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November 13, 2007
TC 261522

Mr. David Hollinger
Supervisor, Water Resources
Ontario Ministry of the Environment
331-435 James Street South
Thunder Bay, ON
P7E 6S7

Dear Mr. Hollinger:

Re: Data Summary and Mercury Monitoring Program, De Beers' Victor Mine – Permit to Take Water, Bedrock Well Field Dewatering

1.0 BACKGROUND

A memo was prepared by AMEC Earth & Environmental (AMEC) on May 28, 2007 documenting results of Victor Mine area mercury monitoring up to that time. The May 28 memo was prepared in response to concerns raised by the federal and provincial government agencies, the Attawapiskat First Nation (AttFN), and others. The memo was addressed to Dr. Lise-Aurore Lapalme of Natural Resources Canada and Carl Jorgensen of Fisheries and Oceans Canada, with copies to others, including the Ministry of the Environment (Thunder Bay Regional Office and Timmins District Office). The May 28 memo also summarized then ongoing and proposed mercury monitoring programs, recognizing that such monitoring programs might change as a result of conditions placed on Permits to Take Water (PTTW) and/or Certificates of Approval (C. of A.) yet to be issued by the Ministry of the Environment (MOE).

Further discussions on mercury monitoring were held with the MOE and representatives of the AttFN on August 30, 2007. Following from those discussions, MOE indicated that a letter, or memo, should be forwarded to the Ministry that could be attached to any PTTW or C. of A. summarizing updated mercury monitoring results and mercury monitoring programs. This letter is intended to serve that function.

The primary consideration involves possible environmental changes to peatlands (increased wetting or drying) and associated potential changes to the release of mercury to aquatic systems, as well as the potential for increased mercury uptake by fish and wildlife.

This memo:

- Summarizes conditions at the Victor site related to the release of mercury from area peatlands;
- Provides an up-to-date summary of monitoring results for water quality and fish tissues; and,

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- Summarizes current monitoring plans for the Victor site that involve surface waters, groundwater, and muskeg systems.

During preparation of the federal Environmental Assessment (EA) for the Victor Project, concerns were expressed regarding possible increased rates of mercury release to the environment as a result of mine development (Federal Authorities 2005). These concerns related to the potential for increased mercury methylation rates in response to peatland flooding; and to the potential for increased mercury release in response to possible peat desiccation and decomposition.

More specifically, Environment Canada (EC) commented on the need to consider mercury more fully in the EA and in post assessment monitoring phases of the Victor Project (EC August 6, 2004 comments on the Comprehensive Study Environmental Assessment – CSEA and related documents); and Natural Resources Canada (NRCan) commented on the potential for the release of heavy metals, including mercury, from desiccating and decomposing peat stockpiles (NRCan January 19, 2004 comments on the CSEA materials).

As part of the EA, the Victor Project team presented data on:

- Total mercury levels in area surface and groundwaters (AMEC 2004a, b);
- Total mercury and methyl mercury concentrations in peatland and surface water environments (AMEC 2004 b);
- Total mercury concentrations in ore leachate and kinetic tests (SRK 2003);
- Total mercury in fish flesh and livers (AMEC 2004b); and,
- Total mercury content in peat materials (AMEC 2005).

De Beers continues to monitor mercury concentrations in surface and groundwater at the Victor site, including waters directly linked to peatland systems, as well as in fish flesh.

Also, in response to concerns expressed by the AttFN and Health Canada (HC), De Beers will be cooperating with the AttFN to collect samples of game meats and organs (livers) for the analysis of mercury and other heavy metals (considered separately from this document).

2.0 MINE DEWATERING AND POTENTIAL MECHANISMS OF MERCURY RELEASE

The potential for Project-induced mercury release from area peatlands is a function of (1) mercury availability in the peat, (2) the potential for the amplification of hydrological regimes in the peat beyond that which occurs naturally, which could accelerate mercury release; and (3) mercury transport.

Mercury Availability in the Peat

Mercury availability in the peat is quite low as shown in Table 1. Sample analyses reported in Table 1, were performed on a set of representative peat samples collected in March 2004 from along the then proposed Victor airstrip (Figure 1). The airstrip has since been constructed and peat from this site has been removed, or constructed over.

Peat solids samples were collected from upper (0 to 0.5 m), middle (0.5 to 1.0 m), and lower (1.0 to 2.0 m) peat horizons. Mercury concentrations in dried peat solids from these three layers averaged <0.03, <0.02 and < 0.01 µg/g, respectively (Table 1). The decreasing mercury concentration with depth is likely a function of the time sequence when these peats were laid down, relative to human induced mercury releases from historic and industrial activities. The deepest (oldest) peats are thought to be in the order of 4,000 years old, based on recessional timetables for the Tyrell Sea in this area. Typical peat depths in the area are from 2 to 2.5 m, and are rarely deeper than 3 m. There may also be a gradual and preferential release of mercury from the lowest, most decomposed peat layers as a result of methylation processes.

The analysis of peat solids samples was performed on approximately 50 g of homogenized samples, which were oven-dried at 50°C to determine moisture content, and to produce a dry peat mass. The dried samples were ground and a portion was ashed at 550°C to determine the percent organic material (loss on ignition - LOI value). Approximately 2 g of the dried and ground peat samples were digested with nitric acid and a few drops of hydrogen peroxide to break down the organic matter. The digest was then treated with aqua regia and perchloric acid to full digestion. The samples were then made to a known volume and metal concentrations were determined by ICP scan. Arsenic, selenium and antimony concentrations were determined by atomic absorption as hydrides. Mercury concentrations were determined by cold vapour atomic absorption.

Concerns have been expressed that the aforementioned analytical procedure may have underestimated mercury concentrations in the peat. To test this hypothesis and to increase the strength of the baseline database, additional peat solids samples were collected from the muskeg monitoring locations described in Table 2. The muskeg monitoring program was first tabled in November 2006 (AMEC 2006). The additional peat solids samples were collected under the direction of Dr. Brian Branfireun of the University of Toronto, a recognized specialist in mercury dynamics and peatland, and will be analyzed at Dr. Branfireun's laboratory (refer to Section 6 for further details). Results of this analysis will comprise part of the developing environmental baseline for the Victor Mine.

Potential for Increased Mercury Release Linked to Amplification of Hydrological Regimes

Mine dewatering has the potential to alter local peatland hydrodynamics by contributing to peatland desiccation in some areas, and peatland flooding in other areas. Changes in soil and wetland hydrological regimes have the potential to alter mercury speciation dynamics (Branfireun et al. 1996, Ullrich et al. 2001, Environment Canada 2003). This includes the potential for increased mercury release from both desiccated and flooded muskeg terrain (peatlands). Peatlands in the Victor Mine area normally go through periods of seasonal wetting and drying, wherein the local surface water table is observed to fluctuate by 0.3 to 0. 5 m in any given year. Well field dewatering activities at the Victor site have the potential to amplify this wetting and drying cycle.

Peatland Desiccation and Re-wetting - Desiccated peat is vulnerable to oxidative processes, which break down the peat, potentially releasing heavy metals held by intact and decomposing plant materials. Metals so released can be potentially flushed from the system during periods of rehydration. This is particularly the case for mercury because of the potential to convert less

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soluble inorganic Hg^{2+} mercury to more soluble methyl mercury (CH_3Hg^+) within the anoxic environment generated by system re-hydration.

In the June 6, 2007 bedrock well field dewatering permit application support document (PASD), it was indicated that the area of muskeg terrain most likely to be affected by mine dewatering was that bounded by the predicted 100 mm/yr isoline of increased infiltration to bedrock, encompassing an area of approximately 75.6 km^2. It was further indicated that peat desiccation within this 75.6 km^2 area was likely to be patchy, with areas of shallower overburden being most vulnerable to increased desiccation, and areas of deeper sediments being less vulnerable, or not vulnerable at all. The HCI June 2007 hydrogeological report also indicated that the area where combined pre-mining and mining induced infiltration to bedrock was expected to exceed the average annual runoff (260 mm) was limited to an area of 30.9 km^2 (Figure 2). Of this area, approximately 9.0 km^2 encompasses existing and proposed mine development areas, and 4.4 km^2 encompasses river and creek bank forest communities, leaving 17.4 km^2 of potentially affected muskeg terrain. From either perspective, the amount of potentially affected (desiccated) muskeg terrain is expected to be small, and centred close to the mine site area, with the strongest expression of desiccation effects likely to be in areas of shallower overburden.

Excess mercury released to the environment through mine induced desiccation / re-hydration processes might be expected to report (1) through subsurface sediments to the pit perimeter well field, with subsequent discharge to the Attawapiskat River; or (2) via surface drainage, especially during the spring freshet, to the Granny Creek / Nayshkootayaow River system. However, the major portion of excess mercury so released is expected to pass downward through the surface sediments, with most of this fraction expected to be re-sorbed by the sediments, thereby limiting potential release to the Attawapiskat River.

Peatland Flooding - Project-induced peatland saturation can occur as a result of effluent discharges to fen systems (highly localized effects); and as a result of ground settlement in response to overburden depressurization linked to mine dewatering.

Effluent discharge to the Southwest Fen occurred during 2006 with development and operation of the Central Quarry. Effluent discharge to the Northeast Fen also commenced in 2006, in association with site dewatering activities linked to plant site area excavations, open pit sump pumping (2007), and the discharge of treated sewage effluent. Effluent discharge to the Northeast Fen is still ongoing and is expected to continue for a number of years. Discharges to both fen systems have presented opportunities to gather monitoring data on the effects of these discharges.

Ground settlement in the Victor site area is generally expected to be only a few centimeters (typically 0-11 cm, HCI 2007, July 24 memo); but in areas of unusually deep sediments of 200 m or more, ground settlement could approach 5 m in localized areas. Differential ground settlement, if of sufficient magnitude, has the potential to cause localized flooding.

Excess mercury released through discharges to fen systems is expected to report to the Granny Creek and Nayshkootayaow River systems, and ultimately to the Attawapiskat River by way of surface water overland flow. Excess mercury released through differential ground settlement would be expected to be released mainly to the Attawapiskat River by way of the well field system (i.e., through subsurface infiltration, less any sediment re-sorption effects); or to the Granny Creek / Nayshkootayaow River as overland flow. All such increased mercury releases are expected to be highly localized.

Therefore, based on the above, there is a limited potential for changes to occur in mercury release rates to Granny Creek, the Nayshkootayaow River, and the Attawapiskat River. There is also the potential for mercury concentrations to change within the muskeg system itself. Based on calculations preformed by AMEC, as reported in the May 28, 2007 memo and expanded on below, any such changes to mercury concentrations within area receiving waters are expected to be well within federal and provincial guidelines for the protection of aquatic life. This aspect notwithstanding, any changes to mercury concentrations within these systems have the potential to affect aquatic communities to some level, and particularly top predator fish species such as northern pike and walleye. Precautionary monitoring linked to these elements is described below.

Estimate of Mercury Release

As described above, well field dewatering has the potential to desiccate portions of an approximately 75.6 km^2 area, with the potentially affected area expected to be as little as 17.4 km^2. Desiccation is a relative term, that for peat means reducing the total water content from approximately 90% by weight (for the natural condition), to a "desiccated" value of approximately 70% water by weight. It is difficult to reduce the moisture content of the peat by more than this amount through increased drainage effects. For example, during commercial peat pressing operations, the water content of peat can typically only be reduced to about 65% by weight. Reducing the water content below this value generally requires active drying using commercial driers.

Once desiccated, it will take time for the peat to decompose and release any contained mercury. Waddington and McNeil (2002) measured long-term peat oxidation rates in drained peatlands in Quebec (latitude 47°58'N). These authors measured peat reduction rates, due mainly to oxidation, to average approximately 6 mm /yr over a period of 19 years. If these rates were experienced at the Victor site (a more northerly latitude site, 52°50'N), complete disintegration of a 2.5 m column of peat would take in excess of 400 years. The maximum time available for peatland desiccation due to mine dewatering is approximately 20 years. This time period allows for groundwater system recovery following the active mining phase. Based on Waddington and McNeil's data, only a very small portion of any desiccated peat mass (likely <10%) would be expected to decompose and release mercury during such a comparatively short period.

A simplified mass balance of potential mercury loading to the lower portion of the Nayshkootayaow River system is shown in Table 3. In performing the calculations, the following assumptions were made:

- The maximum area potentially affected by desiccation varies from 17.4 to 75.6 km^2;
- The average peat depth is 2.5 m (determined from numerous site measurements);
- The solids content of the peat is based on a specific gravity of 1.1 for saturated peat with a solids content of 10% by weight;
- Approximately 10% of the peat mass from the potentially affected zone is decomposed within 20 years;

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- The time period for increased mercury release is also 20 years;
- The initial mercury concentration in peat solids is 0.02 µg/g;
- The increased mercury loading resulting from peat oxidation is released at an average rate over the entire 20 year period; and,
- During mine dewatering, an estimated 75% of the added mercury release resulting from mine dewatering is intercepted by the well field mine dewatering system and is discharged to the Attawapiskat River (watershed area 43,500 km^2).

The above assumptions do not allow for mercury re-sorption on to sediments, and are therefore considered to be conservative (see below).

Based on these assumptions, the resulting increase in total mercury concentration for the lower Nayshkooyataow River (the only portion of the river that could be affected), during mine dewatering, is calculated at 0.22 ng/L (Case 2) to 0.95 ng/L (Case 1), (Table 3). These values compare with a baseline concentration of 1.6 ng/L, and a CCME guideline value of 26 ng/L. Following the completion of mining and the cessation of dewatering activities, well field interception of infiltration water would cease, and the predicted change in total mercury concentration within the lower portion of the Nayshkootayaow River is calculated at from 0.9 ng/L (Case 2) to 3.8 ng/L (Case 1), (Table 3); still well below the CCME guideline value.

The predicted increase in the methyl mercury concentration for the lower Nayshkootayaow River, during mine dewatering activities, is calculated at 0.037 ng/L (Case 2) to 0.162 ng/L (Case 1), (Table 3). This assumes that 17% of the mercury is released as methyl mercury (the average of July, October and January measurements observed for the Southwest Fen (see Section 3). Following the cessation of mine dewatering, the predicted change in methyl mercury concentration within the lower portion of the Nayshkootayaow River is calculated at 0.15 ng/L (Case 2) to 0. 65 ng/L (Case 1). These values compare to a methyl mercury background concentration of 0.062 ng/L for the Nayshkootayaow River, and a CCME guideline value of 4 ng/L.

The above calculations are indicative of the environmental risk associated with mine dewatering activities. The greatest uncertainty is the rate of peat oxidation and consequent rate of mercury release. If the rate of peat oxidation and mercury release is faster than expected, then the rate of added mercury loading would increase, but most of this loading (calculated at 75%) would be intercepted by the pit perimeter well field and discharged to the much larger Attawapiskat River. If, on the other hand, the rate of peat oxidation and mercury release is slower than expected, then the increased loading to the Nayshkootayaow River would be less than calculated.

Also, there is a high potential for "released" mercury to be re-adsorbed onto deeper organic and mineral sediments as drainage waters move down through the system and into the bedrock aquifer. The actual rate of mercury release could therefore be less than that calculated in Table 3.

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Ultimately, the potential for increased mercury release to the Nayshkootayaow River from increased peatland oxidation is limited by the extremely low concentrations of mercury in the peat itself (<0.02 µg/g in peat solids).

3.0 SUMMARY OF MONITORING RESULTS TO DATE

Water Quality

Predevelopment site area water quality data are summarized in Table 4. Water quality sample analyses were conducted by Flett Research Ltd. in Winnipeg (Flett). The data show low background concentrations of both total and methyl mercury, with all values being well below federal and provincial guidelines for the protection of aquatic life.

Effluent discharges during the Project construction phase have occurred to each of the Southwest and Northeast Fens (experimental fen stations). Final compliance points for these two fens are being sampled for total mercury (filtered and unfiltered samples) on a monthly basis; and for methyl mercury (filtered and unfiltered), pH, dissolved organic carbon (DOC), dissolved oxygen (DO), redox potential (Eh), iron, total suspended solids (TSS), and nutrients (sulphate and nitrate) on a quarterly basis. The monthly and quarterly samples for mercury from the fens are sent to Flett Research for analysis. The Southwest Fen received effluent discharge from the Central Quarry during the period of March 28 to December 2, 2006. The Northeast Fen received, receives, or will receive, effluent discharge from: plant site area excavations (May 28 to December 2, 2006), the sewage treatment plant (February 2006 to present), the open pit Phase 1 mine water settling pond (May 7, 2006 to present), and the on-site landfill (future).

To assist with data interpretations, quarterly samples are also being collected from two fen control stations, the Southeast Fen and a fen system just north of the all-season airstrip (Northwest Control Fen) (Figure 3).

Granny Creek receiving waters, associated with the Southwest and Northeast Fen discharges and their control sites, are also being sampled for total mercury (filtered and unfiltered) on a monthly basis; and for methyl mercury (filtered and unfiltered), DOC, DO, Eh, pH, iron, TSS, and nutrients (sulphate and nitrate), on a quarterly basis. Here again, the monthly and quarterly mercury samples are sent to Flett Research for analysis.

