents, copies of these appendices can be placed on the FTP for viewing if required. Appendices D and E will be deleted.
- 5. For the most part AMEC have covered everything that they set out in their proposal with three exceptions :
 - In AMEC's proposal they included a \$6000 budget allowance to complete some preliminary slope stability modelling, but there is no slope modelling included here. We did complete preliminary slope stability modelling, to provide the pit slopes included in the report. The borehole program fell short of expectations and did not provide the anticipated information. For detailed modelling, more soils information, including strength characteristics and their susceptibility to change with time or future site conditions, will be required.
 - Secondly they have not classified the site for earthquake parameters. We will provide a table of site earth quake classifications, as they relate to buildings, which will depend on foundation systems selected.
 - We are still waiting on the HydroG portion of the report which will now be issued separately. I have asked that some preliminary data be released for the HydroG report instead of waiting several more weeks for them to complete the model simulations. As discussed during our meeting in Oakville, the groundwater modelling will be done following a longer (possibly 7 day) pump test and once the block model is finalized. Therefore, the memo promised has grown into more of a report. It will be ready early next week.



3.0 IAN PRITCHARD

The report is very high level and somewhat generic, also in our meeting on Tuesday with Dan Cacciotti he made the point on more than 3 occasions that the till would be suitable for all the construction pads, I do not see this verified in the report. The discussion (Section 4.2) on the use of till will be expanded.

The appendices are unnecessary and we should only reference previous work and not include as part of the document. These will be deleted.

4.0 RAY DUJARDIN

Attached is an extract of the report (i.e. minus appendices) with some rough comments I have inserted (see yellow icons). These comments will be incorporated into the next version. <u>I also attach a report on pit slopes prepared by Golder in July of last year which seems to have been ignored</u>. Discussions with respect to the information in the Golder report will be added.

My comments boil down to the following (some are a bit picky I admit):

- 1. There are a lot of generalizations in this report i.e. it is very short on specifics and to my mind is more of a list of alternatives and what-if's rather than recommendations. The report reflects our original scope of work and as this project progresses with AMEC's involvement, appropriate engineering recommendations will be provided based on appropriate field investigations. If this report is viewed as just interim and direction-pointing it is OK but for an "outside reader" it could be confusing and even misleading e.g. as Tim points out the road construction recommendation is out of line with what has already been laid out. Our report is a factual report and recommendations given are general in nature to cover the possible options that the designer may consider; also as noted, the road design was given to us after the report was written. So much depends on what PhosCan intends to do with the report.
- 2. Starting with the <u>Executive Summary</u> the geological side is very generic. There seems little attempt to use established names for the lithological units so that the reader can get a sense of where the materials fit in the mining plan what is residuum ore and waste etc. I note that in the borehole logs in Appendix A only Till and Muskeg are given names the rest of the material is described generically. The term bedrock is also used generically it would really help to know the geological nature (name) of the bedrock. Golder's 1983 logs do at least identify residuum as well as the till and muskeg. We did have difficulty identifying layers but at no time were we were asked to log for geology, as we thought this was being done by the PhosCan geologist. We will however, make an attempt to improve the logs, using PhosCan logging as guide for geological information.
- 3. It would have been helpful to get an opinion of Golder's 1983 work as well as just adding it as an appendix. We were not asked to provide an opinion on the 1983 Golder work. In fact we found this report on our own when searching MNDM files. AMEC undertook to review previous work so where are the comments? Our intention for the document review



was to acquire understanding of previous work and not to critique. We will be glad to provide comments on the said report, if requested, in a review memo (i.e., separate from our report). The same applies to the attached report by Golder dated July 2007. They may be short in some areas but Golder are one of the leaders in pit slope design so I think their comments are pertinent. We will consider the information of the Golder report in our next version.