Results of water sample analyses are shown in Tables 5 through 8.

Total mercury concentrations in the two experimental fen stations (Southwest and Northeast Fens), and in the two control fens (Southeast and Northwest control fens), for both unfiltered and filtered samples, were all well below the Canadian Council of Ministers of the Environment (CCME), Canadian Water Quality Guideline, Protection of Aquatic Life value of 26 ng/L (Tables 5 and 6). Quarterly sample total mercury averages were not noticeably different for the experimental and control fen sites (Tables 5 and 6).

Measured methyl mercury values were also well below the CCME guideline value of 4 ng/L for all fen samples (Table 7). However, methyl mercury concentrations in the Southwest Fen samples were consistently higher than those for the other three fens. The Southwest Fen received substantial water discharge from the Central Quarry during 2006, which increased steadily from an initial volume of about 5,000 m^3/d in late March, to a final volume of approximately 25,000 m^3/d in early December. Quarry discharge ceased after this date. The Central Quarry discharge was sufficient to keep the Southwest Fen saturated to approximate spring freshet conditions throughout the summer and fall months. The Northeast Fen received a lesser discharge of approximately 2,000 to 3,000 m^3/d during the period from late May to early December 2006, and an average of approximately 4,000 m^3/d to the period of record during 2007, and was also essentially saturated to near spring freshet conditions throughout the summer and fall months.

Methyl mercury concentrations for all fen stations (experimental and control) showed an abrupt increase in the January 2007 quarterly samples, which is probably indicative of under-ice reducing conditions, and the ion concentration effect associated with ice formation. The consistently elevated methyl mercury concentrations for the Southwest Fen is likely a function of water (and possibly nutrients) discharged to this fen from Central Quarry operations.

Total mercury concentrations in the Granny Creek system, upstream and downstream of the Southwest and Northeast Fen discharges, for unfiltered and filtered samples, are shown in Tables 8 and 9. All results are well below the CCME guideline value of 26 ng/L, and the data show no obvious trends. Methyl mercury concentrations in Granny Creek also showed no obvious trends, with all values being well below the CCME guideline of 4 ng/L (Table 10).

Fish Tissue

Data on fish flesh and liver mercury concentrations are shown in Tables 11 through 17.

Fish flesh and liver tissue metal concentrations (including mercury) were reported in the 2004 Environmental Baseline Study (EBS) for fish captured by AMEC in 1999, as well as for area literature values for fish captured in 1981. Data are presented for white sucker (Table 11), walleye (Table 12) and pike (Table 13). Mercury concentrations in both fish flesh and livers were all below the provincial guideline values for sport fish consumption as defined by the MOE (2007).

Additional fish flesh samples were collected in the fall of 2004, with analysis being completed in 2005, as per the following:

- Table 14 – Whitefish (Nayshkootayaow River);
- Table 15 – Whitefish (Attawapiskat River);
- Table 16 – Whitefish / Cisco (Attawapiskat River); and,
- Table 17 – Walleye, Pike and Brook Trout (Nayshkootayaow and Attawapiskat Rivers).

Split samples from the fall 2004 collections were forwarded to the Ministry of the Environment (MOE) for control testing. Results from the MOE laboratory are still pending, and are not expected for a few months.

Results for the fall 2004 samples showed that the MOE sport fish guidelines for mercury in fish flesh were met for all whitefish, whitefish / cisco, and brook trout samples; but most samples from walleye and pike exceeded the guideline values in the background condition. The individual walleye and pike that exceeded the guideline value were all very large fish, considerably larger than those captured during the 1981 and 1999 sampling efforts.

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4.0 GAP ANALYSIS

Peat Solids

Concern has been expressed that the concentrations of total mercury in peat solids reported previously by AMEC may have been under estimated. De Beers has therefore collected additional peat solids samples for mercury analysis, to verify background concentrations. The additional samples were collected in accordance with instructions from Dr. Brian Branfireun, from the muskeg monitoring station locations identified in Table 2. The program involved the collection of samples from several vertical horizons at each station. Samples will be analyzed at Dr. Branfireun's laboratory (refer to Sections 5 and 6 for details)..

Peat Pore Water Samples

Previous data sets did not include peat pore water samples, except for a limited set of samples collected from two bog and fen areas near the Victor site (Table 4). These samples showed total and methyl mercury values that were typically higher than those reported for surface water systems, but with values still well below surface water protection of aquatic life guidelines. To expand this data base both geographically and temporally, De Beers will collect peat piezometer pore water samples from a broader area over the life of the mine. The furthest out-lying stations will serve as control sites. Annual sampling is proposed for the majority of stations, but quarterly samples will be collected from piezometers located within the maximum drawdown area to provide data on seasonal variations (refer to Section 5 for details). The quarterly sampling program will also be supported by work undertaken within the detailed muskeg research area (Appendix A).

Mineral Soil Pore Water Samples

Two to three mineral soil piezometers have been installed at different depths at each of the eight original muskeg system monitoring clusters (i.e., at Clusters 1, 2, 7, 8, 9-1, 9-2, 13 and 15), (Figure 4). In addition, and at the request of the MOE, three additional mineral soil piezometers will be installed within the area closer to the mine site as described in Section 5, with screens positioned at three levels for these wells. Information provided from these wells will help to better define mercury transport processes through mineral sediments, and to confirm the potential for mercury resorption.

Surface Water Systems

An extensive network of surface water sampling already exists for total and methyl mercury sampling, with the majority of samples being collected quarterly. To add to the database, and to better support interpretations of mercury burdens in fish flesh samples, additional water sample stations will be set up at Tributary 5A (the Granny Creek control station), and in Monument Channel near the community of Attawapiskat. Monument Channel will serve as the Nayshkootayaow River control station.

Fish Sampling

A number of fish samples have been collected from Victor area receiving waters for the analysis of mercury. However, to improve statistical rigor, the MOE has requested that De Beers expand the sampling area to include more sites, including more control sites, and that sampling should focus on a top predator fish (northern pike) and a common small fish species that is more likely to show year to year variations in mercury burdens. In addition, lesser numbers of other fish species that are commonly harvested by local fishermen are also to continue to be collected, such that the AttFN can be apprised of any changes to mercury levels in local fish species. Program details are provided in Section 5.

5.0 MONITORING PROGRAMS

Monitoring - Muskeg Systems

Monitoring related to muskeg systems includes the collection of peat solid samples, and peat pore water samples for mercury analysis. Monitoring of peat surface waters is included below in the section on surface water systems.

Peat Solids Samples

Historical peat solids samples were collected from the Victor airstrip site in March 2004, prior to airstrip construction. Samples from this location were collected over a 1,500 m long transect, that included representation of the prevalent muskeg community types found in the Victor area. In total seven samples were collected from the surface peat horizon (0 to 0.5 m depth interval), five from the middle peat horizon (0.5 to 1.0 m depth interval), and six from the lower peat horizon (1.0 to 2.0 m depth interval). Average peat depths in the region have been measured at 2.1 m. with a typical range of from 1.5 to 3 m.

Additional peat solids samples were collected in the fall of 2007 from each domed bog and ribbed fen sites listed in Table 2,. Sample cluster locations are shown in Figure 4, including the recently added MS-V[1], MS-V[2] and MS-V[3] stations. Details pertaining to MS-V(1), (2) and (3) stations are shown in Figure 2. For each of the 21 stations, samples were collected from approximate 10 cm intervals for the first 0 to 0.5 m, and from the 1.0, 1.5, and 2.0 m depth intervals. The symbols D, F, H and R in Table 2 refer to the dominant muskeg community types found in the Victor area, namely domed bog (D), flat bog (F), horizontal fen (H), and ribbed fen (R). Solids samples were sent to Dr. Branfireun's laboratory at the University of Toronto for analysis.

Analysis of these additional peat solids samples will document initial mercury concentrations in the peat, at the established muskeg pore water monitoring stations. Domed bog and ribbed fen community types were selected, as these represent the range of conditions expected at the Victor Site, and because it was thought preferable to conduct more detailed profiling on a smaller number of sites, rather than to have less detailed sampling on a larger number of sites. Results of this sampling will also be compared with earlier results obtained from the March 2004 airstrip sampling campaign.

Station clusters were selected to focus on bioherm / subcrop zones surrounding the Victor mine site, as well as areas closer to the open pit area (station clusters MSV[1], MSV[2] and MSV[3]). Bioherm / subcrop zones are the sites where overburden is shallow and dewatering effects are most likely to be observed. Stations 13 and 15 are well removed from the potential zone of dewatering influence, and were selected as control sites.

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Peat Pore Water Samples

Peat pore water samples will be collected annually from each of the 43 piezometer stations shown in Table 2, with the exception of the V1, V2 and V3 series piezometers which will be collected quarterly, except where precluded by frozen ground conditions. Sampling will be conducted for both total and methyl mercury. The first set of samples (excluding the new V[1], V[2], and V[3] stations) was collected in August/September 2007, and has been forwarded to Flett for analysis of total mercury and methyl mercury. The first set of samples from the V1 through V3 series of wells will be collected in November 2007 when these wells are installed, with samples also to be forwarded to Flett for analysis. The analysis is to be conducted on filtered samples only, as pore water is regarded as groundwater. In future, samples will be sent to Flett Research, or to Dr. Branfireun's laboratory, or to an alternate specialist laboratory of comparable quality.

In addition to mercury analysis, the filtered pore water samples will also be analyzed for the following parameters: pH, conductivity, dissolved organic carbon (DOC), chloride, sulphate, nitrate, total phosphorus, and selected metals (calcium, iron, magnesium, and sodium). Parameters such as pH, DOC, sulphate, phosphorus, nitrate, and iron can potentially affect mercury dissolution and speciation.

Annual pore water samples will be preferentially collected in August / September of each year. And, if for some reason, samples can not reasonably be collected during these months, due to logistical or other constraints, samples will be collected as close to August / September as practicable. Helicopter access is required for virtually all sites. Quarterly samples from the V1 through V3 stations will be collected in May, July and September.

Mineral Soil Pore Water Samples

Mineral soil pore water samples will be collected annually (August / September) from the MSV(1)-D, MSV(2)-D and MSV(3)-D marine sediment installations, for comparison against well field mercury and methyl mercury results. In addition to mercury analysis, the filtered pore water samples will also be analyzed for the following parameters: pH, conductivity, dissolved organic carbon (DOC), chloride, sulphate, nitrate, total phosphorus, and selected metals (calcium, iron, magnesium, and sodium). Mineral soil pore water samples will be collected from three depth zones, provisionally defined as 4 to 5 m, 6 to 7 m and 9 to10 m below ground surface.

Monitoring - Surface Water Systems

Surface Water Quality

Surface water samples will be collected from stations shown in Table 18 and Figure 5. Muskeg ribbed fen surface water sample locations are shown in Figure 4. The Granny Creek control station (Tributary 5A), and Nayshkootayaow River control station (Monument Channel near Attawapiskat) are referenced in the table, and are shown in Figure 6.

Water samples from all stations will be collected quarterly for analysis of total and methyl mercury, for both filtered and unfiltered samples. Samples for mercury analysis will be sent to Flett, Dr. Branfireun's laboratory, or to an equivalent specialist laboratory. In addition to mercury, analysis will also be performed for the following parameters: pH, conductivity, alkalinity, total suspended solids (TSS), dissolved organic carbon (DOC), chloride, sulphate, and ICP metals scan. The analysis for selected metals will include that performed on filtered and unfiltered samples.

In addition to quarterly samples, samples from two Granny Creek stations (North Granny Creek – upstream of the northwest fen; and North Granny Creek – downstream of the Northeast Fen), and from the Northeast Ribbed Fen station will be collected monthly for the analysis of total mercury, as long as discharges to these systems continue. These three stations are associated with on-going, or soon to be initiated, long-term effluent discharge locations, notably those associated with the: Phase 1 mine water pond, the sewage treatment plant, the landfill leachate system, and the future processed kimberlite containment (PKC) facility.

Sediment Quality

Sediment samples will be collected from the receiving water environments, as well as from the surface water control stations, at three year intervals consistent with the fish tissue sampling timelines described below. Samples will be collected from depositional zones as close to the surface water monitoring stations as conditions allow (nearest suitable sediment deposition). Composite samples will be collected from each station, with each composite sample consisting of three pooled grab samples obtained using a grab type sampler. Samples will be sent to Flett, Dr. Branfireun's laboratory, or an equivalent specialist laboratory.

Monitoring - Groundwater Systems

The discharge of individual pit perimeter well field wells to the Attawapiskat River will be monitored quarterly for total mercury and methyl mercury. Samples will be unfiltered, as the well water is clear, and samples will be sent to Flett, Dr. Branfireun's laboratory, or an equivalent specialist laboratory.

Monitoring - Fish

Historic (1999 and 2004) fish tissue samples from the Nayshkootayaow and Attawapiskat Rivers have been collected for metals analysis including mercury. Species sampled included whitefish, ciscoe, northern pike, walleye, white sucker and brook trout. Sampled mercury concentrations were well within recommended consumption guidelines for coregonids (whitefish and cisco) and brook trout; however, the observed values in larger pike and walleye generally exceeded recommended consumption guidelines for women of childbearing age and children less than 15 years of age of from 0.26 to 0.52 µg/g, and for more frequent consumption by the general population of >0.61 µg/g.

Continued monitoring of fish tissue mercury concentrations in the receiver waters and control stations is proposed as described below and shown in Figure 6.

Large Fish Program

Additional fish tissue sampling is proposed to monitor total mercury concentrations in large fish species within the Nayshkootayaow River, the Attawapiskat River, and Monument Channel. The Nayshkootayaow River and downstream Attawapiskat River stations have been selected as the two exposure areas, with the Monument Channel and upstream Attawapiskat River stations serving as control sites. For the purpose of baseline sampling during 2007, downstream large fish sampling for the Attawapiskat River was conducted near to the community of Attawapiskat.

This site was selected due to logistical constraints (i.e., to coordinate sampling with Monument Channel sampling). Results from the two Attawapiskat River baseline sampling locations will be compared statistically to confirm data consistency between the two stations. For longer-term collections during the mine operations phase (as opposed to baseline data collections), the Attawapiskat River downstream fish collection site will be shifted to the area between the Victor site and the Nayshkootayaow River inflow. De Beers will work with AttFN members to pre-select the best fishing locations within this area.

Northern pike has been selected as the indicator large fish species because (1) they are considered more sedentary than the alternative top level predator (walleye), and (2) they are well distributed throughout the local watercourses. The sampling stations and their proposed role in the analysis are summarized in Table 19. The other large fish species (walleye, whitefish, white sucker and brook trout) were sampled less intensively, but in sufficient numbers (target of 10 individuals) to provide a general characterization mercury burdens in these species, as a guide to local First Nation consumers. This latter aspect of sampling "other large fish species" is recognized as an essential aspect of the mercury monitoring program.

For northern pike, best efforts were made during the fall of 2007 to collect from 30 to 35 fish per station, for each of the four stations listed in Table 19. Samples were selected to represent a variety of length intervals to ensure a reasonable sampling of both young and older fish, recognizing that very large fish are not abundant in comparison to other age groups.

Suitable numbers of northern pike were obtained from the four sampling locations, with the exception of the Nayshkootayaow River, where only 14 pike were captured (Table 20). Sampling efforts for pike during the fall of 2007 were hampered by unusually high water conditions. Additional sampling effort will be madse in 2008 to collect more pike from the Nayshkootayaow River. Suitable numbers of other large fish species (walleye, whitefish, white sucker and brook trout) were obtained for all sites with the exception of: whitefish in the Nayshkootayaow River and at the upper Attawapiskat River site, brook trout at all sites, and walleye in Monument Channel (Table 20). Conditions for capturing whitefish in the upper Attawapiskat River were hampered by high water conditions, and whitefish are not common in the Nayshkootayaow River except in the immediate Attawapiskat River confluence area. Brook trout occur only sparingly in the larger river systems, and walleye were not encountered in Monument Channel.

Attempts to conduct non-lethal sampling of larger fish in 2007 were unsuccessful, but will be pursued in subsequent years in accordance with methods described by Baker et al., 2004; and, Environment Canada, 2005) to avoid the need to unnecessarily sacrifice the fish. Scales will be collected from all sampled fish for age determination. Any pike that are killed during the collection or sampling process will have a cleithrum bone removed for a more reliable age confirmation and to corroborate the scale structure age analysis. For walleye, a dorsl spine will be removed for aging, and for any whitefish or brook trout, an otolith will be removed from any sacrificed fish.

<u>Small Fish Program</u>

A small bodied fish sampling program will also be conducted in Granny Creek, Tributary 5A, the Attawapiskat and Nayshkootayaow Rivers, and Monument Channel, to monitor possible shorter-term changes in fish mercury burden. Granny Creek, the downstream Nayshkootayow River, and the downstream Attawapiskat River stations have been selected as the four exposure areas, with Tributary 5A, the upstream Nayshkootayaow River and Attawapiskat River stations, and Monument Channel serving as control sites. Tributary 5A is similar in character to Granny Creek, and Monument Channel is similar in size and character to the Nayshkootayaow River system, although it lacks bedrock outcroppings that characterize portions of latter system's main channel.

Brook stickleback (or finescale dace as an alternate – depending on availability) will be targeted for the small fish sampling program. For the baseline year (2008), efforts will be made to collect 40 small fish from each of the nine sample stations. Of the 40 individual fish collected, approximately 20 will be smallest size class (young-of-year [yoy]), 10 will be from the next largest size class, and 10 will be from the next largest size class after that. Size class will be used as a field indication of approximate age class. Sampling for small fish was attempted during the fall of 2007 but was discontinued due to unfavourable (high water) conditions. Small fish sampling will consequently be conducted during the summer of 2008.

2008 Baseline Year

For small fish sampling, following tissue removal, the remnant fish body will be saved for subsequent structure removal and age analysis in the laboratory. In each subsequent year, 20 yoy will be collected from each of the nine stations. Small fish will be sampled individually for mercury burden. Tissue samples from small fish will be placed in suitable clean containers, frozen and transported to Flett, Dr. Branfireun's laboratory, or an equivalent specialist laboratory, for processing and analysis.

Data Interpretation

Peat Solids Samples

Mercury data pertaining to muskeg solids will be compared against data obtained previously for the Victor site from the pre-construction airstrip site, and against literature values.

Peat Piezometer Groundwater Samples

Peat piezometer groundwater samples will be tracked annually with data comparisons made between close proximity sites (Clusters MSV1, MSV2, MSV3, MS1, MS2, MS7, MS8, MS9-1 and MS9-2) and control sites (Clusters MS13 and MS15); and between the same sites over time. Mercury concentration changes will also be interpreted within the context of other water quality parameters measured for these sites, which relate to methylation potential.

Surface Water Samples

Surface water sample data will be compared against federal protection of aquatic life guidelines for total mercury (26 ng/L) and for methyl mercury (4 ng/L). The data from individual stations will be compared over time, and upstream / downstream / experimental / control samples will be compared against one another, as appropriate.

Early ID of use of CCME Guideline !!!

Sediment Samples

Sediment data will be compared to mercury values in the provincial sediment standards for all land uses under Part XV.1 of the Environmental Protection Act (0.2 µg/g), as well as the long standing Provincial Sediment Quality Guidelines lowest effect level (0.2 µg/g) and severe effect level (2.0 µg/g), (Persaud et al. 1993). Values will also be compared to the federal sediment criteria for the protection of aquatic life, Interim Sediment Quality Guideline (0.13 mg/kg) and the Probable Effects Level (0.70 mg/kg). Values will also be compared between and among stations to assess change over time.

Groundwater Samples

Well field groundwater sample results will be tracked quarterly, with comparisons made between wells, and with the same wells over time. Any changes in well field mercury concentrations would be correlated against changes in Attawapiskat River changes, and to changes in muskeg (and mineral overburden) piezometer mercury concentrations.

Fish Tissue Samples

Data from fish species will be compared on the basis of size / age relationships, and against provincial and federal standards for human consumption. The data will also be analyzed over time, and between experimental (receiver water / exposure) and control stations. Analysis will be coordinated with MOE staff, and will provide for appropriate statistic analysis inclusive of considerations related to data transformations and the treatment of outliers.

Reporting

Annual reports will be prepared summarizing all monitoring results pertaining to mercury, including temporal trends. Reports addressing data from the previous calendar year, and associated cumulative data, will be submitted to the MOE and the AttFN (through the Environmental Management Committee) by June 30 of each year.

Results exceeding applicable receiving water quality guidelines will be reported within 30 days of the receipt of confirmed sample analyses.

Contingency Plans and Corrective Measures

Contingency measures identified through the federal EA process, that are linked to the potential amplification of hydrological regimes and associated affects on muskeg systems and resultant possible increased mercury release, included (1) bedrock grouting to reduce groundwater flow to the open pit area, and (2) infilling of the northeast overburden trench, where major ground subsidence is expected to occur.

Grouting use must be assessed on a case by case basis once a specific need and circumstance are identified and the specific conditions associated with any such need assessed. Infilling of the predicted northeast overburden trench subsidence zone with pit strip spoils was initiated last winter, and will continue, such that this area will not experience flooding. De Beers will also consider other possible options for mitigation through discussions with the MOE.

Contingency plans and associated trigger levels for plan implementation will be developed as part of a Terms of Reference (TOR) specified as a condition of MOE permits. The TOR would establish trigger levels associated with key milestones, and would have to consider changes to peat piezometer water quality; changes in well field water discharge quality; changes to receiving water quality, and changes to fish tissue concentrations. Specific trigger values would be developed for:

- The implementation of enhanced sampling programs for problem verifications;
- Undertaking water quality and/or food chain modeling;
- Undertaking a risk assessment; and/or,
- Implementing mitigation measures.

The TOR would be viewed as a living document that would be responsive to accumulated data inputs, and analysis of those data.

Additional Research Programs

In addition to monitoring program components outlined above, an additional more focused research program is being developed in concert with the universities of Waterloo, Queens and Toronto, as outlined in Appendix A. This research program has been initiated, but final details are still being developed.

6.0 LABORATORY ANALYSIS

Overview of Laboratory Infrastructure

Dr. Branfireun's University of Toronto Mercury Research Lab is fully equipped to undertake ultra-trace level determinations of total mercury (THg) and monomethylmercury (MeHg) using published, standard methods. Results produced by this laboratory have been published in numerous peer-reviewed scientific papers. The laboratory uses different instruments to determine Hg species in various media. A Tekran 2600 Automated Total Mercury System is used to determine ultra-trace THg concentrations primarily in water, but also in sediments and tissues with low THg concentrations (US EPA Method 1631). A Milestone DMA-80 direct mercury analyzer is used for the bulk of trace level Hg determinations for solid phase materials (tissues, soils, sediments)(USEPA Method 7473). A cold-vapour atomic fluorescence spectroscopy (CVAFS) system based around a Tekran 2500 detector is used for MeHg measurements (Horvat et al., Analytica Chimica Acta. 282: 153-168, 1993; Olson et al., Fresenius Journal Analytical Chemistry. 358: 392-396,1997). Our most sensitive instruments and samples are contained within a Class 100 Clean Room to minimize contamination of samples and equipment.

Summary of the Method for Determining Total Mercury in Peat and Sediments

a) Sample Acquisition - All sampling is undertaken using ultra-clean protocols. Technicians are gloved in the field with sterilized, clean-room grade trace-metal free gloves. Using what is commonly referred to as a "clean hands, dirty hands" method, one technician will handle sampling equipment and containers only, while the other will only come into contact with the peat samples. Surface peat samples are taken by directly plucking the surficial material and placing into a small leak-proof zip-closure bag, which is then rolled to exclude air, double-bagged, labeled and placed into a clean, dark cooler that either contains dry ice, or cooler packs to chill the samples until they can be returned to the facility and frozen. Deeper peat samples are handled similarly, but may be acquired either by cutting out a surface block of peat with a clean blade, measuring depth intervals and acquiring sample, or by using a suitable sampler for deep peat deposits (e.g. Russian peat corer). If a deep corer is used, then the sample for Hg analyses is taken from the inside of the core that was not in contact with the corer. Gloves are

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changed after every sample is taken. Samples are kept frozen at -15°C or lower until analyses can be performed.

b) Total Mercury Analysis - In the laboratory, individual samples are thawed, homogenized, and sub-sampled. A small mass is retained for oven-drying, and a minimum of two wet samples (<0.5 g wet weight each) are used for analyses. Remaining sample, if any, is kept frozen for replicate analyses if required. Samples are analyzed as wet weight. Final analytical concentrations are expressed as a standardized dry weight through the generation of a wet-to-dry weight conversion factor derived from the sub-sample used exclusively for oven-drying. This eliminates any matrix changes or Hg losses due to drying or heating. Analysis is by thermal decomposition and atomic absorption detection using a Milestone DMA-80. From USEPA Method 7473:

> Controlled heating in an oxygenated decomposition furnace is used to liberate mercury from solid and aqueous samples in the instrument. The sample is dried and then thermally and chemically decomposed within the decomposition furnace. The decomposition products are carried by flowing oxygen to the catalytic section of the furnace. Here oxidation is completed and halogens and nitrogen/sulfur oxides are trapped. The remaining decomposition products are then carried to an amalgamator that selectively traps mercury. After the system is flushed with oxygen to remove any remaining gases or decomposition products, the amalgamator is rapidly heated, releasing mercury vapor. Flowing oxygen carries the mercury vapor through absorbance cells positioned in the light path of a single wavelength atomic absorption spectrophotometer. Absorbance (peak height or peak area) is measured at 253.7 nm as a function of mercury concentration.

Calibration and instrument performance is verified through the analysis of standard reference materials such as Estuarine Sediment NIST SRM 1646 or similar. Variability greater than +-10% from the reference values in reference material determinations interspersed throughout the analytical run result in a rejection of that sample run. Differences between sample replicates of >10% result in a re-calibration and analysis of those samples. There is no difference in approach for riverine sediments, lacustrine sediments, mineral soils, or organic/peat soils.

Summary of the Method for Determining Total Mercury in Water

a) Sample Acquisition - Following similar ultra-clean protocols as above, water samples for THg analyses are taken in either acid-cleaned Teflon bottles, or pre-sterilized polyethylene teraphthalate (PET) bottles. For surface water samples, the bottle is triple rinsed, then immersed for sampling. The bottle is double-bagged, labeled, and stored in a cool, dark container until it can be returned to the laboratory for processing. Samples that are to be analyzed as unfiltered are simply acidified with ultrapure concentrated HCl (0.5% by volume). Dissolved Hg samples are filtered using an acid-cleaned teflon filter apparatus (Savillex Inc) and pre-muffled (500°C) glass-fibre filters (Whatman GFF 0.7 m) and then acidified as above. Acidified samples are stored doubled bagged in a cool, dark container. Refrigeration is not required.

b) Total Mercury Analysis - A Tekran 2600 Automated Total Mercury Analyzer is used for the determination of total mercury in water. This system complies with EPA Method 1631. Briefly, Bromine Monochloride (BrCl) is added to the sample container to oxidize all forms of Hg to HgII oxidation state. After a minimum of 12 hours the BrCl is neutralized by addition of Hydroxylamine Hydrochloride ($NH_2OH*HCl$). Following neutralization, Stannous Chloride ($SnCl_2$) is added to the sample to reduce the Hg from the HgII to the Hg0 oxidation state. The Hg0 is purged onto gold-coated glass bead traps (sample). The mercury vapor is thermally desorbed to a second gold trap (analytical) and from that detected by cold vapor atomic fluorescence spectrometry (CVAFS).

Summary of the Method for Determining Methyl Mercury in Water

a) Sample Acquisition - Following same ultra-clean protocols as for THg. In fact, sample splits can be used for the determination of both THg and MeHg in water.

b) Methyl mercury Analysis - Aqueous samples are first distilled to minimize matrix interferences. The samples are distilled at 135°C with the addition of potassium chloride (KCl), sulfuric acid (H_2SO_4), and copper sulfate ($CuSO_4$). The pH of the distillate is adjusted to 4.9 using acetate buffer. The distillate is then ethylated using sodium tetraethyl borate (NaTEB) and allowed to react for 15 minutes. Following reaction with NaTEB the distillate is purged with nitrogen gas (N_2) for 20 minutes and the MeHg is collected on a Tenax® Trap. Mercury species are thermally desorbed from the Tenax® Trap, separated using a gas chromatography (GC) column, reduced using a pyrolytic column, and detected using a cold vapor atomic fluorescence spectrometry (CVAFS).

Summary of the Method for Determining Total Mercury in Fish Tissue

a) Sample Acquisition -The fish is acquired via various methods. Ancillary data (weight, length) is collected at time of capture. The fish is killed, and chilled until returned to the facility for processing. Hg is distributed throughout the organism; the most reproducible tissue to sample and analyze is muscle. 1-2 g of tissue is cut from the filet of the fish for larger fish with skin removed. The tissue sample is double-bagged, labeled and frozen at -15°C or colder. Smaller fish or minnows may be frozen intact.

b) Total Mercury Analysis -The procedure for analyzing THg in fish tissue is the same as for soils, peats and sediments and uses the Milestone DMA-80 Direct Mercury Analyzer. Fish tissue standard reference materials are used.

General Quality Assurance

a) Standardization - Standardization is performed at least at the beginning of a daily sample run. For all analyses, a standard curve is used to calculate sample concentrations measured from an instrument response. The curve is generated by measuring instrument responses for a series of standard solutions of the analyte. Sample concentrations are then calculated by interpolating between the standard points. A set of at least three standards that bracket the expected sample concentrations is used for standardization. Instrument responses used to generate the standard curve must be linear according to criteria established for the specific method or a second series of standard solutions are analyzed prior to analysis of any samples.

b) Precision – Duplicates - The precision of an analytical procedure is determined by performing replicate analysis of a sample and must meet the criteria established for the specific method. The indexes of precision used are relative percent difference (RPD) and relative standard deviation (RSD):

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RPD (%) = ((|X1-X2|)/mean) x 100 RSD (%) = (standard deviation/mean) x 100

where X1 and X2 are the measured values for the first and second replicates, respectively. The Limit of Detection (LOD) is the concentration that is three standard deviations of multiple blank analysis (IUPAC definition for a 99% confidence level). Below this concentration, the analyte is considered to be undetectable. The region from three to five times the standard deviation of the blanks is the region of detection but not quantification. A concentration greater that five times the standard deviation of the blanks is the region of quantification. The RPD and RSD are applicable only in the region of quantification. If the RPD or RSD exceeds 10 percent for total mercury the sample must be reanalyzed.

c) Accuracy – Spikes - Sample accuracy is determined by adding a known amount of the analyte (spike) to the sample and measuring the change in concentration. The percent recovery is used as the index for measuring accuracy and is calculated as follows:

Percent Recovery = ((C2-C1)/C2) x 100

Where C2 is the spiked sample concentration and C1 is the sample concentration. Percent recoveries must meet criteria established for the specific method or a second spiked sample must be analyzed. If the second spike does not meet criteria then all sample data for that run are suspect and need to be reanalyzed or a flag is assigned to draw the project chiefs attention to that data.

d) Blanks - Method blanks will be analyzed to verify that the analytical system is free of contamination and sample carryover. The mean of the instrument responses from the blanks is used as the zero value in the calibration curve and in the calculation of the LOD. The LOD/volume of sample in liters, as calculated from the first three blanks, must be less than the expected sample concentration.

7.0 REFERENCES

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CLOSING

We would be pleased to discuss any aspects of the above with the Ministry of the Environment.

Sincerely,
AMEC Earth & Environmental
a division of AMEC Americas Limited
on behalf of De Beers Canada Inc.