- 4. <u>Section 1.3 Site Quaternary History</u> is too academic and not very helpful. It's based on work by Easton R.M in 1992 which is too generalized and speculative for me. More specific would be the data in Ontario Geological Survey Study 24 by R.P.Sage published in 1987: "Geology of the Carbonatite-Alkalic Complexes in Ontario". PhosCan likely knows more and has more data on local geology so we propose to delete this section making reference to the appropriate document(s).
- 5. <u>Section 3.3 Till Soils</u> does not mention the frequency of large boulders in the Till. We need to know if boulders will be a challenge during overburden stripping so this should be raised as a potential issue. We will add commentary based on the number of "hits" in the boreholes.
- 6. <u>Section 3 Soil Conditions</u> does not make it clear where the Cretaceous overburden fits in. We will add commentary.
- Section 3.5 Organic Silt Soil Layer could be an issue as an indication of sources of humic acid-producing waste. It is also a potential source of concentrated trace elements including radon. We need to determine how much of this organic material comes into play. We will add commentary.
- 8. <u>Section 3.6 Residuum Stratum</u> indicates difficulty in distinguishing Residuum from Cretaceous material. Was the material assayed for P2O5 etc. We should glean every bit of data we can from the samples even if they are outside the pit. Also we can then use the assays to log the material accurately and describe results more meaningfully to an outsider. This is outside our scope of the investigation work, and requires specialty lab testing and interpretation. We would gladly incorporate results into the classifications on our logs.
- Section 4.2 Reuse of Excavated Soil certainly offers the opportunity to use the Till for berms, liners etc. This comes up again in the report but I cannot find the rationale. We will add commentary.
- 10. <u>Section 5.1.4 Stripping Overburden Soils</u> raises the issue of "rideability" of roads in Till and Cretaceous materials and the possibility of having to import granular material and geogrids and/or geofabric in some areas. This seems like a candidate for careful further study as this would an expensive option. Again though this only another possibility raised. This is outside our scope of work but can be completed.



- 11. <u>Section 5.1.5 Slope Maintenance</u> raises the spectre of having to drill deep drainage wells to depressurize the rocks before excavation. This sounds like Victor but there the diamond pipe intersects a strong limestone aquifer which has to be drained for mining to be possible. This would hugely increase Martison's capital cost if the same applies. I don't think it does but it is still to proved. I think the problem we ran into during the geotech drilling was with perched aquifers which may or may not intersect the pit area. My experience with such aquifers in Chile was that they tend to have a finite volume and water capacity so what we find may not impact on the pit directly. This whole section raises just about all the pit-drainage schemes possible without saying what is most likely. We need to do more field work and modelling (including aquifer identification, size, etc.) to come to any type of conclusion.
- 12. <u>Section 5.1.6 Mining of the Ore</u> raises some key questions about stability within the pit during miming. This has always been an issue with me: how will the benches stand up in this gravel-pit-like setting for work in the pit, grade control and traffic. In our mine scheduling we assume the ability to practice ore-control methods usually applicable to hard rock mines. This section rightly draws attention to the challenges in the Martison pit. The next phase of fieldwork and involvement with specialists in this field will help focus recommendations.
- 13. <u>Section 6.2 Site Stripping will</u> attract some comments from Hank I'm sure since he advocates building on the muskeg i.e. not removing it where feasible based on the Victor experience. This issue is raised again in <u>Section 7.0 Access Road Foundation</u> where the possibility of using the "displacement" technique is described for areas where muskeg is deep or submerged. The overall site development plan, along with specifics for each component must be reviewed to make decisions on when it can remain.
- 14. <u>Section 7.0 Service Corridor</u> does not make observations on the methods used to build the forestry road in place already. We just got these drawings and have provided comments but have to investigate the soils in this route. This section will be deleted.
- 15. <u>Section 7.2 Pipeline Corridor</u> raises alternatives to burying the pipeline which were Phoscan originally preferred. However the possibility of vandalism of above-ground pipe has been raised a target for hunters! Pipeline design is beyond our scope and geotechnical discussions can be provide after appropriate investigations..
- 16. <u>Table 2 (page 13) Anticipated Steps of Pit Development and Table 3 Recommended Future Geotechnical Fieldwork (page 20)</u> are very general and are just a starting point for future planning. It would add some punch to include a summary of what the main issues are in each area (in addition to the reasons already stated). Although we were asked for this, we will delete it and leave it to each designer to determine.
- 17. <u>Section 8.0 Recommended Future Geotechnical Fieldwork</u> discusses the suitability of various drilling methods for sampling. Mention should also be made of Triple Tube drilling which we have use with some success room for improvement though maybe with a more



competent driller than Norcan. We will modify, and recognize that this requires serious consideration.

18. <u>Figure 3 Bedrock Geology</u> could be left out – it's very regional and does not bring out the structural relationships of the carbonatite complexes of Ontario. Figure 3 will be deleted.