Dave Simms, Ph.D.
Principal, Environmental Assessment and Resource Development

cc: Ruben Walin and Brian Steinback, De Beers
Todd Kondrat and Alisdair Brown, MOE, Thunder Bay
Steve Momy, MOE, Timmins
Suzanne Barnes, AttFN
Rick Hendriks, consultant to AttFN
Simon Gautrey, AMEC
Brian Branfireun, University of Toronto

Prepared by:	Dave Simms	
Reviewed by:	Sheila Daniel	
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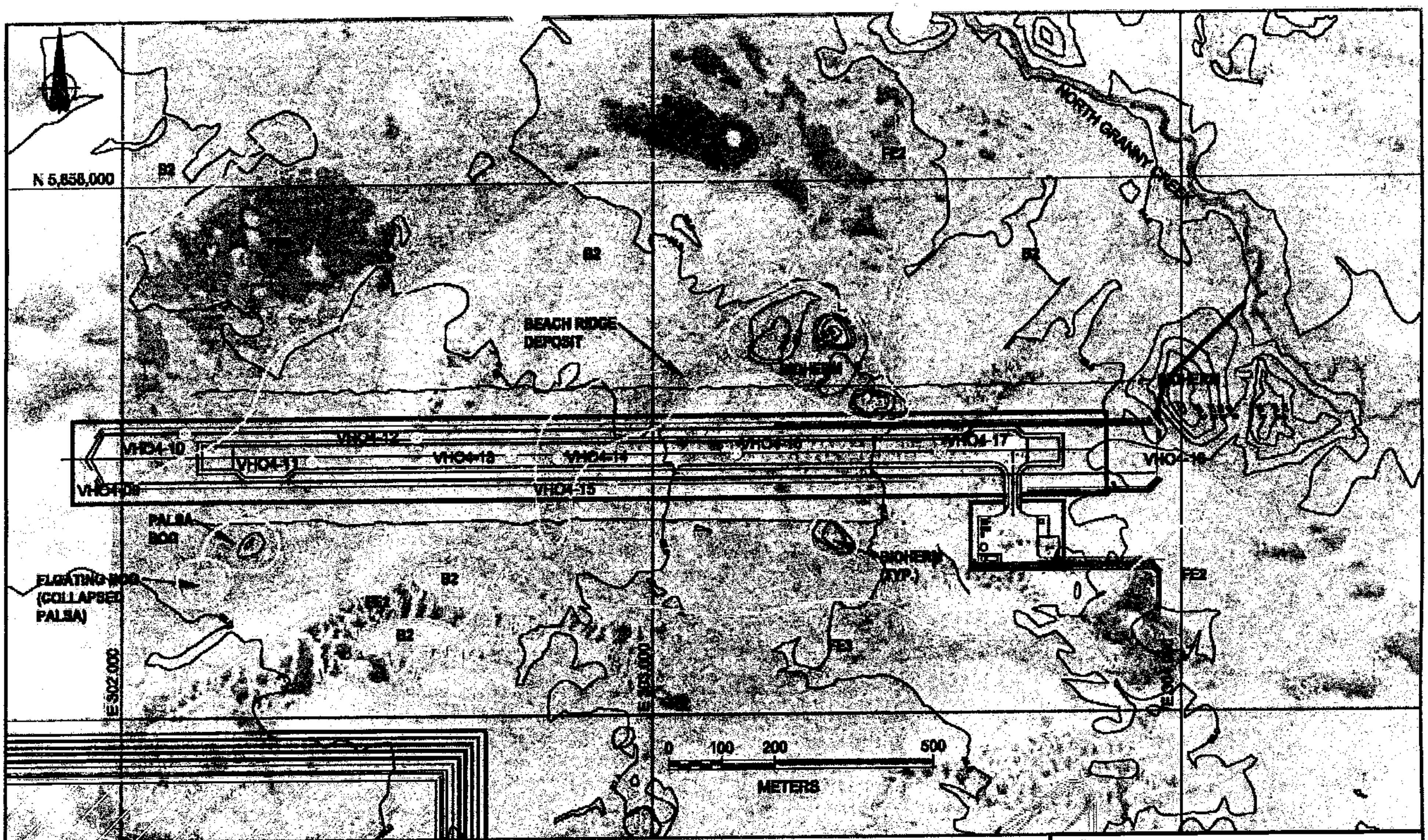

LEGEND:

———	AIRSTRIP OUTLINE
VH04-09 ○	TEST HOLE
— 85.0 —	GROUND SURFACE CONTOUR
B2	NORTHERN PLATEAU BOG PEATLAND
FE2/3	NORTHERN RIBBED FEN PEATLAND

NOTES:

1. THIS DRAWING WAS CREATED FROM AN AERIAL PHOTO PROVIDED BY DE BEERS. THE PROPERTY BOUNDARIES AND OTHER GROUND FEATURES WERE SUPERIMPOSED.

2. ALL GRID COORDINATES (UTM NAD 27) SHOWN ON THIS DRAWING ARE IN METRES.

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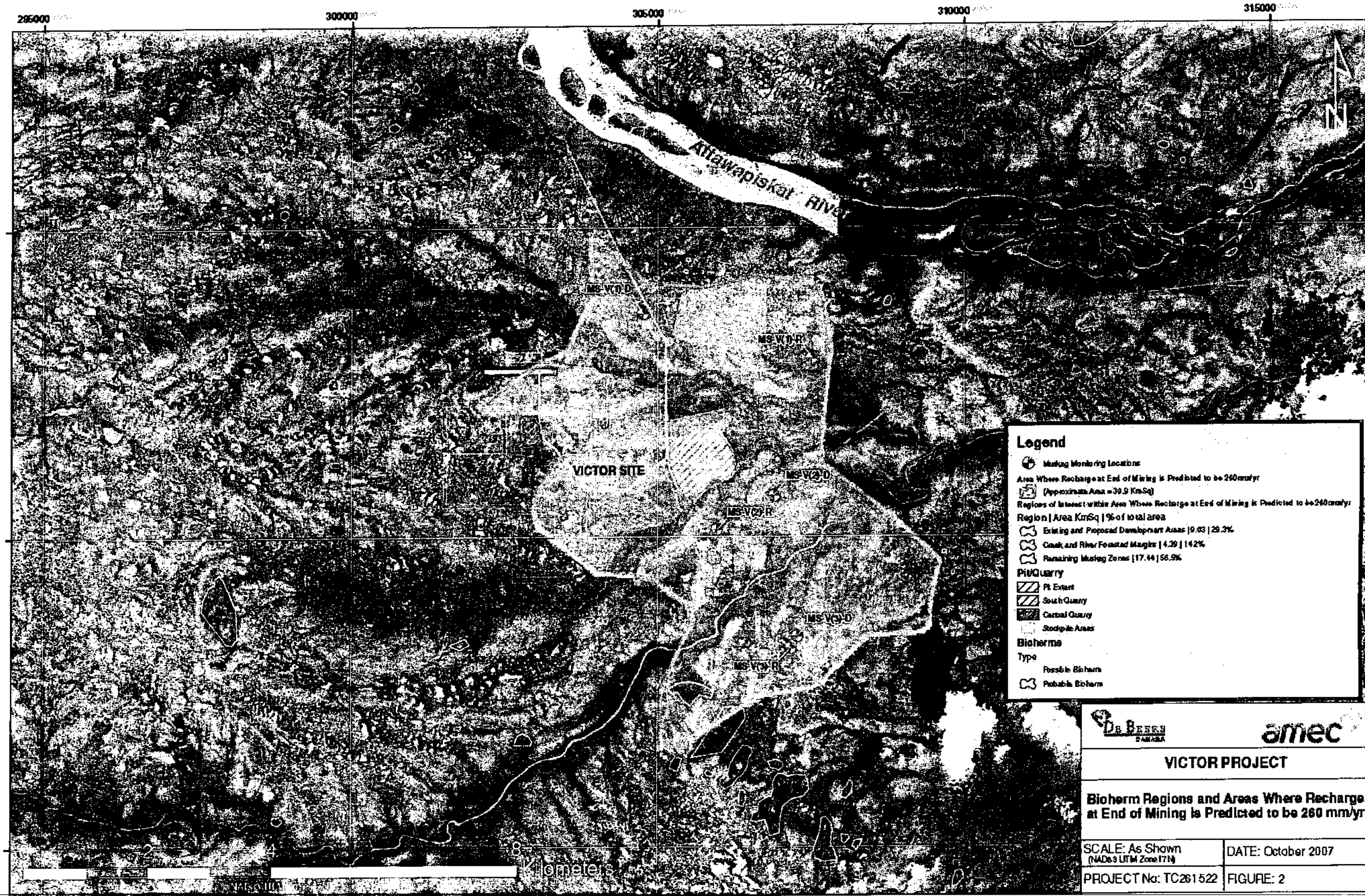
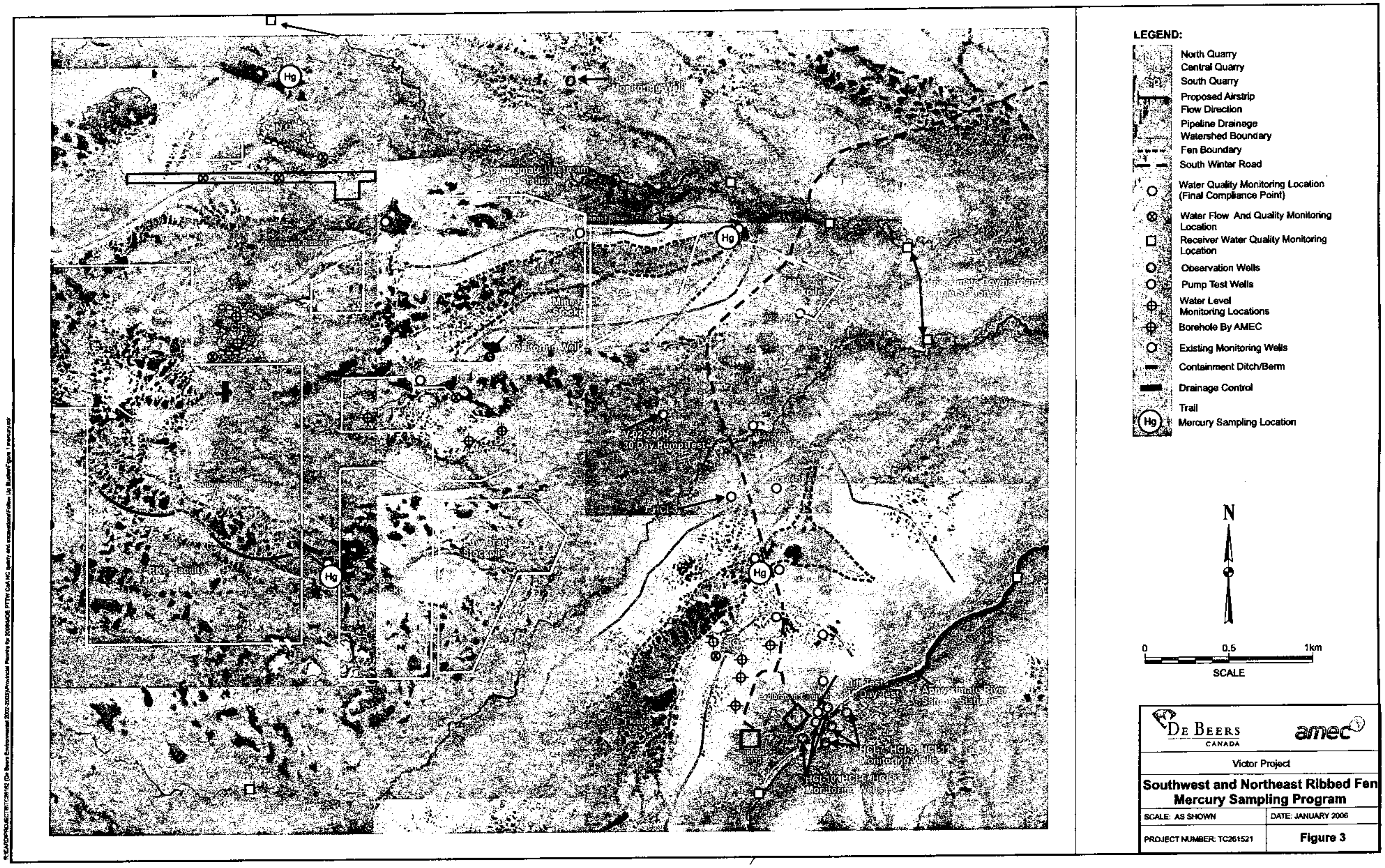
VICTOR DIAMOND PROJECT

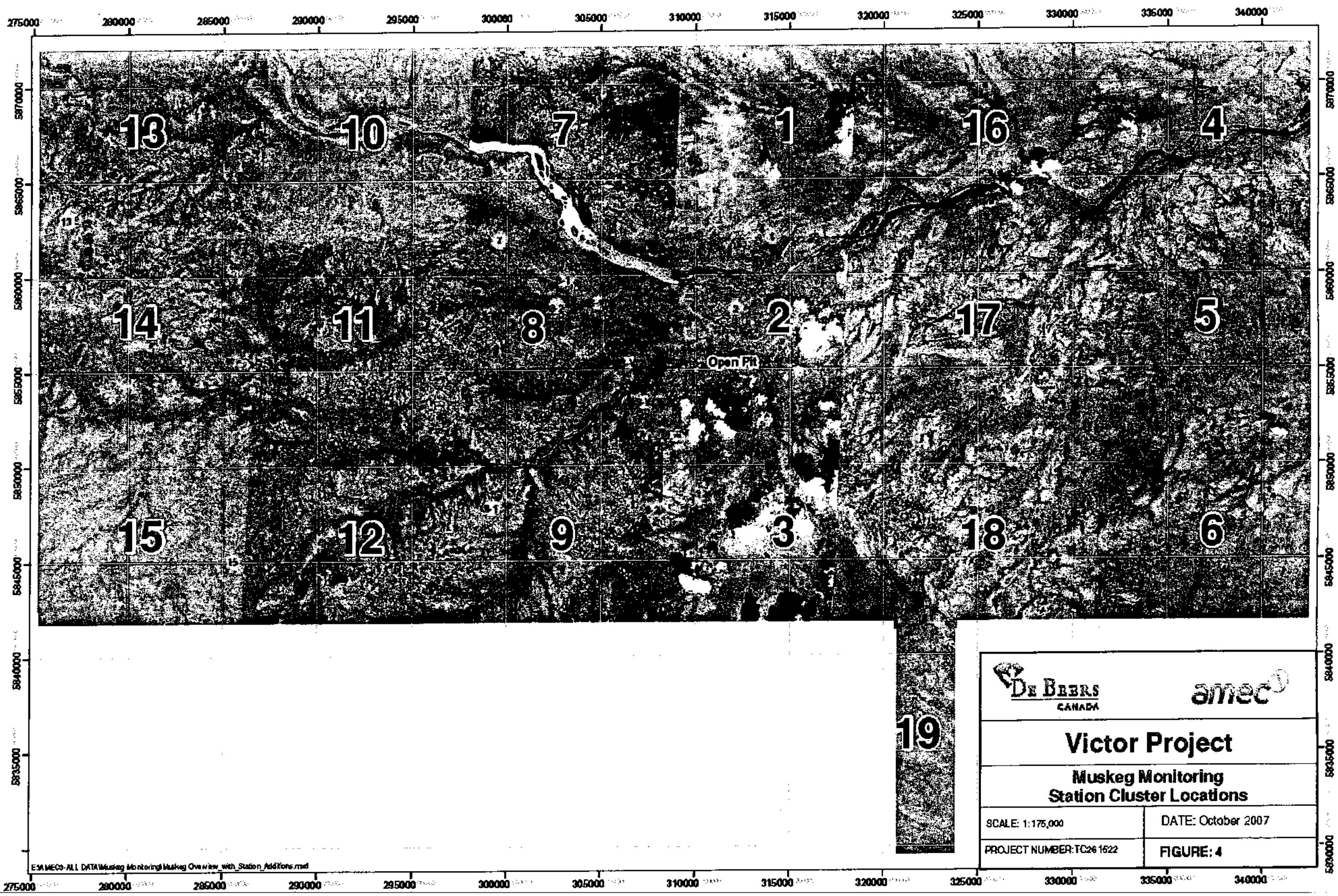
VICTOR AIRSTRIP
SITE INVESTIGATION PLAN

SCALE: 1 :10,000 on 8.5"x11"	DATE: APRIL 2007
PROJECT NUMBER: TC29152	FIGURE 1

R:\EARD\PROJECTS\TC26132 (De Beers Environmental 2002-2003)\Drawings SEPT-05 On\Mercury\Figure 1.dwg Apr 27/2007 1:19:01 PM EDT


295000
300000
305000
310000
315000
5860000
5855000
5850000
Attawapiskat River
MS-V(1)-D
MS-V(1)-R
VICTOR SITE
MS-V(2)-D
MS-V(2)-R
MS-V(3)-D
MS-V(3)-R
N
Kilometers
Legend
Muskeg Monitoring Locations
Area Where Recharge at End of Mining is Predicted to be 260mm/yr
(Approximate Area = 30.9 KmSq)
Regions of Interest within Area Where Recharge at End of Mining is Predicted to be 260mm/yr
Region | Area KmSq | % of total area
Existing and Proposed Development Areas | 9.03 | 29.3%
Creek and River Forested Margins | 4.39 | 14.2%
Remaining Muskeg Zones | 17.44 | 56.5%
Pit/Quarry
Pit Extent
South Quarry
Central Quarry
Stockpile Areas
Bioherms
Type
Possible Bioherm
Probable Bioherm
De Beers Canada
amec
VICTOR PROJECT
Bioherm Regions and Areas Where Recharge at End of Mining is Predicted to be 260 mm/yr
SCALE: As Shown (NAD83 UTM Zone17N)
DATE: October 2007
PROJECT No: TC261522
FIGURE: 2


LEGEND:
North Quarry
Central Quarry
South Quarry
Proposed Airstrip
Flow Direction
Pipeline Drainage
Watershed Boundary
Fen Boundary
South Winter Road
Water Quality Monitoring Location (Final Compliance Point)
Water Flow And Quality Monitoring Location
Receiver Water Quality Monitoring Location
Observation Wells
Pump Test Wells
Water Level Monitoring Locations
Borehole By AMEC
Existing Monitoring Wells
Containment Ditch/Berm
Drainage Control
Trail
Mercury Sampling Location
Hg
PKC Facility
Mine Rock Stockpile
30 Day Pumptest
HCL7, HCL9, HCL11 Monitoring Wells
N
0
0.5
1km
SCALE
DE BEERS CANADA
amec
Victor Project
Southwest and Northeast Ribbed Fen Mercury Sampling Program
SCALE: AS SHOWN
DATE: JANUARY 2006
PROJECT NUMBER: TC261521
Figure 3


13
10
7
1
16
4
14
11
8
2
17
5
Open Pit
15
12
9
3
18
6
19
De Beers Canada
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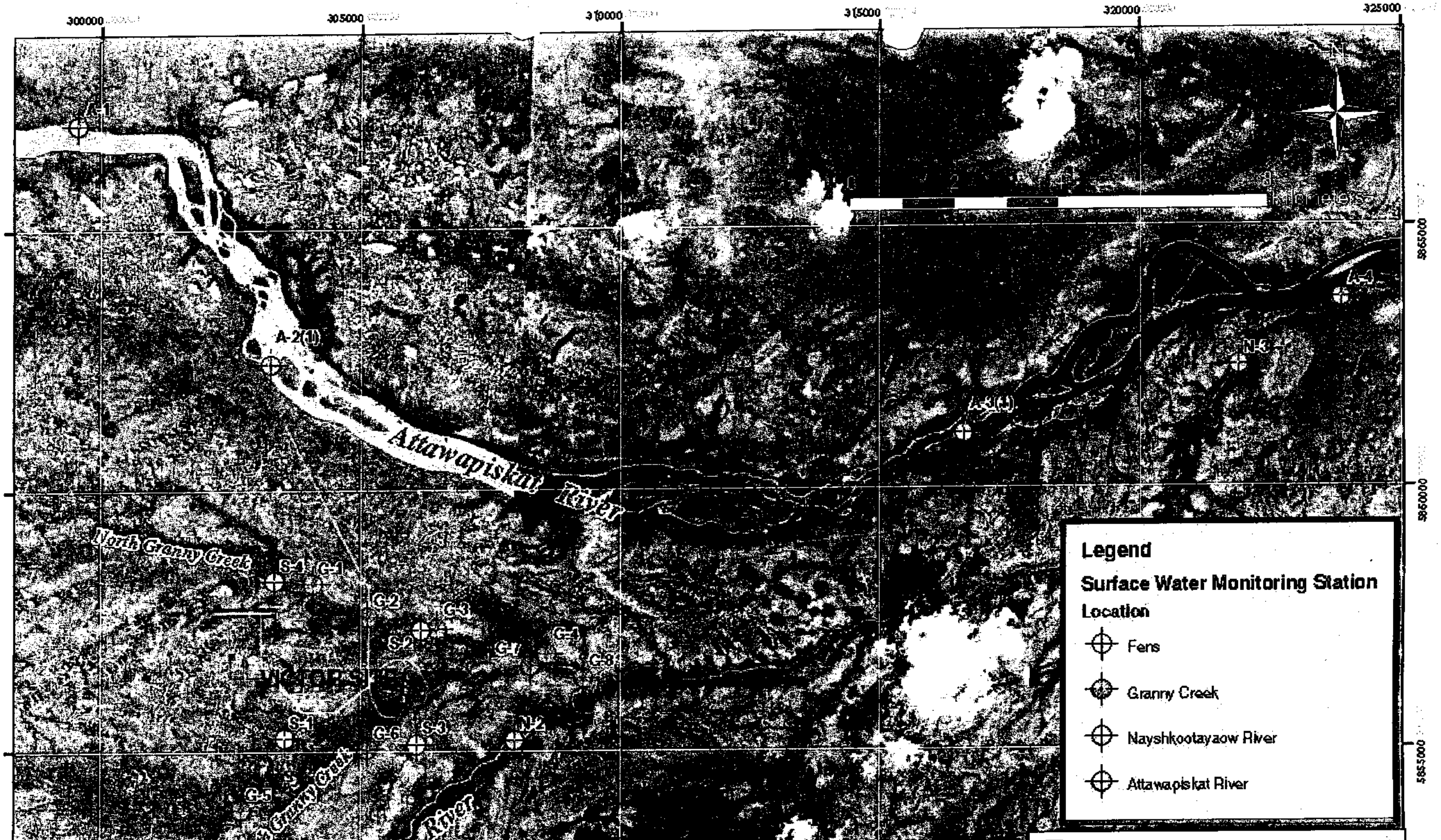
Victor Project
Muskeg Monitoring
Station Cluster Locations
SCALE: 1:175,000
DATE: October 2007
PROJECT NUMBER: TC26 1522
FIGURE: 4



STATION ID	LOCATION	DESCRIPTION	Hg SAMPLING FREQUENCY
A-1	Attawapiskat River	upstream [illegible]	Quarterly
A-2(1)	Attawapiskat River	upstream of site	Quarterly
A-3(1)	Attawapiskat River	downstream of site	Quarterly
A-4	Attawapiskat River	downstream of Nayshkootayaow River	Quarterly
N-1	Nayshkootayaow River	upstream of site	Quarterly
N-2	Nayshkootayaow River	downstream of site (US of Granny Creek)	Quarterly
N-3	Nayshkootayaow River	upstream of Attawapiskat River	Quarterly
[illegible]	North Granny Creek	N. Granny Creek-upstream NW fen	Quarterly
[illegible]	North Granny Creek	N. Granny Creek-downstream NW fen	Monthly, Quarterly
[illegible]	North Granny Creek	N. Granny Creek-downstream NE fen	Monthly, Quarterly
[illegible]	North Granny Creek	N. Granny Creek-downstream	Quarterly
[illegible]	South Granny Creek	S. Granny Creek-upstream SW fen	Monthly, Quarterly
[illegible]	South Granny Creek	S. Granny Creek-downstream SW fen	Monthly, Quarterly
[illegible]	South Granny Creek	S. Granny Creek-downstream	Quarterly
[illegible]	Granny Creek, Confluence	Granny Creek confluence	Quarterly
S-1	Southwest Fen	Southwest fen	Monthly, Quarterly
S-2	Northeast Fen	Northeast fen	Monthly, Quarterly
S-3	Southeast Fen	Southeast fen	Quarterly
S-4	Northwest Central Fen	Northwest central fen	Quarterly

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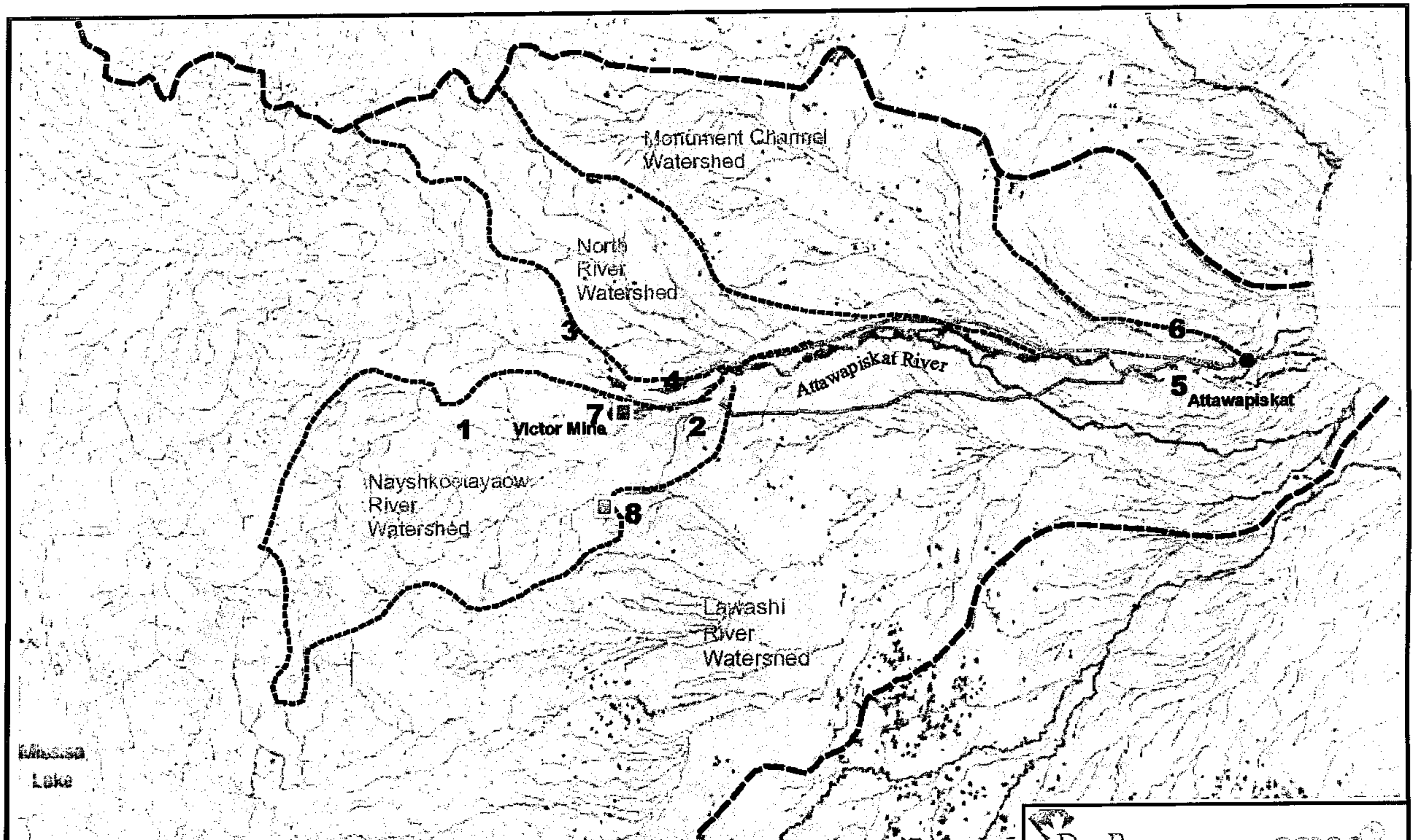
VICTOR PROJECT

Surface Water Monitoring Stations

SCALE: As Shown (NAD83 UTM Zone 17N) | DATE: October 2007

PROJECT No: TC261522 | FIGURE: 5

E:\AMEC3-ALL DATA\Simon's MISC\Kerr's World For Dave\Mercury Monitoring Maps\surface_Water_Monitoring_Stations(8.5x11)_revised_Aug07_2007.mxd



Attawapiskat River Watershed
Sub-watershed Boundaries
Existing South Winter Road
Proposed North Winter Road
Proposed Large Fish and Small Fish Sampling Area
Proposed Small Fish Sampling Areas

1. Nayshkootayaow River (Upstream)
2. Nayshkootayaow River (Downstream)
3. Attawapiskat River Upstream of Mine Site
4. Attawapiskat River Downstream of Minesite
5. Attawapiskat River Downstream at Community (Baseline only - discontinued)
6. Monument Channel
7. North and South Granny Creeks
8. Tributarty 5 - Nayshkootayaow River

DE BEERS CANADA amec

Victor Diamond Project
Mecury Monitoring Plan

PROPOSED FISH TISSUE MERCURY MONITORING LOCATIONS

SCALE: NOT TO SCALE	DATE: SEPTEMBER 2007
PROJECT NUMBER: Tc261622	**Figure 6**

[illegible] (De Beers Environmental 2002-2003)\Drawings SEPT-06 On\Sept 07 Mercury Study\Figure 4 - Mark R Kenneth Revisions.cdr

TABLE 1
CHEMICAL ANALYSIS OF PEAT SOILS FROM VICTOR SITE

Lab #	Units	MDL*	S2005-00992	S2005-00993	S2005-00994	S2005-00995	S2005-00996	S2005-00997	S2005-00998	S2005-00999	S2005-01000	S2005-01001	S2005-01002	S2005-01003	S2005-01004	S2005-01005	S2005-01006	S2005-01007	S2005-01008	S2005-01009	S2005-01010	Average Conc. Depth 0.0-0.5	Average Conc. Depth 0.5-1.0	Average Conc. Depth 1.0-2.0	Average Remote Stations Norway (surface)	CCME Soil Guidelines Agriculture	Canadian Environmental Quality Guidelines Sediment (PEL)
Sample ID			VH04-09 GS1	VH04-09 GS3	VH04-10 AU1	VH04-10 GS4	VH04-11 AU2	VH04-11 GS4	VH04-11 GS9	VH04-12 GS1	VH04-12 GS3	VH04-13 AU2	VH04-13 GS5	VH04-14 AU2	VH04-14 GS5	VH04-16 AU2	VH04-16 GS4	VH04-16 GS8	VH04-17 AU2	VH04-18 AU2	VH04-18 GS6						
Vegetation Type			Fen-BF	Fen-BF	Fen-BF	Fen-BF	Bog-NP	Bog-NP	Bog-NP	Bog-P	Bog-P	Bog-NP	Bog-NP	BR	BR	Bog-P	Bog-P	Bog-P	Bog-P	Bog-NP	Bog-NP						
Depth Range	m		0.5-1.0	1.0-2.0	0.0-0.5	1.0-2.0	0.0-0.5	0.5-1.0	1.0-2.0	0.5-1.0	1.0-2.0	0.0-0.5	1.0-2.0	0.0-0.5	0.5-1.0	0.0-0.5	0.5-1.0	1.0-2.0	0.0-0.5	0.0-0.5	0.5-1.0						
Parameters																											
pH			7.00	6.40	5.20	7.20	4.00	6.00	5.60	5.00	5.50	4.20	6.10	6.80	7.60	4.00	4.80	5.80	5.10	4.40	6.30	5.09	5.82	6.10			
LOI	%		57.70	70.00	86.50	78.30	87.70	79.40	83.30	86.40	83.60	87.70	79.20	80.90	5.76	94.30	95.70	91.40	93.80	94.40	91.50	88.9	82.1	81.0			
Moisture Content	%		84.20	86.00	89.10	87.10	93.30	90.90	90.30	89.10	91.30	90.20	90.00	90.80	32.50	92.70	89.70	88.40	92.30	91.00	83.50	90.3	87.5	88.9			
Aluminum	(mg/g)	5	2220	723	503	1220	394	1220	775	546	649	685	825	1140	3650	441	778	316	763	482	601	647	1,073	751			
Antimony	(mg/g)	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.25		
Arsenic	(mg/g)	0.1	1.3	3.1	1.2	1.3	0.8	0.5	1.2	0.2	0.3	0.4	1.0	10.0	1.0	0.6	0.4	0.2	0.2	0.7	0.7	2.0	0.6	1.2	0.63	12.00	17.00
Barium	(mg/g)	0.5	24.9	17.6	25.7	26.8	15.8	16.7	13.8	10.0	9.4	10.3	11.1	16.0	7.6	7.8	22.1	15.5	11.6	13.3	15.4	14.7	17.8	15.7			
Beryllium	(mg/g)	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2			
Bismuth	(mg/g)	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2			
Cadmium	(mg/g)	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	0.40	1.40	3.50
Calcium	(mg/g)	25	43500	28900	6760	25900	2670	16000	18500	6860	18000	5790	26100	23700	55700	2850	9020	28300	11800	5050	25000	11,224	20,076	24,283			
Chromium	(mg/g)	1	6	3	4	4	1	6	3	1	2	1	2	3	11	2	2	8	4	2	1	2.3	3.2	3.7	0.73	64.00	90.00
Cobalt	(mg/g)	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	3	<1	<1	<1	<1	<1	<1	<1.0	<1.0	<1.0	0.71		
Copper	(mg/g)	1	3	3	1	2	3	2	2	1	1	2	1	4	3	2	2	2	2	2	1	2.1	1.8	1.8	3.06	63.00	197.00
Iron	(mg/g)	5	5520	6020	1170	4450	501	2000	3340	514	1480	793	2780	10100	5800	421	687	3190	790	705	4840	2,659	2,712	3,540	5,709		
Lead	(mg/g)	5	<5	<5	<5	<5	9	<5	<5	<5	<5	<5	<5	8	<5	<5	<5	<5	<5	11	<5	<6.0	<5.0	<5.0	16.7	70.00	91.30
Magnesium	(mg/g)	10	7190	2320	609	2590	781	4110	1160	142	244	173	502	501	5340	261	349	428	1150	480	663	591	2,491	1,207			
Manganese	(mg/g)	1	75	35	5	37	220	36	32	3	10	3	24	29	66	4	7	28	12	31	27	42.9	29.6	27.7	82.5		
Mercury	(mg/g)	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.04	0.01	0.02	0.02	0.03	0.03	0.03	0.06	<0.03	<0.02	<0.01	0.08	6.60	0.48
Molybdenum	(mg/g)	2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	<2.0	<2.0			
Nickel	(mg/g)	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	5	<5	<5	<5	<5	<5	<5	<5.0	<5.0	<5.0	1.2		
Phosphorus	(mg/g)	5	327	328	338	389	467	304	311	225	169	441	179	1040	154	212	407	139	184	708	309	427	314	253			
Potassium	(mg/g)	10	476	173	81	203	765	296	91	25	36	128	56	549	206	120	74	47	107	532	17	252	178	101			
Selenium	(mg/g)	0.1	0.5	0.4	0.3	0.5	0.2	0.1	0.5	0.4	0.3	0.2	0.4	0.4	<0.1	0.3	0.3	0.1	0.3	0.4	0.2	0.27	0.30	0.37	0.71		
Silver	(mg/g)	0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25			
Sodium	(mg/g)	25	445	556	263	323	229	355	315	253	277	267	265	459	303	296	235	302	324	396	356	313	329	340			
Vanadium	(mg/g)	5	6	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	10	15	<5	<5	<5	<5	<5	<5	<5.7	<5.2	<5.0		130.00	
Zinc	(mg/g)	2	13	7	7	10	27	21	11	4	2	7	6	31	11	8	9	7	8	30	3	13.0	10.0	7.2	32.9	200.00	315.00