5.0 HANK GIEGERICH

Ray D. has covered this rather general report very well, and there is not much to add.

However, a few general comments, as follows:

 I noted your comment re the report's lack of verification of the suitability of till for construction pads. I believe that this may be covered if we assume that AMEC's definition of till is "on-site, native, inorganic soils" or "the stiff to very stiff glacio-marine silty clays or compact to dense tills". This should be confirmed by AMEC. We will confirm.

The report noted that this material is usable as long as it is "not excessively wet or oversized". We should be able to handle the oversize with a screen/grizzly operation where required. Agreed. However, excessive moisture may require some time to drain or dry out, which needs to be considered in the construction schedule. As well, if the material is frozen, time and temperature will be required to thaw. However, depending on the rate of excavation, frost penetration, ambient temperature, and the moisture content, this material could possibly be excavated, spread and compacted in the winter period. Agreed.

- 2. The report indicates that "deep vertical wells may be required to allow for reduction of water pressure within the residuum and weathered bedrock layers". This could significantly increase the dewatering costs, as the allowance in the PFS was only for horizontal gravity drains in the toes of the benches, flowing to an in-pit pumping station. However, Ray has noted that this high water pressure may be due to perched aquifers, which needs to be confirmed. This will be reviewed and commented after completion of hydrogeology study.
- 3. The erratic behaviour of the mining faces in the pit due to the heterogeneous nature of the ore types has been recognized, and the mining method will, of necessity, be required to allow for this. This will not be a normal open-pit operation, due to the characteristics of the granular, loose, type 2A material. Where this is encountered, it will not be conducive to stable benches and ramps. This will be complicated by the deep overburden, up to 95 metres, and total pit depths of at least 180 metres (as shown in the 2008 drilling). The key factor will be a haulage system that can handle both of these complications. Agreed
- 4. AMEC's comments in regard to the placing of the slurry pipeline within the road corridor or in an above-ground location could be of interest, and should be considered, as it would result in better access for maintenance, and possibly lower capital cost. Protection from freezing will be a prime concern in this concept. As discussed above, we will delete comments on the road and pipeline until we investigate these areas.
PhosCan Report Comments Responses Proposed Martinson Phosphate Mine Hearst, Ontario August, 2008



5. The section on Waste Rock and Tailings Areas appears to be recommending that all underlying muskeg be removed, although the wording is not completely clear on this point. It is agreed that this should be done in the tailing containment areas, including under the berms, but it is questioned if this is necessary under the waste rock sites, on the assumption that the waste rock can be left in place, with reclamation limited to re-sloping and re-vegetation. This should be confirmed with Janet Lowe. The recommendations will be revised; the final choice will be dictated by design evolution.

6.0 GARRY PIGG

I have not seen the subject report but I am assuming from your comments below that

4. An above ground slurry pipeline is being recommended by AMEC. As discussed above, we will delete comments on the road and pipeline until we investigate these areas. Informal conversation with PSI clearly indicated that, in the Martison environment, an above-ground pipe line would not only cost more to operate but would also be quite a bit higher in capital. Concrete supports down to firm ground or closely spaced spread footings will be required, expansion loop designs more complicated because of the much, much wider ambient temperature range and erosive characteristics on pipe elbows, steam tracing will be required for winter conditions and construction time much longer. Assuming the "road corridor" means in or on the road structure, including shoulders and drainage ditches, building the pipeline, underground or above ground in this area could subject the pipeline to heavy truck vibration and resulting ground shifts. PSI proposed to lay the pipeline during the winter months so it will not be necessary to be on or in the "road corridor" — it will be basically running parallel within the "service corridor". Slurry piping in Florida is laid on top of the ground in 20 ft or longer sections that can be rotated and replaced by section as required. Also the lines can be moved, lengthened or shortened as dictated by the movement of the mine slurry pit relovation. That is mined rock and not fine concentrate, and PSI has worked with AMEC on several projects, according to PSI, so I assume that there is a line of communication there somewhere. Agreed, this will be removed from the geotechnical report.

7. My files clearly indicate that the muskeg was to be left in place under both the waste piles and under the tailings ponds. Only the berms would be built on firm glacial till. The cost of removing the muskeg under these large areas was deemed to be greater than designing for the lower storage volumes to compensate for the in-place muskeg. These design related comments and recommendations will be revised in consultation with our dam and waste pile designers.