Notes Vegetation Type: Fen-BF (northern ribbed fen with broad flarks/pools); Bog-NP (plateau bog - not ponded); Bog-P (plateau bog - ponded); BR (beach ridge)
Norway data are for surface peats of remote northen bogs, as reported by Steinnes et al. (2005)
Data from the 0.5 - 1.0 m horizon of the beach ridge are not included in the averages, as this sample contains primarily mineral soil, as evidenced by the low loss-on-ignition (LOI) value
Data are expressed as ug/g of dry weight

TABLE 2
SUMMARY OF VICTOR SITE AREA MONITORING PROGRAMS INVOLVING MERCURY - MUSKEG SYSTEMS

System / Location	Approximate Coordinates		Frequency - Hg Sampling	Analysis
	Easting	Northing		
Muskeg Monitoring Program - Piezometer Water				
Cluster 1				
MS-1-D	312376	5862048	Annual	Hg-T and Hg-Me (+ initial solids characterization)
MS-1-F	313720	5862550	Annual	Hg-T and Hg-Me
MS-1-H	314926	5862785	Annual	Hg-T and Hg-Me
MS-1-R	314107	5862951	Annual	Hg-T and Hg-Me (+ initial solids characterization)
Cluster 2				
MS-2-D	312604	5857473	Annual	Hg-T and Hg-Me (+ initial solids characterization)
MS-2-F	313440	5858030	Annual	Hg-T and Hg-Me
-			-	-
MS-2-R	307520	5857800	Annual	Hg-T and Hg-Me (+ initial solids characterization)
Cluster 7				
MS-7-D	298460	5862200	Annual	Hg-T and Hg-Me (+ initial solids characterization)
MS-7-F	299180	5862458	Annual	Hg-T and Hg-Me
MS-7-H	398820	5865293	Annual	Hg-T and Hg-Me
MS-7-R	701593	5862531	Annual	Hg-T and Hg-Me (+ initial solids characterization)
Cluster 8				
MS-8-D	302822	5860398	Annual	Hg-T and Hg-Me (+ initial solids characterization)
MS-8-F	303100	5859600	Annual	Hg-T and Hg-Me
MS-8-H	303200	5858384	Annual	Hg-T and Hg-Me
MS-8-R	302232	5858645	Annual	Hg-T and Hg-Me (+ initial solids characterization)
Cluster 9(1)				
MS-9(1)-D	299240	5847200	Annual	Hg-T and Hg-Me (+ initial solids characterization)
MS-9(1)-F	299196	5848137	Annual	Hg-T and Hg-Me
MS-9(1)-H	300551	5845677	Annual	Hg-T and Hg-Me
MS-9(1)-R	300760	5848462	Annual	Hg-T and Hg-Me (+ initial solids characterization)
Cluster 9(2)				
MS-9(2)-D	308710	5847680	Annual	Hg-T and Hg-Me (+ initial solids characterization)
MS-9(2)-F	307915	5847679	Annual	Hg-T and Hg-Me
MS-9(2)-H	310243	5847142	Annual	Hg-T and Hg-Me
MS-9(2)-R	309566	5847400	Annual	Hg-T and Hg-Me (+ initial solids characterization)
Cluster 13				
MS-13-D	679692	5860993	Annual	Hg-T and Hg-Me (+ initial solids characterization)
MS-13-F	680119	5860918	Annual	Hg-T and Hg-Me
MS-13-H	680724	5858613	Annual	Hg-T and Hg-Me
MS-13-R	679990	5861750	Annual	Hg-T and Hg-Me (+ initial solids characterization)
Cluster 15				
MS-15-D	685685	5845879	Annual	Hg-T and Hg-Me (+ initial solids characterization)
MS-15-F	690392	5844380	Annual	Hg-T and Hg-Me
MS-15-H	689226	5844185	Annual	Hg-T and Hg-Me
MS-15-R	691010	5843829	Annual	Hg-T and Hg-Me (+ initial solids characterization)
Cluster V(1)				
MS-V(1)-D	304750	5858600	Annual	Hg-T and Hg-Me (+ initial solids characterization)
MS-V(1)-R[1]	307520	5857880	Annual	Hg-T and Hg-Me (+ initial solids characterization)
Cluster V(2)				
MS-V(2)-D	306075	5854950	Annual	Hg-T and Hg-Me (+ initial solids characterization)
MS-V(2)-R	305970	5855110	Annual	Hg-T and Hg-Me (+ initial solids characterization)
Cluster V(3)				
MS-V(3)-D	307280	5853390	Annual	Hg-T and Hg-Me (+ initial solids characterization)
MS-V(3)-R	307230	5853220	Annual	Hg-T and Hg-Me (+ initial solids characterization)

Notes: D = domed bog; F = flat bog; H = horizontal fen; R = ribbed fen
1 – MS-V(1)-R is the same station as MS-2-R

TABLE 3

POTENTIAL MERCURY LOADING FROM PEAT DECOMPOSITION - NAYSHKOOTAYAOW RIVER BASIN

Total Mercury (THg)					
Case	Maximum Area Potentially Affected (m^2)	Depth (m)	Solids Content by Weight[1] (t)	Weight of Peat Decomposed over 20 Years[2] (t)	Potential Hg Available[3] (t)
1	75,600,000	2.5	20,790,000	2,079,000	0.042
2	17,400,000	2.5	4,785,000	478,500	0.010
Case	Assume Release Time (yrs)	Nayshkootayaow River Flows (m^3/yr)	Nayshkootayaow River Cumulative Flows (m^3)	Predicted Potential Increase in Total Hg Concentration[4] (ng/L)	Predicted Actual Increase in Total Hg Concentration[5] (ng/L)
1	20	546,040,000	10,920,800,000	3.8	0.95
2	20	546,040,000	10,920,800,000	0.9	0.22
1 & 2	Baseline THg concentration (ng/L)				1.6
1	Predicted THg concentration with increase				2.55
2	Predicted THg concentration with increase				1.82
1 & 2	CCME Guideline for THg (ng/L)				26

Notes:
1. Specific gravity of wet peat measured at approximately 1.1, and solids content of 10%
2. Assumed 10% decomposition over 20 years
3. Assumed Hg content of peat (dry weight) of 0.02 ug/g
4. Assumes that all mercury loading reports to Nayshkootayaow River
5. Assumes that 75% of loading during operation reports to the Attawapiskat River as well field drainage

Methyl Mercury (MeHg)		
Case	Statistic	
1 & 2	Average portion as methyl mercury (from SWF - avg. - Jul 06,Oct 06,Jan 07)	0.17
1 & 2	Available portion because of induced losses to Attawapiskat River during dewatering	0.25
1	Predicted increase in MeHg concentration in lower Nayshkootayaow River (ng/L)	0.162
2	Predicted increase in MeHg concentration in lower Nayshkootayaow River (ng/L)	0.037
1 & 2	Baseline MeHg concentration (ng/L)	0.062
1	Predicted MeHg concentration with increase	0.224
2	Predicted MeHg concentration with increase	0.099
1 & 2	CCME Guideline for MeHg (ng/L)	4

Added Notes:

Only the lower portion of the Nayshkootayaow River would be affected.

During mine life, most water drained from the peat due to increased rates of infiltration (75%) would report to the much larger Attawapiskat River, with the well field water discharge (see below).

Localized pre-mining weighted average annual runoff (mm)	247.1
Pre-mining condition weighted average annual infiltration rate (mm)	31.4
Added weighted average induced infiltration within affected zone during mining (mm/yr)	154.7
Proportion lost from Nayshkootayaow R. watershed	**0.75**

TABLE 4
BACKGROUND MERCURY AND METHYL MERCURY CONCENTRATIONS
VICTOR PROJECT
(data expressed in ng/L)

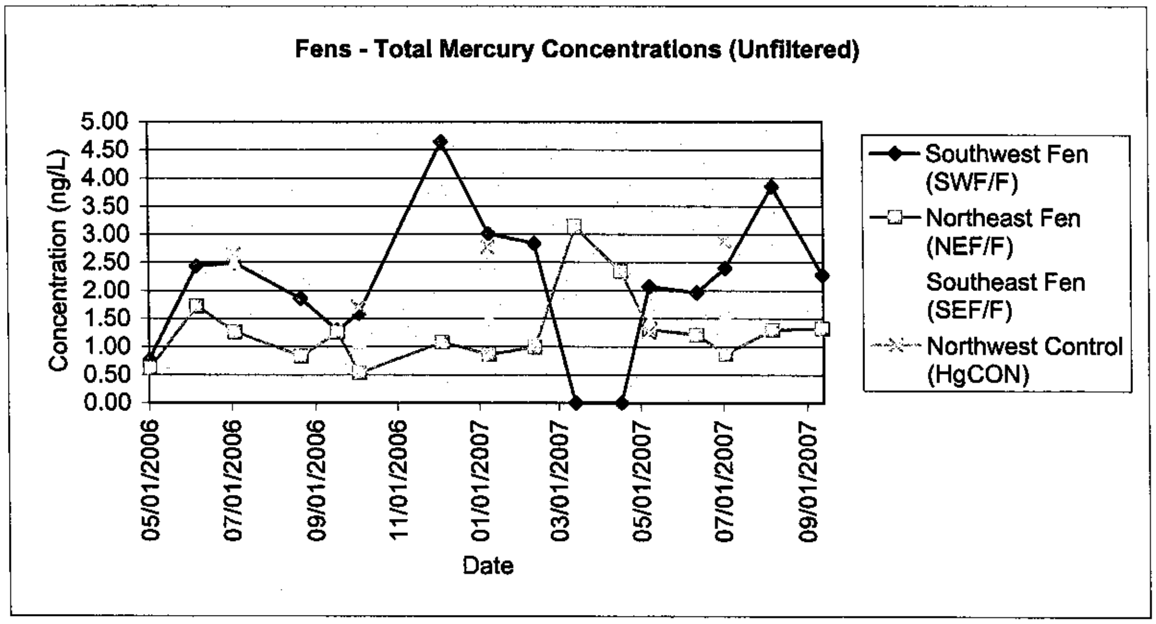
Location	Description	Speciation	Date				
			November 02	March 03	June 03	03-Aug	Average
1	Fen	Total Mercury	9.45	3.04	2.57	2.32	4.345
		Methyl Mercury as Hg	0.255	0.07	0.53	0.25	0.276
		% Methyl Mercury as Hg	2.70	2.30	20.62	10.78	9.101
2	Fen Pond	Total Mercury	-	-	2.48	2.52	2.500
		Methyl Mercury as Hg	-	-	0.12	0.05	0.085
		% Methyl Mercury as Hg	-	-	4.84	1.98	3.409
3	Bog	Total Mercury	16.35	5.39	5.46	5.16	8.090
		Methyl Mercury as Hg	1.22	0.08	0.08	0.18	0.390
		% Methyl Mercury as Hg	7.46	1.48	1.47	3.49	3.475
4	Bog Pond	Total Mercury	-	-	2.3	1.2	1.750
		Methyl Mercury as Hg	-	-	0.05	0.08	0.065
		% Methyl Mercury as Hg	-	-	2.17	6.67	4.422
5	North Granny Creek Upstream	Total Mercury	2.56	5.01	3.17	4.07	3.703
		Methyl Mercury as Hg	0.141	0.82	0.11	0.02	0.273
		% Methyl Mercury as Hg	5.51	16.37	3.47	0.49	6.459
6	South Granny Creek Upstream	Total Mercury	2.23	2.17	2.42	2.72	2.385
		Methyl Mercury as Hg	0.076	0.06	0.07	0.12	0.082
		% Methyl Mercury as Hg	3.41	2.76	2.89	4.41	3.369
7	Nayshkootayaow River Upstream	Total Mercury	1.61	0.99	2.11	1.65	1.590
		Methyl Mercury as Hg	0.037	0.07	0.06	0.08	0.062
		% Methyl Mercury as Hg	2.30	7.07		4.85	4.740
8	Attawapiskat River Upstream	Total Mercury	-	1.52	1.69	1.04	1.417
		Methyl Mercury as Hg	-	0.06	0.03	0.02	0.037
		% Methyl Mercury as Hg	-	3.95	1.78	1.92	2.548

Canadian Environmental Quality Guideline for the Protection of Aquatic Life	26 ng/L	total mercury (unfiltered)
	4 ng/L	methyl mercury (unfiltered)
Provioncial Water Quality Objective for the Protection of Aquatic Life	200 ng/L	total mercury (filtered)

Condition	Average Values
Bog and fen total mercury	4.171
Bog and fen methyl mercury	0.204
Surface water total mercury	2.274
Surface water metal mercury	0.113

TABLE 5
TOTAL MERCURY - FENS UNFILTERED - VICTOR PROJECT
(concentrations in ng/L)

Unfiltered Samples				
Date	**Southwest Fen (SWF/F)**	**Northeast Fen (NEF/F)**	**Southeast Fen (SEF/F)**	**Northwest Control (HgCON)**
01-May-06	0.77	0.62		
05-Jun-06	2.44	1.72		
03-Jul-06	2.49	1.26	2.51	2.64
21-Aug-06	1.86	0.83		
17-Sep-06	1.29	1.25		
03-Oct-06	1.59	0.53	1.09	1.70
04-Dec-06	4.65	1.08		
08-Jan-07	3.01	0.86	1.51	2.77
11-Feb-07	2.84	0.99		
13-Mar-07	Frozen	3.14		
16-Apr-07	Frozen	2.34		
07-May-07	2.07	1.31	1.43	1.25
11-Jun-07	1.96	1.21		
02-Jul-07	2.40	0.87	1.57	2.87
06-Aug-07	3.85	1.30		
12-Sep-07	2.28	1.32		
Average	2.39	1.29	1.62	2.25

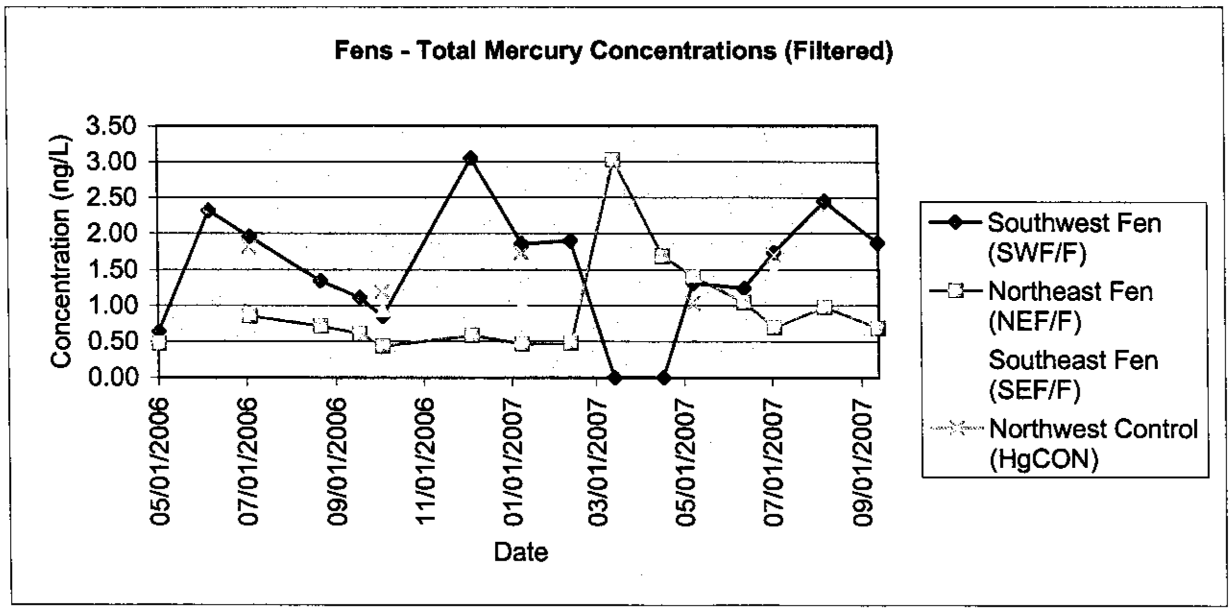


Southwest Fen - Receives effluent from central quarry
Northeast Fen - Receives effluent from plant site excavation, sewage treatment plant and pit sump
Southweast Fen - Control site
Nortwest Control - Control site

CCME Protection of Aquatic Life Guideline - 26 ng/L

TABLE 6
TOTAL MERCURY - FENS FILTERED - VICTOR PROJECT
(concentrations in ng/L)

	Filtered Samples			
Date	**Southwest Fen (SWF/F)**	**Northeast Fen (NEF/F)**	**Southeast Fen (SEF/F)**	**Northwest Control (HgCON)**
01-May-06	0.64	0.48		
05-Jun-06	2.32			
03-Jul-06	1.96	0.86	1.38	1.82
21-Aug-06	1.34	0.72		
17-Sep-06	1.11	0.61		
03-Oct-06	0.85	0.44	0.94	1.19
04-Dec-06	3.05	0.59		
08-Jan-07	1.86	0.47	1.01	1.73
11-Feb-07	1.90	0.48		
13-Mar-07	Frozen	3.03		
16-Apr-07	Frozen	1.69		
07-May-07	1.31	1.41	0.89	1.03
11-Jun-07	1.24	1.05		
02-Jul-07	1.74	0.70	1.48	1.70
06-Aug-07	2.45	0.98		
12-Sep-07	1.87	0.69		
Average	1.69	0.95	1.14	1.49



Southwest Fen - Receives effluent from central quarry
Northeast Fen - Receives effluent from plant site excavation, sewage treatment plant and pit sump
Southweast Fen - Control site
Nortwest Control - Control site

CCME Protection of Aquatic Life Guideline - 26 ng/L

TABLE 7
METHYL MERCURY - GENS - VICTOR PROJECT
(concentrations in ng/L)

Unfiltered Samples				
Date	**Southwest Fen (SWF/F)**	**Northeast Fen (NEF/F)**	**Southeast Fen (SEF/F)**	**Northwest Control (HgCON)**
03-Jul-06	0.16	0.10	0.03	0.06
03-Oct-06	0.20	0.02	0.02	0.05
08-Jan-07	0.97	0.07	0.07	0.16
07-May-07	0.14	0.07	0.01	0.04
02-Jul-07	0.68	0.10	0.02	0.05

Filtered Samples				
Date	**Southwest Fen (SWF/F)**	**Northeast Fen (NEF/F)**	**Southeast Fen (SEF/F)**	**Northwest Control (HgCON)**
03-Jul-06	0.13	0.08	0.02	0.01
03-Oct-06	0.15	0.02	0.01	0.02
08-Jan-07	0.68	0.04	0.06	0.10
07-May-07	0.08	0.06	0.02	0.04
02-Jul-07	0.30	0.10	0.02	0.04

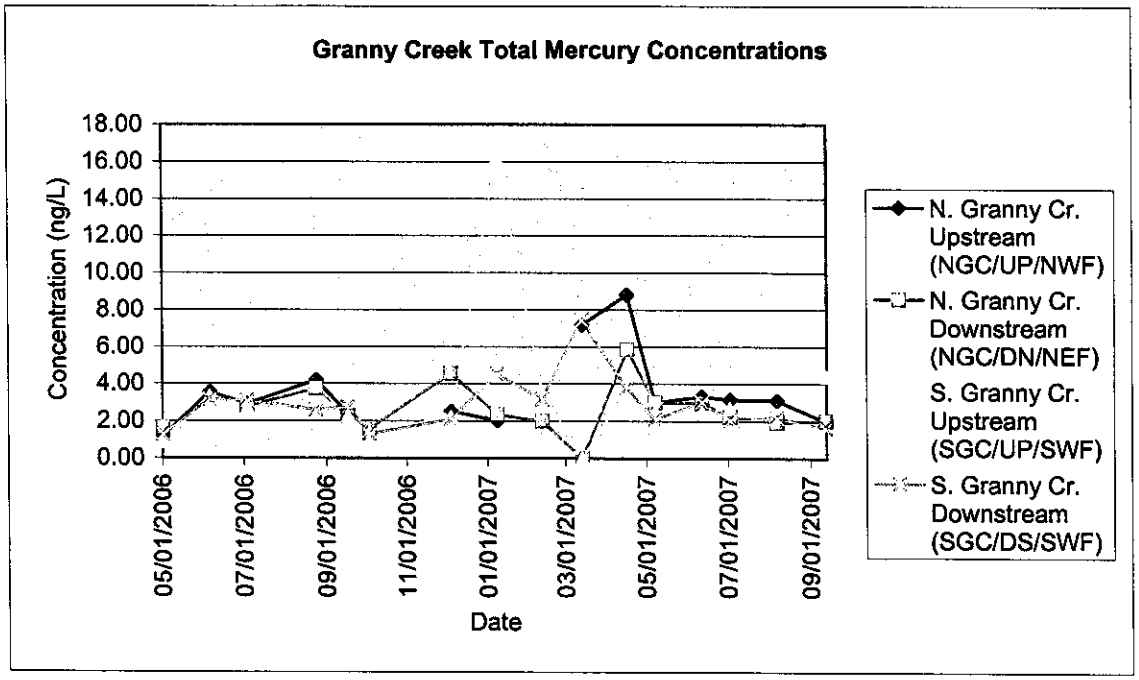
Southwest Fen - Receives effluent from central quarry
Northeast Fen - Receives effluent from plant site excavation, sewage treatment plant and pit sump
Southweast Fen - Control site
Nortwest Control - Control site

CCME Protection of Aquatic Life Guideline - 4 ng/L (unfiltered)

TABLE 8
TOTAL MERCURY - GRANNY CREEK - VICTOR PROJECT
(unfiltered; concentrations in ng/L)

Date	N. Granny Cr. Upstream (NGC/UP/NWF)	N. Granny Cr. Downstream (NGC/DN/NEF)	S. Granny Cr. Upstream (SGC/UP/SWF)	S. Granny Cr. Downstream (SGC/DS/SWF)
01-May-06	1.18	1.66	0.86	1.26
05-Jun-06	3.55		3.37	3.16
03-Jul-06	2.92	2.8	2.72	3.08
24-Aug-06	4.21	3.77	2.57	2.6
17-Sep-06	2.37	2.26	2.28	2.74
03-Oct-06		1.61	1.34	1.3
04-Dec-06	2.53	4.58	2.23	2.08
08-Jan-07	2.02	2.35	16.2	4.52
11-Feb-07		2.02	3.57	3.16
13-Mar-07	7.17	Frozen	Frozen	7.43
16-Apr-07	8.82	5.87	3.72	3.76
07-May-07	3.01	3.02	2.46	2.08
11-Jun-07	3.34	2.99	2.49	3.04
02-Jul-07	3.16	2.23	2.73	2.03
06-Aug-07	3.1	1.94		2.17
12-Sep-07	1.96	2.04	4.41	1.61
Average	3.52	2.80	3.58	2.88

Note: May 7, 2007 US Granny Cr. values are for DS of NW Fen

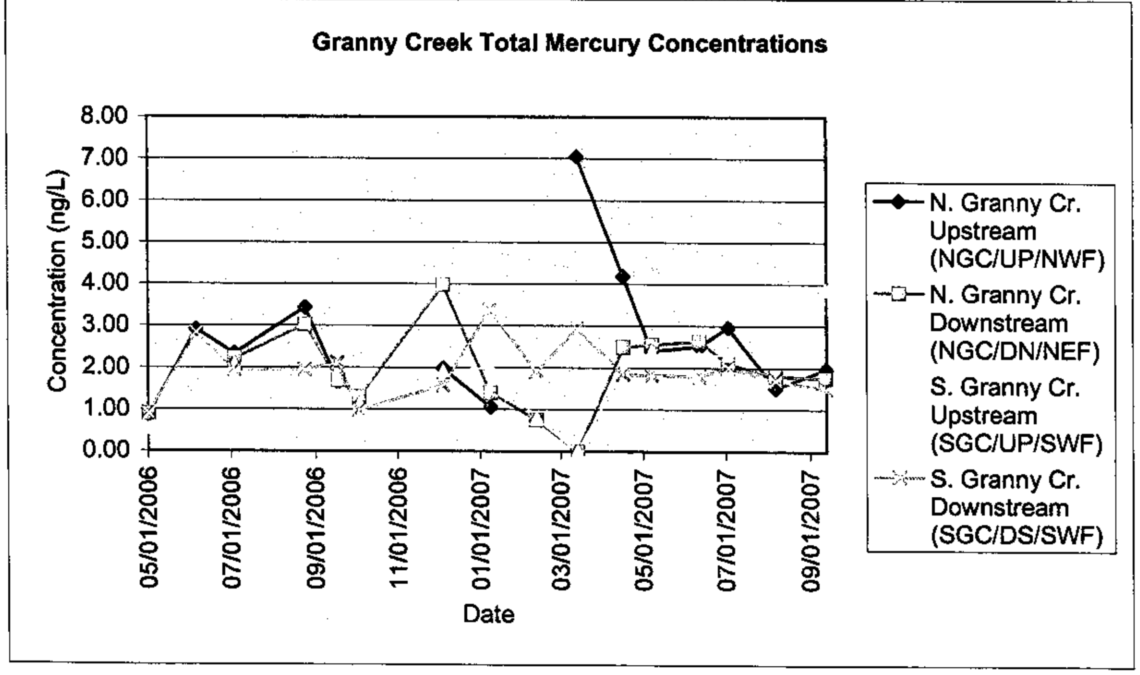


CCME Protection of Aquatic Life Guideline - 26 ng/L

TABLE 9
TOTAL MERCURY - GRANNY CREEK - VICTOR PROJECT
(filtered; concentrations in ng/L)

Date	N. Granny Cr. Upstream (NGC/UP/NWF)	N. Granny Cr. Downstream (NGC/DN/NEF)	S. Granny Cr. Upstream (SGC/UP/SWF)	S. Granny Cr. Downstream (SGC/DS/SWF)
01-May-06	0.87	0.90	0.55	0.90
05-Jun-06	2.91			2.83
03-Jul-06	2.33	2.22	2.07	1.94
24-Aug-06	3.43	3.03	2.07	1.94
17-Sep-06	1.64	1.70	1.34	2.11
03-Oct-06		1.30	1.11	0.97
04-Dec-06	1.98	3.98	1.92	1.58
08-Jan-07	1.06	1.40	2.01	3.37
11-Feb-07		0.75	0.79	1.90
13-Mar-07	7.05	Frozen	Frozen	2.92
16-Apr-07	4.19	2.50	1.96	1.84
07-May-07	2.40	2.56	2.40	1.83
11-Jun-07	2.51	2.64	2.26	1.79
02-Jul-07	2.96	2.10	2.32	2.01
06-Aug-07	1.52	1.81		1.70
12-Sep-07	1.96	1.75	3.87	1.49
Average	2.83	2.17	1.84	2.05

Note: May 7, 2007 US Granny Cr. values are for DS of NW Fen



CCME Protection of Aquatic Life Guideline - 26 ng/L

TABLE 10
METHYL MERCURY - GRANN6 CREEK - VICTOR PROJECT
(concentrations in ng/L)

South Granny Creek				
Date	**Upstream (unfiltered) SGC/UP/SWF**	**Upstream (filtered) SGC/UP/SWF**	**Downstream (unfiltered) SGC/DS/SWF**	**Downstream (filtered) SGC/DS/SWF**
Nov-02	0.08			
Mar-03	0.06			
Jun-03	0.07			
03-Jul-06	0.06	0.05	0.04	0.02
03-Oct-06	0.03	0.03	0.11	0.08
08-Jan-07	0.10	0.08	0.13	0.10
07-May-07	0.04	0.04	0.06	0.06
02-Jul-07	0.05	0.05	0.05	0.04

North Granny Creek				
Date	**Upstream (unfiltered) NGC/UP/NWF**	**Upstream (filtered) NGC/UP/NWF**	**Downstream (unfiltered) NGC/DN/NEF**	**Downstream (filtered) NGC/DN/NEF**
Nov-02	0.14			
Mar-03	0.82			
Jun-03	0.11			
03-Jul-06	0.11	0.05	0.10	0.08
03-Oct-06			0.13	0.14
08-Jan-07	0.12	0.08	0.18	0.13
07-May-07	0.07	0.06	0.09	0.09
02-Jul-07	0.09	0.06	0.10	0.10

CCME Protection of Aquatic Life Guideline - 4 ng/L (unfiltered)

TABLE 11
WHITE SUCKER - METAL ANALYSIS
NAYSHKOOTAYAOW RIVER (JULY/AUGUST 1999) AND ATTAWAPISKAT RIVER (JUNE 1981 from McCrea et.al, 1984)

SAMPLE No.	WS-1	WS-2	WS-3	WS-4	WS-5	WS-6	WS-7	WS-8	WS-9	WS-10	WS81-1	WS81-2	WS81-3	AVERAGE
Watercourse	Naysh.	Naysh.	Naysh.	Naysh.	Naysh.	Naysh.	Naysh.	Naysh.	Naysh.	Naysh.	Att.	Att.	Att.	-
Total Length (cm)	35.9	40.6	28.7	30.5	31.5	38.1	38.6	38.1	37.8	36.0	49.0	45.5	32.0	37.10
Fork Length (cm)	34.0	37.4	27.0	28.5	29.4	35.5	36.0	34.3	34.2	33.4	45.5	42.3	30.0	34.42
Total Weight (g)	550.0	850.0	282.0	290.0	325.0	625.0	710.0	665.0	610.0	470.0	1222.0	980.0	364.0	611.00
Sex	F	F	M	M	M	F	F	M	M	M	F	F	PDN	-
METALS - *LIVER SAMPLE														
Arsenic (ug/g)	0.07	0.06	0.11	0.12	0.09	0.1	0.08	0.14	0.08	0.06	nd	nd	0.07	0.091
Cadmium (ug/g)	<0.05	<0.05	1.57	<0.05	<0.05	0.06	0.1	0.05	<0.05	<0.05	0.02	0.07	nd	<0.312
Copper (ug/g)	8.5	9.6	22.5	14	10.5	15.6	25	11.2	3.2	13.6	1	1.8	1.4	13.37
Lead (ug/g)	<0.1	<0.1	7.7	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nd	nd	nd	<0.86
Mercury (ug/g)	0.048	0.105	0.017	0.055	0.05	0.08	0.002	0.094	0.045	0.028	0.29	0.16	0.11	0.0834
Nickel (ug/g)	0.1	<0.1	8.5	0.3	0.2	0.4	0.3	0.2	0.1	0.2	0.05	0.26	0.06	1.04
Zinc (ug/g)	23.7	25.7	33.4	26.4	24.7	28.2	45	28.7	21.8	35	11	12	8.4	24.92
METALS - FLESH SAMPLE														
Mercury (ug/g)	0.079	0.013	0.011	0.042	0.016	0.196	0.036	0.131	0.008	0.025				0.0557

TABLE 12
WALLEYE - METAL ANALYSIS
NAYSHKOOTAYAOW RIVER (JULY/AUGUST 1999)

SAMPLE No.	YW-1	YW-2	YW-3	YW-4	YW-5	YW-6	YW-7	YW-8	YW-9	YW-10	YW-11	YW-12	YW-13	AVERAGE
Watercourse	Nash.	Nash.	Nash.	Nash.	Nash.	Nash.	Nash.	Nash.	Nash.	Nash.	Nash.	Nash.	Nash.	-
Total Length (cm)	48.5	20.1	64.5	45.2	47.2	19.0	27.1	43.4	41.2	48.1	42.5	47.7	46.0	41.58
Fork Length (cm)	45.5	18.5	60.6	42.5	44.5	18.0	25.8	40.9	38.4	45.5	40.5	44.6	43.4	39.13
Total Weight (g)	1050.0	65.0	2880.0	750.0	1000.0	57.0	180.0	750.0	640.0	975.0	825.0	950.0	900.0	847.85
Sex	M	J	F	M	F	J	M	M	M	F	M	M	M	-
METALS - LIVER SAMPLE														
Arsenic (ug/g)	0.02	<0.02	0.04	0.02	-	0.07	0.02	-	0.03	<0.02	0.03	-	0.03	<0.03
Cadmium (ug/g)	0.06	<0.05	<0.05	0.09	-	<0.05	<0.05	-	<0.05	0.09	0.06	-	<0.05	<0.06
Copper (ug/g)	3.9	2	1.6	2.8	-	2.8	2.2	-	3.6	1.3	2	-	4.7	2.69
Lead (ug/g)	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	<0.1	-	<0.1	<0.1
Mercury (ug/g)	0.18	0.131	0.084	0.182	-	0.168	0.035	-	0.07	0.101	0.083	-	0.062	0.1096
Nickel (ug/g)	0.2	0.6	0.2	0.7	-	1.5	0.2	-	<0.1	0.2	0.2	-	0.2	<0.41
Zinc (ug/g)	16.5	27.8	16.5	25.5	-	33.6	21	-	20.3	15.2	16.1	-	19.5	21.20
METALS - FLESH SAMPLE														
Mercury (ug/g)	0.015	0.026	0.222	0.304	-	0.059	0.048	-	0.116	0.248	0.06	-	0.008	0.1106

TABLE 13
NORTHERN PIKE - METAL ANALYSIS
ATTAWAPISKAT RIVER (JUNE 1981 from McCrea et.al. 1984)

SAMPLE No.	NP81-1	NP81-2	NP81-3	NP81-4	NP81-5	AVERAGE
Watercourse	Att.	Att.	Att.	Att.	Att.	-
Total Length (cm)	52.5	41.2	55.5	48.5	51.0	49.74
Fork Length (cm)	50.5	39.0	52.0	46.0	48.3	47.16
Total Weight (g)	759.0	452.0	1261.0	748.0	918.0	827.60
Sex	F	F	F	M	F	-
METALS - WHOLE FISH SAMPLE						
Arsenic (ug/g)	0.1	0.17	0.71	0.91	0.32	0.44200
Cadmium (ug/g)	0.02	nd	nd	nd	nd	<0.020
Copper (ug/g)	0.81	0.64	0.9	1	1.1	0.89
Lead (ug/g)	nd	nd	nd	nd	nd	nd
Mercury (ug/g)	0.25	0.12	0.11	0.13	0.1	0.1420
Nickel (ug/g)	nd	nd	nd	0.05	0.06	<0.06
Zinc (ug/g)	34	36	25	25	26	29.20

NOTE: Data for 1981 Data (WS81 and NP81 samples) is taken from McCrea et. al., 1984)
* 1981 samples from the Attawapiskat River are whole fish samples (include organs and flesh)
nd = concentration is below method detection limit
PND = Parametre not determined

TABLE 14
WHITEFISH TISSUE - METAL ANALYSIS
NAYSHKOOTAYAOW RIVER (SEPTEMBER / OCTOBER 2004)

Sample No.	WF-4	WF-5	WF-6	WF-22	WF-26	WF-28	WF-32	WF-34	WF-37	WF-41	Average
Total length (mm)	407.0	284.0	356.0	300.0	312.0	311.0	531.0	270.0	365.0	351.0	348.70
Fork length (mm)	365.0	256.0	320.0	269.0	278.0	275.0	483.0	240.0	330.0	321.0	313.70
Total weight (g)	640.0	180.0	400.0	230.0	210.0	230.0	1550.0	150.0	400.0	215.0	420.50
Sex	F	J	J	J	J	J	M	J	M	J	-
Metals - Flesh Sample											
Arsenic (µg/g)	<0.1 (<0.1)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium (µg/g)	<0.5 (<0.5)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium (µg/g)	<1 (<1)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Copper (µg/g)	<1 (<1)	<1	<1	<1	<1	<1	1	<1	<1	<1	<1
Lead (µg/g)	<5 (<5)	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Magnesium (µg/g)	212 (261)	228	242	167	187	175	197	159	259	183	200
Mercury (µg/g)	0.25	0.08	0.07	0.11	0.08	0.06	0.2	0.07	0.19	0.08	0.12
Nickel (µg/g)	<5 (<5)	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Selenium (µg/g)	0.1 (0.1)	0.1	0.2	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.13
Zinc (µg/g)	4 (6)	7	5	6	6	5	7	6	8	5	6

TABLE 15
WHITEFISH TISSUE - METAL ANALYSIS
ATTAWAPISKAT RIVER (SEPTEMBER / OCTOBER 2004)

Sample No.	WFA-1	WFA-2	WFA-3	WFA-4	WFA-5	WFA-6	WFA-7	WFA-8	WFA-9	WFA-10	Average
Total length (mm)	365.0	376.0	403.0	345.0	335.0	330.0	355.0	320.0	333.0	280.0	344.20
Fork length (mm)	325.0	345.0	362.0	305.0	302.0	305.0	320.0	285.0	300.0	243.0	309.20
Total weight (g)	440.0	530.0	600.0	360.0	300.0	300.0	310.0	280.0	300.0	180.0	360.00
Sex	J	F	F	J	J	M	M	J	M	J	-
Metals - Flesh Sample											
Arsenic (µg/g)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium (µg/g)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium (µg/g)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Copper (µg/g)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Lead (µg/g)	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Magnesium (µg/g)	236	191	242	205	220	209	224	205	202	194	212.80
Mercury (µg/g)	0.11	0.1	0.08	0.11	0.1	0.07	0.15	0.05	0.07	0.07	0.09
Nickel (µg/g)	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Selenium (µg/g)	0.2	0.2	0.2	0.1	0.2	0.1	0.1	0.2	0.1	0.1	0.15
Zinc (µg/g)	4	5	4	4	5	6	6	4	5	5	4.80

TABLE 16
COMMUNITY CAPTURED WHITEFISH/CISCO
METAL ANALYSIS
ATTAWAPISKAT RIVER, COMMUNITY OF ATTAWAPISKAT (OCTOBER 2004)

Sample No.	**CWF-1**	**CC-1**	**CC-2**	**CC-3**	**CC-4**	**CC-5**	**CC-6**	**CC-7**	**CC-8**	**CC-9**	**Average**
Total length (mm)	266.0	385.0	369.0	398.0	445.0	417.0	318.0	406.0	396.0	404.0	380.40
Fork length (mm)	250.0	369.0	352.0	372.0	425.0	385.0	295.0	378.0	367.0	375.0	356.80
Total weight (g)	160.0	650.0	575.0	675.0	1125.0	800.0	320.0	750.0	750.0	675.0	648.00
Sex	J	M	F	M	F	F	M	F	M	F	-
Metals - Tissue Sample											
Arsenic (µg/g)	<0.1	<0.1 (<0.1)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.03
Cadmium (µg/g)	<0.5	<0.5 (<0.5)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.06
Chromium (µg/g)	<1	<1 (<1)	<1	<1	<1	<1	<1	<1	<1	<1	<1
Copper (µg/g)	<1	<1 (<1)	<1	<1	<1	<1	<1	<1	<1	<1	<1
Lead (µg/g)	<5	<5 (<5)	<5	<5	<5	<5	<5	<5	<5	<5	<5
Magnesium (µg/g)	231	251 (197)	203	197	213	232	225	214	207	205	214.11
Mercury (µg/g)	0.21	0.19	0.13	0.13	0.22	0.16	0.11	0.25	0.23	0.13	0.18
Nickel (µg/g)	<5	<5 (<5)	<5	<5	<5	<5	<5	<5	<5	<5	<5
Selenium (µg/g)	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.1	0.14
Zinc (µg/g)	3	3 (2)	3	2	2	2	4	2	3	3	2.67

TABLE 17
WALLEYE, PIKE AND BROOK TROUT
METAL ANALYSIS
NAYSHKOOTAYAOW RIVER AND ATTAWAPISKAT RIVER (OCTOBER 2004)

Sample No.	**W-2**	**W-3**	**W-4**	**Average**	**P-2**	**P-5**	**P-6**	**P-27**	**P-28**	**Average**	**B-7**	**B-17**	**B-27**	**B-38**	**Average**
Watercourse	**Nayshkootayaow River**				**Nayshkootayaow River**	**Attawapiskat River**					**Nayshkootayaow River**				
Total Length (mm)	623.0	638.0	618.0	626.33	1050.0	739.0	1005.0	929.0	924.0	929.40	513.0		440.0	421.0	458.00
Fork Length (mm)	592.0	606.0	584.0	594.00	1000.0	700.0	951.0	888.0	859.0	879.60	492.0		420.0	398.0	436.67
Total Weight (g)	2150.0	2300.0	2200.0	2216.67	6400.0	2450.0	6750.0	4900.0	5100.0	5120.00	1500.0		700.0	740.0	980.00
Sex	M	F	F	-	F	M	F	F	F	-	M		M	M	-
Metals - Tissue Sample															
Arsenic (µg/g)	<0.1	<0.1	<0.1	<0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.01	<0.1	<0.1	<0.1	<0.1	<0.01
Cadmium (µg/g)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium (µg/g)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Copper (µg/g)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Lead (µg/g)	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Magnesium (µg/g)	225	202	224	217.00	225	243	232	251	229	236.00	196	159	173	145	168.25
Mercury (µg/g)	0.67	1.16	0.25	0.69	1.49	1.4	0.65	0.74	1	1.06	0.14	0.2	0.13	0.19	0.17
Nickel (µg/g)	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Selenium (µg/g)	0.1	0.1	0.1	0.10	0.1	0.1	0.1	0.1	0.1	0.10	0.1	0.1	0.1	0.1	0.10
Zinc (µg/g)	3	4	4	3.67	4	4	7	4	7	5.20	8	6	7	7	7.00

TABLE 18
SUMMARY OF VICTOR SITE AREA MONITORING PROGRAMS INVOLVING MERCURY - SURFACE WATER SYSTEMS

System / Location	Approximate Coordinates		Frequency - Hg Sampling	Analysis
	Easting	Northing		
Attawapiskat River				
Upstream #2	299 543	5867 042	Quarterly	Hg-T and Hg-Me
Upstream of site	303 993	5862 276	Quarterly	Hg-T and Hg-Me
Downstream of site	317 597	5861 517	Quarterly	Hg-T and Hg-Me
Downstream of Nayshkootayaow River	323 851	5863 600	Quarterly	Hg-T and Hg-Me
Nayshkootayaow River				
Upstream of site	301 757	5850 389	Quarterly	Hg-T and Hg-Me
Downstream of site (upstream of Granny Creek)	307 940	5855 201	Quarterly	Hg-T and Hg-Me
Upstream of Attawapiskat River	321 888	5862 319	Quarterly	Hg-T and Hg-Me
Monument Channel (Nayshkootayaow River Control Site)				
Upstream of community of Attawapiskat	401 650	5864 335	Quarterly	Hg-T and Hg-Me
Granny Creek				
North Granny Creek – upstream NW fen	304 057	5858 207	Monthly, quarterly	Hg-T and Hg-Me
North Granny Creek - downstream NW fen	305 108	5857 580	Quarterly	Monthly for Hg-T, quarterly for Hg-Me
North Granny Creek - downstream NE fen	306 430	5857 346	Monthly, quarterly	Monthly for Hg-T, quarterly for Hg-Me
North Granny Creek – downstream	308 549	5856 867	Quarterly	Hg-T and Hg-Me
South Granny Creek – upstream SW fen	302 679	5853 884	Quarterly	Hg-T and Hg-Me
South Granny Creek - downstream SW fen	305 117	5855 035	Quarterly	Hg-T and Hg-Me
South Granny Creek – downstream	308 238	5856 617	Quarterly	Hg-T and Hg-Me
Granny Creek confluence	309 267	5856 411	Quarterly	Hg-T and Hg-Me
Tributary 5A (Granny Creek Control Site)				
Creek mouth at flow monitoring station	301 176	5845 106	Quarterly	Hg-T and Hg-Me
Site Area Fens				
Southwest fen	303 513	5855 244	Monthly, quarterly	Monthly for Hg-T, quarterly for Hg-Me
Northeast fen	306 133	5857 312	Monthly, quarterly	Monthly for Hg-T, quarterly for Hg-Me
Southeast fen	306 055	5855 133	Quarterly	Hg-T and Hg-Me
Northwest control fen	303 328	5858 261	Quarterly	Hg-T and Hg-Me
Muskeg Monitoring Program Ribbed Fens				
MS-1-R	314 120	5862 950	Quarterly	Hg-T and Hg-Me
MS-2-R	307 520	5857 880	Quarterly	Hg-T and Hg-Me
MS-7-R	297 810	5862 560	Quarterly	Hg-T and Hg-Me
MS-8-R	302 230	5858 650	Quarterly	Hg-T and Hg-Me
MS-9(1)-R	300 750	5848 460	Quarterly	Hg-T and Hg-Me
MS-9(2)-R	309 560	5847 400	Quarterly	Hg-T and Hg-Me
MS-13-R	276 220	5863 580	Quarterly	Hg-T and Hg-Me
MS-15-R	285 710	5844 800	Quarterly	Hg-T and Hg-Me
MS-V(1)-R (same as MS-2-R above)	307520	5857880	Quarterly	Hg-T and Hg-Me
MS-V(2)-R	305970	5855110	Quarterly	Hg-T and Hg-Me
MS-V(3)-R	307230	5853220	Quarterly	Hg-T and Hg-Me

TABLE 19
FISH TISSUE SAMPLING LOCATIONS AND SAMPLE NUMBERS

Waterbody	Location	Purpose of Station	Number of Samples				
Large Fish Sampling Program – Baseline (2007 and/or 2008) plus every 3 years Thereafter							
			Pike	**Walleye**	**White Sucker**	**Whitefish**	**Brook Trout**
Nayshkootayaow River	Upstream of Mouth and downstream of Tributary 3	Receiver Water / Exposure Area	30-35	10	10	10	10
Attawapiskat River US	Upstream of Mine Site (>5<15 km from discharge)	Control Station	30-35	10	10	10	10
Attawapiskat River DS	Downstream of Mine and approximately 8 km upstream of the community of Attawapiskat	Receiver Water / Exposure Station (nearfield)	30-35	10	10	10	10
	Near community of Attawapiskat	Receiver Water (baseline only)	30-35	10	10	10	10
Monument Channel	Downstream of Mine Site (in vicinity of community)	Control Station	30-35	10	10	10	10
Small Fish Sampling Program – Baseline (2007 and/or 2008) plus Annually Thereafter							
			Brook Stickleback (or Finescale Dace)				
Nayshkootayaow River US	Upstream of Tributary 3	Control Station	40 (20+10+10) Baseline - 20/a subsequently				
Nayshkootayaow River DS	Upstream of mouth	Receiver Water / Exposure Area	40 (20+10+10) Baseline - 20/a subsequently				
Attawapiskat River US	Upstream of Mine Site (>5<15 km from discharge)	Control Station	40 (20+10+10) Baseline - 20/a subsequently				
Attawapiskat River DS	Nearfield site approximately 500 m downstream of well field discharge	Receiver Water / Exposure Station (nearfield)	40 (20+10+10) Baseline - 20/a subsequently				
	Farfield site approximately 2,500 m downstream of well field discharge	Receiver Water / Exposure Station (farfield	40 (20+10+10) Baseline - 20/a subsequently				
Monument Channel	Downstream of Mine Site (in vicinity of community)	Control Station	40 (20+10+10) Baseline - 20/a subsequently				
North Granny Creek	Mid-length of channel	Receiver Water / Exposure Area	40 (20+10+10) Baseline - 20/a subsequently				
South Granny Creek	Mid-length of channel	Receiver Water / Exposure Area	40 (20+10+10) Baseline - 20/a subsequently				
Tributary 5A – Nayshkootayaow River	Mid-length of channel	Control Station	40 (20+10+10) Baseline - 20/a subsequently				

TABLE 20

SUMMARY OF FISH TISSUE MERCURY SAMPLES - VICTOR PROJECT

SAMPLE LOCATION	Pike	Walleye	Sucker	Whitefish/ Cisco	Brook Trout	Small Fish
Nayshkootayaow River						
1999		10	10			
2004	1	3		10	4	
2007	13	10	10	3		
Total	**14**	**23**	**20**	**13**	**4**	**0**
Attawapiskat River at Victor or US of Victor						
2004	4			10		
2007	25	10	10	5		
Total	**29**	**10**	**10**	**15**	**0**	**0**
Attawapiskat River near Community						
1984	5					
2004				10		
2007	39	9	10[1]	11		
Total	**44**	**9**	10[1]	**21**	**0**	**0**
Monument Channel						
Total 2007	**42**	**0**	**12**	**19**	**0**	**0**

Notes 1: Sucker in Attawapiskat River near Community were Longnose Sucker (other locations were common white sucker)

APPENDIX A – MUSKEG RESEARCH PROGRAM

De Beers Canada Inc. will begin operating the Victor Mine in 2008. A key technical challenge is the planning and management of water-related issues, particularly the environmental effects related to dewatering of the open pit. Pumping wells located around the open pit mine are necessary to remove water to facilitate mining activities. Dewatering is expected to depressurize sediments underlying local peatlands; hence there is the potential for localized changes in the hydrological and ecological function of these peatlands, depending on the connectivity between the surface hydrological regime and the underlying bedrock aquifer. Furthermore, localized differential settlement of the overburden sediments and peat may interrupt the established surface hydrological regime. Therefore, it is important to establish the location, magnitude and pattern of (enhanced) recharge, the flow pathways, and the implications for the bog and fen peatlands (muskeg).

Consequently a joint Research Program has been established, to be undertaken by the University of Waterloo, Queens University, and the University of Toronto with the following objectives:

- Identify and characterize the principal hydrogeological stratigraphic units that contribute to the linkage between upper (peatland) and lower (bedrock) aquifers;
- Determine the change in recharge and discharge and flow pathways between surface (peatland) and the regional aquifer that occur as a consequence of aquifer dewatering;
- Evaluate the impact of dewatering on bog and fen peatlands in terms of water storage and surface wetness; and,
- Determine the effects of changes to the peatland hydrologic regime on the release of mercury and methyl mercury to the environment.

De Beers Canada has committed approximately $725,000 over a five year period to support the Research Program. Additional in-kind funding is expected to be provided by NSERC

The Research Program will be lead by:

- Dr. Jonathan Price – a peatland hydrologist with the Department of Geography, University of Waterloo;
- Dr. Vicki Remenda – a specialist in fine sediment hydrogeology with the Department of Geological Sciences and Geological Engineering, Queen's University; and,
- Dr. Brian Branfireun – a specialist in mercury geochemistry related to peatlands with the Department of Geography, University of Toronto.

Each of these professors is a recognized expert in their respective fields. The research program will involve the work of graduate students at the Ph.D. and Masters levels, and is expected to compliment other site monitoring programs linked directly to conditions in MOE permits, and to monitoring commitments made through the federal EA process.